

- Sundberg, M. (1993). Selecting a response form for nonverbal persons: Facilitated communication, pointing systems, or sign language? *The Analysis of Verbal Behavior*, 11, 99-116.
- Sundberg, M., & Partington, J. (1998). *Teaching language to children with autism and other developmental disabilities* (version 7.1). Pleasant Hill, CA: Behavior Analysts.
- Tager-Flusberg, H., Paul, R., & Lord, C. (2005). Language and communication in autism. In F.G. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders* (Vol. 1, pp. 335-364). Hoboken, NJ: John Wiley & Sons.
- Tjus, T., Heimann, M., & Nelson, K. (1998). Gains in literacy through the use of a specially developed multimedia computer strategy: Positive findings from 13 children with autism. *Autism*, 2, 139-156.
- Walker, M. (1987, March). *The Makaton Vocabulary: Uses and effectiveness*. Paper presented at the First International AFASIC Symposium, University of Reading, England.
- Webster, C.D., McPherson, H., Sloman, L., Evans, M.A., & Kuchar, E. (1973). Communicating with an autistic boy by gestures. *Journal of Autism and Childhood Schizophrenia*, 3, 337-346.
- Wendt, O., Schlosser, R., & Lloyd, L.L. (2005, November). *How effective are AAC interventions for children with autism? A meta-analysis of research outcomes*. Paper presented at the annual convention of the American Speech-Language-Hearing Association, San Diego.
- Whitehouse, D., & Harris, J. (1984). Hyperlexia in infantile autism. *Journal of Autism & Developmental Disorders*, 14, 281-289.

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Assessment Issues

TERESA IACONO AND TEENA CAITHNESS

The function and principles of assessment relevant to people with autism spectrum disorders (ASDs) are the same as for any other group with developmental disabilities. This similarity is true also when considering assessment that will inform augmentative and alternative communication (AAC) interventions. There are differences, however, in the particular challenges that face people with ASD. Such differences relate to their individual strengths and weaknesses, as well as the effectiveness of their support systems, which enhance communication in reciprocal interactions.

Assessment is a comprehensive, dynamic, and ongoing process based on a transactional model of communication interaction. For children, the assessment process involves the family, other people who provide primary support to the child, and the recognition of their concerns and preferences within approaches that are family-centered. Assessment extends beyond the testing of skills to gathering information about the child's functioning in terms of communication and related areas across environments or social contexts. It includes discovering the preferences of a child with ASD on what and how to learn and, over time, gaining an understanding of his or her perspective. In this chapter, these principles are extended to adults with ASDs, particularly those for whom a clear diagnosis has never been obtained or for whom the information has not been seen as particularly relevant because of an overriding intellectual disability. For these adults, family-centered practice may merge with person-centered practice, as well as consideration of AAC within supported community-based settings (e.g., group homes) and family homes.

Much has been written about diagnostic assessments of children with suspected ASDs (American Speech-Language-Hearing Association, 2006; Lord & Risi, 2000; Paul, 2005). This literature provides characteristics that differentiate ASD from other developmental disabilities. Once diagnosis is confirmed, however, the need for assessment

continues as a means of informing interventions. This chapter focuses on the function of assessment to inform interventions that involve AAC to address discrepancies between current communication functioning and the communication needs of people with ASDs. In particular, this chapter presents assessment principles and strategies from both AAC and ASD literature, a review of learner characteristics in ASD, and a proposed lifespan model of assessment.

MODELS FOR ASSESSMENT

In this section, the participation model and family- and person-centered planning approaches are introduced, both of which are often used as foundations for AAC assessment.

Participation Model

AAC assessment informs planning for intervention to address communication needs over a person's lifetime. The participation model provides a guide to AAC assessment (Beukelman & Mirenda, 2005) by focusing on an area addressed by the International Classification of Functioning, Disability and Health (World Health Organization, 2001). It provides a process to identify participation restrictions while also addressing the levels of impairment and activity restrictions through such criteria as assessment of capabilities and current activities. Using the participation model, information is gathered from a wide range of sources to gain an understanding of an individual's current communication patterns, participation patterns, and opportunities for participation. Distilling this information allows intervention to meet the individual's current needs through AAC systems, which will prepare the person to meet future communication needs (Beukelman & Mirenda, 2005; Mirenda, 2001).

Family- and Person-Centered Approaches

Family involvement in the assessment and intervention process receives the most attention in early childhood intervention literature. Within the context of family-centered approaches, the fact that the child is part of a family unit, which is in turn a part of a larger community, has been acknowledged (Crais & Calculator, 1998; Dunst, Johanson, Trivette, & Hanby, 1991). Building on an argument by Beukelman and Mirenda (2005) about consensus building in AAC assessment, Crais and Calculator (1998) argued that caregivers must be made integral to the assessment and intervention of young children

through collaboration with professionals in problem identification, determining the purpose of assessment, assessment planning and conduct, and development of intervention goals and strategies. Facilitating such an integral role of caregivers is thought to strengthen family functioning (Dunst et al., 1991).

Limited research is available on the impact of cultural differences on the role of families in their child's development, as well as perspectives about disability, professionals, and the use of services. Lynch and Hanson (2004) argued that learning about the cultural group represented within a community and working with a cultural mediator or guide can provide an understanding of factors that influence a caregiver's level of involvement in their child's assessment and intervention, as well as culturally acceptable approaches and strategies. Such an understanding will strengthen the professional's collaboration with the family.

Within the participation model, involving both the individual who is the focus of the assessment and the individual's family is a means of obtaining comprehensive information, promoting ownership of interventions by the person and the family, developing trust between participants, and allowing the individual and family members to become part of the team (Beukelman & Mirenda, 2005). For adults with ASD who may not live in a family unit, support workers are often their main communication partners. Unfortunately, support workers may not want to be involved in the process (Iacono, Forster, Bryce, & Bloomberg, 2004) or may lack the necessary skills to facilitate the person's communicative interactions (Bloomberg, West, & Iacono, 2003). However, recent research by Iacono and colleagues (Iacono et al., 2004; Forster & Iacono, 2007) suggests that with prolonged engagement, support workers can come to see themselves as being communication partners and supports to adults with disabilities in their care.

Involvement of the individual with ASD in the assessment and intervention process also extends the notion of family-centered practice to person-centered approaches, whereby the individual is seen as a valued and included member of society. Of particular relevance for adults with developmental disabilities and complex communication needs, including those with ASDs, is the need for careful consideration of how best to determine that person's needs and preferences, rather than only those of caregivers and other support people. Strategies that address this need fall under the umbrella of person-centered planning approaches, which have developed during the last 30 years (O'Brien & O'Brien, 2002). According to O'Brien and O'Brien (2002), these approaches share the characteristics of 1) seeing people, rather than

diagnostic labels, first; 2) avoiding professional jargon in favor of everyday language; 3) actively identifying a person's gifts and capacities within community life; and 4) ensuring that the voice of the person is heard, both directly and through others who know the person well, to evaluate present conditions and identify desirable changes.

Person-centered planning has particular relevance to assessment of adults for the development of AAC interventions. In focusing on the perspectives of the individual, there is a need to determine how communication can be enhanced with preferred interaction partners, in preferred contexts, and using preferred modalities, including extant modes of communication. In addition, these approaches reflect family-centered approaches by considering the perspectives and resources provided by the family and others who take on facilitator roles (Sanderson, 2000).

IDENTIFICATION OF SKILL PROFILES AND LEARNER CHARACTERISTICS

For people with ASDs, the assessment of capabilities presents particular challenges that arise from their impairment in social functioning. The profiling of skills is essential because the characteristics of people with ASD differ from those of people with other developmental disabilities; these characteristics also contribute to learning styles and methods of processing information. According to Abbeduto and Boudreau (2004), a learner's previous experiences and developmental achievements will influence the capability to acquire new information and approaches to effective intervention. Knowledge of a learner's profile gives insight into previous potential learning experiences. In addition, because the patterns of strengths and weaknesses differ between individuals (Mundy & Sigman, 1989; Wetherby, Prizant, & Hutchinson, 1998) and may change from childhood to adulthood (Howlin, Goode, Hutton, & Rutter, 2004), a comprehensive assessment of social and communication skills is warranted. When planning AAC interventions, such profiles of learner characteristics and capabilities inform the development of AAC systems and strategies, which support continued skill development and enhance social interactions.

Distinct Communication Profiles

ASD is characterized by core deficits in joint attention, symbolic capacity, and social-affective behavior (e.g., Wetherby, Prizant, & Schuler, 2000). These core deficits influence the communication profiles of individuals with ASDs as they progress from early childhood to adulthood.

Early Childhood In their preschool years, the early communicative behaviors of children with ASDs tend to be limited to regulating behavior rather than engaging social interaction or referencing joint attention. Mundy, Sigman, and Kasari (1990) found that children with autism showed a specific deficit in 1) the use of early gestures to coordinate attention between objects or events and another person, 2) sharing experiences with others by drawing their attention to objects or events, 3) following another person's gaze or pointing, and 4) using gaze to shift another person's attention. These deficits lead to asynchronies in the development of early pragmatic functions, particularly the increased use of intentional communication behaviors to signal requests rather than comments (Wetherby, Yonclas, & Bryan, 1989). This pattern is thought to arise from fundamental impairments in social cognition (Mundy et al., 1990), including an awareness that other people have a state of mind that is separate from the child's own.

Young children with ASDs also show delays in symbolic capacity, as reflected in the limited use of symbolic gestures and symbolic play (Wetherby et al., 2000), which contrast with apparent strengths in constructive play (Rogers, Cook, & Meryl, 2005). Along with skills in joint attention, symbolic play has been found to be associated with language performance (e.g., Mundy, Sigman, Ungeler, & Sherman, 1987). Wetherby et al. (2000) argued that as a result of their impairment in symbolic communication, children with ASDs learn to rely on idiosyncratic, unconventional, or undesirable behavior to achieve communicative functions such as gaining attention, escaping situations, or protesting against unexpected changes to routines.

Related to weaknesses in joint attention and symbolic communication are difficulties with social-affective signaling (Greenspan & Wieder, 1997; Wetherby et al., 2000), defined as "the use of gaze shifts between person and object, expression of positive affect with directed eye gaze, and episodes of negative affect" (Wetherby et al., 1998, p. 84). Social-affective signaling is integral to the development of communication in that it impacts the extent to which a child engages with the social environment through meaningful interactions, including shared routines that allow a child to make sense of the world (Carpenter & Tomasello, 2000). As a result of impaired social interaction, children with ASDs have difficulties with receptive language (Greenspan & Wieder, 1997) and integrating linguistic input with real world knowledge, which lead to deficits in pragmatic skills. These deficits, in turn, result in difficulty understanding rules and the nuances that govern social interactions (Lord & Paul, 1997).

Problems with sensory modulation have also been identified in young and school-age children with ASDs. Baranek, Parham, and

Bodfish (2005) noted that sensory problems have been described in various ways, including hypo- or hypersensitivity and preoccupation with different types of sensory input. In addition, some children have shown motor deficits, including difficulties with motor imitation (Baranek et al., 2005; Rogers et al., 2005). According to a review by Rogers et al. (2005), research has failed to identify the primary mechanism underlying imitation problems, although dyspraxia has been nominated as a cause. Despite differences in terms of research findings, Baranek et al. (2005) stated that variations in sensory and motor difficulties across children contribute to the heterogeneity of this group. Furthermore, they argued the need to consider potential differences in learning experiences across children that may arise from sensory or motor difficulties. Such information may assist in the determination of appropriate intervention strategies and preferences for augmented input and production.

Later Childhood Lord and Paul (1997) noted frequent reports that 50% of children with autism fail to develop spoken communication after the age of 5 years. For those children with ASD who do develop functional speech, it is often characterized by immediate and delayed echolalia, which may have interactive or noninteractive pragmatic functions (Prizant & Duchan, 1981), arise from high constraint communicative contexts (Rydell & Mirenda, 1994), or be indicative of limited linguistic skills (Roberts, 1989, 1999). In addition, McEvoy, Loveland, and Landry (1988) found that reductions in the frequency of echolalia were associated with increased levels of expressive language in children with ASD. Roberts (1999) found that an increase in immediate echolalia with a concomitant increase in the percentage of echolalia that was changed in some way (i.e., mitigated), was associated with an increase in receptive language skills.

For children with functional spoken communication, few problems are experienced in terms of linguistic form. A longitudinal study by Tager-Flusberg et al. (1990) indicated that six young children with ASDs (ages 3 years 4 months to 7 years 7 months) showed the same general patterns in their grammatical and lexical skill development during a 12- to 26-month period as a group of language-matched children with Down syndrome. Other studies have provided support for normal developmental patterns in semantic, grammatical, and syntactic language skills, although they may be delayed (see Tager-Flusberg, 1997). An important skill to consider for AAC is reading, given the potential to develop a system using written words and text (Paul, 2005). Research into the reading skills of children with ASDs has focused on apparent hyperlexia, in which skill in word decoding

occurs without comprehension (Nation, Clarke, Wright, & Williams, 2006), which is surprising because of the cognitive and language impairment seen in individuals with autism or intellectual disability (Snowling & Frith, 1986). Nation et al. (2006) noted that although hyperlexia occurs in children other than those with ASDs, it has been associated mostly with this group. Much of the research is based on single case studies (e.g., Atkin & Perlman Lorch, 2006) or small groups (e.g., Snowling & Frith, 1986).

Research has indicated that the poor reading comprehension seen in children and adults with ASD has been associated with poor verbal language skills, particularly receptive language (Nation et al., 2006; Snowling & Frith, 1986). The implication is that apparent word reading skills may not sustain engagement and progress in academic activities, which are reliant on the ability to comprehend connected text as a mechanism for reading to learn (Westby, 1999).

Nation et al. (2006) warned that the focus on hyperlexia in ASD reflects an assumption that reading is an area of strength for this group, in some cases being considered a savant skill (see Atkin & Perlman Lorch, 2006). Their own research with 41 children with ASDs, ages 6–15 years, demonstrated a wide variety of skills. Nine children were nonreaders. Of the remaining 32 children, some showed the hyperlexic pattern of strong word reading but poor reading comprehension of text; others were poor at reading words and nonwords, or nonwords only, despite strong word reading skills. In addition, although they demonstrated strong relationships amongst component skills of reading (e.g., word or nonword reading and text reading), the correlations were smaller than have been demonstrated for a normative sample. Such heterogeneity points to the need for comprehensive reading assessments that include phonemic awareness, word and nonword reading, comprehension of text, and receptive language profiles, including semantic and syntactic skills.

Adolescents and Adults In contrast to the large body of literature addressing communication and learning characteristics of young children, research addressing adolescents and adults is limited (Howlin et al., 2004). The few follow-up studies of children with ASDs have indicated variable outcomes; many adults, even those with high IQs, remain dependent on family and fail to gain open (i.e., in a general, not a special, setting) employment (see Chapter 16; Howlin, 2004; Howlin et al., 2004).

Literature addressing adults with ASDs has focused on continued behavioral difficulties. Ballaban-Gil, Rapin, Tuchman, and Shinnar (1996) noted high rates of behavior problems in adolescents and young

adults with ASDs that appear to be associated, at least to some extent, with continued limitations in language skills. Therefore, although research has indicated that early difficulties with responding to others' communication may ameliorate with time (Lord & Risi, 2000), ongoing limitations in language skills and ritualistic behaviors continue to present significant obstacles to adolescents and adults, particularly in their attempts to achieve independence and form friendships (Howlin, 2004; Howlin et al., 2004). For people with intellectual disabilities, such ritualistic behaviors are overlaid with severe communication impairments, which, in turn, exacerbate problem behaviors (Sigafos, Arthur, & O'Reilly, 2003).

Learning Styles

The relationship between core deficits and communication profiles appears to be complex and mediated to a large extent by social-cognitive learning styles that are specific to ASD. Wetherby et al. (2000), for example, noted that young children with ASDs use trial-and-error methods rather than observational learning or other strategies that involve social interaction. This preference would explain their strengths in constructive rather than symbolic play, predominance of early requests rather than comments, and difficulty with motor imitation (Rogers et al., 2005). Developing an understanding of these styles can be achieved through appropriate assessment strategies and may facilitate the development of effective communication interventions (Wetherby, Schuler, & Prizant, 1997), including AAC systems (Mirenda & Schuler, 1988).

AAC interventions may be particularly suitable for individuals with ASDs because they require processing of visual information that can be made nontransient (e.g., use of static graphic displays or holding a sign constant), which these individuals find easier to process than the auditory transient information of speech (Mirenda & Schuler, 1988). In addition, Prizant (1983) argued that individuals with ASDs process information in a gestalt fashion—that is, they process both visual and auditory information as unanalyzed wholes rather than as sequential units of information. This theory provided both researchers and clinicians with a way of understanding the basis for echolalia. With such an understanding, the need to explore patterns of echolalia becomes apparent.

APPROACHES TO COMMUNICATION PROFILING

Dynamic Assessment

Dominating the literature on assessment of children with ASDs is a model of dynamic assessment, described by Kublin, Wetherby, Crais,

and Prizant (1998) as comparing "a child's assisted and unassisted performances, thereby locating learning within the social context of the help provided and offering hypotheses about the child's learning in situations beyond the assessment" (p. 287). In this way, a child's *zone of proximal development* (Vygotsky, 1934/1986, cited in Kublin et al., 1998), can be identified as a means of fine tuning the assistance that practitioners provide, allowing children to realize their learning potential.

Dynamic assessment has particular relevance to AAC interventions that address the cognitive and language delays of children with ASDs. Unfortunately, few examples of the use of dynamic assessment for developing AAC interventions are evident in the literature. An exception is a strategy suggested by Nigam (2001), whereby symbols are included in a milieu approach to teaching symbol combinations to children with autism. Unfortunately, no data were provided to support the use of the strategy.

Despite the lack of data specific to AAC, strategies to assess a person's potential to increase skills and abilities, as well as the use of systems and devices to assess a person's current communication needs within the participation model (Beukelman & Mirenda, 2005), are consistent with dynamic assessment. This consistency was exemplified in a case study by Light, Roberts, Dimarco, and Greiner (1998) of a 6-year-old boy with autism. With the goal of enhancing the child's functional communication across his daily contexts, the assessment included 1) identification of his communication needs, 2) assessment of his skills, 3) identification of useful strategies used by his facilitators, and 4) planning intervention. Dynamic assessment was used to determine the extent to which augmented input, in the form of written information, assisted him in understanding spoken instructions. This strategy was used in conjunction with formal testing and observation of the child in his classroom.

Transactional Model

The case study provided in the previous section by Light et al. (1998) highlights the need to conduct assessments in a person's daily environments (home and school) and to consider meaningful interactions. This approach is consistent with a transactional model, whereby communication is thought to develop within interactions between the child and communication partners (McLean & Snyder-McLean, 1978). Support for this model comes from studies demonstrating the bidirectional nature of communication, with mutual influence on behaviors, in mother-child dyads involving both children without (e.g., Akhtar, Dunham, & Dunham, 1991) and with disabilities (McCahtren, Warren, & Yoder, 1996).

Kublin et al. (1998) applied the transactional model as a means of extending the dynamic assessment approach. They argued that the trial of strategies to scaffold communication should occur within interactive child-adult contexts, both unstructured and structured, to examine a child's initiations, readability of signals, and responsiveness to others. In addition, the style of the communication partner can be observed, as well as the child's response to the dynamic assessment component provided in the form of various scaffolds, such as modeling, providing directions, and expanding on the child's behaviors.

A Lifespan Model

Recent literature on the assessment of individuals with ASDs for the purpose of intervention planning converge on the need to profile current social communication skills, identify learning objectives and priorities, and examine the influence of communication partners and learning environments (American Speech-Language-Hearing Association, 2006; Kublin et al., 1998; Paul, 2005; Prizant, Wetherby, & Rydell, 2000). Such a holistic approach is also consistent with the participation model.

Strategies for how to conduct such a comprehensive assessment of social communication skills have appeared in the literature according to the development stage of a child with ASD, but the focus has been on children, with a noticeable neglect of adults with ASDs (e.g., Paul, 2005). The principles of assessment identified previously are relevant across the lifespan, as they are to various types of disabilities. In this section, a lifespan model of assessment is presented incorporating these principles, with a discussion of available assessment tools and strategies that are appropriate according to the life stages of early childhood, later childhood, and adolescence and adulthood. The principles of the lifespan assessment model and their implications from early childhood to adulthood in people with ASD are presented in Table 2.1. The use of tools and strategies that can be used in an AAC assessment according to life stages are discussed in the following sections.

Young Children The principles of assessment outlined by Kublin et al. (1998) are fundamental to SCERTS®, a comprehensive educational approach for prelinguistic children with ASDs and associated social-communicative disorders (see Chapter 7; Prizant et al., 2000, 2005). The aim of this approach is to enhance the social communication, emotional regulation, and transactional supports of children and their families. According to Prizant et al. (2000, 2005), key elements of SCERTS are that intervention addresses core deficits of ASD through

Table 2.1. A lifespan model of assessment

Principle	Application across the lifespan
Communication occurs within interactive contexts that are meaningful for the individual.	Assessment is conducted across various situations and environments and includes key people who interact on a regular or semiregular basis with the individual. For children, contexts will include home and early childhood or school settings with caregivers (usually parents), teachers, siblings, and peers. For adults, these contexts will include home (with family or in supported community accommodation), respite care, employment or day activity centers, and community settings (e.g., sports centers, local shops or shopping centers).
Primary caregivers and support people play an integral and collaborative role in the assessment process.	For children, members of the team include parents or other primary caregivers and teachers. For adults, members of the team include parents or other family members, advocates and key support people from supported community accommodation, employment settings and day activity centers. These people provide information about the individual with ASD relating to their relationships, role in each context, expectations and challenges being faced, and about their own concerns, goals, and preferences for the individual. Their knowledge and understanding of and attitudes towards the person with ASD's use of informal and formal communication, including various AAC modalities are also explored.
The assessment provides the opportunity for the individual with ASD to indicate preferences.	For children, information is gathered about learning style and interests that assist in identifying goals and teaching strategies. For adults, strategies are used to gather information about preferences and learning style, as well as preferred activities, dreams, and motivations. This information is gathered in both typical and new contexts that provide the opportunity to respond both to what is known and that which may be unfamiliar. This process includes the provision and support to use various AAC modalities across environments and social interaction contexts to allow the person to indicate preferences (using conventional or unconventional modes of communication) and the extent to which they meet his or her learning styles.
The focus is on identifying strengths in communication and related areas.	For children, the assessment yields information to provide a profile of strengths and areas that show delay across communicative functions, means (gestural and vocal), reciprocity, social-affective signaling, verbal and nonverbal symbolic behavior, receptive and expressive linguistic skills, and conversational pragmatics. Similarly, for adults, assessment provides information relating to areas of strengths in terms of gestural and vocal communication, reciprocity, social-affective signaling, and level of intentional communication. For both children and adults, a variety of tools are used to gather data, including those relying on informant reports, communication sampling procedures that range in degree of structure, and involve various communication partners, formalized tests, and ecological or environmental inventories. Within these interactions, the extent to which various communication modalities are used, including AAC, is determined.

(Continued)

Table 2.1. (continued)

Principle	Application across the lifespan
The assessment is a dynamic process.	For both children and adults, assessment includes the trial of strategies that scaffold learning, which informs intervention. Trials of such scaffolds continue as the individual moves through an ongoing cycle of assessment and intervention, and of hypothesis formulation and testing. Scaffolds include the use of various AAC systems, both aided and unaided
Information is gathered about factors that both facilitate and impede performance and responses to learning opportunities.	For both children and adults, interview and observational data are gathered about factors that may reduce the individual's capacity to learn, including health issues, hearing and vision status, medications, dietary restrictions or preferences, tendency to fatigue, and sensitivities to various stimuli in the environment. In addition, data are gathered so as to sample environments and times of day.
Information from the assessment is shared with team members in ways that are meaningful and allow each member to participate in the collaborative process of setting goals, and planning intervention.	The results are presented in reports that are accessible to and culturally appropriate for each member of the team, using language without jargon. They contain information about an individual's profile of skills and areas of deficit, learning styles and preferences, and strategies that scaffold communication and social interaction. These reports are used by the team to identify members who will take responsibility for key roles in the intervention process and the supports or assistance they will need to do so. They also provide the basis for discussing concerns about the implementation of strategies, including the use of AAC, and the supports and resources each team member requires. Reports are likely to take the form of traditional reports for sharing with other professionals and, in the case of children, to meet education requirements, but can be supplemented by other formats or information. These supplementary formats include video footage and a "A Book About Me," which presents relevant assessment information within an attractive, engaging book, created specifically to quickly pass information to people who may interact with an individual with ASD but may be unfamiliar with that person.

the provision of pragmatic intervention in which the functional use of preverbal and verbal communication skills are enhanced in natural and semistructured interactions. Interventions incorporate multimodal AAC systems that allow a child to use strengths in visuo-spatial processing.

Within SCERTS and the more general assessment model proposed by Kublin et al. (1998), the Communication and Symbolic Behavior Scales™ (CSBS™, Wetherby & Prizant, 2002a) are used to develop a profile of the child's communication and related abilities. The CSBS evolved from early studies (e.g., Wetherby et al., 1989) in which opportunities for sampling communicative behaviors were created using

structured activities that resembled natural child-adult interactions (Wetherby & Prizant, 1992). The CSBS toolkit includes materials to encourage routine activities with a caregiver, such as construction and symbolic play, and structured communication sampling activities (Wetherby & Prizant, 2002a). In this way, a continuum from unstructured to structured activities is used to sample behaviors. These behaviors are analyzed using standard procedures to develop a profile of communicative functions, means (gestural and vocal), reciprocity, social-affective signaling, and verbal and nonverbal symbolic behavior. Wetherby and Prizant (1992) presented results for children with various forms of disabilities, including ASD, demonstrating differences in profiles that assist in both diagnoses and intervention planning.

By incorporating semistructured sampling activities, the CSBS provides opportunities to try visual supports, such as graphic symbols, as a means of scaffolding symbolic development. As an example, the provision of a graphic symbol or a sign for HELP can be provided to a child who shows frustration when handed a deactivated windup toy. When the child hands the symbol to the adult or attempts a sign or gesture, the adult activates the toy. Such AAC strategies can be coupled with other strategies, such as intersected eye gaze (the adult moves between the object of interest and the child, intersecting the child's line of sight to the object, and then responds as soon as the child's gaze meets the adult's eyes) (Warren, 1995), as a way of enhancing reciprocity.

Such structured assessment tasks can be supplemented by informant reports, ranging from in-depth interviews to checklists. In-depth interviews provide caregivers the opportunity to identify concerns and describe the home situation, and allow the clinician to explore attitudes toward AAC modalities (e.g., Goldbart & Marshall, 2004) and cultural influences (e.g., Shannon & Soto, 2004). Caregiver checklists can be used to supplement information obtained through direct observation of the child. An example is the Communication and Symbolic Behavior Scales Developmental Profile (CSBS DPM) Infant/Toddler Checklist (Wetherby & Prizant, 2002b), designed to gather information about predictors of language development, including emotion and use of eye gaze; use of gestures, sounds and words; understanding words; and use of objects. Also, the MacArthur-Bates Communicative Development Inventories (CDI, Fenson et al., 2006) are parent checklists that provide information on the use of gestures, single words, and word combinations. The CDI for infants has been found to be valid for children with developmental delays (Rescorla, 1993). Down syndrome (Miller, Sedey, & Miolo, 1995) and ASD (Charman, Drew, Baird, & Baird, 2003).

Later Childhood For older children who do not develop functional speech, structured observations remain relevant as a means of obtaining information on the continued use of nonverbal communication. Materials, such as the CSBS™ toykit, may be substituted for more age-appropriate materials (e.g., a flashlight with the batteries removed). Also, for children who are using speech, representative language samples provide information about spontaneous expressive language skills, receptive language ability, and the proportion and function of echolalia. Roberts (1999), for example, obtained language samples for 23 young children with ASDs annually over 3 years. These samples were analyzed for the percentages of echolalia and mitigated echolalia and compared with expressive and receptive language measures using a standardized test. Roberts found that proportions of echolalic speech decreased over time while mitigated speech increased, with concomitant increases in receptive language. Extending this approach to include dynamic assessment could include the introduction of augmented input to test if it resulted in reduced echolalia, increased spontaneous language, or mitigated echolalia.

As in the studies by Roberts (1989; 1999), formal testing can provide a means of determining receptive language skills. Formal tests can also be used to develop profiles of reading and reading-related skills. Iacono and Cupples (2001, 2004) have developed protocols that include phonemic awareness, word recognition and word attack, and reading comprehension suitable for children and adults with disabilities, including those with complex communication needs.

Both children with and without spoken communication skills require functional analysis of speech and other behaviors. Given that echolalia can serve both interactive and noninteractive functions (Prizant & Duchan, 1981), functional analysis of echolalic utterances is warranted. Data gathered using communication sampling procedures can be analyzed using functional protocols, such as those described by Prizant and Duchan (1981). Functional analysis of other behaviors that are problematic, such as ritualistic behavior, aggression, and self-injury, are also critical in informing interventions that may incorporate the use of functional communication training (Mirenda, 1997). Data obtained by indirect assessments using interviews and checklists, systematic observations, and hypothesis testing provide the basis for functional analysis of behaviors (see Sigafos et al., 2003). Determination of the functions of problem behaviors facilitates the development of AAC interventions that can enable their replacement with conventional and readily recognized signals (e.g., use of a graphic symbol to indicate the desire to end an activity; see Chapter 12).

Adolescents and Adults The apparent neglect of adults with ASDs in the assessment literature may reflect 1) a lack of access to communication intervention services for this group or 2) the disappearance of adults with ASDs and complex communication needs as an identifiable group within the research literature. Research on the communication of adults with ASDs can be found within that addressing intellectual disabilities in general (e.g., Iacono et al., 2005), including the AAC intervention literature (e.g., Hamilton & Snell, 1993; Romski & Sevelk, 1996).

There are some assessments designed for people with intellectual disabilities—or more generally, those who use or could benefit from AAC—that may be useful for people who also have ASDs. One such assessment tool is the Triple C: Checklist of Communicative Competencies (Bloomberg & West, 1999), designed to be completed by support workers as a means of sensitizing them to potentially communicative behaviors demonstrated by their adult clients who lack linguistics skills (i.e., clients whose communication skills range from unintentional to early symbolic; see Iacono et al., 2005). The Triple C checklist provides a basis for collaborative planning of multimodal communication supports (see Chapter 16).

Another tool that offers potential for profiling the communication of adolescents and adults with ASD is the Social Networks inventory, even though it was developed more generally for people with complex communication needs (Blackstone & Hunt Berg, 2003). This inventory provides a systematic strategy for collecting information about how a person communicates with individuals across five circles of communication partners, moving from close family to people encountered regularly in community settings. Where possible, the individual with complex communication needs is interviewed directly; informants, such as a parent/advocate or key support person, are also interviewed. Information is gathered about modalities used with people in each circle of communication partners, their effectiveness (i.e., results in the desired effect) and efficiency (i.e., is recognizable to the communication partner), people who play key roles in supporting the individual's communication, and strategies they use to support interaction.

Research into the use of the Social Networks inventory is limited. A recent study by Iacono et al. (2004) indicated that the inventory proved useful in profiling the communication skills, modality preferences, and learning styles of three adults with developmental disabilities, including two with ASD. An unanticipated outcome was the finding that the structured interview format allowed the informants—parents and key support workers—to discuss their concerns, attitudes, and roles in supporting these adults.

Other tools that are appropriate for use with adolescents or adults with intellectual disability are the Pragmatics Profile of Everyday Communication Skills—Adults (Dewart and Summers, n.d.) and the Pre-Verbal Communication Schedule (Kiernan & Reid, 1987), although the latter may only be suitable for students because of the terminology used. The extent to which any of these checklists or interview schedules are suitable for people with ASDs, or whether they enable a profile of skills that identifies characteristics of ASD to support their valid use with this group, has not been explored in the research literature.

The use of communication sampling procedures, as used in the CSBS with children, has also been found to be useful in assessing the current communication skills of adults with intellectual disabilities. McLean, Brady, McLean, and Behrens (1999) used a structured series of interactive routines with adults with severe intellectual disability. Each activity included something that was unexpected, such as offering a sealed jar containing a food item. These sampling strategies allowed the researchers to determine the participants' level of intentionality and communicative functions expressed through nonsymbolic and symbolic communicative acts. Such direct assessments supplement the information provided through informant reports, while also allowing the opportunity to test various AAC modalities and strategies, as previously described for children.

Functional behavior analysis remains integral to AAC assessments for adolescents and adults with ASDs because of their high incidence of behavior problems (Howlin, 1997), which is a likely impetus for seeking support services. Such functional assessment needs to be part of a dynamic and transactional assessment of the adolescent or adult, within his or her daily or regular environments.

CLINICAL ILLUSTRATION: STEVE

In this section, a clinical case illustrates the implementation of principles of the lifespan model of assessment with Steve, a 40-year-old man with ASD. Steve lives in supported accommodation in the community with four other adults. He was diagnosed with autism when he was 4 years of age. A year later, he was also diagnosed as having moderate intellectual disability and epilepsy. Until 12 years ago, he lived with his parents. Steve has demonstrated behavior problems since early childhood, which were cited as the reason by a local regular school for excluding him. Instead he attended a school for children with intellectual disabilities. He was referred for a communication assessment because his continued behavior problems, including aggression, property destruction, and of greatest concern, self-injurious behaviors such

as banging his head on the floor, wall, or any hard surface and, more recently, pressing his eyes with his fingers and banging his head with the closed fist of his right hand.

The communication assessment team included a speech-language pathologist, Steve's mother, two support workers from his home, and a support worker from his day service. Although Steve's mother was able to provide information about Steve's development and past experiences, she was suffering from health problems and could take only a limited role in a dynamic assessment process and intervention. Steve's father did not participate because of advanced dementia. In contrast, Steve's support workers, particularly those from his home, were motivated to be active members of the team and thus maintain Steve's place in the day service and reduce his episodes of self-injurious behavior and aggression, which had resulted in staff injuries.

The assessment comprised gathering previous records, including school reports, in-depth interviews with Steve's mother and support workers using the Social Networks inventory, administration of the Triple C checklist, dynamic assessment conducted by the support workers, structured observations by the speech pathologist, and a functional behavior assessment conducted using an informant checklist and observations to test hypotheses developed from the checklist information.

Previous Learning History

According to Steve's school reports and his mother's recollections, in the early years at school Steve developed a few phrases, such as "Go away," "Not now," and a few single words for preferred and motivating activities, including "bubbles" and "water." He also was able to vocalize along to favorite nursery rhymes and, when given time, could fill in the word to complete the phrase. Steve was reported to be fascinated by shiny objects, running water, and music, particularly familiar nursery rhymes. If his teacher or teacher's aide sang, "Twinkle, twinkle little..." and waited, Steve could, after a pause, say, "star." However, Steve did not engage in social-affective signaling; instead, he used adults to achieve goals, such as handing over an object he needed help with and waiting, or leading the adult by the hand to a door to request to go outside. The school tried a variety of AAC systems, both aided and unaided, although little information was available on how they were used or the extent to which they assisted Steve in receptive or expressive communication. School staff reported that although he knew the classroom routine, he would insist upon engaging in activities that he preferred and became exceptionally distressed if told "no" or if he was redirected to another unfamiliar activity.

It was during his school years that Steve's behavior problems worsened. Around the time of puberty, a referral to a child psychiatrist resulted in the trial of medications to address apparent anxiety and depression. At the time of the communication assessment, Steve was on medication for epilepsy and had not had a seizure for many years. His mother noted that he had not had a medication review for a number of years; she was concerned that it might have contributed to the apparent bouts of anxiety that resulted in self-injury or aggression.

Current Assessments

The Triple C checklist was completed by Steve's three support workers (home and day service) and then discussed with the speech-language pathologist. The information from the checklist indicated that Steve was an intentional/informal communicator, using informal strategies of gestures, vocalizations, and facial expressions, as well as problem behaviors to communicate intentionally. This level of communication was confirmed by the speech-language pathologist's observations of Steve during a mealtime routine and structured communication sampling. In addition, completion of the Social Networks inventory indicated that Steve tended to use gestures at home and with family, but rarely with people in the community. In fact, the support workers and Steve's mother felt that he preferred not to go out into the community, as this was where he was likely to demonstrate aggression and sometime self-injury. An exception was the local bakery, which was familiar to Steve because he went there routinely and was served by the same person.

The functional behavior checklist led to the development of hypotheses that Steve tended to be aggressive when something he had not anticipated occurred. Also, it was felt that self-injury was most likely to occur when Steve was in unfamiliar places, with unfamiliar people, or when he was stopped from participating in a preferred routine activity. However, there were times when his behaviors did not appear to be related to environmental factors or communication frustration.

Hypothesis Testing and Use of AAC Scaffolds

Water restrictions because of drought led to a natural testing of one of the hypotheses regarding Steve's aggression and self-injurious behaviors. Previously, Steve had watered the garden daily, but this had been reduced to two days a week to comply with city regulations. On days when Steve was not allowed to water the garden, he was stopped by staff and episodes of self-injury and aggression occurred. On these

days, the support workers provided an opportunity for Steve to spend time hand washing small items of clothes and also assisted him in cleaning the grill. When reviewing incident reports of aggression, the group hypothesized that their attempts to provide physical prompts to complete activities had initiated aggression because support workers had approached Steve from behind without providing a verbal explanation. They changed this strategy so that they now approached him from the front and provided an explanation of what they were about to do. They also decided to pair these explanations with a physical object and a gesture to signify the activity (e.g., showing Steve a small bucket containing a few clothes requiring washing and pointing to the laundry room).

In addition, support staff organized a review of Steve's medication by his general practitioner. His medication was changed and support workers reported that Steve seemed calmer. Daily charts of behavior indicated that Steve's problem behaviors reduced substantially; during a 3-month period, there was only one incidence report.

Support staff, with the help of the speech-language pathologist, gathered information about the use of AAC to aid in Steve's understanding and social communication. By observing Steve's responses to objects in routine activities, they learned that Steve associated certain activities with particular objects (e.g., the large scrubbing-brush with cleaning the grill). In thinking about Steve's daily environment, they decided to consistently use objects to cue Steve into a change in his routine, but also to accompany them with spoken information. They also implemented a trial of showing Steve options for drinks, both hot and cold, to see if he would indicate a preference by touching the container, a skill that his mother reported that he used at home.

Consensus Building

Two meetings were attended by all members of the assessment team. Objectives for intervention and also for further assessment were developed based on the information that had been gathered. Three objectives were agreed upon for intervention: 1) to create a personal communication dictionary (i.e., a record of Steve's informal modes of communication, signs, and their meanings) to enable all staff to share the same information and respond to Steve consistently; 2) to pair real objects with an activity to enhance Steve's understanding of changes in routine and anticipation of new experiences through the consistent use of the same real objects; and 3) to use keyword signs and natural gestures when interacting with Steve to provide consistent visual cues to accompany speech and real objects. In addition, an objective was set for continued assessment whereby staff would add to the personal

communication dictionary if they observed any new behavior or communication through gesture, sign, or vocalization and record if and how these additions changed interactions with Steve. Staff believed that it was possible to achieve these aims by the next review of Steve's service plan in 6 months and were actively engaged in the process.

Documenting Assessment Outcomes

The speech-language pathologist summarized the outcomes of the assessment in a two-page report. Then, with the input of the support workers, strategies that were found to enhance Steve's communication were documented in the personal communication dictionary, using pictures to demonstrate AAC strategies wherever possible. The report was structured according to Steve's current communication skills and modalities, his preferred communication partners, and opportunities that were currently available in his home, in the day service, and in the community. The report also listed further strategies that would be attempted to determine the extent to which Steve's communication partners could be extended (e.g., attending new places in the community) and how to prepare Steve for new places and people through the use of a real objects and keyword signs (e.g., *change, different, okay, relax/calm down, doesn't matter, good work*). Sample dialog or scripts for staff were provided, with the keyword signs selected and illustrated.

RESEARCH IMPLICATIONS

The lifespan model of assessment for people with ASDs has been drawn from extant literature in the fields of AAC and ASD. This literature is based on notions of current best practice, which, in turn, has been based to varying extents on empirical support. The extent to which this model addresses the needs of people with ASDs across the lifespan warrants investigation. Drawing on existing research, there is a need for empirical exploration of how best to incorporate AAC modalities and strategies into dynamic assessment. Further investigation is also needed on the perspectives of caregivers and other support people in terms of their roles in an assessment team, as well as culturally appropriate strategies for professionals to use when developing collaborations and building consensus. Research to date has incorporated qualitative procedures that allow an in-depth exploration of family and support person perspectives (e.g., Goldbart & Marshall, 2004; Shannon & Soto, 2004). Such methods may be appropriate for expanding the research base on family- and person-centered approaches to assessment.

A need exists for the development and testing of assessment protocols that allow for the systematic collection of information about a person's learning style and preferences, especially in relation to AAC. Such approaches may best incorporate observations in both familiar and unfamiliar settings that vary from structured to unstructured, as well as informant reports. These protocols may incorporate existing tools, such as the Triple C and the Social Networks Inventory, to determine the extent to which they profile the skills and learner characteristics of people with ASDs. In addition, there is a need for further development of assessment tools designed to highlight such profiles of adolescents and adults, in the manner of the CSBS™ for children. Such development will allow ASDs to become apparent in adults with intellectual disabilities who have never been diagnosed with ASDs. Determining how such tools inform intervention, particularly the development of AAC and its use across contexts to support social communication, would be the next step.

CONCLUSION

The convergence of principles, strategies, and tools relating to ASDs, AAC, and intellectual disabilities provides direction for the assessment of people with ASDs and planning interventions based on or incorporating AAC. This convergence has been articulated in the lifespan model of assessment in an attempt to enhance the social communication of people with ASDs and complex communication needs through access to AAC systems that meet their current and future needs, desires, and preferences. Variation in the extent to which such needs have been addressed in the literature points to the need for research to test the empirical basis for the model and its clinical and educational utility.

REFERENCES

- Abbeduto, L., & Boudreau, D. (2004). Theoretical influences on research on language development and intervention in individuals with mental retardation. *Mental Retardation and Developmental Disabilities Research Reviews*, 10, 184-192.
- Akhtar, N., Dunham, F., & Dunham, P. (1991). Directive interactions and early vocabulary development: The role of joint attentional focus. *Journal of Child Language*, 18, 41-49.
- American Speech-Language-Hearing Association. (2006). Guidelines for speech-language pathologists in diagnosis, assessment, and treatment of autism spectrum disorders across the life span. Retrieved November 10, 2006, from <http://www.asha.org/members/desktop-journal/desktop/default>