International Journal of Disability, Development and Education

Enhancing the Alternative and Augmentative Communication Use of a Child with Autism through a Parent-implemented Naturalistic Intervention

To cite this Article: Nunes, Debora and Hanline, Mary Frances, ‘Enhancing the Alternative and Augmentative Communication Use of a Child with Autism through a Parent-implemented Naturalistic Intervention’, International Journal of Disability, Development and Education, 54:2, 177 - 197

To link to this article: DOI: 10.1080/10349120701330495
URL: http://dx.doi.org/10.1080/10349120701330495

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: http://www.informaworld.com/terms-and-conditions-of-access.pdf

This article maybe used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

© Taylor and Francis 2007
Enhancing the Alternative and Augmentative Communication Use of a Child with Autism through a Parent-implemented Naturalistic Intervention

Debora Nunesa,b* and Mary Frances Hanlinea

aFlorida State University, USA; bUniversidade Federal do Rio Grande do Norte, Brazil

The effects of a parent-implemented naturalistic intervention on the communication skills of a 4-year-old boy with autism using an alternative and augmentative communication (AAC) system were investigated. The child’s mother was taught to use 4 naturalistic teaching strategies that incorporated a picture communication system during 2 typical home routines. Generalisation probes to assess the caregiver’s use of the intervention techniques and generalisation of the child’s communication outcomes were conducted in 2 similar interactions. A multiple baseline design was used to evaluate the effects of the intervention. Data indicated an increase in the use of 2 caregiver–teaching strategies across two routines following treatment. No consistent changes were observed in the use of the other caregiver strategies across the routines. An increase in the child’s frequency of initiations and responses and the use of the communication system also were observed.

Keywords: Augmentative and Alternative Communication; Autism; Parent Intervention

Introduction

The effectiveness of teaching the use of visual–graphic systems as a means of alternative and augmentative communication (AAC) for individuals with autism spectrum disorders (ASD) has been well documented in the research literature (Bondy & Frost, 1994; Cafiero, 1996; Hamilton & Snell, 1993; Kravits, Kamps, Kemmerer, & Potucek, 2002; Peterson, Bondy, Vincent, & Finnegan, 1995; Schwartz, Garginkle, *Corresponding author. Universidade Federal do Rio Grande do Norte, CCSA, Departamento de Educacao, Av. Salgado Filho, s/n, Campus Universitario, Lagoa Nova, Natal, 59072-970, RN, Brazil. Email. deboranunes@ufrnet.br or deborareginanunes@yahoo.com

ISSN 1034-912X (print)/ISSN 1465-346X (online)/07/020177–21
© 2007 Taylor & Francis
DOI: 10.1080/10349120701330495
Few of these investigations, however, have concurrently examined the use of AAC systems in natural environments, included preschool-aged children, and involved primary communication partners, such as parents (Cafiero, 1996; Stiebel, 1999). This is a critical issue, considering that intervention programmes for children with ASD are most effective when they include natural language-learning settings, begin before the child is 5 years of age, and actively involve the individual’s family (National Research Council, 2001).

One way to promote such family engagement in early AAC intervention programmes is to teach parents to become language intervention agents in the child’s natural environments. Parents may function as effective therapists since they spend more time with their children and interact with them in a wider range of communication contexts than an educator or clinician (Kaiser, Hancock, & Hester, 1998). The active involvement of caregivers in these interventions has proven to enhance the use of AAC in the home setting (Cafiero, 1996; Sigafoos et al., 2004; Stiebel, 1999). The under-use of such systems in these natural environments has been regarded as a critical issue in the AAC literature (Blackstone & Hunt Berg, 2003; Stiebel, 1999).

A potential solution to the under-use of AAC systems in natural environments is the careful consideration of the level of contextual fit when conducting AAC intervention. In other words, the intervention should be based upon the analysis of not only the AAC user’s needs and abilities, but also the communication partners’ preferences and interaction styles (Johnston, Reichle, & Evans, 2004; Stiebel, 1999). Studies have shown that family-friendly programmes where caregivers have an active role and are able to embed intervention plans within the family’s natural milieu are positively rated by parents (Kaiser, Hancock, & Nietfeld, 2000; Koegel, Symon, & Koegel, 2002; Stiebel, 1999; Woods, Kashinath, & Goldstein, 2004). It is, therefore, logical to believe that communication interventions that are implemented within the context of the family’s daily activities and routines would be likely to promote good contextual fit.

Additionally, the use of naturalistic teaching approaches, which derive their principles from typical child–caregiver interactions and capitalise on the child’s preferred activities in settings where language is more functional (Kaiser et al., 2000), seem appropriate in interventions concerned with a good contextual fit for families. Naturalistic teaching is a term that covers a number of instructional procedures that share the following principles: (a) the teacher is encouraged to follow the child’s lead; (b) the child’s preferred activities provide the context of the interaction; (c) interactions are loosely structured, rather than following a predetermined protocol; and (d) the teacher is highly responsive to the child’s communicative attempts (Prizant, Wetherby, & Rydell, 2000). Among the most commonly cited naturalistic procedures are incidental teaching (Hart & Risley, 1975), natural language paradigm/pivotal response training (Koegel et al., 2002), milieu teaching (Alpert & Kaiser, 1992), and enhanced milieu teaching (Kaiser, Yoder, & Keetz, 1992). Although many recent studies have reported successful results in using naturalistic teaching within a parent-implemented format with children with ASD in the home environment (Hancock & Kaiser, 2002; Kaiser et al., 2000; Koegel et al., 2002;
Enhancing AAC Use through Naturalistic Intervention

Woods et al., 2004), only one published investigation (Stiebel, 1999) has focused on teaching parents to promote the use augmentative communication using naturalistic techniques in these settings.

Therefore, the purpose of this study was to extend the current research and examine the effects of a parent-implemented naturalistic intervention on the communication outcomes of a child with autism using an augmentative communication system during home routines. Precisely, this investigation was aimed at answering two questions:

1. Can caregivers learn to implement naturalistic teaching strategies using visual-graphic systems of communication during home routines?
2. What changes in the child’s communication mode (vocalisation/verbalisation, gestures/signs, and aided systems) and frequency of communication turns (initiations and responses) are observed with the implementation of this intervention?

Method

Participants

Julia (a pseudonym), a 30-year-old African American female, and Jason, her son, participated in this study. Julia had a high school degree, was unemployed, and lived in a low-income neighbourhood in a city located in a southern state of the United States with her parents, her 7-year-old daughter, and Jason, her youngest son. Julia had been absent from the home environment for 2 years and was re-establishing her role as primary caregiver for Jason and his sister. When the study began, Jason was 4.6 years old. On the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988) Jason received a score of 36, indicating mild to moderate levels of autism. He had expressive and receptive language skills equivalent to a 21-month-old, as measured by the Learning Assessment Profile (Glover, Preminger, Sanford, & Zelman, 1995). He did not use any verbal language to communicate, but relied primarily on contact gestures. In general, he would make eye contact with a social partner and direct his or her hand towards desired objects/actions. He failed to use distal gestures, such as pointing to objects out of reach or showing objects to others. He presented abnormal gaze, but was reported to appropriately initiate social interactions and share affective states with others. He exhibited limited verbal comprehension and followed simple instructions when they were accompanied by contextual cues. Parent interview and school records indicated that Jason had no hearing or visual impairments. He had gross and fine motor abilities equivalent to a 36-month-old child, as measured by the Learning Assessment Profile. His cognitive abilities were significantly delayed, as he functioned at a 24-month-old level.

Setting, Materials, and AAC Devices

The study was conducted in the family’s home during four routines (playing with puzzles, playing with balloons, snack time, and hand-washing). Materials included
food, puzzle pieces, balloons, and any other object used by the dyad during the interaction. Additionally, each routine had a different communication board (2 × 3 matrix; 15 × 5 inch) composed of detachable 3 × 3-inch cards containing photographs and PCS pictures of the items used by the dyad. The number of cards used varied in each session and ranged from 3 to 10. A description of the materials and AAC devices used during each routine is presented in Table 1.

Data Collection

All baseline, intervention, and generalisation sessions were videotaped and subsequently coded for caregiver’s use of the teaching strategies and child’s responses. The sessions typically varied in length from 3 to 10 min. In order to evaluate the progression of each response using a frequency recording system, interaction episodes of equal length were needed. In this context, only 3 min of interaction of each session were analysed by the research assistants. This length of interaction episode has been previously used in the research literature (e.g., Woods et al., 2004) and was judged to be appropriate for sampling teaching moments between caregivers and children. Sessions that had a duration of less than 3 min were disregarded and those with a duration of 3 min were integrally analysed; in other words, the whole 3-min segment was analysed. The segment selection process of sessions that were of more than 3 min duration was undertaken using a Likert scale, where the frequency of caregiver responsiveness was rated for each minute of interaction. The first three-consecutive-minute segment during which the caregiver received the highest interaction score was chosen for analysis. Therefore, if two (or more) segments had the same interaction scores, the first one was selected for analysis. Each segment selection was done by only one rater. A description of the rating scale used in the segment selection is presented in Figure 1.

Experimental Design

A multiple baseline design across play and caregiving routines was used to verify the effects of the intervention. The study involved initially teaching Julia to use

<table>
<thead>
<tr>
<th>Routine</th>
<th>Materials</th>
<th>AAC devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play: puzzle</td>
<td>Puzzle pieces</td>
<td>Communication cards and board</td>
</tr>
<tr>
<td>(target routine)</td>
<td>Balloons (red, white, blue, and green)</td>
<td>Communication cards and board</td>
</tr>
<tr>
<td>Play: balloons</td>
<td>Food items (milk, juice, cookies, sandwich, etc.) and utensils (cup, spoon, etc.)</td>
<td>Communication cards and a placemat (used as a board to attach the cards)</td>
</tr>
<tr>
<td>(generalisation routine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiving: snack time (target routine)</td>
<td>Liquid soap and towel</td>
<td>Communication cards and board</td>
</tr>
<tr>
<td>Caregiving: hand-washing (generalisation probe)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
the instructional techniques during one caregiving and one play routine, and then evaluating the effects of this procedure on the child’s communication outcomes. In other words, two classes of independent variables were identified in this study. Initially, the caregiver-teaching programme functioned as the first independent variable. The effects of the programme was directly measured by Julia’s use of the naturalistic teaching strategies and indirectly measured through the changes in Jason’s communication outcomes. Therefore, following Julia’s training, the use of the strategies functioned as the independent variable for Jason’s behaviour. Julia’s ability to generalise the strategies to untrained routines and Jason’s communication outcomes were also assessed during generalisation probes.

**Caregiver Use of Naturalistic Strategies**

Environmental Arrangement, Mand, Mand/Comment with AAC, and Model were identified as naturalistic strategies. Julia’s response was coded as “Environmental Arrangement” when she placed the aided system within Jason’s reach and placed desired objects within his sight, but out of reach; provided insufficient components of an element essential for completing a task; and/or stood between Jason and the desired object. A “Mand” was coded when Julia, considering Jason’s focus of attention, verbally manded a response or asked a question. A “Mand/Comment” with AAC occurred when the caregiver used the augmentative system to make comments or ask questions. Julia’s response was coded as a “Model” when she physically guided Jason’s hand to use the system accompanied by caregiver verbalisation.
Child Outcomes

The frequency of Jason’s communication turns (initiation and response), imitative responses, and the modes of expression used (verbal/vocal, augmentative system, or gestures/manual signs) were analysed. A communication turn was identified when Jason initiated an interaction or contingently responded to Julia’s request or commands. Jason’s behaviour was coded as an imitative response when he immediately imitated Julia’s manual, verbal, or AAC response. Communication turns and imitative responses were additionally coded for their modes (verbal/vocal, aided system, or gestures/manual signs). The child’s use of vocalisations or verbalisations to imitate, initiate an interaction, or respond to the caregiver’s requests, instructions, or questions were coded as verbal or vocal modes. A gesture or manual sign was coded when Jason imitated, initiated an interaction, or responded to Julia’s requests, instructions, or questions by using a gesture/manual sign. An aided system response mode was identified when the child used the communication system to imitate, initiate an interaction, or respond to the caregiver’s requests, instructions, or questions.

Procedures

One undergraduate student in Psychology and a Master’s student in Speech Pathology accompanied the interventionist during the home visits to assess treatment fidelity. Three Master’s students in Special Education worked as data coders. The interventionist was a doctoral student in Special Education with 2 years of experience in providing AAC home-based interventions.

Phase 1: Assessment. A child assessment and an interview with Julia were conducted by the interventionist to identify Jason’s communication strengths, needs, and interests. The Childhood Autism Rating Scale was used to measure his level of autism and the Learning Assessment Profile was used to evaluate his auditory comprehension and expressive communication skills. In this phase, the interventionist and Julia defined the routines where the intervention would occur and the type of communication system to be used. Considering the dyad’s interest, comfort level, and availability, snack time and puzzle play were selected as target routines for intervention. Based on the Routine-Based-Intervention framework described by Woods et al. (2004), generalisation data were collected in two other structurally and functionally similar routines: hand-washing (caregiving) and playing with balloons (play routine).

Phase 2: Baseline. Following the assessment phase, baseline observations of the dyad interaction within the puzzle and snack time routines occurred. In these episodes, Julia was given the augmentative system and instructed to interact with Jason as she typically did. This same procedure was used for both target and generalisation routines. In these sessions, the interventionist did not provide instructions on
how to conduct each session, but stayed behind the camera videotaping. After each baseline session, the interventionist viewed the tape and analysed the frequency with which Julia used each strategy. Baseline sessions had an average duration of 8 min. Data were coded for 3 min of each session.

**Phase 3: Caregiver-teaching.** Julia’s teaching in the first target routine (puzzle) began when a stable trend was visually detected in Julia’s use of two of the four teaching strategies during the baseline phase. When changes in her use of two strategies were visually detected in three consecutive intervention sessions (Phase 4) of the first target routine (puzzle), the caregiver-teaching (Phase 3) began on the second target routine (snack time). The other two routines were kept in baseline condition. Routines selected as generalisation probes (balloon and hand-washing) did not receive treatment (caregiver-teaching).

During the caregiver-teaching session, the interventionist and Julia discussed the definitions and utilisation of the four teaching strategies. Julia received a handout with a full description of each strategy and was requested to provide two examples of its use during typical play routines. Next, the interventionist gave Julia a “cheat-sheet” with a summary of the techniques and asked the parent to play her own role while the interventionist played Jason’s part in the target activity (puzzle). Following the role-play, Jason was brought to the setting and the parent was instructed to interact with him using the strategies learned. During this initial session, the interventionist coached the parent throughout the interaction by helping Julia identify episodes where the use of the strategy would be appropriate and modelling its use with Jason. At the end of the routine, the interventionist provided further feedback and answered questions raised by Julia. The Caregiver Training Protocol is presented in Table 2.

The teaching sessions were not videotaped and data on caregiver and child variables were not collected. During the caregiver-teaching session, one of the research assistants observed the interventionist and Julia, and completed a treatment fidelity checklist, containing each step of the teaching protocol. In order to move to Phase 4, Julia had to meet the criteria stated in each step of this instrument. In total, Julia underwent two caregiver-teaching sessions: one for the target play routine (puzzle) and one for the target caregiving routine (snack time). Caregiver-teaching had an average duration of 60 min.

In order to verify that the interventionist implemented the caregiver-teaching phase as described, a Treatment Fidelity Checklist was completed by one of the research assistants in every caregiver-teaching session. Results from this assessment showed that the interventionist followed the steps in the caregiver-teaching protocol with 100% accuracy. The Treatment Fidelity Checklist is presented in Table 3.

**Phase 4: Intervention.** The fourth phase began when Julia met the criteria of following each step in the caregiver training protocol. In this phase, the interventionist provided Julia with the communication system to be used in the routine and asked
her to interact with Jason using the teaching procedures learned during the caregiver-teaching phase (Phase 3). In these episodes, the interventionist did not coach or model the use of the strategies during the interaction, but stayed behind the camera videotaping. After the routine had terminated the interventionist offered feedback to Julia, answered questions, and provided suggestions for subsequent sessions. After each intervention session, the interventionist viewed the tape and analysed the frequency with which Julia used each strategy. If visual inspection of the coded data indicated that Julia’s use of at least two of the strategies returned to

### Table 2. Caregiver Training Protocol

<table>
<thead>
<tr>
<th>Step</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The interventionist will define, model, and discuss the teaching strategies with the caregiver. The caregiver will be given a handout providing the definition of the procedures and examples of its use. The caregiver will describe the strategies using his or her own words and provide two examples.</td>
</tr>
<tr>
<td>2</td>
<td>The interventionist will give the caregiver a “cheat sheet” (summary of the strategies). Then, the interventionist will play the role of the child and ask the caregiver to play his or her role in a simulation of the target routine. The caregiver will apply the strategies at least two times with the interventionist playing the role of the child.</td>
</tr>
<tr>
<td>3</td>
<td>The interventionist will ask the caregiver to practice the use of the strategies with the child during the target routine. The caregiver will apply at least two of the strategies two times with the child during the target routine.</td>
</tr>
<tr>
<td>4</td>
<td>Following the caregiver–child interaction, the interventionist will provide feedback regarding the use of the strategies, provide suggestions for the following intervention session, and ask whether the caregiver has any questions. The caregiver will ask for any clarifications, if needed.</td>
</tr>
</tbody>
</table>

### Table 3. Treatment Fidelity Checklist

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The interventionist defined the teaching strategy to the caregiver.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2 The interventionist modelled the strategy to the caregiver.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3 The interventionist discussed the strategy with the caregiver.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4 The interventionist gave the caregiver a handout with a written description of the strategy.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5 The interventionist asked the caregiver to provide two examples of the strategy using his or her own words.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6 The caregiver practiced the use of the strategy with the interventionist playing the role of the child.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7 The interventionist gave the caregiver a cheat-sheet and requested her/him to interact with the child during the target routine.</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8 The interventionist provided feedback to the caregiver during the training of the target strategy.</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
baseline levels during two consecutive sessions, a new caregiver-teaching session took place. Julia met this criterion throughout the study and was not required to undergo the caregiver-teaching phase of the study more than once. Caregiver intervention sessions had an average duration of 8 min. Data were coded for 3 min of each session.

Reliability

Prior to the onset of the investigation, the research assistants discussed with the interventionist the definitions and examples of each caregiver and child variables, and then practiced independently coding 3 min segments of interactions on a mock tape. The coded data sheets were compared on a point-by-point basis for both caregiver and child variables. An agreement was scored when both coders recorded the occurrence of the same response within the same time interval. A disagreement was scored when the responses were registered in different time intervals and/or differed in category type. This coding process continued until inter-observer agreement of each behaviour reached a criterion level of 80%. Following the reliability practice, the research assistants were requested to view and code the baseline and intervention sessions from the dyad in the study. To measure reliability, the interventionist independently coded 30% of the sessions coded by the assistants throughout the study. The same inter-rater agreement calculation as the one described during the reliability practice was made. On average, agreement on caregiver strategy was 81%; agreement on child communication type (turn or imitative response) was 88%, and child communication mode was 84%.

Results

The frequency of Julia’s use of Environmental Arrangement (EA), Mands, Mands/Comments using the AAC system (MAAC), and Model are displayed in Figures 2, 3, 4, and 5, respectively. The data displayed in these graphs represent the frequency of caregiver strategy use during the baseline (Phase 2) and caregiver intervention sessions (Phase 4) of the study. To initiate intervention in the first routine, the interventionist considered the stable baseline trends detected in the use of EA and MAAC. When Julia’s use of both of these strategies was above baseline levels in a stable or ascending trend, the intervention began in the target caregiving routine (snack time).

Intervention effects were demonstrated by an increase in caregiver use of EA for puzzle play following caregiver-teaching. However, only modest changes in the use of EA were observed during the snack routine (caregiving routine). Precisely, the caregiver began using EA in the initial snack sessions following intervention, but presented a downward trend in the consecutive episodes. During these target routines (puzzle play and snack time), the caregiver would typically provide Jason with insufficient amounts of a food item or place the puzzle pieces within his sight but out of reach. Additionally, increases in the use of MAAC were detected during
puzzle routines subsequent to caregiver-teaching. In these play routines, after Jason had requested a puzzle piece using the AAC, Julia would show him the picture of the item and verbalise its name (MAAC).

Interestingly, Julia presented initial gains in the use of Mands/Comment using the AAC in the target caregiving routine (snack time) following intervention in the target play routines—possibly indicating a generalisation effect. Likewise, data revealed that she also increased the frequency of Model in one snack-time episode immediately following intervention in the target play routines. The use of these two strategies (MAAC and Model), however, presented a downward trend throughout the rest of the study. Following caregiver-teaching, Jason’s mother also decreased the use of Mands across both target routines. These data should, however, be interpreted with caution considering the downward trend observed during the baseline phase.

In the generalisation probes (hand-washing and balloon routines), Julia presented no consistent changes in the use of EA, MAAC, and Model following treatment in the target routines. During these two activities, the caregiver mostly asked Jason questions or manded specific responses. A decreasing trend was, nonetheless,
observed for the use of Mands in both untrained routines following intervention in the target routines.

The frequency of Jason’s communication types (turns and imitative responses) and modes (AAC, verbalisations/vocalisations, and gestures/manual signs) are displayed in Figures 6, 7, 8, 9, and 10, respectively. The data displayed in these graphs represent the frequency of child responses during the baseline and caregiver intervention sessions. Each session had 3 min duration.

Overall, the rate of Jason’s communication turns increased across both trained and untrained routines subsequent to caregiver intervention. Interestingly, an ascending trend in child communication turns was detected during the snack time routine following intervention in the puzzle activity (target play routine). This trend was maintained throughout the intervention phase of the study. No changes were detected in his use of imitative responses following caregiver intervention.

In terms of communication modes, Jason increased his use of the AAC system and gestures across the puzzle and the snack time activities (target routines) during the intervention phase of the study. His rate of verbal/vocal responses also increased in both target routines following the first caregiver-teaching session, but returned to
baseline levels in subsequent interactions. In the generalisation probes, modest changes were detected only in his use of gestures.

**Discussion**

The purpose of this multiple baseline study was to assess the effects of a parent-implemented naturalistic intervention on the communication skills of Jason, a 4-year-old boy with autism, within daily routines. Results show that Julia, Jason’s mother, increased her use of two naturalistic teaching strategies using Jason’s AAC system (i.e., EA and Mands/Comments) in at least two routines after instruction in the use of naturalistic teaching strategies. Interestingly, Julia alternated between high frequencies of the first strategy and low frequencies of the second one, and *vice versa* during the two target routines (see Figure 11). It is important to highlight that despite the increase in the use of EA and MAAC following caregiver instruction, a downward trend in the use of these strategies was observed in the intervention phase of the target caregiving routine (snack time). This may suggest that the maintenance in the use of these two strategies was questionable. As observed in Figure 11 (Child Communication Turn, AAC use, Caregiver use of EA and Mands/Comments using the AAC), however, the level of child responsivity was kept above baseline levels despite the decrease in caregiver strategy use. This may have affected caregiver behaviour. In other words, considering that the child began taking more turns, there

![Figure 4. Caregiver strategies: Mands/Comments with AAC (MAAC)](image-url)
seemed to be no need to prompt responses by rearranging the environment (EA) or using the AAC system to ask questions (MAAC).

The expanded use of MAAC and EA was concurrent with a decrease in the use of Mands. This is congruent with other research, the results of which showed that caregivers prioritise the use of one strategy over another (Elder, 1995; Girolametto, 1988; Kaiser, Ostrosky, & Alpert, 1993; Kaiser et al., 2000). In the parent-implemented intervention study conducted by Elder, for example, one of the caregivers temporarily discontinued the use of an imitation strategy with her child once the researcher taught the use of a “waiting” procedure. Elder attributed this interruption to the caregiver’s comfort level. In other words, the caregiver thought it was difficult to implement more than one strategy at a time and only continued the use of imitation once she felt comfortable in using the second learned strategy.

Kaiser et al. (2000) reported that one of the parents in their investigation presented small changes in the use of milieu teaching strategies and moderately strong changes in other teaching procedures. In the present study, the reduction of verbal Mands and increase in the use of MAAC may have a similar rationale. Prior to the onset of the intervention, Julia already displayed high frequencies of verbal Mands and used the system less frequently to ask questions or make comments. It
may be that, as she felt more comfortable in using the communication device in these instances, she gradually reduced the use of verbal Mands. Considering that the purpose of Mands and MAAC were, at times, functionally equivalent (both serving to elicit child response), it is plausible to think that Julia “substituted” the verbal Mands with questions using the aided device.

The increase in use of less intrusive strategies, such as EA, seemed to provide Jason with more opportunities to communicate, especially using the aided device (see Figure 11). This finding is consistent with previous AAC studies involving participants with ASD, where the use of this intervention procedure has been associated with greater frequencies of child communication turns using aided or unaided systems of communication (Kouri, 1988; Kravits et al., 2002; Schepis, Reid, Behrmann, & Sutton, 1998; Schepis et al., 1982). In these studies, the use of EA combined with other naturalistic strategies also was associated with an increase in verbalisations (Kouri, 1988; Schepis et al., 1998) and non-verbal communication behaviours, such as gestures (Kouri). Similar findings were also reported in this study, in that Julia’s use of EA was associated with Jason’s increase in the use of the AAC system and, in some instances, the use of verbal/vocal responses.

The use of more intrusive strategies, such as Model, was rarely used throughout the intervention. The under-use of this teaching procedure can be attributed to Jason’s rapid learning in how to use the communication device appropriately. In
other words, after Jason began using the pictures to communicate in the initial teaching sessions, there seemed to be no need for Julia to model how to use the AAC system in subsequent interactions.

A reduction in the use of Mands was consistent across both untrained routines. No consistent changes were, however, observed in Julia’s use of the other three strategies in the untrained routines. One possible explanation is that Julia failed to generalise the use of the strategies from the trained to the untrained sessions. An alternative explanation, however, could be that the untrained routines provided fewer opportunities for strategy use than the target routines. EA involved placing the AAC system within Jason's reach and objects out of reach, placing oneself between the child and the desired materials or activities, sabotaging an activity, and/or providing him with inadequate portions of a desired item.

In comparison, the nature of the hand-washing routine made it difficult to place the AAC system close to Jason and the items out of reach. Since it was an activity involving water, Julia preferred to place the communication board above the kitchen sink. The AAC system was, therefore, not readily accessible to Jason. Additionally, the sink space was generally small, making it difficult to find areas to place objects within Jason’s sight, but out of reach. Likewise, there was limited space for Julia to place herself between the routine materials and Jason, and a small number of items were used.
Contrastingly, the number of opportunities to use EA during snack time seemed greater. Julia was able to place the AAC system close to Jason and, while sitting face-to-face to him, had better control of putting items out of his reach. There were more materials used and greater chances of applying certain techniques, such as providing limited amounts of desired items, than during hand-washing.

Similarly, the opportunities to use EA and MAAC seemed greater in the target play routine than during the untrained play activity. The puzzle game appeared to have a more predictable sequence that kept Jason engaged for a longer period of time. Julia would typically place the puzzle board close to Jason and the puzzle pieces out of his reach and wait for him to request them (EA). Jason would then request each item individually until the puzzle was completed. Once a request was made, Julia typically used the system to make comments (MAAC). The balloon activity, on the other hand, seemed less structured. Jason would mainly use contact gestures to request his mother to fill up balloons in a random order. Once the balloons were filled, the activity typically terminated.

The rate of Jason’s initiations and responses (turn) increased in all four routines following caregiver-teaching. No significant changes were detected in his use of imitative responses across activities. However, Jason increased his use of the AAC
system and verbal/vocal responses across both target routines following caregiver-teaching in the first routine. The high rate of AAC use was maintained throughout the study, while the use of verbal/vocal responses returned to baseline levels following the initial caregiver intervention sessions.

Jason also made gains in the use of gestures across both play routines. In the puzzle activity, for instance, Jason typically requested the puzzle pieces using the AAC system. After completing the game, he would usually point to the pieces on the board, requesting the caregiver label them. These gestures were, at times, emitted in combination with vocalisation. As Julia verbally named the puzzle pieces, Jason would often mimic her mouth movements without verbalising the words, but making brief sounds. Previous investigations have reported that signs may function as self-prompts for vocalisation (Remington & Clark, 1983; Tincani, 2004). The use of gestural responses may, in Jason’s case, have had a similar function.

Several limitations were encountered in this investigation. First, as in any intervention, determining the appropriate levels of each specific parent behaviour is a challenging issue (Tannock & Girolametto, 1992). It is, therefore, unfeasible to determine whether the child would have different results in the frequency of initiations and responses or used different modes of communication if the caregiver had applied the strategies in different amounts. Although some investigators suggest that hybrid

![Figure 9. Child responses: Verbalisations and Vocalisations](image-url)
naturalistic approaches are highly effective at promoting language and communication gains (Kaiser et al., 1993), future investigations should separately examine the effects of each of the caregiver-teaching procedures in the child’s responses.

Second, no consistent changes were observed in the parent’s use of modelling. Although the under-use of this teaching procedure could be attributed to the child’s rapid learning in how to use the AAC, further investigation is needed. Third, the decrease in the use of Mands following intervention should be interpreted with caution. As previously stated, a descending trend in the use of this strategy was observed during the baseline phase of the target routines. Likewise, the downward trend observed in the use of MAAC and EA following intervention in the target caregiving routine may suggest a lack of caregiver strategy maintenance.

Fourth, the use of only one dyad in the current investigation limits the generalisations of the findings. Subsequent studies should, therefore, focus on replicating the procedures used in this investigation with other dyads with different social, ethnic, and cultural characteristics. Fifth, no follow-up data or further support to the caregiver were provided following treatment. Therefore, it is not possible to verify whether the mother continued using the teaching strategies when the intervention

Figure 10. Child responses: Gestures and Manual Signs
terminated. As suggested by Sigafoos et al. (2004), follow-up support for parents may be an efficient method for maintaining the use of AAC in the home setting.

**Conclusion**

Despite the limitations of this study, the results contribute to the knowledge base regarding the effectiveness of teaching parents to implement naturalistic teaching techniques in the home. In addition, knowledge regarding the effect of those interventions on the use of AAC systems by young children with ASD was increased. An increase in the use of two caregiver-teaching strategies (EA and MAAC) across two routines following treatment was observed. This study shows that parents can learn to implement naturalistic procedures and increase their child’s ability to communicate in the process.

**References**


