

Choosing an Alternative Communication Mode for a Preschool Aged Child with Apraxia

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Abstract: *Communication preference between picture exchange and manual sign language was examined. Our participant, Erica, was a 3-year-ten-month old female with development delays and Apraxia. She attended a local public school special education preschool program. Erica was presented with two communication choices, picture exchange or manual sign language, during snack time. The results indicate a preference for Picture Exchange. The implications of this study include the brevity of the intervention and the ability to imbed this intervention within the typical special education classroom environment.*

Key Words: *developmentally delayed, alternative/augmentative communication, special education preschool, apraxia, communication preference, picture exchange, manual signing*

Introduction

Many children with disabilities have deficits in language and communication. Sometimes these children are functionally non-verbal, and augmentative or alternative communication (AAC) systems are warranted. Speech is typically the primary goal when teaching language, and often times using these systems eventually leads to speech (Mirenda, 2003). The most common types of AAC are Picture Exchange Communication System (PECS) and sign language (Sundberg & Partington, 1998).

Review of Literature

Schwartz, Garfinkle, and Bauer, (1998) conducted two studies to evaluate the use of PECS. The first study used 31 preschool aged children with communication needs and developmental delays. Sixteen of these children had been diagnosed with autism. By the end of the study, all 31 of the participants learned to use all five stages of PECS in 11 months. The second study employed 18 students (11 with autism) who had learned to use PECS in the first study. This second experiment examined whether the children could use PECS to communicate rather than just request simple items. All of the children could express something they had experienced. Forty four percent of the children (33% of children with autism) acquired spoken language. Their spoken language also generalized to other functional settings

The advantage of the PECS system is that the pictures look like the objects being represented and are readily understood by a communication partner. Oftentimes the response mode (pointing), which remains constant across pictures, is already in the person's skill repertoire, and the initial acquisition of PECS involves matching to sample, which can be easy to teach. PECS can also help avoid any negative history with speech. In some cases PECS can increase vocalizations. Tincani, Crozier, and Alazetta (2006) increased vocal responses in a 10-year-old student with autism using PECS. The participant's vocals increased when using an "I want" picture strip and a 3-5 second delay. However, there are disadvantages to this system. The student has to take the PECS icon with them wherever they go. Another person needs to be close by in order for communication to occur, and it is difficult to convey abstract or complex concepts with PECS (Sundberg & Partington, 1998). While PECS has many advantages and can be a successful intervention, sign language training is also an effective tool and has advantages over PECS.

An advantage of sign language is no specialized equipment is needed, unlike with PECS, so the communicator always has all the materials. Also unlike PECS, sign language has its own community, providing a natural verbal environment (Heward, 2013). A sign community means that there are plenty of resources available: videos, teachers, and materials. Sign language is a topographical language, so the signs often look like the object they represent. However, problems can arise because the person will have great difficulty communicating with someone who does not know sign and each sign needs to be individually taught. This system is also difficult to teach if the student has motor impairments (Sundberg & Partington, 1998). Carbone, Sweeney-Kerwin, Attanasio, and Kasper (2010) found they could increase vocal responses in pre-school aged children with autism when using manual sign training in conjunction with a prompt delay. The participants had to sign and emit a recognizable vocal response to receive reinforcement.

Van der Meer, Kagohara, Achmadi, O'Reilly, Lancioni, Sutherland, and Sigafoos, (2012) conducted a study examining the preference between manual signing and Proloquo2go within a multiple probe imbedded alternating treatments design. There were four all male participants ages 10, 5.5, 7 and 5.5 yrs. The disabilities included ASD, multi-system developmental disorder, Down syndrome and ASD, and congenital Myotonic Dystrophy. These participants were taught to mand for preferred toys, snacks or social interaction (Proloquo2Go only) using Proloquo2Go on an iPod touch and manual signs. The iPod emitted the phrases "I want a snack", "I want to play", and "how are you?" They were taught the signs for snack/eat and play. The researchers implemented an AAC preference assessment. The sign option was put on one side of the table while the iPod was placed on the other. The participants were asked which one they would like to use. All four participants indicated a preference for a communication mode. One student preferred to use manual sign while the other three participants chose the Proloquo2go.

There are distinct advantages and disadvantages to teaching both sign language and PECS. However, there is limited research regarding how to choose between these two systems. Sundberg and Partington (1998) provide guidelines for when sign language and PECS should be taught. However, the application of this process is not well documented (Tincani, 2004). Tincani (2004) conducted a study comparing PECS and sign language. Using Sundberg and Partington's text, Tincani examined which of the two AAC systems would be most appropriate for two individuals with autism. At first, Tincani trained both of the students in PECS and sign and compared the data to see which system resulted in more functional communication and in higher amounts of vocalizations. After determining which system was best for each student, the study concluded by teaching the students their more effective communication mode. One participant was more adept in sign language, the other at PECS.

A further replication of this study used a three-year-old boy with autism and significant hearing impairments. This study had similar results, although there was no clear "best method" of communication because he chose whichever mode of communication would give him access to his preferred item (Dempsey, 2007). While the Tincani (2004) study and subsequent research has focused on communication training with older male students (primary aged and above) and on students primarily with autism and Down's syndrome (Carbone, et al., 2010; Dempsey, 2007; Schwartz, Garfinkle, & Bauer, 1998; Tincani, 2004; Tincani, Crozier, & Alazetta, 2006), there is also research involving communication preference using participants with disabilities other than autism.

Harding, Wacker, Berg, Winborn-Kemmerer, Lee, and Ibrahimovic, (2009)

Evaluate

choice for communication modes during FCT with three preschool aged children with communication delays, developmental delays and disruptive behavior disorder. They investigated whether these participants had a preferred communication mode using a multiple baseline design across manding topographies. During FCT, the three participants were prompted to say a word, sign a word manually, touch a card or touch a micro-switch in order to have continued access to reinforcement. Data were collected on which of the three communication modes the participants used. All three of the subjects had a preferred method of communication by the end of the study. Two of the boys used vocal manding almost exclusively, and the other boy used both vocals and manual signing simultaneously.

Bock, Stoner, Beck, Hanley, and Prochnow, (2005) investigated whether language acquisition was more readily learned using PECS or voice output communication aids (VOCA). The main purpose of the study was to determine which method was more efficient in teaching children language and which was more likely to generalize. Six four-year-old boys with complex communication needs were used in this study. An alternating treatment design between PECS and a Go-Talk (the selected method of VOCA) was employed. The boys had fifteen-minute sessions with PECS and then with the Go-Talk. The findings offered mixed results. Four of the

boys learned how to use PECS much faster than the Go-Talk, whereas the other two boys used both communication methods with equal skill. Neither communication method generalized well into the classroom setting, resulting in a decrease in acquisition across five of the six participants .

Examining the previous research, there appears to be no single best communication mode for all children. In the two studies comparing PECS, signs and vocals, one participant chose PECS, one chose sign, and one used whichever communication mode was required at the time to get access to his preferred item (Tincani, 2004; Dempsey, 2007). Harding et al. (2009) found that vocals were the preferred method for two of their participants, and the final participant preferred a combination of signs and vocals. Bock et al. (2005) concluded that four of their participants were more adept at PECS while two of their participants had equal skill in VOCA and PECS. There is no overwhelming majority revealed in the comparison of these studies.

An expansion of the prior study van der Meer et al. (2012) study was conducted by van der Meer, Sutherland, O'Reilly, Lancioni, and Sigafos (2012). This study was conducted almost identically to the previous study, except PECS was added as a third option. This study, because it ran an AAC preference assessment and compared signs and PECS, most closely resembles the present study. Their study was completed with four participants with autism. All four participants had a preferred communication mode. Two of the participants chose picture exchange and the other two chose the Proloquo2Go most frequently. This study suggests that students communicate better when using their most preferred methods. It should also be noted that all four of the participants chose a picture based communication system over manual sign language when given a choice.

All of these similar studies reveal that there is no one best communication mode. Instead, it depends on the individual, which is why it is so important to give the participant a choice. The purpose of this study was to replicate and expand the study conducted by Tincani (2004) and van der Meer (2012) using a child without a diagnosis of autism and conducting the study in the natural environment (preschool classroom). The present study focused on comparing the acquisition of picture exchange and sign language with a female preschooler with developmental delays. She was taught to mand for snack food items during scheduled snack time using her two most preferred foods combined with food already available at snack time.

Methodology

Participant and Setting

The participant, referenced in this study under the pseudonym Erica, was three years and ten months old at the beginning of this study. Erica attended a special education preschool in the

Pacific Northwest that was primarily for students who were deaf and hard of hearing. Erica had typical hearing, but was placed in this classroom due to her extreme communication deficits. At the start of the study, she had attended the program for three months. Erica was served under the disability label developmentally disabled. She had deficits in cognitive, adaptive, language and fine motor. Across all assessments, she scored at or below 1% except in adaptive behavior where she averaged in the 8th percentile. Her largest deficit was in communication. Erica was diagnosed with Apraxia. Apraxia is a dysfunction of the speech motor function that causes difficulty with articulation and speech prosody (Murray, McCabe, & Ballard, 2012). This means that Erica knew the words she was trying to say, but she had extreme difficulty actually producing the word. She had three intelligible spoken words at the start of the study (uh oh, no, all done). Most of her communication was through gestures, such as pointing toward an item, and unintelligible vocalizations such as vowel sounds, the vocalization “ma, ma”, and yelling. The teacher expressed concern over Erica’s communication during snack time. Due to her delays, Erica was unable to indicate the food she wanted during snack, and the teacher was concerned that she was not getting enough to eat.

The study was initially conducted in the office that was inside Erica’s preschool classroom. The room had a door which was closed most of the way for each training and probe session. The room contained one low table and chairs, shelves, filing cabinet, an office chair, storage boxes, and a computer. Starting at session four, the study was moved to the snack table in the main area in the classroom where other students were present. The classroom teacher sat in the middle of the kidney table and there were typically two to five students sitting on the other side of the table. Sometime one to two extra adults, either IAs or volunteers, sat behind the students to lend extra support. The students each had their own placemat and they were required to raise their hands quietly before requesting a snack item. The researcher conducted snack time for Erica only. These sessions lasted from 2.5 to 15 minutes long, and were conducted on average two days a week.

Materials

The researcher used picture cards of Erica’s top two favorite foods and other food items frequently eaten during snack time such as fish crackers, raisins, applesauce, cookies, pretzel fish, yogurt, and other snacks. These cards consisted of a picture of the item (not a drawing or cartoon) taken from the Internet. Each picture was printed out, laminated, and cut out into squares. The sizes of the pictures ranged in size from 1.5 x 1.75 in to 2.5 x 3.25 in. One other material included was Erica’s snack time placemat, which was provided by the classroom teacher.

Dependent Variables

The behavior measured was picture exchange, manual signing and correct vocals. A correct picture exchange was scored when Erica picked up the picture and put it into the researcher's hand. A correct sign was scored when Erica manually formed the correct or accepted approximation of a sign for an available food item. Incorrect picture exchanges, such as pointing to the picture, or producing the wrong sign were not scored. A correct vocal was scored when Erica vocally produced an intelligible English word. An incorrect vocal was scored when Erica uttered a vocalization that was not a recognizable English word. Independent picture exchanges and signing were only scored for the picture exchange only and sign only conditions due to the way the video was recorded during the choices condition.

Data Collection and Inter-observer Agreement

The researcher used a six-second-interval recording system across 30-second increments. Once the behaviors were recorded, the data sheet was divided into 30-second increments and each increment served as a session. If a target behavior was observed, then the appropriate symbol was marked on the data collection sheet. For all sessions except the picture exchange and sign only conditions, a slash was used to indicate a behavior. In the picture exchange and sign only conditions, a slash was used to indicate independent communication and a circle was used to indicate a prompt. The researcher video recorded all sessions and then scored them at a separate time.

Another graduate student served as the reliability scorer. The researcher and the other graduate student scored the video recorded sessions simultaneously but separately. Inter-observer agreement (IOA) was conducted for 69% of sessions. Agreement was calculated by dividing the number of agreement by the number agreements plus disagreements. The average IOA for baseline and treatment was 99% (range 75-100%).

Experimental Design and Conditions

The design used was an ABCDBE reversal design (Kazdin, 2011) with a component analysis. First forty sessions of baseline, 'A', were recorded. Then the researcher ran a choices condition, 'B'. The researcher presented both sign and picture exchange as communication options, allowing Erica to choose which to communicate with. This session was run until a clear pattern emerged of which communication method she used most frequently. This lasted for 50 sessions. The next session run was sign alone 'C' and picture exchange alone 'D', to assess and confirm proficiency. Each of the 'C' and 'D' sessions was conducted for 10 sessions. Then a modified reversal was done, returning to the choices condition to confirm the results of condition 'C' and 'D'. After a consistent trend was found in the return to 'B', and there was a clear pattern

as to which communication mode she used most frequently, a generalization component, 'E', was also added. In this component, the regular teacher was the communication partner. The second 'B' session lasted for 10 sessions. Session 'E' was run for 24 sessions.

Procedures

The training sessions for picture exchange and signing were ten minutes in length. The probe sessions were five minutes in length. Later, breaks were implemented during training every five minutes. Finally, Erica was placed with her peers and no time limit was put on the sessions.

Preference assessment. A forced choice preference assessment (Fisher et al., 1992) was conducted across eight snack food items. Erica was not required to make a choice each time. For tiebreakers, Erica chose between the two tied items.

Baseline. During baseline, the researcher had no interaction with Erica apart from videotaping. The teacher was asked to lead snack time as normal during the regular snack time. The students had to raise their hands quietly and then request a food item, using signs, signs and vocals or picture exchange. Erica was provided prompts as needed.

Picture exchange training. Erica was first trained using picture exchange. Sessions were run as closely to her regular snack routine as possible, per teacher request (i.e. Erica had to raise her hand in order to mand for a snack item). The researcher provided a model of hand raising as needed. After Erica raised her hand, the researcher asked "Erica, what do you want?" or "What do you want?" If she pointed or reached for the goldfish cracker, then the researcher immediately provided a prompt by placing the card in Erica's hand and then physically guiding her to give the card to the researcher. After two or three times using the physical prompting, the researcher added a delay in the training session, waiting three to five seconds to see if Erica would hand the researcher the picture card prior to a physical or vocal prompt. Simultaneously with the delay, the researcher also added in a visual prompt of holding her own hand out, resting it on the table no more than an inch from the researcher's body.

Picture exchange probe. The first author gave no prompts or physical guidance for the picture exchange, outside of the visual hand prompt already described. The teacher still modeled hand raising and asked Erica what she wanted. After a successful picture exchange, the researcher occasionally provided feedback or praise along with the snack item to facilitate spoken language in the future.

Initially, these probes were conducted with only one food item. However, after the first picture exchange probe, Erica had satiated on the item. After this session, it was determined to present two food items at a time. Training was moved onto the next food item once Erica demonstrated at least a 20% rate of appropriate requesting during three consecutive probe sessions.

Sign training session. These sessions were conducted exactly the same as the picture exchange probe, except using signs. The same foods (goldfish crackers and raisins) were used. Erica did not need physical prompts during this session, so the researcher modeled the sign, and Erica produced a modified version of the sign. After producing the sign, she was given the requested snack item. The researcher implemented the three to five second wait period after teaching the sign for five minutes. The training sessions were ten minutes in duration.

Sign probe. The researcher gave no prompts or physical guidance for the production of the sign. After a successful sign the researcher would say, “Erica wants a (food item)” to facilitate spoken language in the future.

Choices. Erica sat at the snack table with her peers and the researcher accepted all requests for food. Erica was given pictures representing the food items available for snack. Erica was not limited in the number of foods she could request. She was allowed to mand for any available snack item. Whenever Erica pointed or reached for a snack item, the researcher held out one hand on the table while making the sign for the desired food item with the other hand. Erica could then choose how she would respond. Any proper sign or picture exchange was accepted, and Erica was given a small amount of food (i.e., one cracker, one spoon of apple sauce). If Erica immediately utilized picture exchange for an item, a sign was not provided. If Erica immediately signed, then the hand prompt was removed and the mand was honored. This was done because if she immediately responded appropriately, she had already made her communication choice.

Sign only. Again, Erica sat at the snack table with her peers, but the researcher responded to all requests for food. Erica was presented with the same foods her peers were eating. In the sign only condition, there were no pictures present. If Erica pointed to a food item, the researcher prompted her by presenting the manual sign and Erica was required to mimic it to receive a snack item. A five second prompt delay was added to encourage Erica to emit independent signs.

Picture exchange only. This session was run identical to the sign alone condition, except that the communication mode was using pictures. If needed, a physical prompt was used. The necessary pictures were placed in front of Erica within easy reach. The researcher placed the picture in Erica’s hand and then prompted Erica to give the picture to the researcher. At least a five-second prompt delay was used to encourage independent picture exchange. A longer delay was allowed if Erica was choosing a snack item (scanning the pictures, hand hovering over pictures).

Choices. This session was run identical to the first choices condition. It was in effect for 10 sessions.

Generalization. This condition was run using Erica’s best method condition. The best method was determined by whichever mode she used more independently. The typical teacher led snack time with Erica and the researcher just observed.

Findings

Data were only collected from the choices conditions and the subsequent conditions. Any data collected from the probes were not included in the study.

Preference Assessment.

The preference assessment is displayed in Figure 1. The complete results of the study are displayed in Figure 2.

Baseline.

Erica did not emit any intelligible vocals or appropriate mands during baseline. The mean percent of correct signs was 1% (range 0-20%). The mean percent of unintelligible vocals were 23% (range 0-60%).

Choices.

The mean percent of picture exchange was 17% (range 0-60%). The mean percent of manual signs was 5% of intervals (range 0-40%). There was a stable increase in both picture exchange and sign language. The mean percent of unintelligible vocals was 18% (range 0-80%). The mean percent of intelligible vocals was 1% (range 0-20%). Unintelligible vocals underwent a variable decrease and intelligible vocals had a variable increase. Once a stable trend was developed in the data and one communication mode had a higher percentage of intervals than the other, it was decided to move on to the next phase.

Sign Alone

The mean percent of independent signs was 4% (range 0-20%). The mean percent of prompted signs was 24% (range 0-40%). The mean percent of unintelligible vocals was 12% (range 0-40%). The mean percent of intelligible vocals was 0. The data was stable and increasing across target behaviors except for intelligible vocals.

Picture Exchange Alone

The mean percent of independent picture exchanges were 14% (range 0-40%). The mean percent of prompted picture exchanges was 4% (range 0-20%). The mean percent of unintelligible vocals was 22% (range 0-80%). The mean percent of intelligible vocals was 0%. The data was stable and increasing across target behaviors except for intelligible vocals.

Choices

The mean percent of picture exchanges were 13% (range 0-20%). The mean percent of manual signs was 4% of intervals (range 0-40%). The data was stable and increasing for both signs and picture exchange. The mean percent of unintelligible vocals was 20% (range 0-60%). Unintelligible vocals were unstable and increasing. The mean percent of intelligible vocals was 0%.

Generalization

The mean percent of picture exchanges were 5% (range 0-20%). The mean percent of manual signs was 3% of intervals (range 0-20%). The data for these two target behaviors were increasing and stable. The mean percent of unintelligible vocals was 23% (range 0-60%).

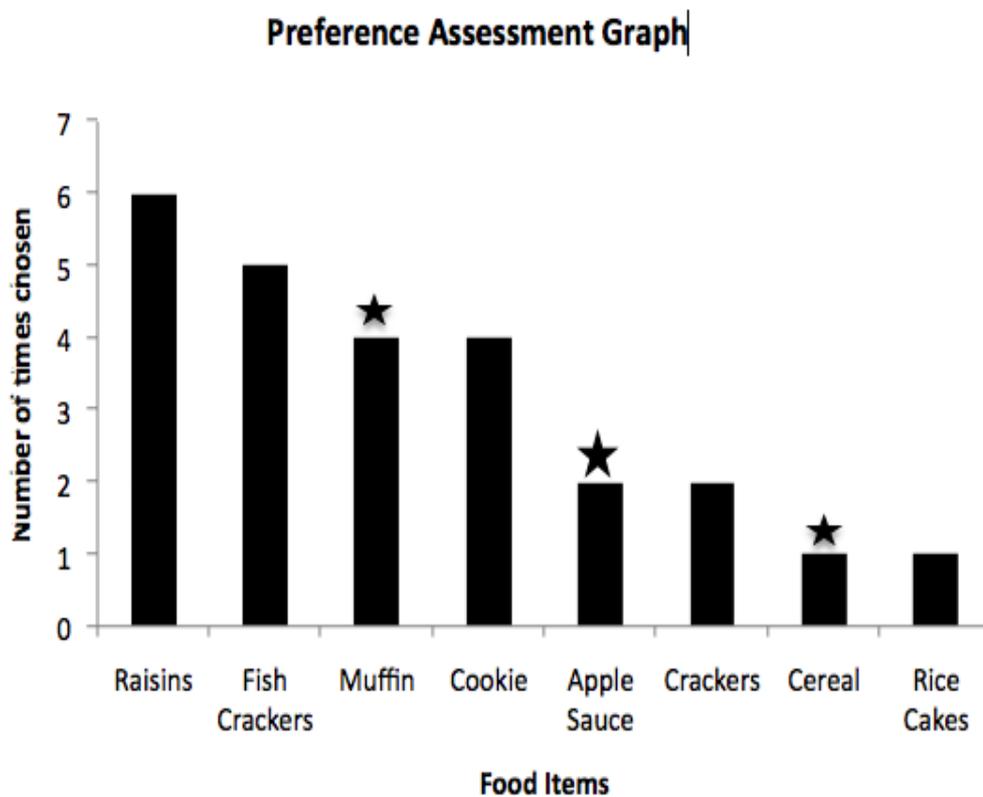


Figure 1. Erica's preference assessment results.

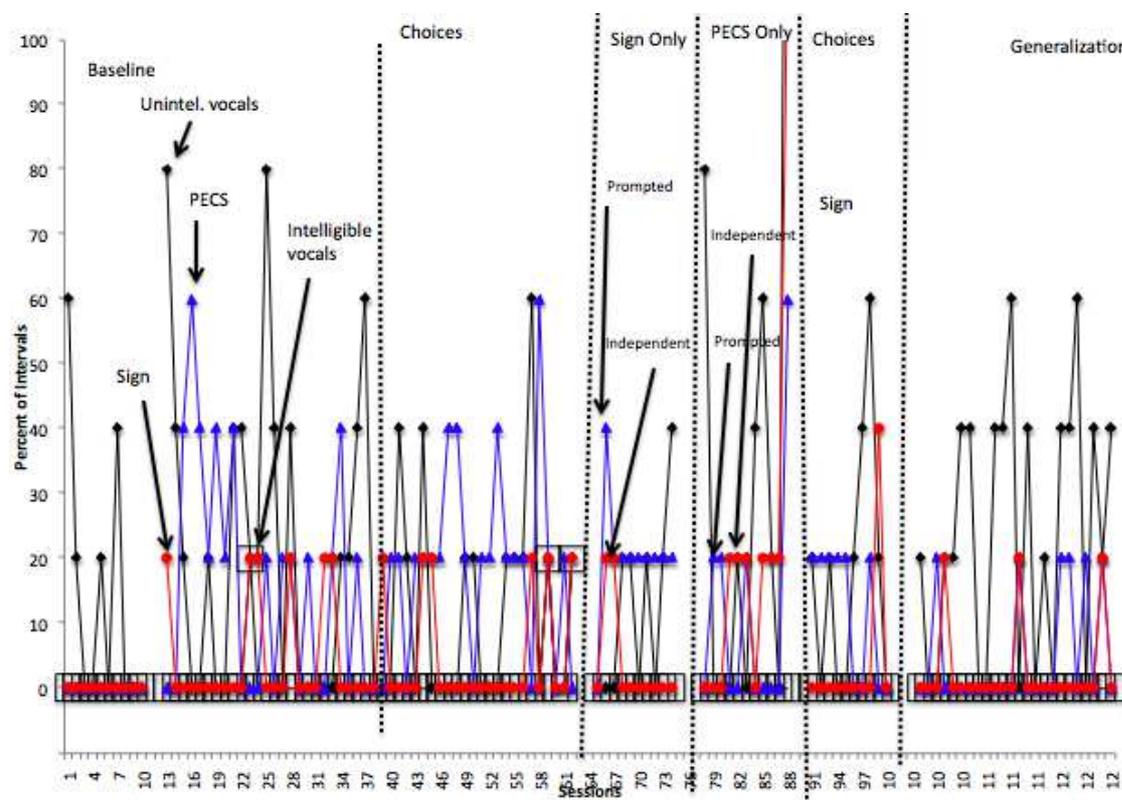


Figure 2. Erica's communication choices across all sessions and experimental conditions.

Conclusion

This study serves as a partial replication of the study conducted by Tincani (2004). This study is further evidence of using choices to determine an AAC device for an individual. It also provides evidence of the flexibility of this method.

The intervention was successful in choosing an effective communication method for Erica. During treatment, Erica used picture exchange 12% more than she used sign. During baseline, Erica emitted only one sign (the sign for more) and did not use picture exchange appropriately. She pointed instead of handing the pictures to the researcher. She emitted only unintelligible vocals during baseline. In treatment, unintelligible vocals decreased. During the generalization phase, her unintelligible vocals returned to baseline levels. Intelligible vocals increased slightly. Erica only spoke one clear word during this study, which was "all done". For picture exchange, Erica did not have to be explicitly trained on each picture. She generalized the first training to all other pictures. During training, Erica emitted many independent picture exchanges, but no independent signs. However, due to the way the data was recorded, it was not possible to indicate whether a communication act was prompted or independent during the regular treatment condition, so a component analysis was run.

Our component analysis was run to specifically record whether an instance of communication was prompted or independent. Additionally, it was conducted to remove any potential confounding variables created by presenting both communication methods at once and to confirm the results of the treatment condition. This condition revealed that she employed picture exchanged independently for 10% more of intervals than independent signs. A return to the choices condition confirmed that she continued using picture exchange more than she used sign. In the generalization condition, she emitted more picture exchanges than sign. However, her use of picture exchange dropped almost by half. This can be explained because the first session, which contained the most trials, was a difficult snack time and Erica's requests were not immediately answered. If taken day by day, there was an increase from 2% to 10% of intervals for picture exchanges use across two days. Signs were still coded because the teacher signed to all students, and Erica occasionally imitated the teacher.

During the first picture exchange probe, Erica satiated on gold fish crackers. She would however sit down for raisins. She successfully generalized her training on the goldfish picture exchange to the raisin icon. During the sign training session, Erica did not emit the signs for either snack food item independently.

During the sign probe, Erica attempted to elope from the classroom and she cried. She did this for the second sign probe session as well. Due to her crying and elopement, a break system with toys implemented for the third sign probe session. After the first five minutes of the training session, the researcher presented Erica with toys and asked, "Do you want these?" After the break was over, Erica still continued to become agitated (crying) and attempted to escape the office. After further discussion with the classroom teacher, all probes were subsequently conducted at the snack table with her peers, but with the researcher running the session solely with Erica.

Probe sessions were terminated and the choices condition was implemented because it was noted Erica did not sit still for very long, and the researcher did not feel that five minutes was adequate training time. Having both choices being available and modeled circumvented this problem.

The strengths of this study include its flexibility and adaptability to change. The intervention changed to meet the needs of the child without fundamentally changing the independent or dependent variable. It was effective in revealing which method was her preferred communication modality. It was cheap and easily implemented in a preschool classroom because the treatment was imbedded into the every day routine and it took little time to run (a little over an hour in total). In theory, this can be used with more than one student (Tincani, 2004). This study also had some social validity (Wolf, 1978), because communication is an essential skill. An additional strength was this study gave Erica the prerequisite skills needed to begin training on Proloquo2Go with the speech therapists.

This study had several weaknesses. Even though there were over one hundred twenty sessions run in this study, it was little less than an hour of data because of how short the data collection sessions needed to be. Another weakness in the study was the single reversal due to time constraints. Independent and prompted mands could not be scored for the entirety of the study because in most of the video it was impossible to see whether the researcher was prompting Erica or not. Her unintelligible vocals decreased throughout the course of the study, but it was unclear whether or not it was because aberrant behavior (yelling, crying) decreased or if the communication modalities replaced some of her vocals, and they returned to baseline levels during generalization.

Suggestions and Recommendations

If the researcher had more time, more reversals between choices and the component analysis would have been conducted. This would have evaluated whether with more time sign would have emerged as Erica's preferred mode of communication because she exhibited independent signs outside of snack time. The researcher would have extended the study to include Erica's Proloquo training.

Further research should implement this procedure over a longer period of time. Independent and dependent communication efforts should be recorded across the entire study. Unintelligible/inappropriate vocals should be categorized as aberrant (yelling/ crying) and non-aberrant in data collection. Multiple reversals should be conducted in future replications. Reproductions of this study should compare using the traditional training and probe method and the choices procedure used in this study. Additional research should be done replicating this procedure with more female participants. Multiple participants should be evaluated with and without the choices procedure. Also, further research should be conducted evaluating picture exchange or PECS as a prerequisite skill for using Proloquo2Go.

There were many practical implications of this study. This procedure can be implemented in the daily routines of a preschool classroom, making this a viable intervention for teachers. This will provide participants with their most preferred communication method. This study provides further evidence that providing a student with their most preferred communication method will increase their communication. This study also provides evidence that this procedure is effective for multiple disability categories and age groups.

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