

**CAMP TALK:**  
**An Exploration of the Dimensions of AAC and a Proposal for**  
**Maximizing the Potential for Communicative Growth**  
**at a Participation-Based Summer Camp**

By:

**Halley Carmack**

Senior Honors Thesis  
Program in Linguistics  
Duke University  
Spring 2008

## **Acknowledgments**

I would like to thank everyone who has guided me and helped to shape this project from the start. First I would like to thank my thesis advisor Dr. Julie Tetel to whom I am indebted for the completion of this project—without her support and confidence in me this project would likely not have been completed. Also, I am deeply grateful to Dr. Karen Erickson for her insightful and thought-provoking suggestions that helped to guide my theoretical explorations in new directions.

Further, I am thankful to Dr. Ed Thile and Heather DeFelice at County Speech in San Diego, CA for the opportunity to have participated in Camp Talk as a camp counselor and for helping me obtain permission from parents. Without that experience this project would not have been what it is, and I may not have discovered the fascinating field of AAC for some time. Thanks are due also to the children who participated in Camp Talk during the summer of 2007, their families, and the other counselors at camp. Thank you for the opportunity to learn, play, and grow with you—it was an invaluable experience and I was in wonderful company. Thank you also for supporting this project with your permission to include your stories. Genevieve, thank you for your emotional support and friendship throughout camp, it would not have been as enjoyable and memorable as it was without you!

Emily and Linda, I am so grateful that we got to experience this journey together—I can't imagine having written it any other way. Finally, I would like to thank my family and friends for their support throughout this year. Thank you for your patience when mine was limited and for helping me work through problems and obstacles as they arose. I'm grateful especially to my mom and my boyfriend for their unwavering confidence in me, their love and their patience.

## **Abstract**

Augmentative and Alternative Communication (AAC) serves as an individualized multi-modal support system or replacement for individuals with complex communication needs who have difficulties with natural speech production, and can offer the opportunity for increased participation in the daily events of an individual's life as well as in the community. Last summer I participated in a camp for disabled, nonverbal children who use Voice Output Communication Aids (VOCAs), a specific and high-tech AAC system, to communicate. Through my experiences and observations at camp I became enthralled by this field and sought to expand my knowledge through this project. This camp, Camp Talk, thus serves as the practical basis for a theoretical exploration of alternative forms of communication or systems of AAC. Through a review of the literature, this project will explore several topics concerning the field of AAC including: the evolution of the field of AAC as well as the devices that therapists can now offer their clients; an overview of the discipline including choosing a system; the fundamental differences and limitations for individuals acquiring systems of AAC; and the effects of AAC on natural speech production. Finally, based on my experience at camp, I propose a change in organizational and structural strategies in order to more effectively maximize the potential for language and communication growth for the participants at camp. It is argued that a change in organization toward a camp organized by the communicative competence of the participants will allow for more individualized activities. Further, the structural addition of a familiar typically developing peer and regular peer training will create opportunities for growth through peer modeling as well as increasing the chance that growth achieved at camp will be generalized to other contexts.

## Contents

Acknowledgments.....	ii
Abstract.....	iii
Contents.....	iv
I. Introduction.....	1
Table 1: Demographic Characteristics of Camp Talk Participants.....	5
Figure 1: Camp Talk Sample Schedule for the Day.....	7
II. The History of Augmentative and Alternative Communication in the United States:	
From Speech Therapy to the Union of Communication and Technology.....	11
Figure 2: Evolution of AAC Devices.....	23
III. Augmentative and Alternative Communication: An Overview.....	25
Figure 3: Examples of Aided AAC Systems.....	27
IV. Limitations and Differences in the Acquisition of an AAC System.....	37
V. AAC and Natural Speech: Reviews on the Affects of AAC for Speech Production.....	53
Table 2: Aspects of SGD use that may promote natural speech production.....	59
VI. Organizing and Structuring a Camp for Children who use AAC Systems.....	63
VII. Conclusion.....	83
Appendices	
Appendix A – Camp Talk: Training Materials.....	87
Appendix B – Camp Talk: Sample Camper Profile.....	89
Appendix C – Camp Talk: Camper Information and Photos.....	90
Appendix D – In-Depth looks at Autism and Cerebral Palsy.....	95
Bibliography.....	105

“Communication is about touching other people and about having our lives touched by others. Communication is about laughing and arguing, learning and wondering why, telling stories, complaining about what is or what isn’t, sharing dreams, celebrating victories. Developing communicative competence allows us to realize the essence of our humanity—to touch the lives of others and to be touched by others.”

-Dr. Janice Light (1997a)

“We believe that communication is the essence of life, which to me means that as *blood* is to *life*, *communication* is to *living*.”

-Dr. David Yoder (2001)

## I. Introduction

As Bedrosian (1997) states, “it is generally agreed that the language acquisition process in children [with complex communication needs] can be facilitated best by increasing their participation in natural contexts” (183). Yet according to Ronski and Sevcik (2005) there are few structured routines outside the home and outside the school day in which to place intervention with augmentative and alternative communication (AAC) systems during the typical day of the young child with complex communication needs (181). However, Batorowicz et al. (2006) describe two programs in Canada designed especially for children who use these unique forms of communication. The authors state that users of AAC often take part in more passive activities, limiting the extent to which they can take part meaningfully in typical activities in their local community. Moreover, because these children need more varied types and degrees of support for successful communication, participation tends to be far more challenging for facilitators. For these reasons, the Thames Valley Children’s Centre in London, Ontario, Canada has developed the Opportunities to Participate initiative to “support children, youth, and families in discovering their unique interests, needs, and opportunities to participate” and to develop partnerships with local community organizations to promote the value of meaningful participation and provide leisure and recreation programs to meet these children’s needs (Batorowicz et al., 2006: 179). Through this initiative, this children’s center has been able to create several programs for children who rely on AAC including *StoryTime*, *Dress Up and Drama*, *Food Talk*, *Mousing Around*, *Surfing Around*, *The Writing Zone*, and *You’ve Got Mail* (Batorowicz et al., 2006).

These programs give children reliant on AAC the opportunity to be on their own and to interact with unfamiliar people outside their immediate social network—opportunities which are

often rare. Parents frequently have fears about their children attending programs in unfamiliar environments with people who do not know their child. In addition, adapted materials may not be available in regular programs to support successful participation. To address these concerns, AAC clinicians in these programs provide education to community facilitators regarding AAC devices and strategies, rules for communicating with individuals who use AAC, and communication facilitating and prompting strategies. These supportive communicative contexts allow each participant to have at least one opportunity to interact in every activity using a variety of communicative functions including turn taking, requesting, choice making, social comments, and exclamations (Batorowicz et al., 2006). Over the summer of 2007, between my junior and senior years of college, I had the opportunity to be a camp counselor at a camp that allowed similar opportunities for children and adolescents using AAC.

The camp I participated in is a day-camp in San Diego, California, for disabled, non-verbal children who used Voice Output Communication Aids (VOCAs) to communicate. Although, as counselors, we were always trying to find ways to best facilitate communication with the children's devices, the camp was not run with a therapeutic goal in mind. Instead, the camp served as a place where kids could meet other kids as well as adults who use AAC, develop real life communication and social skills, participate in fully accessible camp activities, try new experiences, build self-esteem and confidence, and just have fun and be kids. As part of the camp, campers were able to participate in such activities as daily arts and crafts, music and singing, skits, nature walks, storytelling, games, boating, swimming, marine life exploration, and of course making friends—all of which were things they could then tell their parents about at the end of the day.

The camp, called Camp Talk is run by County Speech of San Diego, a private Speech-Language Pathology clinic that treats both children and adults in disorders from stuttering to swallowing as well as conducting classes on Baby Sign, English as a Second Language, and reading classes for young children. The camp was started about six years ago by the director of the clinic and another speech-language pathologist who were interested in having group therapy opportunities for children acquiring AAC systems for communication. The camp is in session for three weeks every summer on Fiesta Island in Mission Bay at the Youth Aquatic Center (a facility owned and operated by the Boy Scouts of America) allowing for fun and unique experiences for each campers.

This summer, a total of 23 children between the ages of five and eighteen (Mean = 12.3; median = 14) participated in the camp over the course of the three weeks it was in session. The first week seven children participated ranging in ages from five years old to ten years old. The second week seven children also participated ranging in ages from six to sixteen, and the final week of camp nine children participated ranging in ages from thirteen to eighteen years of age. Campers' most numerous diagnoses were cerebral palsy ( $n = 9$ ) and autism ( $n = 6$ ) with other diagnoses including Fragile X Syndrome, Down syndrome, Asperger's Syndrome, severe Mental Retardation, Trisomy 9, Recurrent Respiratory Papillomatosis, Rett Syndrome, and Muscular Dystrophy. The children used a variety of communication methods including vocalizations, facial expressions, gestures and PCS symbols ( $n = 3$ ), while all the children used a Speech-Generating Device (SGD) including simple devices ( $n = 3$ ) and dynamic display devices ( $n = 20$ ). Each week the dynamic of the group changed not only because of the children's individual personalities and needs but also based simply on the fact that by age and developmental level they were at varying points of competency with their devices. Moreover, at any given time there

were children at camp who had very different disabilities and needs that had to be catered to—from some who were fully mobile and independent to those who were wheelchair bound ( $n = 10$ ) and needed assistance with most all daily activities from feeding and moving to toileting and changing. Table 1 summarizes the demographic characteristics of the children who participated in Camp Talk during the summer of 2007.

At camp each child was assigned a counselor who was their buddy for the entire week. All the counselors were volunteers, mostly from the greater San Diego area, and all with varying levels of experience and familiarity not only with the speech-generating devices with which these children communicated but also with the disabled population in general. Some counselors were licensed and certified Speech-Language Pathologists in either private or public practice who were participating in the camp as a means to get Continuing Education credits whereas others, like me, were high school or college students who had little to no experience or training at all going into it. All counselors went to a three hour training before the start of the camp where we were briefly introduced to different activities we would be doing at the camp, received information sheets about our campers, and got to explore with different devices that a representative of DynaVox technologies brought in for us to look at. Given my very limited knowledge concerning all aspects of the camp including speech disorders, speech-generating devices, and working with disabled children, I felt that the training overall was inadequate, and that I was grossly unprepared for the first day of camp since the camper profile and the materials provided at training were the only documents we received and provided all of the base knowledge I had going into camp. A copy of the training materials provided to the counselors as well as a sample camper profile can be found in Appendices A and B.

TABLE 1 Demographic Characteristics of Camp Talk Participants

Participant <sup>‡</sup>	Age	Gender (M/F)	Diagnoses <sup>+</sup>	AAC systems	Access to systems
<i>Week 1</i>					
Sonny	5	M	Autism	Vocalizations, gestures, head shake/nod, DynaVox MT4	Direct with finger
Jacob	6	M	Autism	Vocalizations and speech approximations, head shake/nod, Tobii ATI MiniMerc	Direct with finger
Max	7	M	Autism	Vocalization and speech approximations, head shake/nod, DynaVox MiniMo	Direct with finger
Ben	8	M	Autism, general neuromotor disorder, epilepsy	Vocalizations, head shake/nod, DynaVox MiniMo	Direct with finger
Trenton	8	M	Cerebral Palsy	Head shake/nod, DynaVox DV4	Direct with finger
Bobby	10	M	TRACH dependent with Recurrent Respiratory Papillomatosis (HPV)	Vocalizations, head shake/nod, Tango	Direct with finger
Grace*	10	F	Rett Syndrome	AMDi TechTalk 8	Direct with hand
<i>Week 2</i>					
Sarah	6	F	Cerebral Palsy, Kernicterus	DynaVox DV4	Visual scan with feet
Trevor	10	M	Muscular Dystrophy	Vocalizations, DynaVox DV4	Direct with finger
Holly*	13	F	Down syndrome	Vocalizations and speech approximations, gestures, head shake/nod, DynaVox MiniMo	Direct with finger
Michella	14	F	Cerebral Palsy	Vocalizations, head shake/nod, DynaVox DV4, PCS symbols on lap tray	Direct with finger
Brandon	14	M	Cerebral Palsy	Vocalizations, DynaVox DV4	Direct with finger
Tyre	15	M	Cerebral Palsy	Vocalizations, head shake/nod, Vantage Plus	Direct with head mouse
Brian	16	M	Developmentally Delayed	Vocalizations, gestures, head shake/nod, DynaMyte 3100	Direct with finger
<i>Week 3</i>					
Chris	13	M	Autism	Vocalizations and speech approximations, head shake/nod, DynaVox MiniMo, booklet of PCS symbols	Direct with finger
Jessica M.	14	F	Cerebral Palsy	Vocalizations and speech approximations, head shake/nod, DynaVox MT4	Direct with finger
Matt	14	M	Cerebral Palsy	Eye gaze, Vantage	Direct with head mouse
Christian*	16	M	Fragile X Syndrome	Vocalizations and speech approximations, gestures, head shake/nod, DynaVox MiniMo, booklet of PCS symbols	Direct with finger
Erin	16	F	Asperger's Syndrome	Vocalizations, gestures, head shake/nod, LightWRITER	Direct with finger
Jenna	16	F	Autism, severe mental retardation	Head shake/nod, Words+ MessageMate 40	Direct with finger
Jessica P.	17	F	Trisomy 9	Head shake/nod, DynaMyte 3100	Direct with finger
Pedro	17	M	Cerebral Palsy	Vocalizations, head shake/nod, DynaVox DV4	Direct with finger
Maggie	18	F	Cerebral Palsy	Vocalizations, head shake/nod, DynaMyte 3100	Direct with finger

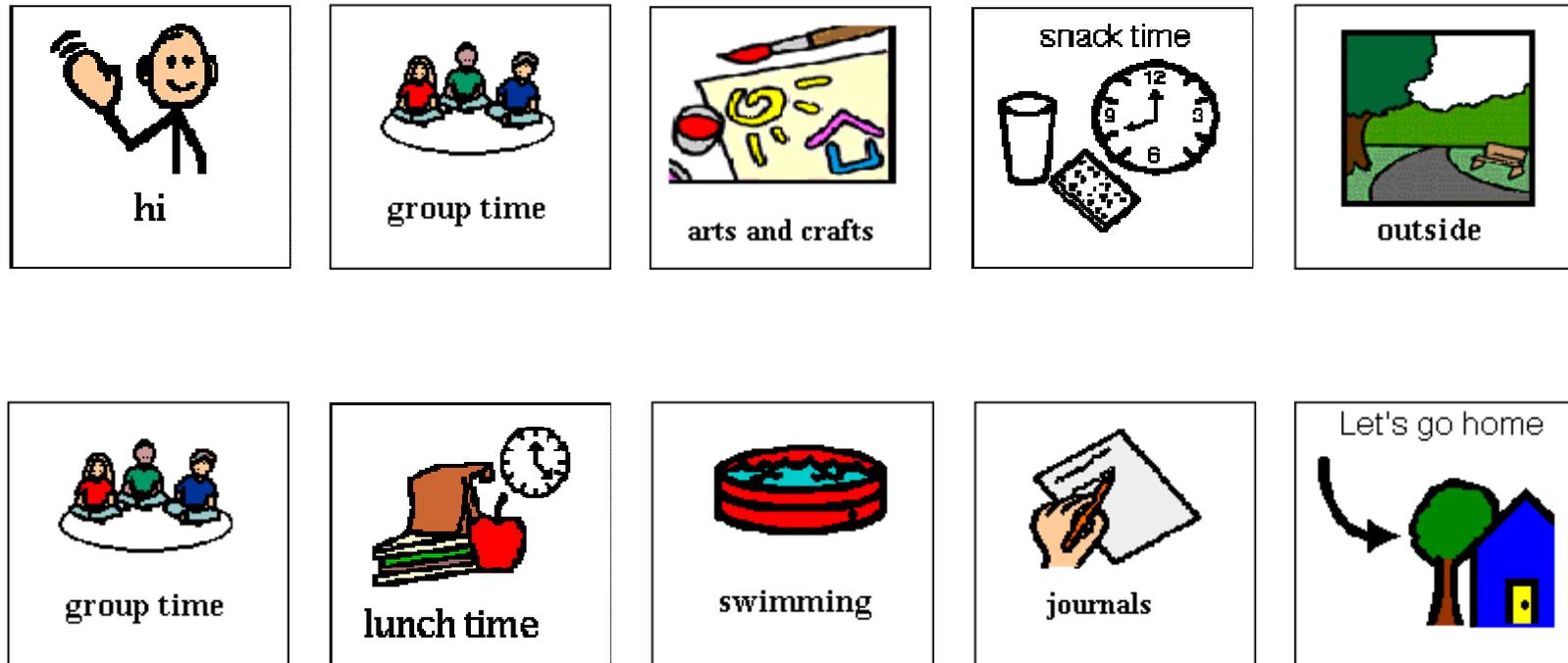
‡ Written permission was obtained from each parent to use their child's name and personal information in this project

\*My camper for the week + As reported by the camper's parent on the Camp TALK application

During camp, each counselor was responsible for the participation of his or her camper throughout the day's activities. The responsibilities of the counselor included maintaining the safety of his or her camper, transitioning his or her camper between activities, making sure that they got snack and lunch, assisting in toileting and changing, and most importantly, each counselor was to help their camper in participating as actively as possible in each activity and in using their device as often and as meaningfully as they could. Essentially each camper's counselor was their primary facilitator and primary communicative partner for the week. They ensured that their camper was optimally positioned, that their AAC equipment was available and set up, and that appropriate vocabulary choices were available; counselors were also charged with providing opportunities to communicate in as many situations and contexts as possible throughout the day.

A typical day at camp started at nine o'clock in the morning when the campers arrived and settled in to play with different toys and books laid out throughout our Hawaii-themed room at the Youth Aquatic Center. When everyone had arrived and was settled in, we went around and greeted everyone, giving every camper a chance to participate by saying "hello" and sharing something about themselves with the other campers. We encouraged parents to program the other campers' names into their child's device so that each child could help take role throughout the week. While we were together as a group the director went over the daily schedule provided in large PCS symbols on a white-board in the room. An example of a schedule is provided in Figure 1. If there was time then we would sing a song (e.g., "Old McDonald had a Farm," "Who Stole the Cookie from the Cookie Jar" or "Icky Sticky Bubble Gum") giving every camper a chance to contribute a line or cue for how the song should continue. When the song was done

Figure 1. Camp Talk: Sample Schedule for the Day



This schedule is a generic example of a day's activities at Camp Talk. Examples of "group time" included singing songs, reading stories, and conducting friend interviews. On certain days there were special events such as a visit to the touch tanks at Sea Camp, canoe and motor boat rides with the Boy Scouts and a talk by our weekly guest speaker, Jennifer Johnson. A large schedule was posted on the white board in the room, and each child and their counselor were given a small copy. Throughout the day as each activity was completed the counselor turned over the symbol to help each child in transitioning.

and everyone had participated we moved to the table to do arts and crafts. This activity followed the Hawaii-theme of the week and included things like decorating foam fish, making leis, and decorating picture frames that would be used to frame a picture from camp at the end of the week. Next was snack time. Some days the campers all worked together to make the snack (e.g., Hawaiian punch or “Dirt” pudding at the end of the week) and other days we provided crackers and juice and they were to request portions. After snack we often went outside to do an activity such as “I spy” or “Camper Says...”. Before lunch we got back into group and read the children’s book *Footloose the Mongoose* that would be used as the basis for a skit performed by the children at the end of the week. At lunch we ate outside near the Boy Scouts who we were sharing the facility with, and after lunch we often had a special activity such as swimming (twice a week), motor boating or canoeing with the Boy Scouts. One day the campers even got to go to Sea Camp to see and touch different sea creatures including everything from starfish to sharks. After these activities we went back into the room to change out of our bathing suits and to write in the campers’ journals about everything that had happened that day. Throughout this activity, campers were encouraged to tell which activities they liked most and to make comments about what they’d done and who they’d done it with. During this time of the day, the last hour of camp, parents were also invited to come and participate in special sessions with the camp director where they had a chance to connect with other parents and learn about things such as literacy development for their children. One afternoon during the week we had a guest speaker come to speak to the children and their parents, a woman with cerebral palsy named Jennifer Johnson who has been using a VOCA for many years. And on the final day of the week the children performed the skit that we’d prepared throughout the week for their parents and siblings.

Those three weeks at Camp Talk had an enormous impact on me. Previous to my experience with Camp Talk I had a somewhat insignificant interest in Speech-Language Pathology. Although I had pretty extensive experience working with school-aged children, I had never worked with children who were disabled or had special needs, and the only exposure I had to speech pathology and therapy was one day of observations two summers before I participated in this camp. Yet now, after those three weeks in San Diego, I know that this is a field I want to pursue—I find it incredible to see the personalities of these children come out through their devices when they may not otherwise have had a way to express themselves.

This camp has introduced a new possibility concerning what path I may take after graduation, and this honors thesis will serve as a further more theoretical exploration into augmentative and alternative communication (AAC). First, the evolution of the field of AAC will be presented taking into consideration the social and technological advances that have brought the field to where it is today. Then, an overview of this unique form of communication will be given followed by a discussion of the limitations and differences presented in the acquisition of an AAC system. As a final point, the effects of AAC systems on natural speech production and an overall review of the communicative medium will be explored. Finally, I will propose that while Camp Talk as it was structured does provide unique and engaging opportunities for children and adolescents using AAC, structural and organizational changes concerning the grouping of campers by week could further maximize the potential for both fun and communicative growth for its participants.



## **II. The History of Augmentative and Alternative Communication in the United States: From Speech Therapy to the Union of Communication and Technology**

Given the prevalence and sophistication of the field of AAC at its current state, it is interesting to look back at the genesis and subsequent growth of this now so multidisciplinary field. The beginnings of what is now known as Augmentative and Alternative Communication started in the late 1950s, so overall this field has a somewhat short history of only several decades. As Dr. David Yoder, a contributor to the field from the beginning, points out in his presentation as the distinguished lecturer at the 2000 International Society for Augmentative and Alternative Communication conference in Washington, D.C., this field started when his title was still “speech therapist,” before professionals in this field became speech-language pathologists. He goes on to explain that in the early 1950s speech therapists who worked with populations of children who would now be almost immediately considered for AAC (most often, he points out, children with cerebral palsy), the primary goal of therapy was language comprehension, which was followed by intelligible speech at all costs. He recounts that in pursuit of this goal of intelligible speech by all, clients performed endless tongue exercises, breathing exercises, and other muscle controlling exercises. In fact, he says that “children licked lollipops, worked peanut butter off the palates of their mouths, choked, vomited, and turned blue—all because [speech therapists of the time] were determined they would use speech as their primary means of communication” (Yoder, 2001: 3). Finally, it was only if a child had reached the age of ten or twelve without achieving intelligible speech that a speech therapist would “resort” to a communication board—a means of what we now know to be augmentative and alternative communication. However, at the time these boards were primarily lap trays on wheelchairs, “consisting of pictures, letters, and words covered with a type of clear plastic or Saran Wrap,” made without copy machines, Mayer-Johnston pictures, or Velcro (Yoder, 2001: 3). For these

children, the high-tech devices of today were unimaginable as the first computers were still the size of an entire room—high-tech in the 1950s meant a mouth stick, head stick, or chin stick (Yoder, 2001: 3).

As is so clearly illustrated from Dr. Yoder’s professional anecdotes, this field has not only evolved theoretically in how it approaches and implements systems of augmentative and alternative communication for nonspeaking individuals, but also in terms of what technology is available to a consumer of AAC. The formation of this field was started by professionals in many settings, including medical, clinical, and educational, who had encountered situations and individuals like those described above. These innovative individuals were challenged to find alternatives to help affect more functional communication methods for their clients and responded with creative strategies and materials that laid the foundation of the field today (Zangari et al., 1994: 27-28). This section will provide a condensed overview by decade based on the Zangari et al. (1994) article “Augmentative and Alternative Communication: An Historic Perspective” of the societal and technological factors that contributed to the evolution of this ever-growing field.

### *1950’s*

In the 1950s, social and technological factors were primed for the emergence of a new way to address the needs of severely disabled persons concerning communication. For instance, advances in medical technology and pharmacology, namely antibiotics, increased both the size of the general population but also the number of people with disabilities since more children survived congenital and developmental disabilities in infancy and early childhood. Also, with adults living longer life spans, there was an increased risk for acquiring a degenerative disability (e.g., neurological diseases, trauma, stroke, etc.), and with the end of World War II, the overall

number of acquired disabilities had dramatically and quickly increased—a population for which the government was expected to provide rehabilitation (Zangari et al, 1994: 28). Thus, it was out of practical and clinical necessity that this field emerged.

In the beginning, only clinical and educational roots were formed, with little in the way of research. Throughout the 1950s and 1960s, there was an important shift in thinking about the disabled individual from the view that the primary need of these individuals is physical care and protection to a model that had a more humanitarian approach which emphasizes the need for cognitively impaired individuals to learn and develop skills that would lead to increased independence and a lifestyle more closely resembling that of their nondisabled peers (Zangari et al, 1994: 29). Furthermore, from a more social standpoint, a group of parents of disabled children formed the Association for Retarded Citizens and subsequently made a significant impact on services provided to moderately retarded children and youth, effectively increasing the awareness of the needs of disabled individuals and helping to expand the roles of communication specialists (Zangari et al, 1994: 29).

Initially, the only speech therapy clients thought to be in need of an alternative to oral communication were those who were incapable of speech as a result of a laryngectomy, but often these individuals were instructed to use written messages until they could learn to use esophageal speech or an artificial larynx. Eventually manual sign language began to be more readily accepted as a means of linguistic expression for children with hearing and cognitive impairments. By the end of the 1950's, the use of AAC was experimental at best and still fairly uncommon due primarily to the lack of documented strategies—the professional community at large was unaware of the possibilities that early AAC might have presented to their disabled clients (Zangari et al, 1994: 30).

## *1960's*

With the onset of a new decade, the 1960's brought a time of social change, technological advances, shifts in educational thinking, and insights from research which helped to set the stage for the true emergence of AAC as a new and multidisciplinary field. As a result of the increased advocacy for civil rights legislation for disabled individuals, the Disability Rights Movement of the late 60's and early 1970's in the United States helped generate substantial interest in AAC. This movement helped to change society's perception of cognitive impairment from a developmental problem to a socio-cultural problem, the result of being raised in an underprivileged and disadvantaged environment (Zangari et al, 1994: 30-31).

The research of this decade also had a great impact of the developing field of AAC. During this period, the "total communication" movement began—a philosophy that stressed the importance of multimodal communication. Proponents of this method advocated the use of all appropriate means of input and output to facilitate communication and learning. Moreover, it was at this time that basic research was being done with nonspeech symbols and nonhuman primates. This research helped provide insight into how chimps could be taught to use manual signs and other abstract symbols in a communicative fashion. Essentially these studies helped to broaden the academic perspective on language, language acquisition, communicative symbol learning, and increased the speech therapist's interest in providing similar symbol training to severely communication impaired individuals (Zangari et al, 1994: 31).

Eventually, researchers began to explore with several different aspects of what we now know as AAC. They began to become interested in those individuals who couldn't speak for physiological reasons (e.g., cerebral palsy) and thus began to experiment with aided systems of AAC. Others were using communication boards and Morse code. And finally in 1964, the Non-

Oral Communication System Project began at the University Hospital School in Iowa City, Iowa which was among the first to utilize empirical data to justify an alternate course of therapy for its clients with cerebral palsy (Zangari et al, 1994: 32).

Furthermore, while the transistor had been developed in the 1930's and 40's, it wasn't until the 1960's that there was finally a link between communicative (re)habilitation and technology with typewriter controls and other electromechanical devices. In fact, in 1963, the development of the Patient Operated Selector Mechanism by Maling and Clarkson was heralded as an enormous advance for individuals with severe physical and communication impairments and was awarded the Bell Grieve Memorial Award for the most significant contribution to the field of rehabilitation (Zangari et al, 1994: 32). These efforts of individual researchers, engineers, and clinicians help to suggest the powerful potential of AAC strategies for individuals with severe communication impairments and encouraged further exploration in the decade to come.

### *1970's*

Early in the 1970's the United Nations issued a Declaration of the General and Special Rights of the Mentally Handicapped which emphasized the universal rights of these individuals to educational services that would allow them to develop to their fullest potential. Not long after, the United States responded with the Education for All Handicapped Children Act which decreed that free and appropriate public education and related services (i.e., therapy) be provided to all students who needed them (Zangari et al, 1994: 32). Since it was initially passed, this law has been extended to include all children birth through twenty-one or twenty-two years of age. Also, professionals working with individuals with cerebral palsy asserted that communication is a fundamental right of every individual and that communication intervention programs should include the use of graphic symbols to augment previously acquired skills (Zangari et al, 1994:

33). These changes in public as well as professional attitudes helped pave the way for AAC as a field.

The 1970's also saw the birth of several new techniques and communication devices. Several pedagogical or contrived manual sign systems which promoted the overall use of manual signs and facilitated the use of syntax that paralleled spoken language were developed, as well as a system of semantically based, generative graphic symbols called Blissymbols. This system, created by Charles K. Bliss, is comprised of combinations of pictographic, ideographic, and arbitrary components designed for children with cerebral palsy who were unable to use traditional orthography effectively, and since its introduction, it has been use internationally as an alternative communication source for communicatively impaired individuals (Zangari et al, 1994: 34). In 1974 the Talking Brooch allowed its user to manipulate a miniature keyboard and produce words on a light-emitting diode (LED) display that was pinned to the shoulder of the user, and in 1976, Auto-Com, a device developed at the Trace Research and Developmental Center for the Severely Handicapped, displayed the user's selections on a LED screen or printed them out on a strip of paper. This device was user-programmable and correctable which added a much desired degree of flexibility for the user and was considered portable at seventeen pounds which allowed the user to take it to different communicative environments (Zangari et al, 1994: 34). Toward the end of the decade communication devices based on microcomputer technology (e.g., Express 1, HandiVoice, and Form-A-Phrase) and other adaptive communication aids including call signals, scanning devices, switches, eye gaze boards, and symbol boards and books began to be commercially available as well (Zangari et al, 1994: 34).

During the mid to late 1970's, a base of systematic research finally began to emerge which helped practicing professionals increase their awareness of communicative options for

individuals with little or no functional speech. In fact, it was during this decade that AAC really seemed to become a field of its own: the first books that concerned AAC in any great deal began to appear which was a much needed compilation of resources; the first courses devoted entirely to AAC were offered at a few universities during the 1977-1978 academic year; and in 1978 the American Speech-Language-Hearing Association (ASHA) formed an Ad Hoc Committee on the Communication Processes of Nonspeaking Persons (Zangari et al, 1994: 35-36). Thus, the status of AAC was changing considerably during this decade, going from a relatively obscure position to one of ever-expanding visibility and familiarity.

### *1980's*

The 1980's was a decade of growth and refinement for the field of AAC with professionals expanding their commitment in three ways: increasing the knowledge base, disseminating the information they gathered, and increasing the quality of services to individuals with severe communication impairments (Zangari et al, 1994: 36). In 1980 and 1982, the first two International Conferences on Nonspeech Communication were held. The second meeting eventually led to the founding and further development of the International Society for Augmentative and Alternative Communication (ISAAC), an organization that has worked to promote consumer involvement as well as to improve service delivery, scholarship, research, and the dissemination of information in the field of AAC (Zangari et al, 1994: 37). In 1985, ISAAC published the first issue of their journal, *Augmentative and Alternative Communication*. This quarterly journal publishes position and issue papers, research reports, and case studies related to various aspects of AAC. Overall, ISAAC continues to be a major international influence in the field with over 2,500 members from 47 different nations (Zangari et al, 1994: 37-38). Further, in 1988 the Technology-Related Assistance for Individuals with Disabilities Act was passed which

aimed to increase the disabled individual's accessibility to adaptive equipment by providing funding to coordinate existing resources and develop model programs, and in 1989, ASHA formed a permanent AAC committee (Zangari et al, 1994: 37).

During this decade, communication aid manufacturers began to play a bigger role in the field by giving scholarships and consultation services to professionals as well as consumers. There was also continued growth in the area of the development of appropriate symbols for representing particular messages as many graphic symbol sets and systems were developed in this period (Zangari et al, 1994: 39-40). Moreover, there were several important advances in the technological arena as the number and variety of commercially available communication devices increased. With increases in computer memory, advances in synthetic speech, and improved graphic capabilities, AAC devices were more powerful than ever before. New speech output devices were available, including: AllTalk, Touch Talker, Say-It-All, SpeechPac/Epson, Special Friend Speech Prosthesis, Trine System, Vocaid, VOIS, and WOLF; those with digitized speech capabilities included: Prentke Romich IntroTalker and Zygo's MaCaw. The commercial availability of these aids allowed both consumers and their families many more choices and more access to support services. This generation of devices included significant improvements in sophistication, speed of performance, and dependability as well as improvements in both miniaturization and affordability (Zangari et al, 1994: 40). Additionally, communication aid technology was also increasingly applied to non-English-speaking nations during the 1980's with devices in German, French, Italian, Spanish, Swedish, and Ewe, a West African language (Zangari et al, 1994: 41).

## *1990's*

The 1990's brought even more growth to the field. The Assistive Technology Law and Americans with Disabilities Act helped to further increase public awareness, but the fact that funding levels did not often match the awareness or need level, often created frustrating situations. Also, it was during this decade that the words "inclusion" and "empowerment" began to first appear in professional literature as part of a social commitment to increasing the independence of individuals with disabilities and to increase their involvement in the mainstream of society. As a result, increasing numbers of special needs children began to be integrated into regular education classes (Zangari et al, 1994: 42).

Further, technological research and development led to even greater options in aided communication. For example, the emergence of DynaVox technologies (currently the primary support and provider for the greater San Diego area and for most of the campers at Camp Talk) represented a generation of new devices that employed dynamic features that could improve the learning and retention of vocabulary storage (Zangari et al, 1994: 42). Research and development into voice-output technology led to synthetic speech in many more language and dialects than was available previously. For example, Adamlab's WOLF was available in Mexican Spanish, Canadian French, German, Dutch, Japanese, Hebrew, Palestinian Arabic, and Hindi (Zangari et al, 1994: 42). And finally it was in this decade that AAC made the transition to becoming a more mainstream intervention technique and a more respected and recognized field in general with the advent of the Vocal Assistant. This device was designed for hospital use with people who may be temporarily vocally impaired as well as those with more permanent conditions (Zangari et al, 1994: 43).

### *Contemporarily*

Currently the leading providers of high-tech speech-output devices in the United States and internationally are DynaVox Technologies and the Prentke Romich Company. DynaVox Technologies began in 1983 as Sentient Systems Technologies, Inc., and their first commercial product, the EyeTyper, was a tool that allowed disabled individuals the ability to communicate by composing and producing messages through eye-gaze techniques. When the company sold the patent for the EyeTyper to the U.S. Navy, the profits were used to develop AAC solutions that would benefit more people. In 1991, the first DynaVox branded products featuring touch screens and dynamic displays were shipped to consumers, and by 1993 word and grammar prediction had been added to their devices to allow for increased speed of production. In 1999, Sunrise Medical Inc. merged with Sentient Systems to become DynaVox Systems, Inc. and began producing the world's first AAC device to combine digitized speech with a dynamic display. Finally, in 2004 DynaVox partnered with Mayer-Johnson Inc., the developer of the popular Picture Communication Symbols (PCS) communication system and Boardmaker, and became DynaVox Technologies (DynaVox Technologies, 2008). Their latest devices, the DynaVox V and larger Vmax, are essentially talking laptops as they can access the internet and allow the user to engage in both emailing and text messaging all from their device. Also, they use AT&T Natural Voices synthetic speech that they attest is "natural-sounding and easy to understand," and they can now accommodate the bilingual AAC user as the V and Vmax come in five bilingual options: English/Spanish; English/French; French/German; English/Dutch; and English/Norwegian (DynaVox Technologies, 2008).

The Prentke Romich Company (PRC), also a worldwide leader in the development and manufacturing of AAC devices, began in 1966 with the development of a typing system based on

a discarded Teletype machine. During the 1980's, they introduced a new concept for coding vocabulary called Minspeak and developed the TouchTalker and LightTalker, devices that were retired more than ten years later. In 2001 PRC released Vantage, a dynamic device that one of the campers at Camp Talk used, and in 2003 they released Vanguard II which featured synthesized and digitized speech, computer emulation, infrared environmental controls, and an integrated headpointing system for those users unable to use their hands (PRC, 2008).

Recently, within the last year, a new company has come into the market: Blink Twice, Inc. Blink Twice was started by Richard Ellenson whose son has severe Cerebral Palsy and is unable to communicate verbally. In an effort to help his son reach his fullest potential, Ellenson with the help of the industry's best professionals developed the Tango, a device designed for use by children with Autism, Cerebral Palsy, ALS, and other conditions. With the collaboration of several innovative professionals and clinicians, and some very powerful companies including Flextronics, the makers of the Xbox 360 and half of the world's cell phones, as well as Frog Design who worked on early Macintosh Computers, and content inspired by Nickelodeon and Hasbro, Blink Twice, Inc. has created a device that effectively targets and addresses the unique developmental and communicative needs of children in need of and acquiring AAC systems with speech-output (Blink Twice, Inc., 2007). Given the impressive and nearly immediate results of the use of this device, it will be very interesting to see where the industry will go from here and how DynaVox and PRC will respond to these developments.

Overall, the field of AAC has seen many significant changes throughout the decades. Since the 1950's this field has grown from something being tentatively explored by a few individuals to a field recognized and celebrated through international conferences and publications. While it was initially seen as a departure from traditional speech, occupational, or

physical therapies, it has become a more typical approach to communication intervention with its own tested models and theories of practice. Finally, there has been a significant change in the population of clients and users of AAC. While it started as being used solely with people who had no functional speech (e.g., laryngectomy, cerebral palsy, severe mental retardation), it is now used as an intervention method with severe speech impairments as a result of acquired disorders such as amyotrophic lateral sclerosis, Guillian-Barré syndrome, multiple sclerosis, Parkinsons's disease, brainstem stroke, respiratory insufficiency, spinal chord injury, closed head injury, and aphasia (Zangari et al, 1994: 46-47). The bottom-up quality of the origins of this discipline (i.e., the efforts of clinical interventionalists and educators preceded the actions of the researchers and academicians), have led to the formation of a field that has become very multidisciplinary in nature which helps in making AAC a discipline that considers the whole individual in assessment and intervention. A visual summary of the technological developments of AAC systems is presented in Figure 2.

## Figure 2: Evolution of AAC Devices

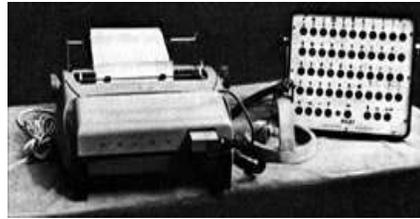
1970's—The beginnings of technological advances in AAC



“The Talking Brooch” (1974)—A wearable communication aid for individuals who could type on a keyboard held in the hand.



“AutoCom” (1976)—A programmable communication aid designed to allow users to directly select words and phrases



“Lightspot-operated Typewriter”—allowed people to control typewriters by simply pointing a beam of light.



“Canon Communicator”—was the world's smallest printing communication aid



“HandiVoice”—a portable communication aid with voice output

1980's—A decade of increases in computer memory, advances in synthetic speech, and improved graphic capabilities.



“Vocaid”—an electronic communication aid with synthesized voice output; used four interchangeable overlays



“Whispering WOLF”—pressure activated voice-output communication aid



“IntroTalker”—a device with a somewhat limited vocabulary and prerecorded phrases; capable of digitized speech.



“MaCaw”—a portable direct selection or scanning communicator. It uses digitized recording technology to provide nine minutes of continuous recording time

1990's—Further Growth



“Vocal Assistant”—a hand-held device capable of recording voice messages on 15 individual square keys. Originally used in hospital settings.



“DigiVox”—by DynaVox, this device, one of the company’s first, combined recorded speech and changeable paper overlays



“DynaVox 2”—the first to feature built-in universal remote control units and provide users with the option of a color screen.

Today—Contemporary Devices



“No Touch Talker”—Allows users to communicate without physical contact, only a slight movement needed to activate



“ChatPC”—a computer direct selection communicator the size of a palm pilot



“Tango”—an innovative AAC device that provides multiple modes of communication to meet communication needs in diverse situations.



“DynaVox V and Vmax”—A full Windows XP computer, the V delivers internet access, email, text messaging, and runs most XP applications; also provides incredible volume and clarity, with a wide range of voice selections, including AT&T Natural Voices.

### **III. Augmentative and Alternative Communication: An Overview**

As a look at the emergence of the field of AAC has shown, and as the name itself suggests, augmentative and alternative communication systems serve as multi-modal support systems designed to facilitate the communication of disabled individuals whose gestural, verbal, and written communication does not meet all of their communicative needs. Depending on the individual using the AAC system the goal may be different, but generally AAC is used to assist individuals with their daily communication needs while helping to facilitate either the development or the return of speech and language, and can include anything from gestures, signing, pictures, photographs and print to computerized communication and voice production (Owens et al., 2006: 467). According to the American Speech-Language-Hearing Association (ASHA), AAC is more specifically defined as:

[F]oremost, a set of procedures and processes by which an individual's communication skills (i.e., production as well as comprehension) can be maximized for functional and effective communication. It involves supplementing or replacing natural speech and/or writing with aided (e.g., picture communication symbols, line drawings, Blissymbols, and tangible objects) and/or unaided symbols (e.g., manual signs, gestures, and finger spelling). (Owens et al, 2006: 466)

Moreover, these systems, devices, and techniques can benefit many populations of people at nearly all developmental ages and levels including deaf individuals, people with mental retardation, individuals with Autism Spectrum Disorders, Aphasia, Traumatic Brain Injury, motor speech problems, Cerebral Palsy, Down syndrome, glossectomy and laryngectomy patients, and those who suffer from dysarthria or apraxia of speech, among others (Owens et al, 2006: 466-467).

#### *Aided vs. Unaided Systems*

In categorizing AAC systems, two large categories emerge: aided and unaided. Unaided systems do not involve any external equipment, but instead rely only on the individual's body.

These systems include gesturing, signing, fingerspelling, cued speech, and writing. Aided systems, on the other hand, use some type of equipment or device and can range from “no-tech” alphabet boards to “low-tech” picture communication boards, and finally to “high-tech” computers with synthesized speech output such as the devices the children at Camp Talk used (see Figure 3). Each aided AAC device can vary based on the type of symbols used, the type of display, the selection technique applied by the user, and the mode of output, each of which will be described in turn (Owens et al, 2006: 467; Burstein, 1998: 373).

The symbols employed on AAC devices usually take one of four forms: tangible or tactile, representational, abstract, and orthographic. Tangible or tactile symbols are objects, miniature objects, partial objects, or textured symbols that the child can physically feel and even manipulate. Representational symbols are photographs, colored pictures, or line drawings such as those used in the Picture Exchange Communication System (PECS). Next are the abstract symbols sets in which the symbol does not suggest its meaning. Orthographic symbols are based on letters and may appear in Morse code, Braille, or phonemic symbols. These sets of symbols are not mutually exclusive, and an individual’s device or symbol set could include any of these types of even a combination of several (Burstein, 1998: 373).

The next aspect of an individual’s communication device is the display which can either be fixed or dynamic. On a fixed display, the symbols and the arrangement of them remain constant. This would be the case with most of the more low-tech devices. A dynamic display allows for greater spontaneity and control on the part of the user in that the symbols and the arrangement of the symbols may change with each selection. For example, in such a system the user may select a button that is labeled “food” and then see a different screen with many options related to food.

**Figure 3: Examples of Aided AAC Systems**

**No-tech**



Alphabet board: user points to letters to communicate message



Eye-gaze system: user communicates by looking at the desired symbols

**Low-tech**



BigMACK: user touches button to play prerecorded message



LiteWriter: portable typewriter that plays typed message



TechTalk 8: users push buttons to play prerecorded, interchangeable messages



Communication boards: user points to pictures to communicate message

**High-tech**



Tango



iChat by Dynavox



Users select picture or symbol to generate the desired message. Some devices have prerecorded messages and additional messages must be manually recorded, while the more high-tech devices have synthetic speech production and even built-in cameras for the creation of new symbols.

Clockwise from top-left: DV4 and MT4, MightyMo and MiniMo, DynaWrite and Dynamo, Dynavox V-Max and Dynavox V.

How the user interacts with his or her system or device can also vary; this interaction may either be direct or indirect. Through direct selection, the child directly indicates items on the device. This direct contact with the device can be accomplished either with physical contact by a body part (e.g., touching the button with a finger or a hand) or with the aid of an adaptive device such as a manual head pointer, a hand splint, a light pointer, a head mouse, eye gaze, or voice recognition technology. Indirect selection occurs through scanning. In this situation the child is presented with items or groups of items in a sequence and then indicates his or her choice when the desired item is presented. This method of scanning can occur in several ways: linearly with one item being presented at a time, by rows or columns in which the child selects the row that contains the item and then selects the specific location of the item, and finally through blocks in which sequentially smaller blocks of items are presented until the desired symbol is selected (Burstein, 1998: 373).

Finally, a device can vary by method or mode of output, either intrinsic or extrinsic. Intrinsic output requires the communication partner to observe each selection as it is being made and to synthesize the complete message. In this situation, ongoing feedback with the individual using the device is important to ensure that each partner in the communicative act knows what the other partner has received. Extrinsic output on the other hand, transforms an individual's selections into visual or auditory information in the form of synthesized or digitized speech, print, and/or electronic displays. Again, these various forms of extrinsic output are not mutually exclusive and many devices may employ more than one mode to better ensure accurate communicative exchanges (Burstein, 1998: 374-375).

### *Choosing an AAC System of Communication*

Given the multitude of different possible systems available to a user, the process of assessing an individual and selecting the appropriate tools to augment his or her communication is very important and employs a view of the whole client when doing so. In selecting a communication or language system, an individual's social, communicative, cognitive, and motoric competencies, abilities, needs, and environmental supports must all be considered (Wetherby & Prizant, 1999: 157; Owens et al., 2006: 480-482). This assessment and selection is not done by the Speech-Language Pathologist (SLP) alone, however. As Dr. David Yoder points out, "We must have thorough knowledge of who we teach so that we can provide the appropriate balance of methods needed for each person" (Yoder, 2001: 8). In that spirit, the SLP in conjunction with a team of the client's family and other professionals including an occupational therapist, a physical therapist, an audiologist, a vision specialist, a psychologist, a rehabilitation engineer, and a classroom teacher may all work together in selecting the appropriate AAC method, symbol system, and potential vocabulary (Owens et al., 2006: 483). For example, the child's level of abstract association, his or her sensory skills, and literacy level help to determine the type of symbols needed for communication. Further, the arrangement of the symbols on the AAC device is influenced by the number of choices the child is capable of handling at one time and whether a static or dynamic display is necessary. Lastly, the output mode(s) needed by a user is determined by the environment in which he or she needs to communicate and his or her ability to comprehend the output (Burstein, 1998: 383-384; Owens et al., 2006: 483).

As explained above, when choosing what AAC device or system a child should use, it is very important to take into consideration what challenges they face in their motor ability—a child may not have any cognitive deficits or delays but may have severe Cerebral Palsy and have

essentially no fine motor control. In this case, the child would not be able to use his or her finger to push a button on a voice-output communication aid (VOCA). Often an Occupational Therapist will work with the Speech-Language Pathologist to devise alternative ways for the child to access and activate the buttons on his or her device. At our camp this summer we had a few children who used different methods of both direct and indirect selection with their devices. Sarah was a six year-old girl who came to camp the second week. She was diagnosed with Kernicterus, which resulted from newborn jaundice as well as severe Cerebral Palsy that affected the use of her hands. Thus, instead of selecting buttons on her device with her fingers, Sarah had two switches connected to a board that sat down by her feet and then were wirelessly connected to her DynaVox device. One of the switches she used to scan through the buttons on her device, either by row or by individual button, and the other switch she used to select the button she wanted. This system, while seemingly overcomplicated and time-consuming worked very well for her and allowed her to participate fully in daily activities.

Another camper named Matthew, who was fourteen and came to the third week of camp, was also diagnosed with Cerebral Palsy and had very high tension in the muscles of his arms and therefore could not access his device with his hands to communicate. Because of these physical limitations but taking into consideration that Matt had fairly good control over his head, he had a HeadMouse which consisted of a sensor placed on his forehead between his eyes that tracked where his head was pointing and then used that signal to scan through the buttons on his device. When he paused long enough on a button it would be selected. Appendix C provides pictures and descriptions of each of the campers discussed throughout this paper.

Considering these examples of how systems were selected and adapted for their specific users really illustrates the importance of considering what each individual cannot do, but also

what they are able to reliably do and how that can help them communicate using an AAC system.

Selecting the client's vocabulary is an especially important aspect to consider when choosing or configuring a user's AAC system because appropriate, useful, and relevant vocabulary can greatly impact how successful a given system will be for an individual. As Owens et al. (2006) state, "poorly selected or inappropriate vocabulary may be one of the primary deterrents to successful communication" (484). Further, decisions about the selection of a system should not be viewed as permanent, but rather as a developing process that continually reevaluates the client's needs and interests to see whether a system is still maximizing their potential for communication as they develop and mature. The idea of continual reevaluation of a client's AAC system was displayed well with the children at Camp Talk, most of whom had used one if not several other devices before their current VOCA. Also, selection of more than one system is often preferable because it allows for the development of a repertoire of communicative means that an individual can use to initiate communicative interactions and to repair communicative breakdowns (Wetherby & Prizant, 1999: 159; Owens et al., 2006: 354). This was also the case with many of the campers. For instance, Michella, a fourteen-year-old with mixed athetoid cerebral palsy, primarily used a DynaVox device but also had a communication board with upwards of 75 symbols on a lap-tray attached to her wheel-chair and was able to produce a few verbalizations; thus, she had access to a combination of several modalities that helped to make her a fairly effective communicator.

### *Speech-Generating Devices and the Benefits of such AAC devices*

While there are many different possible systems of AAC which can all be tailored to fit each user's specific and unique needs as an individual communicator, the common factor among

the AAC users at Camp Talk was the use of mostly very high-tech devices or VOCAs. While some campers had fairly low-tech devices (e.g., TechTalk 8) and others had very high-tech devices (e.g., Tango—equipped with a built-in camera) all of the devices were capable of speech output whether in digitized or synthetic form. As discussed in Chapter II, the merger of technology and communication aids was a natural step in the development of the field as it evolved alongside the development of the micro-processor, and as our society has continued to become more and more technologically based.

For individuals with disabilities, AAC creates opportunities for greater functional independence and for increased participation in their communities—it can help them overcome some of the disadvantages they experience relative to the rest of society (Burstein et al, 1998: 372). AAC can help children as young as nine to twelve months make choices and express their needs. The Picture-Exchange Communication System (PECS), for instance, a relatively simple system using symbols with pictures of objects, allows even children with very limited verbal skills, gestural skills, or both to be able to communicate their wants and needs (Durand, 1999: 332). For older children, competence with a computer or a more high-tech augmentative communication system may be extremely important to their development of literacy and academic skills (Foltz et al, 1998: 274). Furthermore, there has been research to suggest that the successful use of alternative systems of communication may help to reduce the incidence of disruptive behaviors in children (Durand, 1999: 332). Logically, with increased communicative abilities, other positive behavioral patterns may also fall into place. There has even been legislative support of the use of technology with the disabled population. The 1994 amendments to the Technology-Related Assistance for Individuals with Disabilities Act describe the purpose of using technology as helping individuals with disabilities to have greater control of their lives

including more meaningful participation at home, at work, in school, and in other social settings; more interaction with individuals without disabilities; and the ability to enjoy the same opportunities in life as do individuals without disabilities (Burstein et al, 1998: 372).

Each week at camp we had a guest speaker who came to speak to our campers and their parents, her name is Jennifer Johnson. She is 35 years old, married, a four time gold medal winner in swimming at the 2002 Paralympics in Argentina, a volunteer and mentor for children with communication disorders in local San Diego elementary schools, a Consumer Consultant for DynaVox technologies, and she is non-verbal, has athetoid Cerebral Palsy and communicates using a speech-generating AAC device: her hot pink DynaVox Vmax. Each week when she came to speak she told the audience of her struggles growing up being nonverbal and how it affected her literacy. For the majority of her life she used an electric typewriter with a key guard to communicate because she could spell fairly well but this still left her out of many social activities. She recounted feeling intimidated by other disabled children who could talk because by the time she wanted to join a conversation it would be over. Moreover, her communication method required a listener who could both spell and keep what she was spelling one letter at a time in their head long enough to understand the phrase. It wasn't until she was 20 years old that she got her first speech-generating device and then another 6 years before she got her first DynaVox. She taught herself how to use both devices without the help of a SLP and explained to parents what an advantage it is to have such a device as compared to other forms of communication such as spelling boards, gestures, and signing. With her SGD, she can get people's attention, she can interrupt, she can say something even if the listener is busy, and she can even talk on the phone. Overall her device helps her to communicate more efficiently and in more settings; it gives her a voice and a means to get out into the community and be involved.

For her it has helped improved not only her literacy, but also her social skills—allowing her, a non-verbal person, a way to add her contributions to society. Jennifer is a perfect example of how beneficial such a device can be toward living a more normal and productive life.

While AAC as a whole has obvious benefits for the function and integration of persons with disabilities into society, the more high-tech devices known as either voice-output communication aids (VOCAs) or speech generating devices (SGDs) (these terms will be used interchangeably throughout) may present further unique and specific advantages to the user. For instance, in their study, Light and Drager (2005) found that very young children with developmental disabilities between the ages of one and three years of age were able to make substantial increases in their vocabularies when they were provided access to devices with dynamic displays rather than more low-tech static displays. This intervention, in which the children were provided with dynamic display devices to which vocabulary was added daily and in contexts in which communicative partners modeled functional use of the vocabulary allowed for significant language growth (Light and Drager, 2007: 206).

Further, in their study on the attitudes of undergraduate students toward users of AAC systems, Gorenflo and Gorenflo (1991) found that subjects attitudes towards AAC users varied depending on the type of system used. After subjects viewed videotapes that depicted a male participant with significant communication impairments and physical disabilities interacting with a nondisabled female participant, the results showed that attitudes improved toward the user if the AAC system included speech output compared to an AAC system without speech output. In a subsequent study Gorenflo and Gorenflo (1994) further showed that in a similar set-up subjects had better ratings on the Attitudes Toward Nonspeaking Persons scale if the speech generating device was “easier to listen to” or more intelligible (Schlosser, 2003: 7-8).

From a different perspective, the use of SGDs has also been shown to be effective in reducing challenging behaviors in nonspeaking individuals. Durand (1993) evaluated the effect of functional communication training using SGDs to replace challenging behaviors in three individuals with severe disabilities and complex communication needs in a classroom setting. In his study participants were successfully taught to request escapes, tangibles, or attention using the SGDs rather than relying on challenging behaviors. Durand conjectures that the reason that SGDs are so effective in this way is due to the fact that they maximize the correct response/reaction to the child's feelings of frustration while reducing the time delay of action on the part of the communicative partner. Further, in comparison to either communication boards or manual signs, the SGD does not require the listener or partner to be facing the individual in order to receive and respond to requests—a factor that is crucial in classroom situations in which teachers must distribute their attention among many students (Schlosser, 2003: 11-13).

Finally, SGDs may help users be better and more efficient communicators overall. In 1995, Schepis and Reid conducted a study in which a quadriplegic, nonspeaking young woman was given a VOCA and observed to see how this device would influence her interaction with the hospital staff caring for her. They found that before she had access to the device she had a lot of difficulty initiating interactions with support staff members, but after very basic intervention with a simple device programmed with four of her preferred items, support personnel increased their frequency of interactions with her both in the classroom and in her residence. Moreover, she also increased the number of initiations of communicative interaction on her part and received the requested item 100% of the time (Schepis & Reid, 1995: 73-74).

On a very basic level, the use of an augmentative and alternative communication device that has the capacity to output speech allows for a greater semblance of a voice for the user.

These forms of AAC have the potential to release a person with complex communication needs from the role of passive observer and let them become an active participant in communication interactions and in their world while also being less demanding on communicative partners since the listener does not have to attend to the device directly in order to understand the message. With SGDs also comes the potential to produce an infinite number of messages, complete grammatically correct utterances, and perform a broader range of communicative functions (Schlosser, 2003: 30). As I learned at Camp Talk, these devices help kids to be kids—Bobby could interrupt his mom when she said something that wasn't quite right or call his friend from across the room to come play, Holly was able to tell us all several times a day that her favorite television show is “Clifford the Big Red Dog,” and Trenton was even able to call his older, teenage sister “fat.”

#### **IV. Limitations and Differences in the Acquisition of an AAC System**

While it was apparent to me from the beginning of camp that the devices the children were using to communicate allowed them many more communicative opportunities than they would have had without them, it was also incredibly salient how fundamentally different the language learning and communicative experiences of these children were because they did use AAC systems and devices. In fact, the literature has shown that there are developmental differences in how children with complex communication needs learn language from very early in development even including the linguistic input they receive from their caregivers. Further, these fundamental differences put into place from early on persist through a child's acquisition of an AAC system and lead to differences in how children using AAC interact with their communication partners in nearly every context. Finally, specific aspects of the AAC systems themselves such as limited access, restricted expression, lack of language models, and asymmetry between linguistic input and output, all contribute to the perpetuation of these fundamental differences in language acquisition and communicative experiences for the user of AAC.

##### *Early Developmental Differences*

Children with congenital and developmental disabilities have different developmental trajectories from birth which can obviously affect how the process of language acquisition unfolds. As Solot (1998) points out, children with disabilities usually have different early cry behaviors from typically developing children which can result in reduced parental response to behavior. Moreover, smiling and laughing on the part of the infant with disabilities may be more difficult due to motor impairment, and their attempts to communicate (e.g., smiles) may be less recognizable and less easily interpreted by their caregivers. If a child's efforts are not reinforced,

this has the potential to lead to passivity and reduced communicative effort on the part of the child (347).

Research also suggests that linguistic input to children with language impairments may differ from that provided to either language-matched or age-matched peers in two key ways. First, it has been shown that when mothers talk to their language-delayed child their language is more directive, reflected in their increased use of demands, imperatives, and tendencies to initiate conversation. A parent who uses this type of directive speech may tend to use language as a means of controlling their child's behavior rather than as a medium for reciprocal communicative and informational exchange. Secondly, there is reduced semantic contingency between the utterances of the mother and those of the child which may be attributable to difficulties in intelligibility (Smith, 2003: 160). These differences in linguistic input may also be attributed to the fact that there is an apparent asynchrony across different domains of development (e.g., motor, social, linguistic) in children with disabilities and complex communication needs making it challenging for parents to try to gauge an appropriate level of linguistic input. Thus, parents may use these strategies (directiveness and less semantic contingency) in an effort to maintain conversational focus or topic (Smith, 2003: 161). While this study shows little evidence of a causal relationship between features of adult input and language acquisition in children with complex communication needs, it does add to the list of experiential differences and *may* contribute to altered linguistic forms and output later.

What's more, children not only receive altered linguistic input from their caregivers, but they also have impoverished experiential bases for certain aspects of language development. Severe motor disabilities can affect mobility and manipulation skills, resulting in less opportunity for the child to engage in active and physical exploration and manipulation of the

environment—explorations and manipulations which are critical in the formation of concepts (Solot, 1998: 348; Light, 1997b: 159). Their lack of independent experience with the physical elements of the world such as books, toys, cooking materials, art and writing materials, dress-up clothes, and playground equipment severely limit their ability to formulate an experiential base for conceptual and lexical development (Light, 1997b: 159) which will in turn affect their later communicative interactions.

### *Differences in Social Interaction, Communicative Roles and Opportunities*

When children with complex communication needs develop to the point at which they can begin to use systems of AAC, the basic differences in their beginning linguistic encounters persist in interactions with both caregivers and other members of the community. Individuals who use AAC have been repeatedly shown to be passive participants in communication interactions while speaking partners dominate nearly every aspect of a communication exchange including initiation, termination, topic setting, and conversational turns (Schlosser, 2003: 30). These trends in interactions between individuals who use AAC and their speaking partners may be attributed to several factors inherent to communication with an AAC device. First, the typical AAC user is much slower at producing messages than the typical speaker. Message construction which is commonly described as telegraphic as children convey one concept at a time leads to interpretation that can take an inordinate amount of time relative to the content of a given message as messages are co-constructed by the child and the partner over successive turns. Thus, communication partners may feel compelled to complete the message for a user or to take more responsibility for the communication than during speech. In this situation, an untrained partner may unintentionally take control away from the AAC speaker leaving him or her in a passive communicative role and effectively blurring speaker-listener role boundaries (Smith, 2003: 161;

Owens et al., 2006: 467, 475; Light, 1997b: 167-168). Relatedly, communication with aided AAC without speech output tends to be less face-to-face as both participants attend to the device, raising further issues concerning the establishment of joint attention in communicative exchanges (see Clibbens & Powell, 2003 for more discussion).

As Janice Light (1997b) mentions in her discussion of the language learning contexts for children who use aided AAC, parents and teachers dominate interactions with children who use aided AAC in many contexts including play situations, story reading activities, and classroom activities. Specific studies and their findings will be discussed in more detail below. In these situations, turn-taking patterns are largely asymmetrical as the adults occupy most of the conversational space, and create situations in which the child participates less frequently, only fulfilling turns when obligated or allowed to do so (167).

Smith (2003) presents a case study of a five-year-old girl with cerebral palsy named Yvonne who uses a communication board to communicate and was observed interacting with each of her parents individually on several different occasions. Interestingly, her communication patterns varied greatly depending on with whom she was communicating. When Yvonne interacted with her mother, the focus seemed to be restricted to eliciting particular syntactic structures with little apparent attention to the content of the message. In other words, the goal of the interaction was to practice the use of a particular structure rather than to engage in a reciprocal communicative exchange of information. This goal was particularly evident when Yvonne's mother indicated that Yvonne selected an "incorrect" sign although the mother did not know what the intended message was supposed to be and therefore could not have known whether or not the selection was appropriate (165). Further, at the end of the sequence presented, her mother thanks Yvonne for cooperating and selecting the appropriate sign, effectively

reinforcing the idea that the important element of the task relates to the structure, rather than the content of the communication. This implied emphasis on form over content is in direct contrast with communicative interactions between parents and typically developing children.

Ferm et al. (2005) studied an interesting and important interaction between caregivers and children with complex communication needs—mealtime. Children who use AAC spend significantly more time in daily care routines than their nondisabled peers and significantly less time in play and social activities. In fact, daily routines such as feeding, toileting, and dressing can take a long time resulting in days consisting of little other than these fixed routines (Light, 1997b: 160). Mealtime for typically developing children is a time when children are exposed to a variety of new words and are also provided with different kinds of support and information for learning their meanings. Moreover, topics and narratives often relate to the immediate past, present, and future; as well as to familiar people, places, and things that are removed from the immediate situation and play a significant role not only in relation to the development of language but also self-awareness, problem solving, theory building, and more advanced discourse skills and analytic thinking (Ferm, 2003: 21). Mealtime for children with complex communication needs, especially those who use aided AAC systems, however, presents much more limited possibilities for interaction. In fact, daily caregiving routines including meals require significant concentration and attention to positioning as well as therapeutic goals which make it difficult to also incorporate language learning opportunities. At mealtimes specifically, assistance, nutrition, and safety issues often become the focus of interaction, and this in turn may affect communication possibilities.

The first week at camp this summer my camper was Gracie, a ten-year-old girl diagnosed with Rett syndrome. This camp was my first experience being in the caregiver role for another

person and I remember mealtimes as being especially stressful. Gracie was physically unable to feed herself, so that responsibility fell on me. Due to her Rett syndrome, she had very ragged and erratic breathing and could only take small bites of food every couple of minutes, so mealtimes for us were particularly long. Further, while her device—a low-tech TechTalk8—was always set up near us, I was often so focused on making sure that she was getting enough nutrition and wasn't choking that I wasn't able to really make her device available to her in a way that accomplished both the assistance and nutrition goals while fostering meaningful communication.

In their study, Ferm et al. (2005) found that although the focal child and her caregiver were both competent users of the Blissymbolics system, the girl's Blissymbol board was unavailable during mealtime. Instead, the natural mode of communication at mealtime was conventional speech, gestures, and facial expressions used by the caregiver and word approximations, vocalizations, gestures, and other body language by the child. Due to these methods of communication, the child's possibilities for independent participation during the interaction samples were severely limited and she was communicatively and physically dependent on her caregiver. Further, the topics introduced were things that related to the situation at hand and were ultimately left to the caregiver who was primarily responsible for interpreting and making communicative content explicit.

The expressive shortcomings of the dyad impeded the chances for the introduction and development of more personalized topics and the authors concluded that communications aids should always be used at mealtimes and should enable communication that relates to issues other than the immediate ongoing activity (Ferm et al., 2005: 35). At camp I have a distinct memory of a girl at lunch during the third week of camp telling her counselor and the others seated at that table that she had been to a Justin Timberlake concert that summer and they were able to talk

about that experience and what other concerts she'd been to while eating lunch. While that camper was mostly independent, the campers who were not as independent, always had their pages set to talk about the immediate situation—that is, to ask for more food or drink or to voice an opinion on the quality of the food. Given the social nature of mealtime, caregivers should encourage and provide access to the introduction of more personalized topics during this activity.

Another important and salient interaction between parents and their children occurs at story time, and research has shown that the early literacy experiences of preschoolers who use AAC are quantitatively and qualitatively different than those of their nondisabled peers (Light et al., 1994: 256). When parents read stories to children with complex communication needs, they frequently dominate the interaction by choosing the book, reading the text, and labeling pictures—placing the child in a passive role. When the child is encouraged to participate, the more mechanical aspects of storybook reading (e.g., page turning) are often emphasized rather than opportunities for the child to predict outcomes, contribute to the storylines, retell the story, or ask questions (Bedrosian, 1997: 183; Light et al., 1994). In a study of five parent-child dyads conducted by Light et al. (1994), none of the children had access to their aided AAC systems during the story reading sessions. Instead, they relied on unaided modes (e.g., vocalizations, gestures, actions, pointing) which greatly limited and restricted the extent to which the children could participate in the session. Given the limited opportunities for participation, young children with severe speech impairments who require AAC may be at risk for delay in the development of emergent literacy and related language skills (Bedrosian, 1997), so consideration should be given to positioning the child and their device in order to foster both the intimacy and closeness of a story reading session as well as the meaningful participation of the child with vocabulary that

allows the child to not only label pictures and repeat lines in the text, but also to ask questions, predict outcomes, and to relate it to his or her own experiences (Light et al., 1994: 266).

Children with complex communication needs not only experience asymmetrical interactions with their parents, but similar interactions also occur in the classroom. A study by Calculator and Dollaghan (1982) found that nonspeaking students using Blissymbol communication boards rarely used their communication boards in spontaneous classroom interactions despite their observed ability to initiate and respond to a wide range of topics in interactions with their speech-language pathologists. In fact, less than two thirds of the initiations made by students with communication boards were responded to by the teachers in the classroom. In practice, the use of a communication board neither increased the likelihood of student message success nor did it decrease the ambiguity of their messages. Thus, students were far more successful in the respondent role than the initiator role regardless of whether or not they used the communication board—as a respondent the students elicited a greater proportion of teacher's acceptance, received fewer requests for clarification, and were generally more successful in their communicative interactions.

It's been clearly illustrated by research that interactions experienced by children using AAC are different from those of the typically developing child—not only are these children put in a role as a passive communicator where they have little to no control over initiating conversations or choosing topics, but they also experience less meaningful and developmentally beneficial participation in common activities such as mealtimes, story reading sessions, and interactions in the classroom. Taking into consideration the differences in language experiences of the child who uses AAC discussed above, it is also important to acknowledge that AAC

systems in and of themselves present many limitations to typical language acquisition and communicative development.

### *Limitations of AAC systems*

One of the primary difficulties of acquiring a system of AAC is the fact that there is an asymmetry between the input received by the user and the output expressed. That is to say, the child has to be knowledgeable in two different linguistic codes: the language(s) spoken in the child's home or broader social community and the "language code(s)" of the AAC system used by the child (Light, 1997b: 161). While most children are not even introduced to AAC until the age of two or three or later, this introduction creates a dissonance in linguistic codes as they continue to receive input through spoken language—an issue that is not present in typical language learning environments (Soto & von Tetzchner, 2003; Smith, 2006). Further, it has been argued that the "language code(s)" that the children are using as part of their AAC systems are in fact not really language systems at all. Many of the AAC symbol sets (e.g., Mayer Johnson Picture Communication Symbols, Picsyms, Minspeak icons, key word signing) that are options for AAC systems, are lacking in several key areas that define language and linguistic signs. First, many symbol sets are not arbitrary—the relationship between the symbol and the referent is easily guessable or even transparent. Furthermore, many sets also lack the potential for segmentation including lacking morphological markers that indicate tense or plural forms, for example (Light, 1997b; Smith, 2006). With these fundamental differences in both structure and organization it would seem that graphic symbols cannot be considered equivalent to spoken linguistic signs, or words.

Yet another interesting and distinctive feature of language acquisition with AAC systems is the fact that children learning to use AAC do not have communication partners who are more

skilled communicators with their device than they are—in other words, they have no linguistic models. Compared to other people in the linguistic environment, the children are using what Renner (2003) deemed an “alien form,” (80) and because of the asymmetry in input and production, a situation is created in which there are simply fewer opportunities for adults to model the use of the system leaving children with no access to proficient alternative communicators. In fact, a child’s most significant communication partners may have only marginally higher—or even lower—alternative language competence than the child himself. This is likely to lead to very few interactions with competent users using mature forms of their own communication form and may in turn hinder their development of communicative skills (Clibbens & Powell, 2003; Soto & von Tetzchner, 2003). Lastly, it could potentially be very helpful for adults to be knowledgeable in the use of a child’s AAC system, not only as a means to provide a mature model but also because an adult may be able to identify other shortcomings of the device and suggest ways to overcome them (Renner, 2003).

Further difference is created in the different ways in which children create output. In aided communication, graphic symbols are selected, not produced which restricts them in many ways. For instance, repetition is not a feature of graphic symbol communications and may be discouraged. As Smith (2006) states, “it is hard to imagine a scenario where a child using a communication board would ‘play’ independently with the boards, selecting symbols and exploring the motor act of the selections” (154). One should note, however, that while this play may not be observed with graphic communication, a child could be seen playing on a speech-generating device. Moreover, the limited access to natural speech production that children with complex communication needs experience restricts their opportunities to test the meanings of new words they hear in the environment and also contributes to a decreased understanding of

certain grammatical morphemes (Light, 1997b: 161; Blockberger & Johnston, 2003). In fact, it has been shown that certain symbolic AAC systems such as graphic and tangible communication systems restrict spontaneity of communication, something well illustrated when one considers that speaking children are estimated to produce as many as 20,000 words in a day whereas aided communicators may communicate fewer than 20 graphic symbols in the same time, severely restricting their opportunities for feedback and interaction (Carter, 2003; Smith, 2006: 154). Lastly, a characteristic of linguistic signs that graphic symbols lack is the potential for change across time or across socio-cultural contexts, changes that can lead to dialectal variations and the potential for group identification through particular language forms (Smith, 2006: 153).

#### *Differences Specific to High-Tech Speech-Generating Devices*

While it has been shown that AAC systems of nearly all types create different contexts for the acquisition of language for children with complex communication needs, the high-tech devices that the children of Camp Talk used encompassed a whole other range of issues not present in lower-tech devices. The range of concepts available, though potentially wider than on a communication board, is still severely restricted on a speech-generating device (SGD) consisting of an uneven distribution of concrete objects with the neglect of more abstract concepts and relational words. In fact, children who use aided AAC systems rarely have access to more than a few hundred concepts and many have access to significantly fewer concepts than that (Light, 1997b). My camper the first week, Gracie, a ten-year-old girl diagnosed with Rett Syndrome, used a TechTalk8 to communicate. Such a device has eight buttons visible at a time with eight possible levels accessible through a switch on the back so that different overlays can be used. Essentially, Gracie had access to 64 possible recorded words or phrases at a time (as many as some campers had on one page at a time), and as her counselor it was up to me to

choose which eight words she would see on her device given the context of the activity. She had an overlay with the other camper's names, one for colors during craft time, one with outside words for when we went on walks outside, and one for snack time. There were many instances in which she didn't have an overlay that was applicable to the activity at hand during which she was basically without a voice. Perhaps of all the differences or limitations with these devices I found that this was the most debilitating as far as language production or acquisition is concerned. If Gracie had needed to tell me something that was not one of her eight options at the time, she simply couldn't.

As illustrated by this example, vocabularies on these devices can be fairly static and are, in general, horribly inadequate in meeting the child's communication needs. This is especially the case for children who are preliterate. A preliterate and nonverbal child has nearly no control over the acquisition of new vocabulary—rather, they are provided with vocabulary as deemed necessary and appropriate by the adults around them. This is a stark contrast to the process of vocabulary acquisition by children who use natural speech and have complete autonomy over their expressive vocabularies (Light, 1997b: 164-165). Because of these factors, many children can find themselves with concepts they wish to express but without the means to do so on their aided AAC system (Light, 1997b: 164). At camp there was a little boy named Max the first week, and during introductions and welcome time every morning we always tried to have the kids tell us something about themselves. Max's mother, however, had managed to delete Max's entire social page containing all of the personal information about him so he had no means to participate in that part of the day. As Light (1997b) states, if we fail to provide relevant vocabulary, we restrict children from channels to express important communication functions. “We provide children with ways to ask for cookies and juice and favorite toys but often neglect

to provide vocabulary to allow them to tease their brothers and sisters, or to ask questions like Why? What if? and What's that?" (Light, 1997b: 165).

Further, prerecorded messages on SGDs present other issues in that in some cases the intrinsic message selected by the child may differ from the extrinsic message received by the partner. For example, the button on a device may say "dog" which is all the child intends to produce, but when selected, the message produced instead is "I have a dog named Skippy" (Light, 1997b: 165). In these situations, the extrinsic message may have to be translated or transformed by the partner to match the intended intrinsic message of the child. In fact, von Tetzchner and Martinsen (1992) suggested that the selection of a graphic symbol from an aided communication system is better thought of as a cue for a partner to guess the meaning of because of the possibility of this dissension between intent and production. While pre-stored messages can offer advantages in some situations as far as efficacy and clarity of communication are concerned, they may also limit the generative capacity of the child and may lock the child into set scripts and patterns of interaction (Light, 1997b: 165).

One of the issues that I noticed while at camp was that communication can be stopped by someone other than the speaker. Speech-generating devices all have on/off switches allowing communicative partners in the environment to silence a user with the push of a button. Also, if the battery on the device dies then communication is also stopped. This happened frequently with campers, causing them to be tied to the wall in reach of an outlet. Another common issue arose when a child did not know how to control the volume on his or her device. If it was set too low then they were stripped of the ability to interrupt or get someone's attention if they were not being attended to. Finally, high-tech devices, though generally fairly rugged, can break which also ceases a child's communicative abilities. The third week of camp we had a thirteen year old

Autistic boy named Chris who really did not want to use his device most of the time. His counselor was often met with resistance when she would ask him to tell her something using his device or when she tried to get him to participate in our activities. On the second day of camp he finally grabbed his device and slammed it down on the floor—breaking it. The rest of that day he had no way to communicate what he wanted and the next day his mother brought a book of PCS symbols to use instead. For the rest of the week, when the other children could use their own “voice” to speak, Chris was forced to point to a picture and have his counselor then speak what he wanted to communicate to the rest of the group. This situation effectively illustrated to me how different this manner of communication can be—typically developing children cannot have their voices broken.

Light (1997b) notes that a particular problem for children who use aided AAC is the fact that they often have limited access to their means of communication. When children don’t have their devices, they are essentially without language and can potentially spend significant proportions of time without access to expressive language (Light, 1997b: 167). In a study of play interactions between preschoolers who used aided AAC and their primary caregivers, Light et al. (1985) noted that children were able to either play or communicate with their devices, but not both (Light, 1997b: 160). This was often the case at camp as well since the electronic devices could not go in or near the water. That meant that any and all activities that took place in the ocean occurred without access to their communication devices.

This section aimed to show just how fundamentally different the acquisition of a system of augmentative and alternative communication can be at every moment and in every context for children with complex communication needs. From birth children with disabilities and complex communication needs may develop differently and are exposed to different linguistic inputs that

could potentially affect their later social interactions. When an AAC system is introduced to a child, interactions with parents and teachers begin to change and show differences from those experienced by typically developing children, and finally attributes of the devices and systems themselves are so fundamentally different from typical verbal language that the experience of linguistic development and the subsequent communicative experiences can be vastly different for users of AAC. However, AAC with speech-output is a unique tool whose admitted limitations should not stand in the way of recognizing its many benefits.



## **V. AAC and Natural Speech: Reviews on the Affects of AAC for Speech Production**

One further issue that presents itself concerning the use of SGDs as a user's primary AAC system is the question of natural speech development and production and how AAC overall, but specifically SGDs may or may not affect it. During camp I remember asking this very same question during the second week when Holly was my camper. Holly, thirteen years old and diagnosed with Down syndrome and severe apraxia, used manual signs as her primary means of communication at home with her family which seemed to work very well. However, I do not sign and neither do most people in the community so Holly was also learning how to use a SGD, the DynaVox MiniMo, to communicate more effectively in more situations. At camp I found that in most instances Holly preferred to use her voice instead of her device since she couldn't sign. She had a habit of leaving her device just sitting in a chair or on the floor and I remember feeling as if I was always reminding her to bring it with her when we went to lunch or outside. She loved playing catch and would often grab a ball and run outside, but while we were playing she never used her device, instead she would use her voice to ask me for the ball saying "Ball, please" or by telling me who I was supposed to throw it to by pointing and vocalizing the person's name as best she could, and she would even yell "Hey!" if I threw the ball too high over her head. During snack and lunch she would verbally answer "yes" and "no" to questions I asked her. So, I always wondered why she was using a device instead of concentrating on making her speaking abilities better. Wouldn't it have been better to focus on teaching her to produce more natural speech instead of impeding possible progress by replacing her voice with a speech generating device?

Interestingly, this is a very common question among parents and even some practitioners unfamiliar with SGDs and their influence on speech production. As was pointed out in Chapter

II, at the beginning of the development of AAC as a field, any intervention or therapy that did not focus on natural speech production and improving that form of communication was considered a last resort. Meaningful communication by any means was not the goal—the goal was speech. Unfortunately these sentiments still persist among many parents who are worried that learning a different means of communication will adversely affect their child’s natural speech. People often believe that if a person produces manual signs, points to graphic symbols, and/or uses a SGD or VOCA that his or her natural speech will diminish or fail to develop all together (Foltz et al., 1998: 274-275; Owens et al., 2006: 477; Light & Drager, 2007: 205; Cress, 2003: 10-11; Blischak et al., 2003: 29); that the AAC system will become the primary communication mode and take away from the child’s motivation to speak (Ronski & Sevcik, 2005: 178-179); or that AAC will become a “crutch” for individuals with developmental disabilities resulting in a preference for the use of AAC over speech because it is perceived as being an easier way to communicate compared with speech (Millar et al, 2006: 248-249).

However, these worries and concerns are unwarranted since much research shows that the use of AAC and in particular SGDs can enhance natural speech in its users. Practitioners who adhere to a “use it or lose it” philosophy expect that if a person produces manual signs, points to graphic symbols, and/or uses a SGD as part of an AAC system, then his or her natural speech will diminish or fail to develop; however, this perspective is based on assumptions taken from other areas of development such as muscle strength or second language learning, where strength and skill do diminish after a period of disuse (Blischak et al., 2003: 29).

In actuality, there have been no published reports of decreased speech production after AAC intervention and there are many studies that illustrate the numerous benefits that AAC intervention can have. In a meta-analysis by Millar, Light, and Schlosser (2006), twenty-three

studies were explored that met the inclusion criteria as follows: the studies were published between 1975 and 2003, involved individuals with developmental disabilities with significant speech impairments, included implementation of an AAC system and documentation of its progress, and also included data on speech production of the participants before, during, and/or after intervention. Of these twenty-three studies, 61% of them implemented systems of unaided AAC involving manual signs and nonelectronic systems whereas only 4% (one study) investigated a combination of aided AAC systems with and without speech output. The results of these studies showed that none of the cases showed a decrease in speech production as a result of AAC intervention, and the vast majority (89%) demonstrated gains in speech after intervention. The study that demonstrated the largest gains in speech production was a study by Kouri (1988) using manual signs accompanied by speech in a child-initiated play setting with preschool-aged children with Autism, developmental delays, and Down syndrome over a period of seventeen to twenty-five sessions. Pre-intervention, it was reported that the participants in the study had very limited speech repertoires, with productions between zero and eight words. Post-intervention, however, the participants' repertoires were between four to ten times greater amounting to gains of 10 to 52 words for some children.

Blischak (1999) examined changes in natural speech production as a result of two different phonological awareness instruction methods in two groups of pre-schoolers and young school-aged children with complex communication needs. One group received instruction with graphic symbols and the other group with both graphic symbols and synthetic speech. While the differences only approached statistical significance, the absolute numbers are quite impressive. In the group of children who received only the graphic symbols, the production of natural speech declined between 12-25% following instruction. However, in the group that received instruction

with both graphic symbols and synthetic speech, the production of natural speech increased between 19-39%. And although the children's exact number of synthetic speech activations was not recorded, all the children were observed to activate the synthetic speech spontaneously throughout the activity (50-51).

Blischak, Schlosser, and Millar (2000) conducted a study with adults in two parts. In part one adults with intellectual disabilities were taught to recognize graphic symbols with the addition of an equal number of natural (researcher-produced) or synthetic (device-produced) speech productions. The results showed that symbol learning with these adults was most effective and efficient in the synthetic condition. In part two, the participants learned to recognize graphic symbols when both the natural speech and synthetic speech were produced by a SGD. Again, learning was most efficient in the synthetic speech condition suggesting that it is not just the amount of additional feedback but also the type of speech that is relevant for learning and furthermore that synthetic output is more efficient than natural speech (Schlosser, 2003: 9).

Finally, Iacono and Duncum (1995) compared natural simultaneous communication versus simultaneous communication with a SGD in terms of the number of words or word combinations produced by a child with Down syndrome. The results showed that the child produced more words or word combinations in the condition with the SGD than in the condition without the SGD. Further, the child used the SGD more frequently than any other modality even though there were more opportunities to use sign (Schlosser, 2003: 11). Thus, the best evidence indicates that AAC interventions do not have a negative impact on speech production, but rather that if AAC is presented along with speech (natural or synthetic) and followed by reinforcement, both AAC use and natural speech production should increase in frequency.

Although there appears to be a general agreement among practitioners that AAC intervention can facilitate speech, there is no general agreement about why it does do. Blischak (1999) suggests that AAC, especially with synthetic speech-output, serves to strengthen or activate the phonologic code which focuses the child's attention to the phonological characteristics of the spoken words—thereby contributing to increased speech production (51). Further, the fact that synthetic speech provides an immediate spoken label and consistent auditory feedback may aid learners in associating and recalling meaning as well as promoting attention to and imitation of the synthetic speech model (44).

From a different perspective, Blischak, Lombardino and Dyson (2003) argue that AAC may support natural speech production by producing three types of effects: communication effects, motor effects, and acoustic effects. Communication effects of using a SGD allow for an increase in overall communicative participation by the user including allowing for longer utterances, more conversational turns, and in more contexts. In fact, several intervention studies have reported improvements in conversational interactions when instruction and practice in SGD use with appropriate messages are provided (30). Furthermore, these positive outcomes have been reported across a variety of populations including school-aged children, adults with intellectual disabilities, adults with aphasia, and children with autism. Motorically, a SGD reduces motor demands as well as results in a reduction of the pressure on individuals with poor motor control to speak. Finally, acoustically speech-output devices allow for immediate output by the individual as well as consistency across activations. Plus, the pairing of speech output with a visual representation of a referent may serve to strengthen both the association among the spoken word, graphic symbol, and referent as well as an individual's internal representation of

the spoken word (32). In summary of the ways in which AAC intervention with a SGD may affect natural speech production, Blischak et al., present the following table.

TABLE 2. Aspects of SGD use that may promote natural speech production<sup>1</sup>

<b>Communication Effects</b>	<b>Motor Effects</b>	<b>Acoustic Effects</b>
Increase in number of conversational turns	Reduced physical demands	Immediate output
Increase in number of messages/functions	Reduction in pressure to speak	Communication across distance
Increase in utterance length		More natural, transparent to communication partners
		Consistent across activations
		Increase in number of speech models
		Pairing of spoken with graphic symbols
		Support for development of internal phonology

Lastly, Ronski and Sevcik (1993) speculate that synthetic speech output may play a role in the emergence of expressive spoken language skills in particular for people who have difficulties processing the natural speech signal. They argue that although the initial intelligibility may be different from natural speech, the consistency of the synthetic speech output could preserve aspects of the auditory signal that allow the listener or AAC user to segment the stream of speech more easily. Thus, it's the immediacy and consistency of the synthetic speech output that encourages imitation and production of natural speech for SGD users (Schlosser, 2003: 22).

While supporters of the argument against AAC have said that children with developmental disabilities are more apt to use their AAC system because it is easier or less motorically demanding to the user, it is important to note that AAC interventions are implemented in order to build communication and language skills through a range of modalities rather than simply to increase speech production alone, and communication can occur with signs,

---

<sup>1</sup> Table taken from Blischak, Lombardino, & Dyson, A.T. (2003). Page 31.

aided AAC systems, as well as natural speech. Also worth emphasizing is the fact that speech is a much more efficient means of communication compared with AAC and proponents of the argument for AAC believe that children will inevitably choose the easier, more efficient, and more accepted mode of communication (i.e., speech) provided that it is a viable mode within their communicative repertoire (Millar et al., 2006: 249, 257).

One further topic that is worth addressing concerning the use of SGDs and their effects on a user's language skills is how appropriate they may be in early intervention situations with very young children who are still actively acquiring language. Dr. David Yoder (2001) points out that he has observed a "fast tracking of technology" where practitioners and clinicians have "glossed over the important step of teaching the basics and instead have focused on how we can hook every person without speech to a communication device" (7). He further argues that little regard is given to an individual's language abilities and the fact that they may not even have a way in which to communicate their thoughts or ideas regardless of whether or not they need technology. It almost seems as if in response to Dr. Yoder's concerns, Ronski and Sevcik (2005) wrote a paper about the realities and myths concerning the implementation of AAC systems in early intervention saying that the use of such myths and concerns in clinical practice as those that Dr. Yoder has expressed may result in young children being inappropriately excluded from AAC supports and services (178). The first of several myths presented concerns the use of AAC as a "last resort" measure in speech-language intervention. According to this myth there is still a lingering sentiment from when AAC first emerged as an intervention strategy and some practitioners continue to think of AAC systems as systems of last resort if every other option for the successful development of speech has been exhausted. However, Ronski and Sevcik argue that it is crucial that AAC be introduced before communication failure occurs. This change in

thinking means that AAC is not only appropriate for older children who have failed at natural speech production, but also for the young child during the period when he or she is just developing communication and language skills in order to prevent failure in communication and language development altogether (178-179). The second myth is that AAC hinders or stops further speech development which as we have seen is not supported by the available empirical data. In fact, the literature suggests the opposite outcome (179). The successive myths concern whether children must have a certain set of skills, intact cognition already in place, and be of a certain age in order to benefit from an AAC system, but as the authors state, developing language skills through AAC may be very important in making functional cognitive gains as well (180). Overall, the authors conclude that the reality of early intervention with AAC is that it is never too early to incorporate AAC into language and communication intervention for the young child with a significant communication disability (182).

To conclude this chapter, it is important to note that AAC devices, strategies, and systems are simply a tool, a means to an end—language and communication skills—not the end (Romski & Sevcik, 2005: 182-183). Further, AAC intervention includes making the best of *all* of a child's available communication methods, including behavioral, gestural, verbal, or pictured communication methods (Cress, 2003: 11). For many parents, given the common emphasis on speech as synonymous with communication, labeling a child as “nonspeaking” may imply that the child will never be able to effectively communicate. However, as Cress (2003) points out, communicators are not divided neatly into groups of people, one with fully intelligible speech, and the other consisting of people who never vocalize at all—instead it is a spectrum with multiple outcomes in multiple modalities (10).

While it was shown in this chapter that AAC systems with or without speech output do not decrease the frequency of an individual's natural speech production and in most cases results in an increase in speech production, it is doubtful that there is a straightforward answer to the question of the comparative effectiveness of AAC systems as overall effectiveness is determined by complex interactions between various factors including factors intrinsic and extrinsic to the child such as communication partners and social context as well as the overall purpose of the interaction (Light & Drager, 2007: 205). It is highly unlikely that a single system will meet the needs of all children with complex communication needs across all daily interactions which further stresses the importance of AAC intervention as a multi-modal approach that utilizes the aided and unaided systems as well as any natural speech production and/or gestures that the individual might have in his or her repertoire.



## **VI. Organizing and Structuring a Camp for Children who use AAC Systems**

While it was pretty apparent that each camper at Camp Talk last summer was having a great time, having the opportunity to swim and go on boat rides as well as all of the other fun and unique activities that had been arranged, it was also apparent that very few of the children, if any, were achieving new levels of competency with their communication aids. Granted a week is not a very significant amount of time and the goal of the camp is not interventional or therapeutic, one would still hope for some measure of growth for each participant. Also, even though each week of camp was designated for a specific age group (designations which became unclear with camper registration), the structure and material presented in each week's activities did not vary with the different ages. Ultimately, by the end of the three weeks of camp, I began to wonder what could have been done differently concerning the efficacy of the program overall—was there a better way to structure the camp in order to maximize the potential for both growth and fun experienced by each camper? This question drives this chapter and leads to a discussion of possible organizational and structural categories that could help maximize the potential of this type of community-based activity for children with complex communication needs who are users of AAC systems.

### *Chronological Age vs. Mental Age*

The organizational variable that Camp Talk uses is the chronological age of the camper. The first and second weeks of camp were designated for children ages six through twelve years of age, and the third week was designated for adolescent participants, ages thirteen through eighteen. These lines were significantly blurred, however, when parents were only able to participate in a certain week of camp. This resulted in the second week of camp having campers from ages six through sixteen. While logistically it is very simple to group children by age,

children with disabilities often exhibit a substantial difference in their chronological or numerical age and their developmental or mental age (Firth, 2003: 99). This difference may be attributed to cognitive delays or deficits. For example, my camper the second week of camp, Holly, was a thirteen-year-old girl diagnosed with Down syndrome. Unlike most thirteen-year-old girls, Holly's favorite TV show was *Clifford the Big Red Dog*—thus, there was a marked difference for Holly in her chronological age and her mental age. Since Camp Talk only considered a camper's chronological age with apparent inconsideration of the children's developmental levels, this presented problems affecting the selection and preparation of camp materials and activities, engaging children's individual interests, and making use of available vocabulary items, among others things.

### *Disability*

Another way in which a camp for children with disabilities may be organized is by disability. For example, at Camp Talk, fifteen of the twenty-three campers over the three weeks of camp were diagnosed with either cerebral palsy or autism (see Table 1; page 5). Thus, it could be beneficial for both the campers and the counselors to have different weeks of camp designated for different disabilities. This type of categorization would allow for better expectations and preparation of the materials and the environment based on the specific needs of a particular disability. Consider cerebral palsy and autism, for example. Each of these disabilities presents different needs both motorically and socially for affected children. For example, children with cerebral palsy are more likely to be wheel-chair bound since their disability is muscular in nature (Owens et al., 2006: 347; Dorman & Pellegrino, 1998: 372). A large number of wheelchairs in a room would suggest that any furniture may have to be arranged differently and counselors may need to be more thoroughly trained concerning lifting, positioning, and taking care of other daily

care needs for these children. On the other hand, children with autism are likely to be ambulatory as well as more independent and self-sufficient concerning self-help skills. However, their disability may not only affect their language and speech skills but also how they relate to other children and the extent to which they are able to socialize with potential communicative partners (EDM, 2007: 250-253; Frith, 2003; Wetherby & Prizant, 1999). Clearly, different considerations must be given to counselor training and activity planning for a group of autistic children. However, this model of organization limits the extent to which the camp could benefit its participants because in using a model in which children are grouped by broad categories such as disabilities, their individual needs and differences may not be taken into account. For example, in considering all of the children with cerebral palsy who attended camp, their displayed level of functioning covered a wide spectrum of abilities from some who were very high functioning and ambulatory on one end to others who were wheelchair bound and very low functioning at the other. Thus, while organizing by disability may outline broad expectations for participants, there will still be a large amount of personal variation. For a more in-depth discussion of cerebral palsy and autism see Appendix D.

#### *Function of Device: Expressive, Supportive, and Alternative Language Groups*

Since Camp Talk is a camp specifically for children who use systems of augmentative and alternative communication, the camp could also be organized around their systems including what system they use, what the goal of their system is, or the level of automaticity that they've achieved with their system and/or speech-generating device (SGD). Martinsen and von Tetzchner (1996) divide children with complex communication needs who need an alternative language form into three groups differing in respect to the role that the AAC system is assumed to fill for the user. The three groups are: the expressive, supportive, and alternative language

groups (38-39; 42-43). The expressive language group concerns children who have a large gap between their understanding of other people's speech and their ability to express themselves through spoken language (e.g., children with cerebral palsy). Most of the children at Camp Talk fell into this category. Thus, for this expressive language group, the purpose of AAC use and intervention is to provide a communication form which will become their permanent means of expression—that is, to be used in every situation for the rest of their lives (Martinsen & von Tetzchner, 1996: 43). Children in the supportive language group are taught an alternative language form as a temporary intervention measure. These may be children who have learned to speak but who have difficulty in making themselves understood with speech alone or who are expected to learn to speak but whose language development is very delayed (e.g., children with Down syndrome) (43). In these situations the AAC system is expected to scaffold the development of natural speech production through increased participation in conversations and other social situations. The third and final group is the alternative group. Since children in this group are characterized by little or no use of speech as a means of communication, the alternative communication form becomes their main form of expressive communication and the language form they comprehend best (e.g., autistic children and severely intellectually impaired children) (45). According to the authors, acquisition of an alternative language form or system of AAC is optimally achieved when contextualized in an environment that supports a child's possibilities for learning language use and comprehension through social interaction with others in the environment (Martinsen & von Tetzchner, 1996: 47). Thus, a camp such as Camp Talk may well provide this type of supportive environment of the learning that Martinsen and von Tetzchner (1996) describe. Further, if their categories of AAC function as described above were used in structuring each week of camp, then many more intervention strategies, specific to each

group of children, could be integrated into the more “fun”-oriented aspects of the camp, theoretically promoting more growth by the children.

### *Degree of Automaticity with Device*

Yet another manner in which different weeks of camp could be structured concerns levels of automaticity that the children have developed with their devices. As defined by Higginbotham et al. (2007), automaticity is “fluent performance without the conscious deployment of attention” (245) and means that individuals can competently perform a task under varying conditions and attentional demands. Essentially it is a feature of any well-learned complex cognitive and motor skill such as typing, playing a musical instrument, driving, or even using a SGD to communicate effectively since the use of such a device requires the coordination of a variety of memory, attention, and perceptual motor processes (245). According to the authors, automaticity is achieved when a particular task can be successfully performed without experiencing a significant cognitive load and/or when a particular task can be successfully performed while coordinating it with other tasks, for example, operating an AAC device while interacting with a communication partner (Higginbotham et al., 2007: 245). However, it may be difficult to achieve automaticity with AAC devices for several reasons. First, only Morse code and alphabet displays have a small enough selection set to easily achieve automaticity. Most other symbol sets, having a new symbol for every concept, are simply too large for the ease of use necessary to achieve automaticity. Second, most SGDs employ some form of dynamic display. While this feature does provide many more choices for the user, frequent changes in the information content of the display requires that users maintain their focus on the display in order to identify changes as they occur, effectively preventing the acquisition of automaticity. Finally, individuals who use SGDs often do so while participating in and coordinating several on-going tasks including constructing

and issuing utterances, interacting with communication partners, negotiating their environment, etc. (Higginbotham et al., 2007: 245). Thus, given these obstacles to automaticity in the use of SGDs, it presents an interesting factor in structuring a participation-based community activity like Camp Talk. If children who had achieved higher levels of automaticity with their devices were all grouped into one week of camp, then it is possible that more activities or more complicated activities could be planned given the higher levels of competency in the participants. On the other hand, one might also structure the groups of camp using a type of peer modeling system (to be discussed in more detail below) so that children who had achieved relatively low levels of automaticity could benefit from interaction with their more capable peers. This notion of automaticity is definitely a factor to be considered in structuring a camp based on communication.

### *My Proposal*

While all of the factors previously discussed cannot be disregarded when structuring a camp, they should not be the primary means of organization. Considering age, disability, function of device, and automaticity with device, while all relevant and useful, limits the extent to which a camp overall and individual activities especially can be geared and changed to best fit the individual needs and strengths of any group of children. That is why I propose that for a camp to maximally benefit its participants, organizational changes must be made to take a much more comprehensive look at each child's communicative competence as well as structural changes that include the addition of a familiar typically developing peer which would create a communicative triad (i.e., the camper using AAC, the typically developing camper, and the counselor) instead of the typical dyad (i.e., the camper using AAC and the counselor). The addition of the peer allows not only for the possibility of a more inclusive environment with the

advantage of peer modeling, but also promotes the possibility that strategies learned and growth achieved at camp may be extended past the week at Camp Talk into other communicative situations.

### *Communicative Competence*

From an organizational standpoint, it would benefit the participants of a communication based camp if the communicative competencies of the AAC users were taken into consideration. Communicative competence as loosely defined by Yoder (2001), is the knowledge of when to communicate, when not to communicate, what to communicate about, with whom, where, and in what manner (4). Outlined by Light (1989), communicative competence can be defined as “the quality or state of being functionally adequate in daily communication, or of having sufficient knowledge, judgment, and skill to communicate” (138). By adopting such a perspective on language and communication the practicality of language is highlighted. That is to say, in this viewpoint, language is not viewed as “an isolated inventory of symbols in a nonspeaking persons’ repertoire”, but rather as the means by which these symbols are used in a given situation, with a specific purpose in mind, and to achieve a certain end (Calculator & Dollaghan, 1982: 281). The goal for these systems is to be effective and relevant in the everyday social interactions of their users, and understanding this idea is paramount in facilitating meaningful growth within the context of a participation-based community activity such as summer camp.

The extent to which a user of AAC has achieved communicative competence can be judged by looking at the functionality of their communication, which refers to the utility of their communicative systems and attempts within the demands of daily living and includes the skills to initiate and maintain interactions within the natural environment; the adequacy of their communication which is a variable concept since some users may be considered competent

communicators in some contexts but not in others; and the sufficiency of their knowledge, judgment, and skill in four areas: linguistic competence, social competence, operational competence, and strategic competence (Light, 1989: 138-139).

Linguistic competence refers to an adequate mastery of the linguistic code including phonological, morphological, syntactic, and semantic aspects. For users of AAC, the challenge is two-fold in that the user must master their native language as spoken by the community as well as the “linguistic” code required by the AAC system. Social competence refers to the knowledge of the social rules of language use which includes discourse strategies (e.g., initiating, maintaining, and terminating interactions, turn taking, and cohesion and coherence of conversation), interaction functions (e.g., expression of needs and wants, social closeness, and information transfer), and specific communicative functions (e.g., requests for information, protest, and self-expression). Social competence is usually evaluated in terms of appropriateness and effectiveness of communication. Operational competence refers to the technical skills required to operate an AAC system proficiently. These skills include the ability to use the access method(s) or transmission technique(s), as well as the ability to operate specific device features such as the on/off switch, volume control, output mode selection, etc. Moreover, mastery of a direct selection access method (e.g., with a head-mounted light-beam pointer or automatic row-column scanning operated by a single switch) may require the user to develop a range of motor, sensory/perceptual, and cognitive skills in order to achieve proficient use. Finally, strategic competency, originally considered in the second language learning context, refers to the compensatory strategies used by individuals when their mastery of their communication method is lacking; these strategies allow them to make the best of what they do know. This competency is especially important for AAC users as they face constant barriers and limitations in their

attempts to communicate with a speaking world (Light, 1989: 139-141). In order to achieve communicative competence, individuals who use AAC systems must integrate their knowledge, judgment, and skills in each of the four areas described above. Introducing these different areas of competency specific to the acquisition and practical use of systems of AAC is useful in the context of a communication based camp and adds a different dimension to its organization.

Communicative competence is, however, a relative and dynamic concept based not only on personal characteristics, but also on partner characteristics, and environmental factors which all interact. In fact, Light (1989) asserts that the acquisition of communicative competence is fed by social experience (139). By applying these areas of competency to a camp setting, communicative opportunities are forcibly contextualized in social situations. The social nature of camp allows for communicative exchanges between individuals of different competencies resulting in opportunities for less competent users to benefit from peer modeling by their more capable peers. Further, if in organizing a camp based on communication with AAC systems, the participants' levels of communicative competency in the four areas described above could be evaluated previous to camp, then the goals of the activities throughout the week could be structured to address the specific strengths and weakness of each camper or each group of campers. Counselors would be more prepared to meet each individual camper's needs and could also scaffold their interactions in each activity in a way that might maximize the potential for growth in a certain area of communicative competence since models matched to an individual's ability are the most effective models for learning (Gillette, 2005).

### *The Zone of Proximal Development*

In fact, several authors describe the efficacy of using Vygotsky's notion of the Zone of Proximal Development (ZPD) with children with complex communication needs (Bedrosian,

1997; Renner, 2003; Letto et al., 1994). This construct describes the difference between the child's actual level of development as determined by independent performance and the child's potential level of development accomplished through collaborative interaction with a more skilled partner. It is this collaborative interaction that serves as the language learning context for children with severe speech impairments who require AAC systems, since guidance by a more skilled partner (i.e., the counselor in the context of camp) allows performance by the child at language and cognitive levels of which the child would not otherwise be capable. The goal in these interactions is that eventually the child will assume autonomous control over the skills involved (Bedrosian, 1997: 181). Moreover, this type of growth is more likely to be something that could be generalized to other contexts outside of camp. In their study, Letto et al. (1994) showed that a young child with cerebral palsy who used a system of AAC was able to progress through the ZPD when interacting with a more skilled partner by showing an increase in both the average percentage and frequency of child-initiated episodes. In fact, the child was able to generalize the strategies he learned to other communication partners in the classroom environment.

### *The Importance of the Communicative Partner—Partner Training*

This construct, the ZPD, helps to emphasize the importance of the interactional nature of the communicative task concerning children with complex communication needs who use AAC. Bedrosian (1997) asserts that there are four components, the child, the AAC system, the partner, and the communicative task, that must be viewed interactively (185). Also, Letto et al. (1994) point out that “when a child with severe speech impairment and physical challenges attempts communication, it is difficult to conceive of a communicative situation that is not jointly accomplished” (152). These insights help to highlight the importance of social interaction for

children with complex communication needs. In fact, the success of the communicative act for the user of AAC may be contingent on the skills of the communication partner with whom he or she is constructing the message. The mere presence of a potential communicative partner is often not sufficient for effective communicative exchanges to occur, as the success of the interaction will depend heavily on the interaction skills of the communication partner (Sigafoos, 1999; Kent-Walsh & McNaughton, 2005). In fact, empirical research and clinical experience have proven that intervention directed solely at the person who uses AAC is not sufficient to ensure social competence (Lilienfeld & Alant, 2005: 273). For optimal communicative success, communication partners of those who use AAC must learn to identify opportunities for communication and create a need for the individual to communicate.

As was discussed in Chapter IV, communicative interactions between individuals with complex communication needs and their speaking partners have been noted to show a dominance by the speaking partner: they ask predominately yes/no questions, take the majority of conversational turns, provide few opportunities for individuals using AAC to initiate conversations or to respond during conversation, frequently interrupt the utterances of individuals using AAC and focus on the communication technology or technique instead of the individual using AAC and his or her message—all behaviors that do not effectively support positive communicative interactions (Kent-Walsh & McNaughton, 2005: 196). However, following instruction, communication partners have been noted to be less dominating in their interactions with individuals who use AAC and have been shown to provide increased opportunities for these individuals to communicate (Kent-Walsh & McNaughton, 2005: 196). Given these factors, it would seem that best practice in AAC intervention for children and adolescents needs to be twofold: addressing the needs and building the competencies of the AAC

user and instructing and training significant communicative partners including parents, teachers, facilitators, and peers (Lilienfeld & Alant, 2005: 274). In the context of Camp Talk, these authors have highlighted the importance of having counselors who are effectively trained to be adequate communication partners with their campers—a structural component of camp that could greatly benefit the overall experience of every camper.

### *Peer Modeling*

Furthermore, camp presents the opportunity to train other potential communicative partners of the child who uses AAC and also creates the opportunity for generalizability of any new skills acquired. The most socially significant communication partners that a child with complex communication needs could have are peers, and the introduction of a typically developing peer as another communication partner into camp could greatly benefit the user of AAC. Positive peer relations contribute to psychological and personality development as well as the development of communicative competence and play behaviors (Seráfica, 1990). Relationships with peers not only contribute to the social, cognitive, emotional, and academic development of children, but are also extremely important in a child's life contributing feelings of happiness and self-worth (Lilienfeld & Alant, 2005: 227). Moreover, peers serve as models for a variety of behaviors including communicative and social processes that are acquired through observational or social learning that can only take place by regularly interacting with and by developing friendships with peers; these processes include achievement, altruism, compliance or resistance to deviation, delay of gratification, and moral judgment (Seráfica, 1990). Perhaps most important for a context such as Camp Talk, however, is that peers may also serve as effective tutors and therapists if coached and trained in the right way (Seráfica, 1990).

Yet another reason why child-child friendships and interactions are important is because unlike the parent-child relationship, they tend to be much more egalitarian. Clarke and Wilkinson (2007), in a study that looked at how typically developing peers interact with their classmates with complex communication needs who use systems of AAC, found interesting patterns concerning communication in the child-child or peer dyad. The researchers examined two dyads involving a child with cerebral palsy who used a voice-output communication aid (VOCA) to communicate and a naturally speaking peer. Their interactions were videotaped while they were in a room together without the experimenter. They found that the speaking participants established distinct structural frameworks for the interaction which involved organizing specific sequential locations within the dialogue in which the VOCA might be used. As a result of these frameworks, it was concluded that the speaking children in these dyads considered VOCA as a relevant communication modality and often asked questions that required VOCA use to be answered. Moreover, the dyads displayed a shared responsibility for accomplishing interactional organization and incorporating communication aide use into the dialogue. This more egalitarian pattern of communication shows that in these peer dyads, there were conversations that used communication aids rather than conversations between children who used communication aids and their speaking peers (Clarke & Wilkinson, 2007: 346). Given that the relationship between peers as well as the manner in which they communicate is often different from that of children and adults, peers may be a valuable asset if incorporated into interventions and strategies aimed at improving an AAC user's communicative competence.

Even though it has been well shown that peer interactions are beneficial for all children, those who require AAC often have extremely limited social networks, communicating only with immediate family or caregivers, and with those who are paid to communicate with them; they

often have no real interaction with peers (Lilienfeld & Alant, 2005). These limited opportunities to interact in peer groups can negatively influence the development of communicative and social abilities in children and adolescents with disabilities who have little to no functional speech. Thus, it is important that opportunities are created and facilitated for meaningful interaction between disabled and nondisabled peers, and Camp Talk could serve as such an opportunity.

As a means to attain such an interaction, Soto and von Tetzchner (2003) describe Rogoff's (1993) notion of "guided participation" which refers to the process of involvement of children with other children and adults as they communicate and engage in shared endeavors (289). In a practical application of this concept, one can implement the scaffolding strategy called the "peer buddy system." This strategy involves speaking classmates supporting children who use AAC in educational activities throughout the school day and in joint activities before, during, and after school. In these situations, buddies are communication partners and may assist children who use AAC when communicative challenges arise. These communicative and social supports may vary from being social company during classroom transitions to working collaboratively or having lunch together in the cafeteria. Importantly, the role of the buddy is not primarily to be a helper, but rather to be an equal companion for the child with complex communication needs (Soto & von Tetzchner, 2003: 297). This type of system or strategy utilizes the social learning theory. This theory indicates that individuals learn from watching other people and doing as they do, and promotes modeling as an effective teaching strategy. Children learn to do what others do by observing them and using observed behaviors to participate with others in events of daily life (Gillette, 2005). Using this premise, it stands to reason that increased interaction between typically developing children and their peers with

complex communication needs has the potential to lead to increased communicative competency—especially in the social and strategic areas.

### *Peer Training*

Considering the importance of peer interaction for children using systems of AAC and the positive development it can foster, there is a need to consider how best to facilitate meaningful interaction between disabled children and their typically developing peers to promote communication competence of the child using AAC as well as to equip all children with the necessary skills to interact effectively with their peers who use these alternative systems. As was discussed earlier, the mere presence of a communication partner or peer is not going to ensure a positive and reciprocal communicative context so one must also train typically developing peers on how best to communicate with their friends and classmates who use alternative forms of communication. A study by Carter and Maxwell (1998) implemented a training program for peers in a classroom where several students used AAC systems and examined the effects of the program on social interaction between these peers. The participants were three five-year-old boys and a nine-year-old girl, all diagnosed with cerebral palsy. Each student had an individualized communication board with pictographic symbols. While they spent most of their time in a special-needs classroom, they were integrated with typically developing peers for specific lessons several times throughout the week. The experimenters conducted several weeks of baseline observations in the classroom after which intervention was started. During the baseline measures, peers rarely waited for a response from the AAC users and frequently did not respond at all to the AAC users' communicative attempts.

The intervention took the form of an initial and brief overview to teachers and support staff and an orientation and group instruction for the typically developing peers. Orientation

consisted of one fifteen minute lesson with the kindergarten class and two sessions for the fourth-grade class. During these lessons, the researcher gave an explanation of the purpose of the research and addressed general questions about cerebral palsy and associated communication problems. Group instruction consisted of the researcher giving specific details of communication characteristics of a particular student including how the student initiated, responded, and used vocabulary to groups of children in both classes—this instruction took place over two sessions lasting between fifteen and thirty minutes each time. During the first lesson, the researcher highlighted difficulties that occur when trying to communicate without speech and showed peers each of the participants' communication boards and discussed its specific characteristics. This lesson allowed peers an opportunity to work in pairs and role-play interactions using the communication boards. During these role playing exercises, the researcher supported the children by prompting them and assisting them to use the AAC systems. The second lesson then introduced some general principles of effective communication along with four deliberately simple strategies which have been previously used in the research literature: establishing eye contact, asking questions, waiting for responses, and responding to communicative attempts. For this study, however, peers were taught to look at the partner, ask a question, wait five seconds for a response, and respond within three seconds when communication had been attempted. After these group instruction sessions, classroom teachers were specifically asked not to prompt students in the use of the techniques discussed.

The results showed that there was increased social interaction between students with complex communication needs and peers following this intervention. The authors speculate that the increases in social interaction by the AAC users may have been related to an increase in the number of opportunities for communication, imitation of appropriate communicative strategies

that were modeled by peers, or perhaps natural peer reinforcement of communicative attempts. Moreover, the results showed that although no follow-up training was offered after the initial intervention, the intervention effects persisted for ten weeks for two of the participants and six weeks for the remaining participants. Finally, the authors conclude that while it cannot be assumed that the provision of an AAC system will necessarily result in increased or even satisfactory interaction with peers, implementation of programs to teach peers to facilitate communication with AAC users may be one useful approach to increased social interaction and may enable optimal social exchange to occur in integrated settings (Carter & Maxwell, 1998: 88).

In another study, conducted by Lilienfeld and Alant (2005), the authors studied the interaction between a fifteen-year-old student with severe athetoid cerebral palsy named Simon in his 8<sup>th</sup> grade class at a school for students with physical disabilities. Simon's preferred mode of communication was his natural voice though he was highly unintelligible, but he was also a competent user of his SGD, a DeltaTalker programmed with two thousand words and phrases. The goals of the intervention in this classroom were determined by difficulties identified by Simon in interactions with his peer group. The difficulties identified by Simon included inadequate time given to him to formulate what he wanted to say during small group discussions; insufficient opportunities to initiate interactions about topics of concern to him; peers often addressing him and asking him a question but leaving before he could answer the question; and peers pretending to understand his message when they had not done so. Correspondingly, the authors identified several behaviors that would be desirable from Simon's peers. These behaviors included peers being more aware of the time taken to interact using AAC strategies and to allow time for Simon to formulate messages; increasing awareness of their behaviors that block conversations with Simon including improving their listening and negotiating skills; peers

learning the strategy of waiting for a response from Simon; increasing peers' awareness of how frustrating it is for a person not to be understood; and peers learning the importance of telling Simon that they have not understood him and learning methods to assist in clarification of his messages (Lilienfeld & Alant, 2005: 285). The peer training program that was implemented in this classroom consisted of eight workshops of 50 minutes duration each time. Each session had a different objective consisting of specific goals and themes so that each workshop formed a collaborative unit. The themes of the workshops included conversation (turnabouts), behaviors that block communication, listening skills, conversation maintenance, group consensus, feedback and clarification, rate enhancement and negotiation, and finally a recall and review of aspects of the previous topics. These topics were taught using a principle called social modeling which involves the practices of teaching a behavior by presenting a model to be observed and imitated.

The interactions in the classroom were videotaped and interactions between peers were transcribed and analyzed in three contexts: teacher-directed time, outcome-based educational small-group discussion, and informal time. Results showed that after the intervention, Simon's interaction changed including the development of friendships, interaction outside of the classroom and changes in the communication functions of his interactions with peers (Lilienfeld & Alant, 2005: 288). The differences between baseline measures and post-intervention measures in each context varied with the greatest increase between pre- and post-intervention (or maintenance) interactions in the informal context. The difference in this context was a total of 252 messages per hour. The second largest was the small-group context with a difference of 217 messages per hour and finally there was a difference of 84 messages per hour for the teacher-directed context (Lilienfeld & Alant, 2005: 289). Significantly, the largest increase in the informal context signifies a true change in social interactions as it is during this time that peers

can choose with whom, to whom, and for how long they wish to communicate. Thus, there was a definite increase in social interactions of Simon with his peers as measured in messages per hour (Lilienfeld & Alant, 2005: 289).

The two studies just highlighted show that peer training in the classroom context can lead to an increase in social interaction for all the participants involved, both typically developing children and users of AAC systems. Thus, it is important that rather than viewing communicative difficulties as resulting substantively from lack of competence on the part of the individual with a disability, such difficulties should be increasingly viewed as a failure of an interactive process where the partners' skills are of equal importance in sustaining successful interaction (Carter & Maxwell, 1998: 77). Moreover, as Lilienfeld and Alant (2005) affirm, there is an interactive effect between the competence of the peer partner and the competence of the person using AAC, each impacting the other. The development of communicative competence is therefore inseparable from socialization and partner interaction (281). Taking these studies' findings into consideration, it can be hypothesized that in a similar social context such as camp, similar results could be found. If disabled campers brought familiar peers to camp with them, either from school or the community, the peer could be coached throughout the week by the counselor on how to best communicate with their friend while the AAC user would have the benefit of positive peer modeling of competent skills, both linguistically and socially.

Moreover, peers may also assist in the maintenance and generalization of skills as once one partner has been trained, the participant could go on and teach other communication partners (Carter & Maxwell, 1998: 77; 87). If a familiar peer were trained throughout the week on communication strategies that would best facilitate meaningful communication between peers,

he or she could then return to school or another community-based setting and teach others how to socialize and communicate effectively with the user of AAC.

As Lund and Light (2006) affirm, one of the unique things about AAC is that it involves not one specific intervention for all, but rather a range of interventions for individuals with a variety of disabilities whose speech is not adequate to meet their daily communication needs (296). Thus, my proposition is multi-faceted and takes into account as much as possible each individual AAC user and communicator. First, the camp should be organized in a different manner so that instead of making age the organizational factor, each camper's communicative competence in several areas should be the primary factor taken into consideration. Using this variable would provide counselors with much more detailed and individualized information about their camper and could help them to better support and scaffold activities throughout the week. Secondly, each camper should bring to camp a familiar peer, either schoolmate or family member, to interact with during the week. The introduction of the typically developing peer allows for peer modeling and the possibility that through training and coaching throughout the week, growth achieved while in the context of camp may be generalized to contexts outside of camp. The combination of these strategies allows for the maximum potential for growth for the participants involved.

## **VII. Conclusion**

This project has served as a broad overview of a very extensive field and in essence shows that speech-language intervention involving an AAC system, be it high-tech or low-tech, requires a holistic view of the individual. The field emerged with the realization that perhaps speech is not the only means of communication and that every individual deserves a means with which to communicate be it vocal or otherwise. Selecting a system requires knowledge of the individual's abilities, linguistic as well as motoric, and also requires knowledge of what is relevant to that individual so that the vocabulary and system chosen will integrate effectively and meaningfully into their natural environment. The limitations of systems of AAC need to be well known and taken into consideration so that each individual can be supported such that they are given meaningful ways in which to communicate with their device(s). Finally, the user needs to be considered at an individual level so that his or her unique levels of competencies can be identified and addressed with the most accuracy as possible. Moreover, the AAC system user, the system, the environment, and the communication partner must all be considered together so that each communicative exchange can be maximally efficient, effective, and meaningful in every context.

The result of this literature review has culminated in a proposal concerning the best way to organize a summer camp for disabled, nonverbal children who use systems of AAC as their primary means of communication. Based on this research, the proposal asserts that the ideal camp that has the most potential for not only communicative growth but also generalization of any skills learned has several features. First, the groups of campers should be organized based on competence in several areas as defined by Light (1989). These groups could either be organized by week so that one week was for participants who had particularly low competencies in the

operational aspects of their AAC systems, for example, or perhaps there would be a week for campers whose linguistic competence was high but whose social competence was low. These types of groupings would allow for more specific and individualized planning of materials and activities for its participants, targeting the areas in which they need continued support. Another possibility is that the campers could be paired each week in such a way that for each camper who had a high competence linguistically there would be another camper whose linguistic competence is low, allowing for reciprocal learning and increased peer modeling between AAC users. Once the groups have been organized in one of these manners, I propose that each camper also bring a familiar typically developing peer to camp as their “buddy.” This child would be paired with the camper throughout the week creating a more inclusive environment which allows for even further peer modeling and provides the campers using AAC the very important but often lacking, interaction with their peers. Moreover, each pair of campers would also have their own counselor trained to be an effective communication partner who could help coach the typically developing peer in how best to communicate with his buddy who is using AAC. The addition of this familiar peer to the traditional dyad would increase the likelihood of skills learned at camp to be generalized to other communicative contexts as the peer could go on and teach other potential communicators how to also be an effective communication partner.

Participation-based community activities such as Camp Talk provide a valuable resource and opportunity for children who use AAC and their families. While my proposal for camp includes the introduction of typically developing peers, one of the great and unique things about camp in and of itself is the fact that it promotes the disability culture described by Hall (2002). She states that opportunities for children with disabilities to interact with one another should not be overlooked since they provide opportunities to learn alongside other individuals who share

similar identities and life experiences. Moreover, there is a benefit in the exchange of insights and common concerns among individuals with disabilities, and in the case of camp for the parents of these children. Camp was a great place for parents to meet other parents who have experienced the same barriers and challenges that they have faced and allowed them to become resources for one another. Thus, camp could effectively be a best-of-both-worlds situation in that participants at camp would have the opportunity to be a part of this disability culture while also getting the benefit of inclusive peer interactions.

Obviously this is an area for future research. Since there is a lack of community programs for users of AAC, as identified by Batorowicz et al. (2006), programs such as Camp Talk are important opportunities to sustain. However, it is because these programs are limited that they should be organized and structured to be maximally engaging, fun, and effective, and the best way to accomplish these goals is to have a clear understanding of the unique characteristics of the individual who uses AAC and by giving them meaningful opportunities in which to communicate with partners who will help them assert their equal standing in each communicative exchange.



## Appendix A: Training Materials for Counselors of Camp Talk

### ➤ **Fundamental Principles of Camp Talk:**

- Every kid deserves something to talk about and a way to say it!
- Camp talk is a place for kids with disabilities to just be kids. So, let's sing, play, and have a great time!
- Each counselor will be responsible for 1-2 campers.
- Counselors are responsible for the safety of their camper:
  - Notify the supervisor when leaving an area.
  - Stay with your camper at all times.
- All rules of camp talk and the Youth Aquatic Center are to be observed at all times:
  - Wear shoes.
  - Do not go near water unless a lifeguard is present.
  - Respect the boy scouts and their activities.
  - Respect nature—stay on trails and don't litter.
  - Smoking is not allowed anywhere on YAC property.
- Each counselor is responsible for reading their camper profile and the information in this packet. Pay close attention to allergies and feeding requirements.
- Each counselor is responsible for assisting their camper and encouraging communication throughout the day. This includes cueing the camper to use the device and helping retrieve or build messages with the appropriate level of support.
- Counselors need to make sure the camper is picked up by the appropriate person at the end of the day and that parents are informed of the day's activities and news.
- If a question arises about either behavior or the device, consult the supervisor.
- Each counselor is expected to be flexible and maintain a positive attitude. Your attitude sets the stage for the campers.
- Counselors are here to have a great time!

### ➤ **General principles of facilitating interactive communication**

- All children have a basic need for control and connection. It is essential to use these needs to motivate the child.
  - Choose activities that the child really likes
  - Set up natural communication opportunities within an activity
  - Use vocabulary that facilitates control and connection (e.g., more, all done, no)
  - Use action-oriented play
  - Use a variety of communicative functions:
    - Social chit-chat
    - Relating/sharing experiences
    - Expression of feelings, emotions, opinions
    - Choice making
    - Directing the actions of others
    - Expression of needs
  - Follow the child's lead: empowering the child and giving him or her control
- Respect the child's specific learning style
  - Expect delayed processing time
    - Use anticipatory pauses
    - Do not distract child from his thought process—wait quietly and patiently

- Allow the child to withdraw and center and then continue at own pace
- Treat the AAC user as you would treat any other communication partner his or her age
  - Do not say “good job” or “good talking” when child uses device appropriately—respond to message
  - Avoid using, “What’s this?” and asking yes/no questions—puts child in passive communicative role
  - Keep questions and extraneous language to a minimum—do not talk for child or continue talking when child is building message
  - Keep the conversation equal. Include child in conversation with other people in the environment
  - Always assume child can understand everything you say. NEVER talk about child in his or her presence and assume he/she cannot understand you
- Use principles of Environmental Communication Teaching
  - Use incidental teaching episodes that are short, positive, and geared toward functional communication, NOT language training
  - When communication is expected (set up by partner or expected within context of activity), always follow the prompting hierarchy
- Understand and acknowledge that a child recognizing and pointing to symbols in response to questions is a very different skill from initiating a new idea through the use of these symbols.

#### ➤ **Prompting Hierarchy**

- Provide an expectant pause to provide the child the needed time to respond.
- If no response, ask child an open ended question, then pause (e.g., What do you want Sarah to draw?).
- If no response, provide child with a multiple choice question, then pause (e.g., What should we draw? An eye or a nose?).
- If no response, provide child with a partial prompt, then pause (e.g., use eye gaze, pointing, tapping to indicate correct place to find needed response)
- If no response, provide child with full model of an appropriate communicative response (e.g., activate the message for the child).

#### ➤ **Rules of Thumb for Interacting with the Campers**

- Be patient when camper is developing a response.
- Communicate naturally.
- Apply the Golden Rule: do for them what you would want others to do for you.
- Let the camper do as much as possible independently, then assist only as much as is necessary.
- Every child should have a chance to be involved in every activity.
- Follow the least-to-most prompting hierarchy.
- At lunch time and during activities, expect child to request foods or materials. Provide small portions to increase number of requests.
- Provide picture schedules and/or accompany spoken language with related picture representation if camper requires it.
- Familiarize yourself with the organization of your camper’s device.

**Appendix B**  
**2007 Camp Talk Camper Profile – Week 2**

**General Information**

My name is Holly!

I am 13 years old.

I live in San Diego, California.

I have the diagnosis of Down syndrome with severe apraxia.

**Communication History**

I communicate using the DynaVox MiniMo, though mostly I use sign language.

I have been using the MiniMo for 9 months and I am at an intermediate level.

I am working on n/a

In the past I have used the GoTalk for 3 months.

Important facts: I dislike new and unexpected situations, loud places or crowds – I will shut down communication. When I am comfortable, though, I am very talkative and outgoing. Make/require eye contact, visual cues help, written schedule helps. Will talk about “Mom” a lot; reassure me of the schedule and when I’ll see mom.

**Health History**

Vision: In normal range. I am exploring my tracking abilities.

Hearing: At low range of normal.

Allergies: None.

Seizures: None.

Important facts: No medication. Severe apraxia. Mostly unintelligible unless you know what she is saying. Uses Sign Language as primary means of communication.

**Self-Help Skills**

Mobility: Ambulatory – poor balance, poor muscle tone.

Feeding: No special dietary needs.

Toileting/Dressing: May need some help with snapping, zipping or buttoning.

**Fun Facts About Me**

This is my first time at Camp Talk!

## Appendix C: Camper Information and Photos\*



*Name:* Sarah  
*Age:* 6 years old  
*Disability:* Cerebral Palsy,  
Cochlear Implant  
*Device:* DynaVox MT4  
with feet switches  
*Picture:* Sarah loved the  
camera! Here she's posing  
with her counselor.



*Name:* Matt  
*Age:* 14  
*Disability:* Cerebral Palsy  
*Device:* Vantage with  
wireless, optic tracking  
*Picture:* Matt with his friend  
(behind him) who helped him  
through each day of camp.



*Name:* Jennifer Johnson;  
Guest Speaker  
*Age:* 36  
*Disability:* Cerebral Palsy  
*Device:* DynaVox V-Max



*Name:* Gracie  
*Age:* 10  
*Disability:* Rett Syndrome  
*Device:* TechTalk 8  
*Picture:* Gracie in costume as the mother mongoose for our end of the week skit



*Name:* Christian  
*Age:* 16  
*Disability:* Fragile X Syndrome  
*Device:* book of PCS symbols, DynaVox MiniMo; receptive bilingual—English/Spanish  
*Picture:* Christian in costume as a little turtle for our skit



*Name:* Chris  
*Age:* 13  
*Disability:* Autism  
*Device:* DynaVox MiniMo  
*Picture:* Chris posing for the group picture after coming back from the beach.



*Name:* Holly  
*Age:* 13  
*Disability:* Down syndrome  
*Device:* DynaVox MiniMo  
*Picture:* Holly helping Miss Heather, the camp director, tell the story *The Woman who Swallowed a Fly*



*Name:* Tyre  
*Age:* 15  
*Disability:* Cerebral Palsy  
*Device:* Vantage Plus with wireless, optic tracking  
*Picture:* Tyre using his device to sing "Amazing Grace" to the boy scouts at lunch



*Name:* Michella  
*Age:* 14  
*Disability:* Cerebral Palsy  
*Device:* DynaVox MT4, PCS symbols on a lap-board  
*Picture:* Michella on a motor boat in Mission Bay



*Name:* Bobby  
*Age:* 10  
*Disability:* HPV and TRACH  
*Device:* Tango  
*Picture:* Bobby dressed as the main character, Footloose the Mongoose in our skit



*Name:* Trenton  
*Age:* 8  
*Disability:* Cerebral Palsy  
*Device:* DynaVox MT4  
*Picture:* Trenton, shaded by an umbrella so that he could see his device, playing one of our outside games like “Camper Says...”.



*Name:* Ben  
*Age:* 8  
*Disability:* Autism, general neuromotor disorder, and epilepsy  
*Device:* DynaVox MiniMo  
*Picture:* Ben and his aide/counselor at arts and crafts time making a Lei to accompany the camp’s Hawaiian theme.



*Picture: A group picture of everyone from week 2 getting ready for the skit*



*Names: Holly and Brian  
Ages: 13 and 16  
Disabilities: Down syndrome and developmentally delayed  
Picture: Holly and Brian, best friends since preschool, waiting for their turns on the canoes*



*Picture: Tyre showing off his device to the boy scouts at lunch. It was really neat to see how interested they were.*

## **Appendix D: Cerebral Palsy and Autism In-Depth**

### *Cerebral Palsy*

The first disability to be addressed in-depth is Cerebral Palsy (CP). According to an introductory text on communication disorders by Owens, Metz, and Haas (2006), this term describes a heterogeneous group of nonprogressive neurological difficulties resulting from brain injury that occurs very early in fetal or infant development usually before, during, or soon after birth with early signs appearing before 18-months-old. This disorder is characterized by abnormal muscle tone which subsequently affects the whole individual (including motor movement, communication, growth and development, locomotion, learning, and sensation) and has a fairly low reported incidence averaging 1.5 to 3 infants with CP per thousand births (2006: 347). In about 70% of cases, CP results from events occurring before birth that can disrupt normal development of the brain (EDM, 2007: 278). The two most common causes of CP are anoxia and hemorrhages in the brain while infections, toxins, and accidents can also cause injury to the fetal or infant brain that result in CP (Owens et al, 2006: 352). Contrary to popular belief, lack of oxygen reaching the fetus during labor and delivery contributes to only a small minority of cases of CP. In fact, in many cases the cause of CP in a child is not known (EDM, 2007: 278).

Early symptoms of cerebral palsy include irritability, weak crying and sucking, excessive sleeping, little interest in surroundings, and persistence of primitive reflexes beyond the newborn stage (Owens et al, 2006: 352). Infants will exhibit two types of abnormal muscle tone: hypotonia or decreased muscle tone causing the baby to seem flaccid and relaxed, even floppy; and hypertonia or increased muscle tone causing the baby to seem stiff or rigid. Frequently infants with CP are slow to reach developmental milestones such as learning to roll over, sit, crawl, smile, or walk (EDM, 2007: 277-278). There are many variations with this disorder thus it may be hard to predict what areas of development will be affected and how severely. For instance, one or more limbs may be affected, the individual may or may not have speech difficulties, and cognitive abilities can range from mental retardation through superior intelligence with roughly half of all individual's with CP having some significant cognitive deficits (Owens et al., 2006: 347). Individuals often have difficulty with fine motor skills and precise motions, difficulty maintaining balance or walking and difficulty with involuntary movements. Other symptoms include excessive drooling or difficulties swallowing, sucking, or speaking (EDM, 2007: 278). Because children with CP manifest impairments of sensory, motor, and cognitive function, these impairments can affect the child's

ability to participate in everything from activities involving communication, mobility, environmental mastery, recreation, and activities of daily living (Burstein et al., 1998: 372).

There are three distinguishing characteristics that set cerebral palsy apart from other disabilities—namely, its onset, its classification, and its predictability. CP is a developmental neurogenic disorder meaning that the insult to the neurological system that results in this disorder occurs before the neuromotor system has matured. Thus, the child must learn motor movements for which no patterns have been established resulting in the possibility of such movements being learned in an atypical way. Secondly, cerebral palsy is not a disease; rather, it is a nonprogressive, noninfectious injury to one or more parts of the central nervous system. Finally, being a developmental neurogenic impairment, the motor patterns in CP are much more predictable than those in acquired neurogenic impairments meaning that a person with CP is likely to have similar severity of abnormal muscle tone in all affected limbs. This can take the form of paraplegia (affecting the legs only), quadriplegia (affecting all four extremities), hemiplegia (affecting one side only), or monoplegia (affecting only one limb) (Owens et al., 2006: 347).

Moreover, there are several types of cerebral palsy which vary with the areas of the central nervous system that are affected and the type an infant exhibits may change over the first few years of life. Generally, injury can occur in the motor cortex, the pyramidal or extrapyramidal tracts, and the cerebellum—each of which results in different types of disabilities. Usually CP is classified in one of three ways: spastic, athetoid, and ataxic and it is common for patients to have symptoms of more than one of these forms. Spastic cerebral palsy, otherwise known as hypertonia, occurs most commonly between 60-80% of cases and is a condition in which the muscle tone is too high or too tight, especially in the muscles that oppose the bending of joints and that help us to stand erect. This condition is a result of damage to the motor cortex of the brain and/or lower brain areas (including the pyramidal tract). Because of this high muscle tone in opposing muscle groups, movement is extremely difficult and may be described as jerky, labored, and slow, and individuals with this type of CP often have a hard time moving from one position to another or letting go of something in their hand (Owens et al., 2006: 347-348; EDM, 2007: 280).

The second type, occurring in roughly 20-30% of cases is called athetoid cerebral palsy or dyskinesia. It's caused by injury to lower brain areas including the extrapyramidal tract and basal ganglia that help to plan motor patterns and modify motor cortex impulses. Consequently, the excitation mechanisms of the motor cortex are not appropriately monitored resulting in too much muscle activity. This type is characterized by mixed muscle tone, sometimes too high and

sometimes too low, resulting in slow, involuntary writhing movements of their face, arms, and upper body, most pronounced when the individual attempts volitional movement of which the resultant behavior may be disorganized and uncoordinated. Interestingly, it has been noted that with a change in an individual's emotional state (such as being under stress, excited, or amused) there may be an accompanying increase in muscle tone (Owens et al., 2006: 348-349). In fact, I remember observing this feature in my time spent around Jennifer Johnson, our guest speaker at Camp Talk. During her presentation, when she would speak about her husband or tell a joke there would be a simultaneous increase in muscle tone during which her arms would shoot up toward her face and her head would shake a bit more violently than normal.

Finally, the third type is ataxic cerebral palsy which occurs in about 10% of cases and is characterized by uncoordinated movement and disturbed balance. Ataxia results from injury to the cerebellum which subsequently impairs the monitoring of balance information from the inner ears and of proprioceptive information from the muscles regarding the rate, force, and direction of movements. With this type of CP, the individual seems clumsy and awkward—movements lack direction, and hypotonic muscles lack adequate force and have poor direction control. Walking is particularly difficult for these individuals and may be characterized by a wide stance, the head pushed forward, and the arms back in an almost birdlike appearance (Owens et al, 2006: 349).

Because of the oral-motor difficulties associated with this disorder, the part of the communication process that children with CP usually have the most trouble with is speech (Foltz et al, 1998: 266). Because speech movements are the result of a dynamic interaction among processes and structures (Solot, 1998: 355), all aspects of speech production—including respiration, phonation, resonance, articulation, and prosody—may be affected. Speech may be slow and labored, and in severe cases it may even be unintelligible. Many individuals have breathing difficulties which can also affect speech because an inconsistent or inadequate airflow and involvement of the laryngeal muscles will affect phonation. Articulation involving the tongue, lips, and/or jaw may be extremely difficult: the tongue of an individual with CP may move as one unit with limited ability to differentiate its parts; lip movement may be slow and restricted; and jaw and tongue movements may be unspecified, commonly moving together. Prosodic aspects of speech—including pitch, loudness, and duration—may be very monotonous. An individual's speech may be characterized as nonrhythmic or nonfluent resulting in speech that may be choppy with short phrases or words and frequent interruptions. Finally, intellectual, auditory, information-processing,

and language impairments may also complicate the production of meaningful speech (Owens et al., 2006: 350-351).

Generally, individuals with spastic CP have motor problems specifically with their legs and may not have severe speech issues whereas individuals with athetoid CP nearly all exhibit an accompanying motor speech disorder that affects all aspects of production. Also, issues with speech disorders in individuals who have ataxic CP may be related to cognitive impairment and phonological processing problems (Owens et al., 2006: 350-351). Concerning speech disorders in this population, the term that professionals use to describe the disordered speech of people with neurogenic disorders is dysarthria which describes the slow, sluggish, monotone quality of speech in children with CP because of their muscle tone problems (Foltz et al., 1998: 267); abnormalities are noted in range, strength, precision, speed, tone, steadiness, and coordination of speech movement (Solot, 1998: 355). Another problem that they encounter is dyspraxia which refers to motor planning difficulties that impede clear, fluent speech. When individuals experience this motor speech disorder, they have the ability to produce the movement, but can't always successfully transmit the message to the specific muscles necessary to initiate the movement (Foltz, 1998: 267). When thinking about these disorders, it's important to remember that although adults with acquired motor speech disorders once had typical speech, the developing child with a neurogenic impairment did not and consequently may develop atypical motor patterns of production in the process of learning speech using a faulty motor system (Owens et al., 2006: 350). Moreover, hearing or visual impairments, attentional difficulties, and other medical conditions also frequently associated with CP can comprise language development (Solot, 1998: 347).

Lastly, it's also important to note that the actual production of speech may not be the only part of the speech, language, communication triad that is affected in these individuals—language delay is also a concern. Brain lesions underlying CP may also involve the neurological structures responsible for the processing of language which may result in delays in language processing. Mental retardation, hearing loss, and associated conditions such as seizures, attention deficits, and visual impairments may also adversely affect language learning and language use in children with CP (Solot, 1998: 364-365).

## *Autism*

The next developmental disorder to be discussed is defined in the Individuals with Disabilities Education Act as:

A developmental disability significantly affecting verbal and nonverbal communication and social interaction, usually evident before 3 that adversely affects a child's educational performance. Other characteristics often associated with [this disorder] are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences. (EDM, 2007: 249).

The label “autistic” was first introduced by Eugen Bleuler near the beginning of the twentieth century and was well known in psychiatry before its use expanded to our contemporary understanding. Originally it referred to a particular disturbance in schizophrenia—namely, the narrowing of relationships to people and to the outside world. This narrowing was so extreme that it seemed to exclude everything except the person's own self. Fittingly then, Bleuler used the Greek *autos* meaning “self” and described these patients as autistic (Frith, 2003: 5). The term was first used in the more contemporary manner in 1943 by Dr. Leo Kanner, and now in current literature, the terms used in referring to the disorder most commonly known as autism are many. According to the Educator's Diagnostic Manual (2007), “classic autism” can also be referred to as Pervasive Developmental Disorder (PDD), and Autism Spectrum Disorder (ASD) synonymously (249). In fact, ASD is a general term that can refer to Classic Autism, Rett's syndrome, Asperger's syndrome, Childhood Disintegrative Disorder, High-Functioning Autism, Hyperlexia, and Multiplex Developmental Disorder (EDM, 2007: 254-261).

Autism in its more general form is a behavioral syndrome defined by patterns of behavior that a person exhibits, the symptoms of which can range from mild to disabling. As a result of this very broad definition, the individuals who exhibit the symptoms of this disorder can vary widely in ability and personality. For example, intellectually or cognitively, some individuals display superior abilities in particular areas such as music, mechanics, and arithmetic calculations while others show significant delay—fifty percent of people with autism have some form of mental retardation and approximately half are completely nonverbal. Further, while many autistic individuals prefer isolation and tend to withdraw from social contact, others show high levels of affection and enjoyment in social situations. Finally, while some appear lethargic and slow to respond with more focus on objects than people, others may be very active and interact constantly with preferred aspects of their environment (EDM, 2007: 250-253).

Before any major research had been done concerning the etiology of autism, child psychiatrists often made conjectures of their own. In his initial observations of autistic children, Kanner observed that the parents of these children were often from upper middle-class backgrounds and that they seemed to exhibit a cold manner in dealing with their affected child. Then, Bruno Bettelheim, an Austrian born child psychiatrist, picked up on this theme and used it to build his theory on the nature of autism in which he asserted that the coldness of parents, and particularly of mothers, was the central cause of the disorder. Bettelheim himself had been a prisoner in a Nazi concentration camp, and this experience seemed to influence his views on autism. His thought was that autistic children had been mistreated by their mothers in roughly the same way that Nazi concentration camp prisoners had been mistreated by their guards. Thus, these children (or prisoners) were left with feelings of hopelessness, despair, and apathy which lead them to withdraw from contact with reality (Olley & Gutentag, 1999: 5). Although the specific cause of autism remains unknown, it is clear that trauma related to abuse and neglect by caregivers is not the cause (EDM, 2007: 251).

The search for the physiological causes of this disorder began in the 1960s, and currently we know that autism is a neurological disability that is presumed to be present from birth. It's likely that multiple causes are at work in autistic people and that each manifests itself differently in varying forms and severities. Currently a variety of infectious, metabolic, genetic, and environmental factors are being investigated. To date there has been no conclusive evidence that any vaccine increases the risk of developing autism (EDM, 2007: 250-251). Recent studies, however, have shown differences in the shape and structure of the brain in autistic versus nonautistic children (EDM, 2007: 256) with some researchers findings abnormal development of the cerebellum, which regulates incoming sensations, and also sections of the temporal lobe which is responsible for memory and emotions (Owens et al, 2006: 116). Moreover, other neural studies have suggested that the eye and face detection processing of children with ASD may be delayed, explaining their failure to bond early-on with their caregiver, and that infants with autism have a facial processing impairment in that they show no difference in brain response to familiar and unfamiliar faces (Owens et al, 2006: 116). Further, it has also been suggested that some people may have a genetic predisposition to autism since the risk of having a second child with the disorder in a family that already has one autistic child is approximately five percent greater than the risk for the general population (EDM, 2007: 252).

As definitions of autism have broadened over the past thirty to forty years, figures on prevalence for individuals diagnosed with autism have increased substantially (EDM, 2007: 251; Olley & Gutentag, 1999: 8). Different studies have found that between 2 and 6 births per 1,000 are autistic, and in nearly 50 percent of children diagnosed with autism, the defining characteristics do not become evident until the child is a toddler at which point some children begin to regress markedly in communication and social abilities (EDM, 2007: 251). Often, their development proceeds in spurts and plateaus instead of smoothly and consistently like typically developing infants and children (Owens et al, 2006: 115).

Currently 0.12 percent of all school-age students are diagnosed with autism, which accounts for 2.3 percent of all students in special education programs, and the prevalence rate is approximately four times higher for males than females. Moreover, when females have autism they are more likely to have cognitive deficits than are males (EDM, 2007: 251). Interestingly, autism has been found throughout the world in people of all racial and social backgrounds and exists at approximately the same level in all racial and ethnic groups as well as among individuals of all socio-economic status (EDM, 2007: 252).

Autism Spectrum Disorder in general is characterized by several classic symptoms or developmental difficulties that are usually related to verbal and nonverbal communication, social relatedness, and leisure and play activities. For example, autistic individuals often exhibit unusual, repetitive, and preservative movements or narrow, obsessive interests; they are resistant to changes in routines and in other features of their environment; they have substantial problems with social interactions and may exhibit extreme tantrums, aggression, or other forms of acting-out behavior; and they often exhibit an apparent oversensitivity or under-sensitivity to specific kinds of stimulation including audition, vision, and tactile, motor, olfactory, and taste stimulation (EDM, 2007: 252-253; Owens et al, 2006: 115). Other common symptoms include difficulty in expressing needs which may lead to using gestures and pointing instead of words, difficulty in relating and mixing with others, lack of response to normal teaching methods, lack of response to verbal cues, minimal or no eye contact, difficulty expressing and receiving physical affection, no real fear of danger, inappropriate attachment to objects, preference to be alone or an aloof manner, and engaging in sustained, odd play (EDM, 2007: 256). Moreover, some children exhibit self-injurious or self-abusive behaviors including hand biting, hand slapping, and head banging (EDM, 2007: 252-253, 256), while still others will engage in self-stimulatory behaviors such as hand flapping,

rocking, or spinning objects (Owens et al, 2006: 116) which research suggests are efforts to manipulate the environment or avoid demanding or stressful situations.

Impaired functioning in social situations is one of the symptoms characteristic of autism, and can show dramatic change throughout development. Between three and five years old, the isolation of the autistic child from the world of others is at its height, and after five they often show marked improvement in social skills and general adaptation (Frith, 2003: 103). Interestingly, Frith (2003) reports studies done using the Vineland Adaptive Behavior Scales that show that autistic children are often not impaired equally across all categories of social behavior but instead show a rather wide scatter in ability. Importantly, the studies show that these children are by no means devoid of social interest or responsiveness. Further, in self-care and simple daily living skills children with autism do rather well and at times even better than their peers. However, in interpersonal communication the autistic children come out much worse showing poor ratings in sharing and cooperating, apologizing, making and keeping appointments, borrowing and returning things, controlling impulses, and responding appropriately to familiar and unfamiliar people. Overall the results of these studies show that the groups tested were functioning an average of four years below what was expected for their mental age level (99). Other studies have shown that the nature of the social difficulties in autism seems to be strongly related to the individual's inability to mentalize or to think about the content of other's minds by taking into consideration that other people know and believe different things (Frith, 2003: 100).

Associated with the autistic individual's social impairments comes some type of language difficulty that is virtually always present in this population. While the forms that their language problems may take are extremely varied, pragmatics and semantics are affected more often than language form itself. Many people with autism, particularly those of lower intelligence or those with some level of mental retardation, do not speak at all or make only unintelligible noises—at least one third of children and adults with autism have no speech (Wetherby & Prizant, 1999: 142). Others may speak only on rare occasions such as during a temper outburst, and still others may speak clearly but in echolalia, a whole or partial repetition of previous utterances, often with the same intonation (Olley & Gutentag, 1999: 10; Owens et al, 2006: 117). Further, some children may have a condition known as hyperlexia in which they have an inordinate interest in letters and words and can often read from a very young age without any understanding of the word's meanings. Nearly all autistic individuals display semantic-pragmatic disorder in which they possess a very

limited vocabulary with only concrete definitions and poor conversational skills (Owens et al, 2006: 115).

Wetherby and Prizant (1999) assert that deficits in social aspects of communication and symbolic abilities of children with autism fall into three major areas: joint attention, symbolic communication, and symbolic play (142). Children with autism in the prelinguistic and early stages of language development communicate predominately or exclusively for behavior regulation functions, in other words only to request to get others to do something or to protest or stop them from doing something. Thus, they show a deficit in or absence of communication for joint attention—commenting or labeling to direct another’s attention to an object or event. This apparent failure to acquire gestural joint attention may be a crucial milestone that impairs language development and may be an important target for early communication intervention (Wetherby & Prizant, 1999: 142). Moreover, the authors report several studies that have shown that children with autism show significantly less positive affect coordinated with eye gaze and are much less likely to respond to their mother’s smile than typical children. Intriguingly, the studies found that frequency of gaze directed toward their mother was significantly correlated with receptive and expressive language (Wetherby & Prizant, 1999: 145). As they develop, pre-school and school-age children with autism tend to predominately use primitive, contact gestures such as leading, pulling, or manipulating another’s hand to communicate and lack the use of many conventional gestures such as showing, waving, pointing, and symbolic gestures such as nodding their head and depicting actions which illustrates their inability to establish joint attention or communicate symbolically (Wetherby & Prizant, 1999: 143).

In further language development, the vast majority of these children go through a period of using echolalia, which as mentioned previously, is imitation of the speech of others and can occur either immediately after they hear an utterance or at a delay, occurring at some other time. Current understanding of echolalia indicates that it may actually serve a variety of communicative and cognitive functions including a progressive language learning strategy for many children with autism (Wetherby & Prizant, 1999: 143). Children who progress past this stage usually acquire more advanced aspects of grammar and language form; they develop grammatical skills in the same general progression as typically developing children. However, children who develop functional and spontaneous language often use it very idiosyncratically and show persisting problems with pragmatics, particularly social rules and conversational turn-taking (Wetherby & Prizant, 1999: 144).



## Bibliography

- Batorowicz, B., McDougall, S. & Shepherd, T.A. (2006). AAC and Community Partnerships: The Participation Path to Community Inclusion. *Augmentative and Alternative Communication, 22*(3), 178-195.
- Bedrosian, J.L. (1997). Language Acquisition in Young AAC System Users: Issues and Directions for Future Research. *AAC Augmentative and Alternative Communication, 13*, 179-185.
- Blink Twice. (2007). *Learn About the Tango: A Breakthrough in Communication*. Retrieved February 21, 2008, from <http://www.blink-twice.com/tango/index.html>.
- Blischak, D.M. (1999). Increases in Natural Speech Production Following Experience with Synthetic Speech. *Journal of Special Education Technology, 14*(2), 44-53.
- Blischak, D.M., Lombardino, L.J., & Dyson, A.T. (2003). Use of Speech-Generating Devices: In Support of Natural Speech. *Augmentative and Alternative Communication, 19*(1), 29-35.
- Blockberger, S. & Johnston, J.R. (2003). Grammatical Morphology Acquisition by Children with Complex Communication Needs. *Augmentative and Alternative Communication, 19*(4), 207-221.
- Burstein, J.R., Wright-Drechsel, M.L., & Wood, A. (1998). Assistive Technology. In John P. Dormans & Louis Pellegrino (Eds.), *Caring for Children with Cerebral Palsy: A Team Approach* (pp. 371-390). Baltimore, MD: Paul H. Brookes Publishing Co.
- Calculator, S. & Dollaghan, C. (1982). The Use of Communication Boards in a Residential Setting: An Evaluation. *Journal of Speech and Hearing Disorders, 47*, 281-287.
- Carter, M. (2003). Communicative Spontaneity of Children with High Support Needs who use Augmentative and Alternative Communication Systems I: Classroom Spontaneity, Mode, and Function. *Augmentative and Alternative Communication, 19*(3), 141-154.
- Clarke, M. & Wilkinson, R. (2007). Interaction between Children with Cerebral Palsy and their Peers 1: Organizing and Understanding VOCA Use. *Augmentative and Alternative Communication, 23*(4), 336-348.
- Clibbens, J. & Powell, G. (2003). Joint Attention and Lexical Development in Typical and Atypical Communication. In Stephen von Tetzchner and Nicola Grove (Eds.), *Augmentative and Alternative Communication: Developmental Issues* (pp. 28-37). London: Whurr Publishers Ltd.
- Cress, C.J. (2003). Responding to a Common Early AAC Question: "Will my child talk?" *ASHA SID 12 Newsletter*, 10-11.

- Durand, V.M. (1999). New Directions in Educational Programming for Students with Autism. In D.B. Zager (Ed.), *Autism: Identification, Education, and Treatment, 2<sup>nd</sup> Edition* (pp. 323-343). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- DynaVox Technologies. (2008). *The History of DynaVox*. Retrieved February 21, 2008, from <http://www.dynavoxtech.com/about/History.aspx>.
- Ferm, U., Ahlsén, E. & Björck-Åkesson, E. (2005). Conversation Topics Between a Child with Complex Communication Needs and her Caregiver at Mealtime. *Augmentative and Alternative Communication, 21(1)*, 19-40.
- Foltz, L.C., DeGangi, G., & Lewis, D. (1998). Physical Therapy, Occupational Therapy, and Speech and Language Therapy. In Elaine Geralis (Ed.), *Children with Cerebral Palsy: A Parent's Guide, 2<sup>nd</sup> Edition* (pp. 231-290). Bethesda, MD: Woodbine House.
- Frith, U. (2003). *Autism: Explaining the Enigma, 2<sup>nd</sup> Edition*. Malden, MA: Blackwell Publishing.
- Gillette, Y. (2005). A Communication Independence Model: For People With Severe Communication Disabilities. *speechpathology.com*
- Goldbart, J. & Marshall, J. (2004). 'Pushes and Pulls' on the Parents of Children who use AAC. *Augmentative and Alternative Communication, 20(4)*, 194-208.
- Gorenflo, C.W. & Gorenflo, D.W. (1994). Effects of Synthetic Voice Output Attitudes toward the Augmented Communicator. *Journal of Speech and Hearing Research, 37(1)*, 64-68.
- Hall, J.P. (2002). Narrowing the Breach: Can Disability Culture and Full Educational Inclusion be Reconciled? *Journal of Disability Policy Studies, 13(3)*, 144-152.
- Higginbotham, D.J., Shane, H., Russell, S., & Caves, K. (2007). Access to AAC: Present, Past, and Future. *Augmentative and Alternative Communication, 23(3)*, 243-257.
- Hjelmquist, E. & Sandberg, A.D.. (1996). Sounds and Silence: Interaction in Aided Language Use. In Stephen von Tetzchner and Mogens Hygum Jensen (Eds.), *Augmentative and Alternative Communication: European Perspectives* (pp. 137-152). London: Whurr Publishers Ltd.
- Hodapp, R., & Zigler, E. (1990). Applying the Developmental Perspective to Individuals with Down syndrome. In Dante Cicchetti & Marjorie Beeghly (Eds.), *Children with Down syndrome: A developmental perspective* (pp. 1-28). Cambridge: Cambridge University Press.
- Huer, M.B. & Lloyd, L.L. (1990). AAC Users' Perspectives on Augmentative and Alternative Communication. *Augmentative and Alternative Communication, 6(4)*, 242-249.

- Kent-Walsh, J. & McNaughton, D. (2005). Communication Partner Instruction in AAC: Present Practices and Future Directions. *Augmentative and Alternative Communication, 21*(3), 195-204.
- Kouri, T.A. (1988). Effects of Simultaneous Communication in a Child-Directed Treatment Approach with Preschoolers with Severe Disabilities. *Augmentative and Alternative Communication, 4*(4), 22-32.
- Lasky, E.Z. & Klopp, K. (1982). Parent-Child Interactions in Normal and Language-Disordered Children. *Journal of Speech and Hearing Disorders, 47*, 7-18.
- Lenneberg, E.H. (1962). Understanding Language Without Ability to Speak: A Case Report. *Journal of Abnormal and Social Psychology, 65*(6), 419-425.
- Letto, M., Bedrosian, J.L., & Skarakis-Doyle, E. (1994). Application of Vygotskian Developmental Theory to Language Acquisition in a Young Child with Cerebral Palsy. *Augmentative and Alternative Communication, 10*, 151-160.
- Light, J. (1989). Toward a Definition of Communicative Competence for Individuals Using Augmentative and Alternative Communication Systems. *AAC: Augmentative and Alternative Communication, 5*(2), 137-144.
- Light, J. (1997a). 'Communication is the Essence of Human Life': Reflections on Communicative Competence. *Augmentative and Alternative Communication, 13*, 61-70.
- Light, J. (1997b). 'Let's Go Star Fishing': Reflections on the Contexts of Language Learning for Children Who Use Aided AAC. *AAC Augmentative and Alternative Communication, 13*, 158-171.
- Light, J., Binger, C. & Smith, A.K. (1994). Story Reading Interactions between Preschoolers Who Use AAC and Their Mothers. *Augmentative and Alternative Communication, 10*, 255-268.
- Light, J. & Drager, K. (2007). AAC Technologies for Young Children with Complex Communication Needs: State of the Science and Future Research Directions. *Augmentative and Alternative Communication, 23*(3), 204-216.
- Lilienfeld, M. & Alant, E. (2005). Peer Learning and Participation in AAC Intervention. In Erna Alant & Lyle L. Lloyd (Eds.), *Augmentative and Alternative Communication and Severe Disabilities: Beyond Poverty* (pp. 272-299). London: Whurr Publishers Ltd.
- Lund, S.K. & Light, J. (2006). Long-Term Outcomes for Individuals Who Use Augmentative and Alternative Communication: Part I—What is a “Good” Outcome? *Augmentative and Alternative Communication, 22*(4), 284-299.

- Martinsen, H. & von Tetzchner, S. (1996). Situating Augmentative and Alternative Communication Intervention. In Stephen von Tetzchner and Mogens Hygum Jensen (Eds.), *Augmentative and Alternative Communication: European Perspectives* (pp. 37-48). London: Whurr Publishers Ltd.
- Millar, D.C., Light, J.C., & Schlosser, R.W. (2006). The Impact of Augmentative and Alternative Communication Intervention on the Speech Production of Individuals with Developmental Disabilities: A Research Review. *Journal of Speech, Language, and Hearing Research, 49*, 248-264.
- Olley, J.G. & Gutentag, S.S. (1999). Autism: Historical Overview, Definition, and Characteristics. In D.B. Zager (Ed.), *Autism: Identification, Education, and Treatment, 2<sup>nd</sup> Edition* (pp. 3-22). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Owens, R.E., Metz, D.E., & Haas, A. (2006). *Introduction to Communication Disorders: A Lifespan Perspective, 3<sup>rd</sup> Edition*. Boston, MA: Allyn & Bacon.
- Pierangelo, R., & Giuliani, G. (2007). *EDM: The Educator's Diagnostic Manual of Disabilities and Disorders*. San Francisco: Jossey-Bass.
- PRC: Prentke Romich Company. (2008). *About PRC*. Retrieved February 21, 2008, from <http://www.prentrom.com/about>.
- Pueschel, S. (1990). A Brief History of Down syndrome. In Siegfried M. Pueschel (Ed.), *A Parent's Guide to Down syndrome: Toward a Brighter Future* (pp. 9-16). Baltimore, MD: Paul H. Brookes Publishing Co.
- Renner, G. (2003). The Development of Communication with Alternative Means from Vygotsky's Cultural-Historical Perspective. In Stephen von Tetzchner and Nicola Grove (Eds.), *Augmentative and Alternative Communication: Developmental Issues* (pp. 67-82). London: Whurr Publishers Ltd.
- Romski, M. & Sevcik, R.A. (2005). Augmentative Communication and Early Intervention: Myths and Realities. *Infants and Young Children, 18(3)*, 174-185.
- Schepis, M.M. & Reid, D.H. (1995). Effects of a Voice Output Communication Aid on Interactions Between Support Personnel and an Individual with Multiple Disabilities. *Journal of Applied Behavior Analysis, 28(1)*, 73-77.
- Schlosser, R.W. (2003). Roles of Speech Output in Augmentative and Alternative Communication: Narrative Review. *Augmentative and Alternative Communication, 19(1)*, 5-27.
- Serafica, F.C. (1990). Peer Relations of Children with Down syndrome. In Dante Cicchetti & Marjorie Beeghly (Eds.), *Children with Down syndrome: A developmental perspective* (pp. 369-398). Cambridge: Cambridge University Press.

- Sigafoos, J. (1999). Creating Opportunities for Augmentative and Alternative Communication: Strategies for Involving People with Developmental Disabilities. *Augmentative and Alternative Communication*, 15, 183-190.
- Smith, M. (2003). Environmental Influences on Aided Language Development: The Role of Partner Adaptation. In Stephen von Tetzchner and Nicola Grove (Eds.), *Augmentative and Alternative Communication: Developmental Issues* (pp. 155-175). London: Whurr Publishers Ltd.
- Smith, M. (2006). Speech, language and aided communication: Connections and questions in a developmental context. *Disability and Rehabilitation*, 28(3), 151-157.
- Solot, C.B. (1998). Promoting Function: Communication and Feeding. In John P. Dormans & Louis Pellegrino (Eds.), *Caring for Children with Cerebral Palsy: A Team Approach* (pp. 347-370). Baltimore, MD: Paul H. Brookes Publishing Co.
- Soto, G. & von Tetzchner, S. (2003). Supporting the Development of Alternative Communication Through Culturally Significant Activities in Shared Educational Settings. In Stephen von Tetzchner and Nicola Grove (Eds.), *Augmentative and Alternative Communication: Developmental Issues* (pp. 287-299). London: Whurr Publishers Ltd.
- Stoel-Gammon, C. (1997). Phonological Development in Down syndrome. *Mental Retardation and Developmental Disabilities Research Reviews*, 3, 300-306.
- von Tetzchner, S. & Martinsen, H. (2000). *Introduction to Augmentative and Alternative Communication: Sign teaching and the use of communication aids for children, adolescents and adults with developmental disorders*. London: Whurr Publishers.
- Ward, O.C. (1999). John Langdon Down: The Man and the Message. *Down syndrome Research and Practice*, 6(1), 19-24.
- Wetherby, A.M. & Prizant, B.M. (1999). Enhancing Language and Communication Development in Autism: Assessment and Intervention Guidelines. In D.B. Zager (Ed.), *Autism: Identification, Education, and Treatment*, 2<sup>nd</sup> Edition (pp. 141-174). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Yoder, D.E. (2001). Having My Say. *Augmentative and Alternative Communication*, 17(1), 2-10.
- Zangari, C., Llyod, L.L., & Vicker, B. (1994). Augmentative and Alternative Communication: An Historic Perspective. *Augmentative and Alternative Communication*, 10(1), 27-59.