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# Looking for verbal communication in the non-verbal world: A case study of the picture exchange communication system

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Looking for Verbal Communication in the Non-Verbal World: A Case Study of the  
Picture Exchange Communication System

by

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Thesis

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In partial fulfillment of the requirements for the degree of

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in

Education

Thesis Committee

Dr. Kathlyn Parker

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## Dedication

This thesis is dedicated to my parents, Dave and Linda Blauet, who continually pushed me to become a special education teacher. Now they can finally stop asking when graduation is. As well as to Lauren Quinlan, who made sure I never gave excuses for not finishing this and kept reminding me that I could do this if I believed in myself. Her editing skills and patience were invaluable on this project, and it probably would not have gotten done without her. Last, I want to dedicate this to Dr. Parker, who never let me take the easy route and always kept an open door for me over the long course of this thesis.

## Abstract

In this study, a three year-old boy with autism named Alex's communication needs were evaluated and then his current communication program was compared to other communication programs. The programs must have included an Augmentative and Alternative Communication (AAC) for use with children in Alex's cognitive state and chronological age, a final goal of verbal communication, and were tested on children in the autism spectrum. Alex had been taught using the Picture Exchange Communication System (PECS), so PECS was chosen to be analyzed for this review for its efficacy with children similar to Alex. Once Alex completed the program, he again was assessed. It was found that he still had limited verbal communications and little to no use of spontaneous verbal communication. Further help with his expressive needs were found to be needed.

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## Definition of the Problem

As of 2011, the rate of children who were diagnosed as being on the Autism Spectrum is 1 in 110, according to the U.S. Centers for Disease Control and Prevention. Children and adults with autism face a myriad of cognitive delays. These include, but are not limited to, lack of eye contact, auditory processing problems, social/emotional processing problems, and also communication problems (DSM-IV-TR, 2000). Due to delays in cognitive growth and communication limitations, Alex has been diagnosed as having moderate autism. One of the problems Alex, and all children with autism, faced is the lack of verbal expressive language. He was in need of a way to express himself non-verbally that would lead him to a verbal expressive language of his own. In this study, Alex's communication needs will be examined and communications will be evaluated for him. The study will also offer a detailed program to meet Alex's educational and communication needs.

## History of the Participant

Alex was born August 27, 2004. From birth he had physical difficulties. The doctor thought Alex's large head could be hydro encephalitis, a diagnosis which was later changed to macrocephaly. At eighteen months, Alex began to express autistic tendencies; however, the doctor did not believe that it was full blown autism. In contradiction to other children who had been diagnosed with autism, Alex interacted with and was able to be comforted by his parents. To ensure Alex received proper school funding, the doctor diagnosed Alex with mild autism. Also, because his development was delayed, Alex did not walk until he was twenty-four months of age, and he was also diagnosed with hypotonia, also known as low truncal muscle tone, in addition to macrocephaly. At eighteen months, his parents started

him in the Early On program through Wayne/Westland schools at Stotlemeyer that runs a local birth to three years-old program which specializes in early intervention and early age therapies. Alex received a diagnosis of cerebellar ataxia in April of 2006, in addition to the diagnosis of hypotonia and macrocephaly. Cerebellar ataxia impairs a person's ability to walk and maintain balance. These three diagnoses reaffirmed that Alex's physical impairment coincided with the diagnosis of autism. Alex also began to display a blank gaze during which his parents could not gain his attention; after testing, these incidences were discovered to be seizures, specifically, a type of absence seizures. Though these seizures were not frequent, it did suggest that there was further neurological damage occurring and may be one of the causes of Alex's inability to retain information. In July of 2007, Dr. Hack, a developmental pediatrician, reassessed Alex's diagnosis of mild autism and suggested that the autism was actually moderately severe. At the age of three, Alex entered into the Perrinville Early Childhood Center's autism program.

After two years of school at Perrinville, Alex could now consistently recognize colors, shapes, numbers up to ten, and some letters. He could also recognize his own written name and would respond to his name verbally. To help Alex focus and stay organized, his teachers developed a picture schedule through the Picture Exchange Communication Systems (PECS). While at school, Alex participated in classroom time with a special education teacher, his own paraprofessional, and his peers. In addition to traditional classroom time, he also attended private sessions with a physical therapist, an occupational therapist, and a speech language therapist. To improve Alex's gross and fine motor skills, he met with a physical therapist. Specifically, the physical therapist focused on increasing his ability to write with a pen or pencil; however, he still showed resistance due to touch aversion that is

mainly focused on avoidance of coming in contact with objects. The occupational therapist developed a sensory diet for Alex. This program also focused on reducing Alex's touch aversion to objects through mild sensory stimulation. To address Alex's delay in speech and increase his communication skills, he met with a speech language pathologist (SLP) once a day. Due to the size of his deficit in this area, Alex spent more time in this therapy than the others available through the school.

Alex has shown desire to communicate and becomes frustrated when he is not able to convey his ideas and needs. He is capable of making vocalizations, but does not readily use them and does not have a history of being able to form words prior to the diagnosis of autism. One of the first attempts of teaching Alex language was through sign language. He occasionally used his signs, but most often he did not, even when prompted. When he did not use signs, his parents attempted to prompt Alex to either show them what he wanted, or they used the trial and error method to invoke a response. This could include, but was not limited to, showing him objects until a response was given showing which object he desired, or they used repeated verbal and signing prompts. Alex seemed to prefer showing his parents what he wanted to communicate instead of having to search for the word or sign to convey the meaning. It was suggested that some form of augmented and alternative communication (AAC) should be tried. To promote independent language use, he was switched to the Picture Exchange Communication System (PECS). At the start of the program, Alex relied on expression through the use of pictures that correlated to objects in real life. As he became familiar with the words and their relation to the object in the real world, he was weaned off of the crutch of picture cards and used verbal language. The ultimate goal of PECS was to have Alex fully vocal without having to rely on his picture cards. After a year of daily

training, Alex had much greater success with the use of PECS than other previously attempted communication programs; however, full mastery of the program had not been completed.

Through the use of PECS, the SLP has worked with Alex through all of the stages, and he now is able to speak in short phrases that usually relate to an object or his person. So far, he has mastered five hundred words with cards and two hundred words without the use of the aids. However, there are still incidents when he is not able to express himself and exhibits signs of frustration when his needs are not able to be easily conveyed. These behaviors, both prior to and after to learning PECS, usually include screaming, falling on the floor, or banging his head. Conversely, when Alex's desires are exposed, the behaviors are curbed and the rate of behaviors has been significantly reduced since PECS was introduced. Though Alex is able to express his needs, there is still an absence of social interaction communication. While in a social setting, Alex will respond to greetings and closings when initiated by other people, but does not initiate the conversation himself.

#### Purpose of the Study

The purpose of this study is:

- (1) To analyze existing alternative and augmented programs.
- (2) To analyze Alex's current program.
- (3) To create an individualized program for Alex.

## Statement of the Problem

In Alex's current educational program, new techniques were tried with Alex in an attempt to find those techniques that were most appropriate for him to express himself through verbal and nonverbal communication. The paper will review techniques tried in the past with other children with ASD, as well as the communication systems currently used by Alex in order to come up with an appropriate program to match his needs.

## Definitions of Terms

### Augmentative and Alternative Communication (AAC)

AAC includes all forms of non-verbal communication that are used to express thoughts, needs, wants, and ideas. AAC can range from body language such as facial expressions, body position, or gestures, to symbols, pictures, or written communication that can include words, symbols, pictures, or abstract design. There are two types of AAC: aided and unaided.

Unaided AAC uses such things as gestures, body language, and sign language, which can be done by the user with little to no help. Aided AAC includes tools or equipment, in addition to the user's body, that can be used by communicator, with or without the help of an assistant, to help the user converse. The assistant aids the communicator by supplying support, guidance in the creation of the communication, or even just slowing down the user enough to find what they want to express on the board. The tools or equipment can include, but are not limited to, a laminated board that is the same setup as a keyboard for a computer, or a pencil and paper where hand over hand is used to help the user hold onto the pencil, or portable computerized speech machines, such as iPads, Dinavox, or a handheld computer.

### Autism Spectrum Disorder (ASD)

Autism is a disorder of neural development that is characterized by impaired social interaction and communication, and by restricted and repetitive behavior. These signs all begin before a child is three years old, according to the Diagnostic and Statistics Manual (DSM-IV-TR). While the cause of autism remains unknown, it is generally believed to be a genetic disorder that involves formations in the brain of a spongy material that affects the way thought processes work. Typical signs of autism are decreased social skills, inability to grasp non-concrete concepts, lack of eye contact, and extreme sensitivity to stimuli. The DSM-IV-TR has the following requirements for a diagnosis of autism:

I. A total of six (or more) items from heading (A), (B), and (C), with at least two from (A), and one each from (B) and (C):

(A) Qualitative impairment in social interaction, as manifested by at least two of the following:

- Marked impairments in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction.
- Failure to develop peer relationships appropriate to developmental level.
- A lack of spontaneous seeking to share enjoyment, interests, or achievements with other people, (e.g., by a lack of showing, bringing, or pointing out objects of interest to other people).
- A lack of social or emotional reciprocity.

(B) Qualitative impairments in communication as manifested by at least one of the following:

- Delay in or total lack of the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime).
- In individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others.
- Stereotyped and repetitive use of language or idiosyncratic language.
- Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level.

(C) Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least two of the following:

- Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus.
- Apparently inflexible adherence to specific, nonfunctional routines or rituals.
- Stereotyped and repetitive motor mannerisms (e.g. Hand or finger flapping or twisting, or complex whole-body movements).
- Persistent preoccupation with parts of objects.

II. Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years:

- (A) Social interaction.
- (B) Language is used in social communication.
- (C) Symbolic or imaginative play.

III. The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder. Source: Diagnostic and Statistical Manual of Mental Disorders; Fourth Edition

### Cerebellar Ataxia

Ataxia is a neurological sign and symptom consisting of gross lack of coordination of muscle movements. Cerebellar ataxia is used to show a dysfunction in the cerebellum. This can often cause symptoms like hypotonia. It can affect eye movements, balance, and walking abilities.

### Joint Attention

Joint attention starts to be developed around twelve months of age. The child learns to follow the gaze of the adult in order to share in what the adult is attempting to point out. These behaviors are used in everyday life and encourage positive social interactions by allowing children to share, follow, and direct the attentional focus of communicative partners to gain a similar goal. Joint attention is broken down into two parts: initiating joint attention (IJA) and responding to joint attention (RJA; Sullivan, 2007). Initiating joint attention is when a child attempts to get an adult to pay attention to him or her. Responding to joint attention is when a child makes eye contact with the person speaking, follows a direction (such as something being pointed at), or turns their head when their name is called. Children with autism tend to have severely lowered responses to joint attention due to aversion to holding eye contact and

lack of the ability to follow the other persons' directions. The lack of RJA ability is included in the diagnosis of autism, since most children with autism tend not to follow directed gaze, participate in joint play, or respond to their own names even though there is nothing wrong with the child's auditory system.

### Macrocephaly

Macrocephaly is a condition when the head's circumference is two standard deviations or greater above the mean size in relation to the generalized measure. Relative macrocephaly occurs if the head's measured circumference is less than two SD above the mean, but is disproportionately above that when ethnicity and stature are considered. In research, cranial height or brain imaging are also used to determine intracranial volume more accurately.

### Picture Exchange Communication System (PECS)

The PECS program is a communication system typically used for children with autism, but it can be generalized to any type of verbal communication delay. It involves the simple exchange of a picture, usually of an object, person, or place, with a person with whom the child is attempting to communicate. PECS was created in 1985 by Andy Bondy, PhD, and Lori Frost, CCC/SLP, following the behavioral modification theory (Ganz, 2004). The program was originally designed for nonverbal children. Later, the program became accepted widely by professionals as the best form of AAC for children with autism even though there was a significant lack of empirical evidence that supported that claim. PECS is a form of AAC in which correlating pictures with objects or items in the real world teaches children to change the way they use language through a direct, physical result. The primary use of PECS, in this study, will be as a method of moving the communicator from non-verbal expression to verbal expression. PECS is used in six phases, as shown in Table 1.

Table 1

*PECS Phases and Descriptions*

Phase		Description
Phase 1	Basic Picture Exchange	Teaches students to pick up the picture of the desired item, reach toward the communication partner, and release the picture into the partner's hand.
Phase 2	Increasing Distance	Teaches students to go to their communication book/board, pull the picture off, go to the communication partner, and release the picture in to the partner's hand.
Phase 3	Picture Discrimination	Teaches students to discriminate between pictures of the desired object and multiple other pictures of objects.
Phase 4	Sentence Structure	Teaches students to use sentence structure to make a request in the form of "I want ..."
Phase 5	Responding to "What do you want?"	Teaches students to respond to the question, "What do you want?"
Phase 6	Responsive Commenting	Teaches students to comment about things in their environment, both spontaneously and in response to questions.

## Review of the Literature

Early Intervention with the Picture Exchange Communication System (PECS)

The McConkey, Truesdale-Kennedy, Crawford, McGreevy, Reavey, and Cassidy (2010) study followed twenty-four families, each of which included at least one child with autism spectrum disorder (ASD) above the age of two years, but below school age. Implementing an in-home method of intervention using PECS, the children were visited twice a week by a speech and language therapist. All the children in the study were able to master the first three phases of PECS after ten to fifteen weeks of intervention. The children

were assessed using the Gilliam Autism Rating Scale and the Vineland Adaptive Behavior Scales before and after the study to determine a baseline score and the children's progress of their growth of their adaptive skills. If the child's score increased on the Vineland Adaptive Behavior Scales and decreased on the Gilliam Autism Rating Scale, then it could be reasoned that the PECS was helping the child learn to be more socially adjusted. While this study has a large sample and does show significant results, there was a lack of follow-up after the study had concluded, so there was no way to know if they families had continued using the PECS once the researchers left.

Ganz and Simpson (2004) also studied how quickly preschool-aged children can learn to use PECS. They studied three preschool-aged children in a school setting. They met with a speech and language therapist three to five times a week over four months. This study wanted to show the efficacy of how PECS could be learned over a four-month period. All three children were able to master the first four phases of PECS within the five session boundary that the program outlines. The biggest issue with this study is that it only states the baseline data, but does not present it for the reader to see anywhere in the study. Also, this only uses the first four phases of PECS, of which there are six. This seems to be an issue with most research articles involving PECS. However, all three students were able to master the four phases in the four months that the study was conducted. The authors of this article noted that while the students did learn to use the system readily, the amount of speech formation was very limited. The students still choose to not speak and to use the cards over speaking. They suggested that more studies needed to be done on the connection between PECS use and speech development.

Ganz, Simpson, and Corbin-Newsome's article (2007) focused on recreating the conditions of their earlier study. They studied three preschool-aged children in a school setting, who met with a speech and language therapist three to five times a week. However, this study did include baseline data for each of the participants. Two of the children were able to master the first four phases of the PECS program in the time allotted. However, one child could not master the first phase within the first fifteen trial sessions and was, in turn, dropped from the program. Since the child was released from the study, the child's data were not included in the final analysis of the data. Ganz, Simpson, and Corbin-Newsome's explanation of what needed to be done to help children included the theory that a more aggressive course of action was needed to be taken in order to help this student master PECS. While the data are not presented, they state that they believed the program was moving too fast for that student and that a slower, more direct intervention, with more one-on-one time, was necessary. Only the first four phases of PECS were implemented. However, in this study, they explained that because the first four phases of PECS were designed to increase requesting behaviors and, thus, increase RJA, the other two phases were not necessary. The results did show a marked increase in RJA for the two that completed the study. The authors did note that the goal of increased speech communication was not met.

All three of these studies found that children with autism, even at a young age, are capable of learning the PECS program within the scope of its guidelines, which according to its developers can be taught to children as young as twenty-four months (Frost & Bondy, 1994). Only one child was not able to complete the program, for reasons that were not published (Ganz, Simpson, & Corbin-Newsome, 2007). It would have been helpful to know why this particular child had such difficulty, although from the baseline data provided, it

might have been due to level of autism this child was diagnosed with. The authors, while not mentioning the child in particular, wrote about indicators they viewed as helping to determine the success of PECS, which were a) motivation of the student, b) use of concrete visuals as opposed to transitory symbols, and c) initial lessons focusing on requests. It is hard to say for certain whether one of these conditions was not met for that student. Of major concern is why all of these studies ended with the first three or four phases of PECS. It is a six-phase program, so it is curious why the authors would label the children as having “completed” PECS, when only part of the program was instituted. The first four phases of PECS focus on initiating requests; however, the last two phases focus on answering questions and forming non-request based sentences, with the end result of full speech (Frost & Bondy, 1994).

### PECS vs Other Systems

PECS is not the only option when developing a communication system for non-verbal children with autism. Because the system requires training, there is a possibility that schools might not have the staff trained in how to use PECS or deliver it. PECS can actually be a very costly program to implement for a school, and it is not always certain it will work. Also, because autism is so varied, the same programs may not always work for each child. In those cases, other systems are sought.

### Voice Output Communication Aide (VOCA)

Beck, Stoner, Bock, and Parton (2008) studied the rate at which four preschool-aged children, who did not speak, could learn PECS or learn to use a Voice Output Communication Aide (VOCA). The study focused on speed of learning and mastery of the

program as well as which of the two was more likely to lead to actual speech communication. The objective for the study was to teach the children to make requests for objects they desired. Only the first three phases of both PECS and VOCA were taught, as those are the phases that work entirely with requests. After that they begin to diverge in their training techniques. Their study went four weeks over the course of summer school for these four children, whom all came from the same classroom. Their findings concluded that Phase 1 of the PECS was easier for the students to learn than VOCA. Each of the students mastered Phase 1 of PECS in the four weeks. Two of the children mastered Phase 3 of PECS. Only two of the children (Derek and Susan) mastered Phase 1 of the VOCA; the other children did not.

The major concern regarding use of the VOCA was that in order to use it, the student first had to pick up the VOCA device. This seemed to be the major limitation on the study, in that the VOCA device had a high learning curve. The software was not easy for the students to understand and it was difficult for the staff to program. It was also fairly heavy for a preschool-aged child, so there was a lot of resistance to using the device. Of the two students who mastered Phase 1 of the VOCA, Derek continued to use it after the study concluded. It was shown that Derek had more word utterances than Susan in a follow-up after the study. Evidence showed that prior to the conclusion of the study, Derek and Susan had the same number of word utterances, but when Susan switched to using just PECS, her word utterances decreased. The authors speculated that this was because using the PECS cards was easier than speaking, whereas the opposite was true for Derek; using the VOCA was more difficult than speaking.

### American Sign Language

Alternative to the use of AAC techniques, SLP suggest the use of American Sign Language (ASL). This form of communication is used as another option for the children with verbal language delays because there is no need to lug around any type of devices. The child only needs to use hand signals to express his or her needs or wants. Mostly rudimentary hand signs are taught to both the child and the parents or any other adults who would need to know what each sign means. The child is able to learn the signs similarly to how AAC is taught; the object is shown to the child, then the hand sign is given. To learn the signs, the SLP uses the hand over hand technique to shape the child's movements. As the child masters these movements, the SLP's help is slowly weaned.

Tincani (2004) studied which system (PECS or sign language) would produce better requesting behaviors and which would produce more speech development. He studied two school-aged children (Mean age 5:10), Carl and Jennifer, both of whom did not currently speak and had no training in speech communication until this point. Only Phases 1 through 3 of PECS was taught. He had the students learn symbols and signs for their favorite objects so that they could request them.

This study presented a number of interesting issues. First, Carl learned Phase 1 of PECS very quickly (21% of the time he made a request with PECS), but was struggling with the sign language (2% of the time he made a request with sign). The author decided to decrease the amount of PECS that Carl was being taught and focus entirely on sign language. While Carl did master both phases of PECS, his mastery of Phase 2 was severally limited, while he began to excel in sign language. He was receiving twice as much sign language training as he was PECS training, so that by the end of the second round of test checks, his

sign language had increased by 34%, while his PECS had decreased by 16%. The author attributes this to Carl's preference of learning sign, but that seems to be counterintuitive to the evidence presented. It would seem that Carl's increase in the use of sign was due to the increase in the training. Second, for Jennifer, her data mirror Carl's for the first group of sessions; however, sign language was not increased for her. She mastered all three phases of PECS, while her sign language use held fairly steady around 15-20%. Third, this study only used two students, which the author did not view as a limitation. It was never explained why he went with just these two students at this particular school. In fact, he doesn't go into much detail at all about the selection process, other than to say these were the two students that he picked.

Both students showed an increase in word utterances, but Carl's was much higher than Jennifer's. As Jennifer increased her use of PECS, once again, her number of word utterances decreased. This study does not definitively answer which system is better for students simply because it used only two students and of those students, one used PECS and one used sign language. It came down to the student and that student's abilities. A student with better hand-motor skills will be more likely to use sign language. Another limitation to this study was that only one object was allowed to be chosen. There is no proof that the students learned that the symbols they were either making or showing were representations of the object they desired. This method took more of an approach that says, "I must first do this action, before I can get what I want."

#### Responsive Education & Prelinguistic Milieu Teaching (RPMT)

Yoder and Stone (2004) studied the difference on requests made by teaching PECS and requests made by using Responsive education & Prelinguistic Milieu Teaching (RPMT).

RPMT is a therapy technique that involves parents and children in a play-based method that is designed to improve communication, both verbal and nonverbal, in children with autism. The parents are involved in the act of teaching the child based on the idea that the child will want to get attention from the parent and is more likely to imitate what the parent is doing or request attention from the parent. The Yoder and Stone divided all thirty-six students into two randomized groups. Out of the sampled selected, thirty-three were diagnosed with ASD and the other three were considered to have a Pervasive Developmental Delay – Not Otherwise Specified. To obtain a baseline, both groups were tested using the Early Social Communication Scales test prior to the subject division or therapies were to be started. Group One was taught PECS, Phases 1 through 3, while Group Two focused their therapy sessions on the RPMT technique. Over the next six months the subjects would meet for three 20-minute sessions a week with a therapist. Along with the subjects' therapy sessions focusing on mastering the language programs, the parents of both groups received training in how to continue the use of the program within the home and everyday life. By encouraging the parents to become involved in both therapy types, Yoder and Stone attempted to ensure that the subjects' every day lives were immersed within the language learning techniques.

At the conclusion of the test, the Early Social Communication Scales were again administered to the subjects to see how far above the baseline data they had progressed. The final data collection suggested that both groups displayed an increase in Initiating Joint Response, but the Group Two with the RPMT program showed a much greater increase in the amount of IJR (21.5 RPMT, 13.5 PECS). The Yoder and Stone attribute the RPMT's success to two possible causes: either the parents in the RPMT group, voluntarily, asked for more training in their process and/or the parents within the PECS group felt that the system

of picture exchange was sufficient to meet their child's communication needs. A possible limitation to this study is that the leader of this study, Paul Yoder, just happened to also be the main developer of RPMT. Not only was this study led by Yoder, but also any study involving RPMT has been conducted by Paul Yoder. There have not been any independent studies conducted on this theory. Because of the lack of unbiased empirical evidence, there is a higher risk for the statistical findings to be skewed or interpreted to promote RPMT by the bias of Yoder. Another possible concern was that hypothesis of this study indicated that RPMT would be superior to using PECS in joint response (except for the hypothesis that PECS would be better at facilitating requests). Again, with Yoder being the one who both designed the study and created the RPMT system, these hypotheses are questionable. Third, there was no object discrimination used within the study's method. Children were allowed to choose from only one object, so there is no clear indication that the children understood the decision they were making or if they truly wanted that object.

This study showed that there are other options available if PECS does not work. Just like PECS, RPMT depends on the amount of time and effort the instructor is willing to put into teaching a child the method. Of particular note is that in all three of these studies, as the amount of PECS use increased, the amount of verbal expression decreased. PECS has a reputation of being a very simple program to for students to learn; however, these studies indicate that there could be a problem with instituting PECS if the end goal is verbal expression.

#### Can PECS be Generalized Across Areas?

Dogoe, Banda, and Lock (2010) studied whether the use of PECS could be generalized across areas and aspects of a child's life. Teaching a child to use PECS during a

requesting interaction in therapy or at school is appropriate for those settings, but will the child continue to use PECS in the home? The three subjects followed within the study were preschool-aged children with autism and how the therapy was promoted at home, at school, and in therapy sessions. The concept being studied was whether the children would understand that the use of PECS remains the same in each location. This study focused on only the first three phases of PECS, as this was a test to see whether the children would make requests using PECS outside of a school/therapy setting. The definition of “generalize” for this test was that the child would not distinguish between instructors and people in their home life. Training was given to the participating families on how to use PECS and the proper way to receive a request from their child. None of the children had used PECS prior to the study and all were non-verbal. Each child had an initial request response of 0%, but by the end of the study all had a successful request rate of 90% or higher. This indicates a mastery of the first three phases of PECS. All three students had great success with generalization across settings, including school, home, and the playground. They were able to distinguish that they were to give their request picture to whomever they wanted permission from. For instance, one child gave a request for “book” to his sister for the book she was using.

This study concluded that PECS can be generalized and children should be expected to use PECS outside of a classroom setting. One of the participants was also three years old, which is further evidence that PECS can be taught at a young age. However, there is a limitation in this survey in that it depended on a high level of parental involvement. The parents attended each of the therapy sessions with their child and were instructed, while in

the home, not to give the child their desired object until the correct request was made. Many parents might not be that diligent.

Ostryn, Wolfe, and Rusch (2009) used the Paradigm of Communication Competence to study whether children with autism would be able to communicate functionally in any setting using PECS. The core concept behind communication competence is that a person must have the knowledge, skill, and judgment to understand what is being expected from a communication experience. The authors concluded that most people who use an Augmented Alternative Communication (AAC) device, such as PECS, have the ability to express wants and needs. It is uncertain whether they possess the ability to express anything else or understand things other than wants and needs in others. The authors gathered evidence from articles found through ERIC, PsychINFO, and PubMed databases published between 1985 and 2007 that were about PECS, autism, and the use of AAC. They found fifteen articles that met their experimental qualifications. While the goals of PECS and the communication competence paradigm are similar in that they both hope to promote functional and spontaneous communication, they found that PECS lacked in the spontaneous area. They learned that only five out of twenty-four children in all the studies they looked at had an increase in spoken words. They noted that there was a high amount of generalization for the children, but only in the area of requests. They also found that PECS did a very good job of increasing joint attention, but only in the area of requests and not in the area of spontaneous speech.

Experimental designs were considered in their research. There is a great wealth of information published about PECS that is not done in an experimental format. Also, this study started its article search in 1985, but PECS wasn't invented until 1994. It was

interesting to note that of their fifteen studies, only four went through all six of the PECS phases. Oddly enough, Phase 6 of PECS is spontaneous speech. It would seem that if they wanted data on whether PECS encouraged spontaneous speech, they would have looked for more articles where the entire PECS process was used. This article stated that there were very few, specifically three, articles that compared PECS to another form of AAC.

Sulzer-Azaroff, Hoffman, Horton, Bondy, and Frost (2009) wanted to study whether or not data supported PECS being a useful form of AAC. Bondy and Frost are the creators of the PECS system. To do this study, they used the Science Direct, ERIC, PsychINFO, and Google Scholar databases and searched for articles that were specifically about PECS in the way that matched the original designs of the program as designed by Bondy and Frost and that were conducted by people highly trained in the use of PECS, such as psychologists or speech language pathologists. The number of articles they found to meet that criteria was thirty-four. What they found was that most articles show a high number of requests which lead to an increase in joint response; however, it is only in the area of requests. Of the thirty-four articles, only eight reported using all six phases, with most stopped after Phase 4. Many of the studies reported high amounts of generalization in the area of requests. The largest limitation on this study was that it was being conducted, in part, by the creators of PECS. Not much mention is made of the fact that many studies did not complete all six phases. They also comment about the lack of comparisons between PECS and other forms of AAC.

PECS does appear to be generalizable across areas of life, but only in the realm of requests. PECS also seems to be designed only for the purpose of making requests. The lack of articles that show a comparison of PECS and other AAC programs makes it difficult to determine if PECS is the best program for generalization, but the results of these articles are

fairly conclusive in that all three of these articles showed high amounts of generalization. If a child is to be able to function in the everyday world, being able to generalize the skills taught by PECS is going to be a necessity.

## Methodology

### Participants

This was a single-participant case study. This is a study of a six year-old male named Alex. He has been diagnosed with macrocephaly, hypotonia, cerebellar ataxia, and moderate autism. Alex is mostly non-verbal, speaking only a few words and with limited use of sign language.

### Materials

Currently, Alex receives fourteen to seventeen and a half hours of special education at a school for children with special needs as defined by his Individualized Educational Plan. His original program involved teaching Alex to express himself using American Sign Language. The program ran for about one year and was met with very little success with both nonverbal and verbal communication. His parents took the position that they wanted their son to use verbal communication. In order to comply with the parents' wishes, Alex was then started to be trained in using the PECS. Alex is currently in the third stage of the program, which is defined as that stage of discrimination between pictures and having the student select the appropriate picture for the item that is desired.

## Procedures

The parameters of this study are that all methods employed implementation of Augmentative and Alternative Communication (AAC) on a child with Alex's cognitive age. The second is that all methods examined and employed must include the use of verbal expression for communication as an end goal of the therapy. The third is that the data within the studies focused specifically on children who fall in the autism spectrum. These parameters are all in place to ensure that the therapies will be best suited for Alex's condition and the goals set out by the family and all professionals involved.

For inclusion in this study, each article had to meet these specific outlined criteria:

1. *All articles employed implementation of Augmentative and Alternative Communication (AAC) with a child with Alex's cognitive and chronological age.* It was imperative that the systems researched were used on a child with Alex's cognitive abilities and chronological age. While there are communication systems for children who display developmental delays within their diagnoses, those studies may be more specifically intended for children with typical cognitive abilities. Alex is cognitively behind other children his age, so he is in need of a therapy that is developed for someone who is cognitively delayed due to more extreme neurological differences than just a delay in information processing.
2. *All methods employed had verbal expression as an end goal.* Alex's parents have expressed their wishes to ensure that Alex develops a verbal form of communication and does not have to rely on communication aids for the rest of his life. To ensure that these desires are fully met as the end result, only articles that focused on directing the child towards verbalization were examined. He had been taught American Sign

Language but is mostly reluctant to use his signs. His parents believe that because this is not only nonverbal communication, but also the general public's limited knowledge of ASL, a communication skill that is more socially accepted will benefit their son the best. In order to meet the parents' standards, Alex has begun the use of PECS as his primary form of communication, which has evoked some usage of vocalizations.

3. *The data gathered were used for a child diagnosed with autism spectrum disorder (ASD).* This is the most crucial of the three. Every system examined had to show evidence that it worked on children with autism because of Alex's diagnosis of moderate autism, which factors into his delay in communicational and developmental skills at every facet. Based on these studies, PECS has been shown to work well with children with autism because it is so structured and encourages physical interactions that associate physical objects with words. Children with ASD have difficulty connecting concepts to meanings. PECS looks to circumvent that by applying direct/physical meanings to words, such as, teaching a child to identify fruit snacks by using a picture of fruit snacks paired with actual fruit snacks so that, when requested by handing the teacher the picture of the fruit snacks, the child receives some fruit snacks from the teacher.

Out of the twenty-three articles found, the total number of articles fitting these criteria was eight, and these are reviewed in this paper. The others either were not relevant or only met one or two of the criteria, but not all three. From these articles and past experiences, a program for Alex will be determined.

### Analysis of the Data

The Ganz (Ganz, 2004) article focused on whether or not children with autism could develop speech by starting with the PECS system and moving into verbal speech (Ganz, 2004). It had three participants--Gail (5 years), Ramon (7 years), and Ben (3 years)--all three of whom were able to speak words (names of people, colors, numbers, etc.) but not form consistent questions to ask for things. While PECS uses six phases, this study used only the first four phases. Their reasoning for this was that each of these children had the ability to sound out words, but not put them into sentences to ask questions. The fourth phase of PECS is Sentence Formation. Phase Five is responding to questions, which was not being tested, so it was not taught. In the results section, it mentions that "three independent graduate students" were the data collectors; it does not say whether the authors of the study, the data collectors, or the teachers were trained in the use of PECS. Each of these children mastered the four phases of PECS within the time allotted, with Gail mastering it the fastest and with the best results. The results from this study are compiled with the results of the other articles in Table 2.

The second Ganz article (Ganz, Simpson, & Corbin-Newsome, 2007) again studied the impact of PECS on requesting and speech development, but only preschool-aged children were used. For this study they used three participants--Gaspar (4 years), Leo (3 years), and Elise (5 years)--all of whom had been diagnosed with autism and/or developmental delays, had limited functional speech, and had no experience using the PECS system. Once again, only the first four phases of PECS were used. The major difference between this study and the last was that the authors conducted all the trials. It is stated that Ganz had extensive knowledge in both the use of PECS and in training others to use it. The other two observers

were both researchers for language acquisition, one of whom was an author on the study. For this study, they did 10 PECS sessions with 10 trials in each session each week, and they did not set a limit on how long they would continue the study. In the results section, Gasper mastered all four phases in just over 5 weeks. Leo took almost 9 weeks to master all four phases. Elise had very different results from the other two in that after 31 sessions (3 weeks) she had still not mastered phase 1. Ganz stated that Elise's results were omitted from the study because of the drastic changes to the PECS protocols that needed to be made in order for Elise to progress. While it says that those modifications were described and documented, they could not be found in this copy of the study.

The third study compared using a PECS to a VOCA device for request development in preschool children (Beck, 2008). The four children used were enrolled in a summer school for children with autism, and all four of them were either non-speaking or had a limited ability to speak and did not use any form of AAC. The children were Mitchell and Brad (twins), Susan, and Derek. No information was given about the ages of these children other than they were "preschool aged." This study was conducted by six speech-language pathology graduate students, three doctoral level faculty instructors in special education and speech-language pathology, and the speech-language pathologist from the summer school. This study was only 4 weeks long, with the child meeting with a tester for 15 minutes each day. The researchers did not set a limit on how far a child would be able to progress with either device because the goal was to see which device the child would prefer to use once training was given in both programs. Due to the very short time frame of this study none of the children made it to Phase 2 of the VOCA program. Mitchell and Brad did not make it to Phase 2 of PECS, while Susan and Derek made it to Phase 3 of PECS. With all four

children, however, there was a larger difference in the choice of using PECS over VOCA, about 100% more. Three of the four children would not even touch the VOCA machine. This study showed that, while technology may be getting easier to use, most children still prefer the simplicity of PECS.

The fourth study was a comparison of 27 different studies that used PECS with children of all ages (Preston, 2009). However, one of the age groups they examined was children less than 5 years old. The point of the study was to determine whether PECS was truly an efficient way of teaching non-verbal children to communicate. The authors stated that most studies done about PECS use very limited testing pools, often studying only one child. Scientifically, it cannot be determined as being a useful program when tests were done on just one subject. The results, though promising, cannot be generalized to a large population when the sample size is so small. This study attempted to show that when a large group of studies are combined, all on the same topic, all with the same result, that can be used as evidence of efficacy. They did point out concern that early studies (those from when PECS was first invented) often used faulty controls, such as that Bondy and Frost were the only people doing studies on PECS, even though they invented it, or their data sets were missing or unclear, such as in Ganz 2004 where the age of the children was just labeled as “preschool.” For that reason, they excluded any study that occurred pre-2000. Of the cases reported for Preston’s study, 13 met the criteria for this study as well. Of those, five taught Phases 1 – 6; the others only did 1 – 3 or 1 – 4. In total, there were 377 individuals with ASD represented in these studies. To prove their hypothesis, that PECS could be shown as an efficient way of teaching communication, the authors related the percentage of studies that shared the same results with the percentage of studies that did not, meaning those in which

PECS was successful vs. those in which another form of communication was sought. While they found many cases of success with all phases tested (89.1%), they took issue with whether the tests were sufficiently random. They continue to attest that studies with few subjects are not as generalizable as ones with larger populations.

The fifth study compared the use of Responsive Education and Prelinguistic Milieu Teaching (RPMT) and PECS (Yoder, 2006). The authors wanted to know which program would be best to get children with autism to initiate joint response. RPMT is similar to PECS in that it can be used as a foundation for communication creation. The difference is in RPMT's approach. It has a structure, but nothing as rigid or planned as PECS. In RPMT, the interventionist will wait until the child initiates communication. The concept is to let the child lead in his/her communication growth by having the instructor participate in activities with the child, such as games or eating and responding to each attempt the child makes. PECS is similar to that except that the interventionist will guide the activities and is the first to initiate communication. Thirty-six children between the ages of 2 and 5 were chosen for this study. Each child met the prerequisite of being diagnosed with autism and speaking fewer than ten words when communicating. Nineteen of the children were assigned to PECS and the others were assigned to RPMT. The children received three 20-minute sessions per week for 6 months in a university clinic. The interventionists were trained in their respective programs during a 2-day workshop. The PECS interventionists followed the PECS procedures as laid out in the PECS manual, with the only exception being that the sessions were only for 20-minutes as opposed to being throughout an entire day. The interventionists were overseen by a professor with a master's degree in speech-language pathology. While the report does say that PECS was shown to be more effective than RPMT (3.84 uses to 1.06

uses, respectively), it does not say what parts of PECS were taught. It would appear that they did not do anything beyond Phase 1 because all the child had to do was pick up a picture, without discrimination between other pictures, and initiate interaction, for which the child was given that object. The concept they were testing was which of these two programs showed the most likely signs of continued success based on the initial phases and which one was better at initiating joint response.

The sixth study by Dogoe (2010) used three preschool aged children: Tony (3 years, 8 months), Brooke (3 years, 8 months), and Ray (5 years, 1 month). Each child was diagnosed with autism and was either nonverbal or verbal with limited or no functional communication skills. Only the first three phases of PECS were implemented (up to request discrimination). Each child was able to master all three phases. The intended goal of this study was to see if PECS use could be generalized across settings and persons once the first three phases had been mastered. While it is important that children be able to learn and use PECS, it is even more important that they be able to use it with people other than their teachers in a setting other than their school. In this case, the children were taught PECS in the home by family members and then, once the phases had been mastered, were tested on their use in a psychology clinic with a clinician. All three children showed that they could generalize PECS across setting and persons. This shows that PECS is a useful instrument in allowing children to communicate with the world around them.

The seventh article used PECS invention in the home with preschool-aged children (McConkey, 2008). Thirty-five families with preschool-aged children (sixty-one children total, fifty-five boys and six girls with a mean age of 2.8 years) that had been diagnosed with autism were recruited for this process, as well as twenty-six families with preschool-aged

children with autism to be used as a control. The control group received no training in PECS or therapy. They were given general information about autism and educational toys for the children. The other families were trained in how to use PECS as well as receiving therapy once a week (for a total of 18 visits/weeks) from a specialist trained in PECS. While the study does not go into great detail on their use of PECS, Phase 3 was the highest level taught to the families. The results of the study indicated that the families that received therapy and training had higher rates of communication with their children than the families who did not receive any help. This study also shows that using PECS at an early age and in the home will help establish communication skills for non-verbal children.

The final article that was reviewed compared the use of PECS against the use of sign language for encouraging non-verbal children to communicate (Tincani, 2004). The author studied two preschool aged children, Carl (5 years, 10 months) and Jennifer (6 years, 8 months). American Sign Language and PECS were chosen for these children because, while both of them showed no verbal expression, they were able to make vocalizations and used gestures to indicate things they wanted. In this experiment, the children were taught both PECS and sign language at the same time. Then when given a desired object, the hope was that they would choose to use one or the other to get said desired object. This was done in a classroom with an instructor who was trained in both PECS and sign language. For the sign language the children were taught the signs for each of the desired objects, most of which were toys, and then those signs were practiced and repeated until the children had memorized them. The PECS instruction followed the typical steps in PECS, concluding with the mastery of Phase 3. This study produced mixed results in that sign language worked better for Carl and PECS worked better for Jennifer. PECS was discontinued for Carl after he could not

master Phase 1. Sign language was discontinued for Jennifer because she was having such a positive response to the PECS. However, both children exhibited higher amounts of vocalization requests while using sign language. In fact, with Jennifer, the farther along she progressed in PECS, the lower her word vocalizations became. While the results are mixed, this study does show that PECS can be more useful than sign language for increasing word vocalizations, but it is dependant on the temperament of the child.

Table 2

*Complied Article Data Results*

Name	Age	Diagnosis	Age Equivalency	Highest Phase Implimented	Highest Phase Reached by Child	Study
Derek	Preschool	PDD-NOS	NA	Phase 3	Phase 2	Beck 2008
Susan	Preschool	SLI, apraxia	NA	Phase 3	Phase 2	Beck 2008
Mitchell	Preschool	ASD	NA	Phase 3	Phase 1	Beck 2008
Brad	Preschool	ASD	NA	Phase 3	Phase 1	Beck 2008
Tony	3 yrs 8 mos	ASD	1 yrs 6 mos	Phase 3	Phase 3	Dogoe 2010
Brooke	3 yrs 8 mos	ASD	3 yrs 9 mos	Phase 3	Phase 3	Dogoe 2010
Ray	5 yrs 1 mo	ASD	1 yrs 4 mos	Phase 3	Phase 3	Dogoe 2010
Gail	5 yrs 8 mos	ASD	0 yrs 7 mos	Phase 4	Phase 4	Ganz 2004
Ramon	7 yrs 2 mos	DD, SLI	NA	Phase 4	Phase 4	Ganz 2004
Ben	3 yrs 9 mos	DD, SLI	2 yrs 2 mos	Phase 4	Phase 4	Ganz 2004
Gasper	4 yrs 5 mos	ASD, DD, aphasia	NA	Phase 4	Phase 4	Ganz 2007
Leo	3 yrs 1 mo	ASD	0 yrs 3 mos	Phase 4	Phase 3	Ganz 2007
Elise	5 yrs 1 mo	ASD, DD	1 yrs 3 mos	Phase 4	Phase 1	Ganz 2007
Carl	5 yrs 10 mos	ASD	NA	Phase 3	Phase 1	Tincani 2004
Jennifer	6 yrs 8 mos	PDD-NOS	NA	Phase 3	Phase 3	Tincani 2004

ASD: Autism Spectrum Disorder

DD: Developmental Delay

SLI: Speech/Language Impairment

AE: Age Equivalency

PDD-NOS: Pervasive Developmental Delay-Not Otherwise Specified

NA: No Assessment Done

## Conclusion

Alex is now six years old and attends a school for children with special needs. The PECS program he went through concluded at the end of his school year in 2009. He completed all six phases. His verbal communication rate has dramatically increased and he is more apt to verbally communicate his needs and wants. In turn, the rate of negative behaviors has decreased greatly. Not only has his ability to communicate lowered his frustration, but he is also more independent as well. His parents have reported that he is initiating asking for things and on occasion retrieving the desired object himself. He verbally asks for things that he wants or needs. This has greatly reduced the number of negative behaviors he had been having.

Though he has graduated from the PECS program, there are still areas in his communication that are lacking. According to the PECS system, at completion of Phase 6 the child should be able to speak in full sentences and initiate conversation without prompts from those around them. Alex does initiate communication; however, it is only when he is in need of something. In the articles I had reviewed and in my own personal experience with children who have completed the PECS system, the children speak in full sentences, but the initiation of conversation is little to none. While the children may have graduated from the use of the PECS system, the program seems far from complete.

Per the completion of Phase 6, the child's communication board should no longer be of use. The system states that the child should have been eased into verbal communication while the communication aid is faded out. Alex, a graduate of the program, still carried a small communication board. In my experience in the field, I have worked with other graduates of this program. Of those children, only two have stopped carrying a

communication aid with them. The other children have at least one small aid with them at all times.

This seems to be a major flaw in the PECS system. In all the articles reviewed for this study, not a single one offered any evidence that the subjects in their studies would ever stop using PECS. In fact, it was never even discussed as an end goal of any of the studies. PECS has been proven to make communication easier for those with autism; however, it also gives the users a ready-made crutch. The card system isn't faded out properly before the end of the program. What I see most often is an over-reliance on the cards and not enough actual vocalization. Why should a person bother to use verbal expression when they already have something simple and functional to use? In fact, that is what appeared to have happened in Tincani's study (Tincani, 2004) with Jennifer. As she increased her use of PECS, her need for speaking decreased. Using PECS was a much more efficient way of getting what she desired than attempting to make the sounds and words that were being asked for.

This is what I consider to be the problem with Phase 6 of PECS. Even though the idea is that a student will begin communicating verbally, it does not account for desire. It seems to just assume that everyone wants to communicate verbally. Even though the program is built on verbal expression, it has nothing built into it to create a desire within the user to communicate verbally without the use of PECS. It is always limited to using the pictures to get things the user wants. This appears to have happened to Alex.

Perhaps what PECS needs is a seventh phase. This phase could be called Phase 5.5 and come between 5 and 6. PECS, while it is an extremely useful communication tool, does not seem to have a built in system for weaning children off of it. With the amount of time spent to get a child to pick up the cards, let alone remember to use them, it seems odd that

there is not a clear “step down” procedure for moving into Phase 6. This new phase would be just as long, if not longer, than Phase 5. It could start by making fewer cards/pictures available to the child. This could force the child to use their vocalizations and say what they want. If vocalization is the primary end-goal of PECS, then more time must be spent on using those vocalization skills that were created in Phases 3, 4, and 5.

Alex is only six years old. It is possible that, in time, he will become more verbally expressive. Alex is currently enrolled in a center-based program. He still uses his PECS cards while at school. His teachers are hoping that in the next year he will stop using the cards altogether. He is still meeting regularly with a speech therapist who is working on developing his verbal expressiveness. He, too, appears to be a student that, while having the ability, lacks the desire to communicate verbally. While there is no doubt that PECS has improved his ability to communicate with his family and others, for now he will remain in a world of silence that is broken only when he needs something.

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