



The Changing Face of Augmentative and Alternative Communication: Past, Present, and Future Challenges

Janice Light & David McNaughton

To cite this article: Janice Light & David McNaughton (2012) The Changing Face of Augmentative and Alternative Communication: Past, Present, and Future Challenges, *Augmentative and Alternative Communication*, 28:4, 197-204, DOI: [10.3109/07434618.2012.737024](https://doi.org/10.3109/07434618.2012.737024)

To link to this article: <https://doi.org/10.3109/07434618.2012.737024>



Published online: 21 Dec 2012.



Submit your article to this journal [↗](#)



Article views: 23061



View related articles [↗](#)



Citing articles: 24 View citing articles [↗](#)

EDITORIAL

The Changing Face of Augmentative and Alternative Communication: Past, Present, and Future Challenges

JANICE LIGHT* & DAVID MCNAUGHTON

The Pennsylvania State University, Pennsylvania, USA

Keywords: *Augmentative and alternative communication, Developmental disabilities, Acquired disabilities, Communication, Participation*

Introduction

It is with great excitement that we are assuming our roles as co-editors of the journal, *Augmentative and Alternative Communication*. As we embark on this new journey, we would like to take a moment to consider the enormous changes that have taken place in the field of augmentative and alternative communication (AAC) over the past four decades and to reflect on the future challenges that lie ahead if we are to attain our mission of enhancing communication for all people with complex communication needs. Thirty to 40 years ago, people with complex communication needs typically lived in large institutions, isolated from the community (Collier & Self, 2010; Mirenda, 1993). AAC interventions were the exception rather than the rule, typically implemented only after years of traditional speech therapy had produced little benefit, and often reserved only for those individuals who were judged to have the necessary “prerequisite” skills (Estrella, 2000). Since these early days of AAC, the field has witnessed dramatic changes: changes in the demographics of the population that uses AAC; changes in the scope of communication needs that must be considered; changes in the AAC systems that are available; and, ultimately, changes in expectations for participation by individuals who use AAC.

Changes in the Demographics of the Population that Uses AAC

At the very center of the field are the individuals with complex communication needs who require AAC. The demographics of this population have changed

substantially over the past 30 years. There are increased numbers of individuals with significant communication disabilities who require AAC, including individuals from diverse cultural and linguistic backgrounds. With growing evidence of the potential benefits of AAC for a variety of populations, and the increased interest in and availability of AAC technologies, more individuals are now receiving AAC services than ever before.

Increased Numbers of Individuals who Require AAC

Beukelman (2012) highlighted several factors that have contributed to increases in the number of individuals who require AAC. For example, the incidence of autism spectrum disorders (ASD) has increased significantly in recent years; in the United States, 1 in 88 children is now diagnosed with ASD (Centers for Disease Control and Prevention, 2011), and approximately 30–50% of children with ASD do not develop functional speech and require AAC (National Research Council, 2001). In addition, due to advances in medical intervention, there are now improved survival rates for children born with developmental disabilities and for those with acquired disabilities. These increased survival rates have resulted in increases in the numbers of individuals who experience lifelong disabilities, many of which include significant communication impairments (e.g., Vincer et al., 2006). For example, the incidence of cerebral palsy in the United States is increasing (Loyola University Health System, 2010), making it one of the most common causes of chronic childhood disability; approximately 95% of children with cerebral palsy who have speech and/or language limitations would benefit from AAC intervention (Hustad & Miles, 2010).

*Correspondence: Department of Communication Sciences and Disorders, 308 Ford, Penn State University, University Park, PA 16802, USA.
E-mail: JCL4@PSU.EDU

Not only are there increased numbers of people with significant communication disabilities who require AAC, but also these individuals are living longer (Balandin & Morgan, 2001), thus increasing the prevalence of individuals who require AAC even further. Finally, increased life expectancy for the population generally has resulted in an increased number of older adults (i.e., age 65 or older). As people age, they may experience concomitant sensory perceptual, motor, cognitive, and language impairments and may ultimately require AAC to support communication (Segalman, 2011).

Increased Awareness and Acceptance of AAC

Over the past 30 years, there have also been substantial changes in public and professional awareness and acceptance of AAC, resulting in significant changes in the range of populations considered to potentially benefit from AAC interventions. Historically, AAC was erroneously viewed as a “last resort” for people with complex communication needs, reserved for situations where all other interventions had failed (Ronski & Sevcik, 2005). Many clinicians and families feared that AAC interventions would negatively affect speech development or recovery. As a result, it was primarily individuals with significant motor impairments, with a poor prognosis for speech development or recovery, who were even considered for AAC interventions, and even then intervention was often delayed. Many clinicians erroneously believed that there were specific cognitive prerequisites to AAC; as a result, many individuals, especially those with severe cognitive impairments, were excluded from AAC interventions (Hourcade, Pilotte, West, & Parette, 2004; Ronski & Sevcik, 2005). Over the past 30–40 years, there have been substantial changes to these practices. There is now a growing body of empirical evidence documenting the positive outcomes of AAC intervention (e.g., Beukelman, Fager, Ball, & Dietz, 2007; Bopp, Brown, & Mirenda, 2004; Branson & Demchak, 2009; Fried-Oken, Beukelman, & Hux, 2012; Ganz, et al., 2011; Machalicek et al., 2010; Schlosser, Sigafoos, & Koul, 2009; Wendt, 2009). Moreover, there is evidence that AAC interventions pose no risk to speech development or recovery (e.g., Beukelman & Mirenda, 2013; Millar, Light, & Schlosser, 2006; Schlosser & Wendt, 2008). In addition, the myth of prerequisites to AAC intervention has been debunked, as the positive benefits of AAC have been demonstrated with infants and toddlers (e.g., Branson & Demchak, 2009; Light & Drager, 2012; Ronski, et al., 2010) as well as with older beginning communicators with severe disabilities (e.g., Snell et al., 2010).

The positive outcomes of AAC intervention, supported by scientific evidence, have resulted in increased professional and public awareness of AAC. As a result, AAC interventions are being initiated with younger children (e.g., Branson & Demchak, 2009; Light & McNaughton, 2012; Ronski et al., 2010) and with individuals with severe intellectual disabilities (Snell et al., 2010). Furthermore, AAC interventions are

being initiated not just with children who have no functional speech, but also with children who are at risk for speech development, who may develop speech but not until later in their development, or who have speech that is difficult to understand, including children with ASD, Down syndrome, and developmental apraxia (e.g., Braddock et al., 2012; Calculator & Black, 2010; Baumann Leech & Cress, 2011; Light & Drager, 2012; Ronski et al., 2010; Sigafoos et al., 2011).

These changes in awareness and acceptance of AAC extend to adults with acquired disabilities as well. For example, Ball, Beukelman, and Bardach (2007) reported that approximately 96% of individuals with ALS for whom speech-generating devices were recommended ultimately accepted, acquired, and used the devices; while in this issue of *AAC*, McKelvey, Evans, and Kawai (2012) report that families also highly value AAC systems as tools to support communication with individuals with ALS. In addition, increasing numbers of speech language pathologists are working to reconcile the traditional restorative approaches to language intervention (utilized historically with individuals with aphasia) with AAC interventions that focus on functional communication for these individuals (Simmons-Mackie, King, & Beukelman, in press). Increased awareness and acceptance of AAC have also resulted in its successful application to new populations of adults with acquired disabilities, including individuals with primary progressive aphasia, Alzheimer’s disease and dementia, and those in intensive care units (ICU) who may have temporary conditions (e.g., Beukelman et al., 2007; Bourgeois, Dijkstra, Burgio, & Allen-Burge, 2001; Cress & King, 1999; Fried-Oken, Rau, & Oken, 2000; Fried-Oken, Rowland et al., 2012; Downey & Hurtig, 2006).

Increased Cultural and Linguistic Diversity

The field has not only witnessed increases in the number of people who use or require AAC, but it has also seen much greater cultural and linguistic diversity among those receiving AAC services (Binger, Kent-Walsh, Berens, Del Campo, & Rivera, 2008; McCord & Soto, 2004). Concerted efforts by the International Society for Augmentative and Alternative Communication (ISAAC) and other organizations have increased awareness of AAC around the world (e.g., Siu et al., 2010). Furthermore, with increased globalization, demographics in many countries are changing considerably and reflect greater diversity. For example, recent data indicate that approximately 40–45% of all children served through the Individuals with Disabilities Education Act (IDEA) in the United States come from families of diverse cultural and linguistic backgrounds (U.S. Department of Education, 2010). These changes bring increased demands for culturally responsive AAC interventions that focus on the needs and priorities of those served, and that provide access to communication via culturally appropriate and accepted means (Pickl, 2011).

Clearly there have been dramatic changes in the profile of individuals who currently receive or would benefit from AAC services. There are increased numbers of individuals with complex communication needs: They represent a wide range of ages, both younger and older, than ever before; they experience a wide array of disabilities (both developmental and acquired), resulting in an extensive range of motor, sensory perceptual, cognitive, and language skills; they come from diverse cultural and linguistic backgrounds; they participate in a wide range of environments (home, school, work, and community); and they require services over a longer life span, as their needs and skills change over time. Despite increased awareness and acceptance of AAC over the past four decades, there remain many individuals with complex communication needs around the world who are not receiving the AAC services that they require (e.g., Hustad & Miles, 2010). There remain many education and rehabilitation professionals who lack the knowledge and skills to provide effective research-based AAC services (Costigan & Light, 2010). The future challenge is to build professional capacity in AAC around the world to ensure that all individuals have access to the high quality services that they require.

Changes in the Scope of Communication Needs

Along with the changes in the population of individuals who are receiving or would benefit from AAC services, there have also been dramatic shifts in recognition of the scope of communication needs that must be addressed in intervention (Simeonsson, Björk-Åkesson, & Lollar, 2012; Williams, Krezman, & McNaughton, 2008). Historically, research and clinical practice in the AAC field focused solely on augmenting or replacing speech and enhancing face-to-face communication. Interventions were typically designed to address the expression of needs and wants. However, in recent years, there has been increased recognition of the breadth of communication needs that must be addressed to support full participation in society – not just the expression of needs and wants, but also information transfer, the development of social closeness, and social etiquette routines (Light, 1997). Research has demonstrated that AAC interventions can serve to enhance comprehension as well as expression (e.g., Bruce, Trief, & Cascella, 2011; Sevcik, 2006; Wood, Lasker, Siegel-Causey, Beukelman, & Ball, 1998). Furthermore, there has been increased realization that communication is achieved via many channels – not just face-to-face communication, but also written communication and telecommunication (e.g., Bryen, Heake, Semenuk, & Segal, 2010; Sundqvist & Ronnberg, 2010).

The very nature of communication in society has changed dramatically. Individuals without disabilities utilize a wide range of communication options to meet their diverse needs on a daily basis: speech, gestures, and facial expressions to communicate in face-to-face interactions; writing to exchange information at school

or in the work place; multimedia (e.g., photos, videos) to enhance communication and engage interest; the Internet to rapidly access information on a multitude of topics; social media to network and establish membership in peer communities; texting and cell phones to connect with friends; blogging to provide commentary and build communities with like interests; Twitter to express short bursts of opinion or reaction, and so on. Individuals who require AAC “...have a need for, and a right to, the same range of communication options available to everyone else” (RERC on Communication Enhancement, 2011, p. 3).

Moreover, there is now increased recognition of the fact that communication is not a separate isolated activity, but rather an essential process that is integrated into almost all other daily living experiences. For example, when Light, Page, Curran, and Pitkin (2007) investigated children’s designs of technologies to meet the needs of children with speech and motor impairments, they found that the children valued technologies that seamlessly integrated a wide range of functions – social interaction, communication, play, entertainment (music, video), telecommunication (cell phone, social media), art, even companionship. Similarly, adults who require AAC report the need for integrated access to a wide range of functions if they are to successfully participate in work, community, family, and social activities (e.g., Kennedy, 2010; Trembath, Balandin, Stancliffe, & Togher, 2010; Williams et al., 2008). Unfortunately, current AAC technologies, even those that support multiple functions, still require individuals to toggle between these different functions; they do not readily support the integrated use of communication within other activities. Clearly, the future poses many challenges as we strive to address seamlessly an increasingly diverse and complex array of communication needs – be it via face-to-face interactions, writing, Internet, multimedia, texting, cell phone, social media, etc.

Changes in AAC Systems

The third significant development is the availability of an increased number of AAC systems generally and the advent of mobile technologies specifically. According to Caves, Shane, and DeRuyter (2002), the first published reference to aided AAC systems was in a book by Goldberg and Fenton written in 1960, a guide to the development and use of low-tech conversation boards for individuals with cerebral palsy. Since this early reference to nonelectronic communication boards, there have been significant developments, resulting in a large array of AAC systems, including unaided and aided systems, both nonelectronic and electronic. In recent years, efforts to enhance communication access have extended beyond traditional AAC systems to include the use of partner listening strategies (e.g., Hustad, Dardis, & Kramper, 2011) as well as communication assistants who translate messages communicated via AAC, much as sign language interpreters translate between sign

language and spoken language (e.g., Collier, McGhie-Richmond, & Self, 2010). Ongoing research and development has expanded the range of AAC options available, including new symbol sets, layouts, organizations, selection techniques, and output (e.g., Fager, Beukelman, Fried-Oken, Jakobs, & Baker, 2012; Light & Drager, 2007; Light & McNaughton, 2012; Schlosser, Shane, Sorce, Koul, & Bloomfield, 2011; Wallace, Hux, & Beukelman, 2010).

In the past, a small number of AAC manufacturers developed, produced, and supported a comparatively small number of dedicated AAC speech-generating devices (DeRuyter, McNaughton, Caves, Bryen, & Williams, 2007). More recently, the field has witnessed the explosion of mobile technologies (e.g., touch screen phones and tablets such as the iPadTM) with a wide range of “apps” (i.e., software applications), including those intended to support communication (RERC on Communication Enhancement, 2011). The advent of mobile technologies has resulted in enhanced potential to meet the increased scope of communication needs for some individuals who require AAC (RERC, 2011). These mobile technologies are not simply speech prostheses; rather, they are multi-function devices that can offer options for not only communication, but also Internet access, education, social interaction, entertainment, gaming, and information access. Although we are starting to see research on the impact of mobile and tablet technologies (e.g., Flores et al., 2012), additional research to determine these effects is a priority.

With the advent of these relatively inexpensive mobile technologies and apps to support communication, AAC is now widely available through a variety of mainstream technologies. Mobile technologies are very appealing and, as a result, have been readily adopted by many individuals who require AAC and their families. Today, individuals with complex communication needs and their families are no longer obliged to wait for AAC recommendations from a clinical team for a dedicated speech generating device and to then wait for subsequent approval by a funding agency; rather, many individuals and their families are becoming active consumers, making their own decisions as they purchase the widely available mobile technologies and apps (RERC on Communication Enhancement, 2011; Shane, Gosnell, McNaughton, & Sennott, 2011).

With the advent of mobile technologies, there has been a “democratization” of not only device acquisition (Rummel-Hudson, 2011), but also AAC system development. The creation of AAC software applications no longer rests solely in the hands of the traditional assistive technology manufacturers; rather, apps are being developed by a wide range of stakeholders, from family members to mainstream programmers. For example, Hewlett Packard launched the Hacking Autism website (see <http://www.hackingautism.org/>) where families, teachers, and other professionals can post their ideas for apps to meet the needs of individuals with autism. Software programmers recruited through the site respond

to these ideas by developing innovative applications of touch-enabled technologies, and the apps are then made available free of charge.

This model of development differs dramatically from the traditional models of AAC research and development. It supports the rapid development of AAC apps by providing direct links between end consumers and software developers. Unfortunately, this model also has some liabilities. Many of the AAC apps are not based on research evidence. As a result, anticipated benefits may not be realized for many individuals, not because they cannot benefit from AAC, but rather because the AAC apps are either not appropriate to their needs or not easily customized, and/or do not come with sufficient technical and implementation support (RERC on Communication Enhancement, 2011). The limitations are not just restricted to AAC apps; they also extend to mobile technologies. The development of mainstream technologies is largely driven by the needs and preferences of the masses; as a result, these technologies may not meet the needs and skills of individuals with complex communication needs (Beukelman, 2012). For example, many of the new tablets incorporate an array of access options (e.g., pinching, swiping left to right, swiping up, etc.) that may be difficult or impossible for young children or individuals with motor impairments to use; furthermore, these apps provide few affordances to support the user in knowing which gesture to use when.

Beukelman (2012) noted that the proliferation of mobile technologies has forced some individuals to make changes in their AAC technologies, not out of choice, but rather out of necessity when their technologies are no longer supported or when funding sources and school systems provide pressure to select cheaper, more commonly available technology. Beukelman explained that this type of forced technology change may be problematic for many people, especially those who have difficulty learning new procedures (e.g., individuals with cognitive impairments, older individuals) or who do not have access to facilitators to teach them new AAC technologies. Research is urgently needed to tackle these problems to ensure that the potential benefits of AAC are indeed realized for individuals with complex communication needs. Clearly, we need to avoid the trap of believing that “one size fits all.” Although the use of small, highly portable technologies is a boon to some, access is a challenge for many with more severe physical and cognitive challenges (Chapple, 2011).

We need to ensure that there is a wide range of options available to meet the needs and skills of the many different individuals who would benefit from AAC as well as to accommodate changes in these needs and skills over time (Fried-Oken & Light, 2012). Innovative technologies, including the use of cloud computing², offer a potential tool in this challenge. As Wise (2012) noted, technological innovation is transforming the impacts of disability. We must ensure that communication technology mitigates, and does not exacerbate, disability (Beukelman, 2012).

Changes in Expectations for Participation and Inclusion

Forty years ago, many individuals who required AAC lived in large institutions, removed from society. As recently as 1977, over 85% of individuals with intellectual and developmental disabilities, who were receiving residential services in the United States, lived in state institutions or nursing homes (Lakin & Stancliffe, 2007). Most children with complex communication needs were excluded from an appropriate education; few adults with complex communication needs had jobs or lived independently; and few individuals with complex communication needs of any age had opportunities to participate in their communities in meaningful ways (Williams, 2000). During the past four decades, there have been dramatic changes for children and adults who require AAC with respect to both living arrangements and participation. Now, many individuals who use AAC expect to be full participants in a wide range of environments – family, school, work, and community (McNaughton & Kennedy, 2010). Children with cerebral palsy, ASD, Down syndrome, and other developmental disabilities are using AAC to participate in general education classrooms, to learn literacy skills, and to interact with friends and family members (e.g., Anderson, Balandin, & Clendon, 2011; Light & McNaughton, 2009, 2012; Kent-Walsh & Light, 2003; Finke, McNaughton, & Drager, 2009; Stoner, Angell, & Bailey, 2010). Adults with severe disabilities are living in the community and using AAC to participate in employment, to volunteer, and to take part in recreational activities (e.g., McKelvey et al., 2012; McNaughton & Bryen, 2007; McNaughton, Light, & Arnold, 2002; McNaughton, Light, & Groszyk, 2001; Dattilo, Estrella, Estrella, Light, McNaughton, & Seabury, 2008; Trembath et al., 2010).

Thirty to 40 years ago, the focus of intervention was on using AAC to address traditional language goals, and the effects of intervention were measured simply in terms of vocabulary acquisition or mean length of utterance. Over time, this view was replaced with an increased focus on functional communication, with outcomes measured in terms of enhanced communication effectiveness (Beukelman, 1991). More recently, there has been increased recognition that functional communication is itself a tool to support participation in society, be it at home, at school, or in the community-at-large. With this increased focus on participation has come increased awareness of the breadth of outcomes that must be considered for AAC interventions (e.g., Fried-Oken & Granlund, 2012; Simeonsson et al., 2012), along with increased realization that AAC intervention must extend beyond the individual who uses AAC to address the needs and skills of family and other facilitators, as well as society-at-large (e.g., Broberg, Ferm, & Thunberg, 2012; Bryen, Heake, Semenuk, & Segal, 2010; Thirumanickam, Raghavendra, & Olsson, 2011). The ultimate measure of the success of AAC

intervention is the degree to which it improves access and participation in valued activities and experiences of everyday life.

Making the Possible the Probable

There is a growing body of research that demonstrates convincingly that individuals with complex communication needs can derive substantial benefits from AAC (e.g., Beukelman et al., 2007; Branson & Demchak, 2009; Fried-Oken, Beukelman et al., 2012; Ganz et al., 2011; Machalicek et al., 2010; Schlosser et al., 2009; Wendt, 2009), with no risk to speech development or recovery (e.g., Beukelman & Mirenda, 2013; Millar et al., 2006; Schlosser & Wendt, 2008). The accumulated research evidence extends across the life span of individuals with a wide range of developmental and acquired disabilities, and supports the positive impact of a wide range of AAC techniques, including unaided systems such as signs; aided systems such as nonelectronic low-tech symbols or symbol boards; and high-tech speech-generating devices.

Although the extant research base demonstrates the positive benefits of AAC interventions, most of the research to date has focused on establishing what is possible through AAC interventions. Now that the potential positive benefits of AAC intervention have been firmly established, there are two main challenges that face the field: (a) to improve AAC interventions to maximize communication and participation outcomes for individuals with complex communication needs; and (b) to ensure the effective translation of these evidence-based AAC interventions to the everyday lives of individuals with complex communication needs so that the possible becomes the probable. There is currently a substantial gap between what we know about effective AAC interventions and what currently happens in the everyday lives of children and adults who require AAC (Light & McNaughton, 2012). In order to close the gap between the state of the science and the state of practice, we need to increase public awareness and reduce attitudinal barriers (e.g., McCarthy, Donofrio-Horwitz, & Smucker, 2010), improve preservice and inservice training in AAC for rehabilitation and education professionals (e.g., Costigan & Light, 2010), and build more effective collaborations with families and professionals (e.g., Granlund, Björck-Åkesson, Wilder, & Ylvén, 2008). These are the challenges before us for future years if we are to improve outcomes for all people who require AAC.

Final Thoughts

We believe that the journal, *Augmentative and Alternative Communication*, plays a critical role in the future of the field by providing a peer-reviewed archive of our collective knowledge. The journal has been instrumental in documenting and supporting the progress in the field to

date. We are very grateful to Ann Sutton, the past editor of *AAC*; to Jackie Brown, Editorial Assistant; and to all of the former associate editors and consulting editors for their hard work in developing such a vibrant and high quality journal for the field. We greatly appreciate the willingness of the new team of Associate Editors (Ann Beck, David Beukelman, Eva Björck-Åkesson, Michelle Bourgeois, Michael Clarke, Al Cook, Jennifer Ganz, Mats Granlund, Bronwyn Hemsley, Katherine Hustad, Julia King, Pat Mirenda, Billy Ogletree, Mary-Ann Ronski, Charity Rowland, Jennifer Stephenson, Martine Smith, and Natacha Trudeau), as well as the reviewers and Jackie Brown, Editorial Assistant, for stepping up to serve the Journal during our tenure. We are honored to have the opportunity to work with such an outstanding team to build an even stronger journal.

As we look back and realize the substantial gains in the AAC field to date, we are struck by the huge debt that we owe to the pioneers in this field: the consumers and families who were the first to take a leap of faith and implement AAC in their lives; the teachers and clinicians who worked tirelessly to find a voice for these children and adults; the assistive technology developers and manufacturers who developed the first AAC systems (nonelectronic and electronic); the researchers who first tackled the myriad questions in the field to begin to build a scientific base to guide practice; the university faculty who advocated for preservice and inservice education in AAC when there was none; the advocates who organized law suits and fought to establish policies with professional and governmental organizations to support AAC intervention; the leaders who established the International Society for Augmentative and Alternative Communication (ISAAC) as the nexus for the field; and, of course, the first editors of *AAC* for their tireless work in establishing a high quality repository for the research and evidence-based practices in the field.

We stand on the shoulders of these individuals who had a vision of what should be – the fundamental right of all individuals to be able to express themselves and attain their full potential – and who also had the resolve and determination to make this vision a reality. We owe a tremendous debt to these pioneers. We also look ahead to the next generation of stakeholders to take up the cause in future years: individuals who require AAC and their families, rehabilitation and educational professionals, researchers from multiple disciplines, university faculty, assistive technology developers and manufacturers, policy analysts, and advocates. There is still much work left to be done if we are to attain our mission: to enhance communication and improve quality of life for all individuals who require AAC and their families throughout the world.

Notes

1. The iPad is a registered trademark of Apple Inc., 1 Infinite Loop, Cupertino, CA 95014, USA.

2. Cloud computing involves the use of a network of remote servers on the Internet to store, process, and manage data.

Declaration of interest: The authors report no conflict of interest. The authors alone are responsible for the content and the writing of this paper.

References

- Anderson, K., Balandin, S., & Clendon, S. (2011). "He cares about me and I care about him." Children's experiences of friendship with peers who use AAC. *Augmentative and Alternative Communication*, 27, 77–90.
- Balandin, S., & Morgan, J. (2001). Preparing for the future: Aging and alternative and augmentative communication. *Augmentative and Alternative Communication*, 17, 99–108.
- Ball, L., Beukelman, D., & Bardach, L. (2007). AAC intervention for ALS. In D. Beukelman, K. Garrett, & K. Yorkston (Eds.), *Augmentative communication strategies for adults with acute or chronic medical conditions* (pp. 287–316). Baltimore, MD: Paul H. Brookes.
- Baumann Leech, E. R., & Cress, C. J. (2011). Indirect facilitation of speech in a late talking child by prompted production of picture symbols or signs. *Augmentative and Alternative Communication*, 27, 40–52.
- Beukelman, D. (1991). Magic and cost of communicative competence. *Augmentative and Alternative Communication*, 7, 2–10.
- Beukelman, D. (2012, June). *AAC for the 21st century: Framing the future*. Presentation at the State of the Science Conference for the RERC on Communication Enhancement, Baltimore, MD.
- Beukelman, D. R., Fager, S., Ball, L., & Dietz, A. (2007). AAC for adults with acquired neurological conditions: A review. *Augmentative and Alternative Communication*, 23, 230–242.
- Beukelman, D., & Mirenda, P. (2013). *Augmentative and Alternative Communication: Supporting children and adults with complex communication needs* (4th ed.). Baltimore, MD: Paul H. Brookes.
- Binger, C., Kent-Walsh, J., Berens, J., Del Campo, S., & Rivera, D. (2008). Teaching Latino parents to support the multi-symbol message productions of their children who require AAC. *Augmentative and Alternative Communication*, 24, 323–338.
- Bopp, K. D., Brown, K. E., & Mirenda, P. (2004). Speech-language pathologists' roles in the delivery of positive behavior support for individuals with developmental disabilities. *American Journal of Speech-Language Pathology*, 13, 5–19.
- Bourgeois, M., Dijkstra, K., Burgio, L., & Allen-Burge, R. (2001). Memory aids as an augmentative and alternative communication strategy for nursing home residents with dementia. *Augmentative and Alternative Communication*, 17, 196–210.
- Braddock, B., McDaniel, J., Spragge, S., Loncke, F., Braddock, S., & Carey, J. (2012). Augmentative and alternative communication in persons with Trisomy 18 and Trisomy 13. *Augmentative and Alternative Communication*, 28, 266–277.
- Branson, D., & Demchak, M. (2009). The use of augmentative and alternative communication methods with infants and toddlers with disabilities: A research review. *Augmentative and Alternative Communication*, 25, 274–286.
- Broberg, M., Ferm, U., & Thunberg, G. (2012). Responsive style in parents who use AAC with their children: Development and evaluation of a new instrument. *Augmentative and Alternative Communication*, 28, 243–253.
- Bruce, S. M., Trief, E., & Cascella, P. W. (2011). Teachers' and speech-language pathologists' perceptions about a tangible symbols intervention: Efficacy, generalization, and recommendations. *Augmentative and Alternative Communication*, 27, 172–182.
- Bryen, D., Heake, G., Semenuk, A., & Segal, M. (2010). Improving web access for individuals who rely on augmentative and alternative communication. *Augmentative and Alternative Communication*, 26, 21–29.

- Calculator, S., & Black, T. (2010). Parents' priorities for AAC and related instruction for their children with Angelman Syndrome. *Augmentative and Alternative Communication*, 26, 30–40.
- Caves, K., Shane, H. C., & DeRuyter, F. (2002). Connecting AAC devices to the world of information technology. *Assistive Technology*, 14, 81–89.
- Centers for Disease Control and Prevention (2011). Autism and Developmental Disabilities Monitoring (ADDM) Network. Retrieved September 14, 2012, from <http://www.cdc.gov/ncbddd/autism/addm.html>
- Chapple, D. (2011). The evolution of augmentative communication and the importance of alternate access. *Perspectives on Augmentative and Alternative Communication*, 20(1), 34–37.
- Collier, B., McGhie-Richmond, D., & Self, H. (2010). Exploring communication assistants as an option for increasing communication access to communities for people who use augmentative communication. *Augmentative and Alternative Communication*, 26, 48–59.
- Collier, B., & Self, H. (2010). Preparing youth who use AAC to communicate with their personal assistants. In D. McNaughton & D. Beukelman (Eds.), *Transition strategies for adolescents and young adults who use AAC* (pp. 163–180). Baltimore, MD: Paul H. Brookes.
- Costigan, F. A., & Light, J. (2010). A review of preservice training in augmentative and alternative communication for speech-language pathologists, special education teachers, and occupational therapists. *Assistive Technology*, 22, 200–212.
- Cress, C., & King, J. (1999). AAC strategies for people with primary progressive aphasia without dementia: Two case studies. *Augmentative and Alternative Communication*, 15, 248–259.
- Dattilo, J., Estrella, G., Estrella, L. J., Light, J., McNaughton, D., & Seabury, M. (2008). "I have chosen to live life abundantly": Perceptions of leisure by adults who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 24, 16–28.
- DeRuyter, F., McNaughton, D., Caves, K., Bryen, D. N., & Williams, M. B. (2007). Enhancing AAC connections with the world. *Augmentative and Alternative Communication*, 23, 258–270.
- Downey, D., & Hurtig, R. (2006). Re-thinking the use of AAC in acute care settings. *Perspectives on Augmentative and Alternative Communication*, 15(4), 3–8.
- Estrella, G. (2000). Confessions of a blabber finger. In M. Fried-Oken & H. Bersani (Eds.), *Speaking up and spelling it out* (pp. 31–45). Baltimore, MD: Paul H. Brookes.
- Fager, S., Beukelman, D. R., Fried-Oken, M., Jakobs, T., & Baker, J. (2012). Access interface strategies. *Assistive Technology*, 24, 25–33.
- Finke, E. H., McNaughton, D. B., & Drager, K. D. (2009). "All children can and should have the opportunity to learn": General education teachers' perspectives on including children with autism spectrum disorder who require AAC. *Augmentative and Alternative Communication*, 25, 110–122.
- Flores, M., Musgrove, K., Renner, S., Hinton, V., Strozier, S., Franklin, S., & Hill, D. (2012). A comparison of communication using the Apple iPad and a picture-based system. *Augmentative and Alternative Communication*, 28, 74–84.
- Fried-Oken, M., Beukelman, D. R., & Hux, K. (2012). Current and future AAC research considerations for adults with acquired cognitive and communication impairments. *Assistive Technology*, 24, 56–66.
- Fried-Oken, M., & Granlund, M. (2012). AAC and ICF: A good fit to emphasize outcomes. *Augmentative and Alternative Communication*, 28, 1–2.
- Fried-Oken, M., & Light, J. (2012, June). *Language and learning: Cognitive science considerations in the design of AAC technologies*. Presentation at the State of the Science Conference for the RERC on Communication Enhancement, Baltimore, MD. Retrieved from <http://youtu.be/6uhs7YfSL9s>
- Fried-Oken, M., Rau, M., & Oken, B. (2000). AAC and dementia. In D.R. Beukelman et al. (Eds.), *Augmentative and alternative communication for adults with acquired neurologic disorders* (pp. 375–406). Baltimore, MD: Paul H. Brookes.
- Fried-Oken, M., Rowland, C., Daniels, D., Dixon, M., Fuller, B., Mills, C., (...) Oken, B. (2012). AAC to support conversation in persons with moderate Alzheimer's disease. *Augmentative and Alternative Communication*, 28, 219–231.
- Ganz, J. B., Earles-Vollrath, T. L., Heath, A. K., Parker, R. I., Rispoli, M. J., & Duran, J. B. (2011). A meta-analysis of single case research studies on aided augmentative and alternative communication systems with individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 42, 60–74.
- Granlund, M., Björck-Åkesson, E., Wilder, J., & Ylvén, R. (2008). AAC interventions for children in a family environment: Implementing evidence in practice. *Augmentative and Alternative Communication*, 24, 207–219.
- Hourcade, J., Pilotte, T. E., West, E., & Parette, P. (2004). A history of augmentative and alternative communication for individuals with severe and profound disabilities. *Focus on Autism and Other Developmental Disabilities*, 19, 235–244.
- Hustad, K. C., Dardis, C. M., & Kramper, A. J. (2011). Use of listening strategies for the speech of individuals with dysarthria and cerebral palsy. *Augmentative and Alternative Communication*, 27, 5–15.
- Hustad, K. C., & Miles, L. K. (2010). Alignment between augmentative and alternative communication needs and school-based speech-language services provided to young children with cerebral palsy. *Early Childhood Services*, 4(3), 129–140.
- Kennedy, P. (2010). Navigating through transition with individuals with speech disabilities. *Perspectives on Augmentative and Alternative Communication*, 19(2), 44–50.
- Kent-Walsh, J. E., & Light, J. C. (2003). General education teachers' experiences with inclusion of students who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 19, 104–125.
- Lakin, K. C., & Stancliffe, R. J. (2007). Residential supports for persons with intellectual and developmental disabilities. *Mental retardation and developmental disabilities research reviews*, 13, 151–159.
- Light, J. (1997). "Communication is the essence of human life": Reflections on communicative competence. *Augmentative and Alternative Communication*, 13, 61–70.
- 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, 204–216.
- Light, J., & Drager, K. (2012). Early intervention for young children with autism, cerebral palsy, Down syndrome, and other disabilities. Website. Retrieved August 12, 2012, from <http://aackids.psu.edu>
- Light, J., & McNaughton, D. (2009). *Accessible Literacy Learning (ALL): Evidence-based reading instruction for learners with autism, cerebral palsy, Down syndrome, and other disabilities*. Pittsburgh, PA: Mayer-Johnson.
- Light, J., & McNaughton, D. (2012). Supporting the communication, language, and literacy development of children with complex communication needs: State of the science and future research priorities. *Assistive Technology*, 24, 34–44.
- Light, J., Page, R., Curran, J., & Pitkin, L. (2007). Children's ideas for the design of AAC assistive technologies for young children with complex communication needs. *Augmentative and Alternative Communication*, 23, 274–287.
- Loyola University Health System (2010). Incidence of cerebral palsy on rise in US, new data reveals. *Science Daily*. Retrieved September 14, 2012, from <http://www.sciencedaily.com/releases/2010/02/100209144203.htm>
- Machalicek, W., Sanford, A., Lang, R., Rispoli, M., Molfenter, N., & Mbeseha, M. K. (2010). Literacy interventions for students with physical and developmental disabilities who use aided AAC devices: A systematic review. *Journal of Developmental and Physical Disabilities*, 22, 219–240.
- McCarthy, J. W., Donofrio-Horwitz, L. M., & Smucker, L. M. D. (2010). The effects of reading personal narratives written by an individual who uses AAC on the attitudes of pre-professionals in business. *Augmentative and Alternative Communication*, 26, 61–74.

- McCord, M. S., & Soto, G. (2004). Perceptions of AAC: An ethnographic investigation of Mexican-American families. *Augmentative and Alternative Communication*, 20, 209–227.
- McKelvey, M., Evans, D., & Kawai, N. (2012). Communication styles of persons with ALS as recounted by surviving spouses. *Augmentative and Alternative Communication*, 28, 232–242.
- McNaughton, D., & Bryen, D. N. (2007). AAC technologies to enhance participation and access to meaningful societal roles for adolescents and adults with developmental disabilities who require AAC. *Augmentative and Alternative Communication*, 23, 217–229.
- McNaughton, D., & Kennedy, P. (2010). Supporting successful transition to adult life for individuals who use AAC. In D. McNaughton & D. Beukelman (Eds.), *Transition strategies for adolescents and young adults who use AAC* (pp. 3–15). Baltimore, MD: Paul H. Brookes.
- McNaughton, D., Light, J., & Arnold, K. (2002). “Getting your wheel in the door”: Successful full-time employment experiences of individuals with cerebral palsy who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 18, 59–76.
- McNaughton, D., Light, J., & Groszyk, L. (2001). “Don’t give up”: Employment experiences of individuals with amyotrophic lateral sclerosis who use augmentative and alternative communication. *Augmentative & Alternative Communication*, 17, 179–195.
- 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.
- Mirenda, P. (1993). AAC: Bonding the uncertain mosaic. *Augmentative and Alternative Communication*, 9, 3–9.
- National Research Council (2001). *Educating children with autism*. Committee on Educational Interventions for Children with Autism, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academies Press.
- Pickl, G. (2011). Communication intervention in children with severe disabilities and multilingual backgrounds: Perceptions of pedagogues and parents. *Augmentative and Alternative Communication*, 27, 229–244.
- RERC on Communication Enhancement (2011, March 14). Mobile devices and communication apps: An AAC-RERC White Paper. Retrieved from <http://aac-lerc.psu.edu/index.php/pages/show/id/46>
- Romski, M. A., & Sevcik, R. A. (2005). Augmentative communication and early intervention: Myths and realities. *Infants & Young Children*, 18, 174–185.
- Romski, M. A., Sevcik, R. A., Adamson, L. B., Cheslock, M., Smith, A., Barker, R. M., & Bakeman, R. (2010). Randomized comparison of augmented and nonaugmented language interventions for toddlers with developmental delays and their parents. *Journal of Speech, Language, and Hearing Research*, 53, 350–364.
- Rummel-Hudson, R. (2011). A revolution at their fingertips. *Perspectives on Augmentative and Alternative Communication*, 20(1), 19–23.
- Schlosser, R. W., Shane, H., Sorce, J., Koul, R., & Bloomfield, E. (2011). Identifying performing and under performing graphic symbols for verbs and prepositions in animated and static formats: A research note. *Augmentative and Alternative Communication*, 27, 205–214.
- Schlosser, R., Sigafoos, J., & Koul, R. (2009). Speech output and speech-generating devices in autism spectrum disorders. In P. Mirenda & T. Iacono (Eds.), *Autism spectrum disorders and AAC* (pp. 141–170). Baltimore, MD: Paul H. Brookes.
- Schlosser, R. W., & Wendt, O. (2008). Effects of augmentative and alternative communication intervention on speech production in children with autism: A systematic review. *American Journal of Speech-Language Pathology*, 17, 212–230.
- Segalman, R. (2011). AAC, aging, and telephone relay access technology. *Disability Studies Quarterly*, 31(4). Retrieved from <http://dsq-sds.org/article/view/1722>.
- Sevcik, R. A. (2006). Comprehension: An overlooked component in augmented language development. *Disability and Rehabilitation*, 28, 159–167.
- Shane, H., Gosnell, J., McNaughton, D., & Sennott, S. (2011). *Mobile devices and communication apps: Current trends and future directions*. Retrieved from <http://youtu.be/3F3Ud6BFtAQ>
- Sigafoos, J., Wermink, H., Didden, R., Green, V. A., Schlosser, R. W., O’Reilly, M. F., & Lancioni, G. E. (2011). Effects of varying lengths of synthetic speech output on augmented requesting and natural speech production in an adolescent with Klinefelter Syndrome. *Augmentative and Alternative Communication*, 27, 163–171.
- Simeonsson, R. J., Björck-Åkesson, E., & Lollar, D. J. (2012). Communication, disability, and the ICF-CY. *Augmentative and Alternative Communication*, 28, 3–10.
- Simmons-Mackie, N., King, J., & Beukelman, D. R. (in press). *Communication support for people with aphasia*. Baltimore, MD: Paul H. Brookes.
- Siu, E., Tam, E., Sin, D., Ng, C., Lam, E., Chui, M., (...) Lam, C. (2010). A survey of augmentative and alternative communication service provision in Hong Kong. *Augmentative and Alternative Communication*, 26, 289–298.
- Snell, M. E., Brady, N., McLean, L., Ogletree, B. T., Siegel, E., Sylvester, L., (...) Sevcik, R. (2010). Twenty years of communication intervention research with individuals who have severe intellectual and developmental disabilities. *American Journal on Intellectual and Developmental Disabilities*, 115, 364–380.
- Stoner, J. B., Angell, M. E., & Bailey, R. L. (2010). Implementing augmentative and alternative communication in inclusive educational settings: A case study. *Augmentative and Alternative Communication*, 26, 122–135.
- Sundqvist, A., & Ronnberg, J. (2010). A qualitative analysis of email interactions of children who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 26, 255–266.
- Thirumanickam, A., Raghavendra, P., & Olsson, C. (2011). Participation and social networks of school-age children with complex communication needs: A descriptive study. *Augmentative and Alternative Communication*, 27, 195–204.
- Trembath, D., Balandin, S., Stancliffe, R. J., & Togher, L. (2010). “Communication is everything”: The experiences of volunteers who use AAC. *Augmentative and Alternative Communication*, 26, 75–86.
- U.S. Department of Education, Office of Special Education and Rehabilitative Services (2010, July 15). *IDEA Data Accountability Center*. Retrieved from <http://www.ideadata.org/>
- Vincer, M. J., Allen, A. C., Joseph, K. S., Stinson, D. A., Scott, H., & Wood, E. (2006). Increasing prevalence of cerebral palsy among very preterm infants: A population-based study. *Pediatrics*, 118(6), e1621–e1626.
- Wallace, S. E., Hux, K., & Beukelman, D. R. (2010). Navigation of a dynamic screen AAC interface by survivors of severe traumatic brain injury. *Augmentative and Alternative Communication*, 26, 242–254.
- Wendt, O. (2009). Research on the use of manual signs and graphic symbols in autism spectrum disorders: A systematic review. In P. Mirenda & T. Iacono (Eds.), *Autism spectrum disorders and AAC* (pp. 83–140). Baltimore, MD: Paul H. Brookes.
- Williams, B. (2000). More than an exception to the rule. In M. Fried-Oken & H. Bersani (Eds.), *Speaking up and spelling it out: Personal essays on augmentative and alternative communication* (pp. 245–254). Baltimore, MD: Paul H. Brookes.
- Williams, M. B., Krezman, C., & McNaughton, D. (2008). “Reach for the stars”: Five principles for the next 25 years of AAC. *Augmentative and Alternative Communication*, 24, 194–206.
- Wise, P. H. (2012). Emerging technologies and their impact on disabilities. *The Future of Children*, 22, 169–191.
- Wood, L. A., Lasker, J., Siegel-Causey, E., Beukelman, D. R., & Ball, L. (1998). Input framework for augmentative and alternative communication. *Augmentative and Alternative Communication*, 14, 261–267.