Examining Effective Intervention Practices for Communication Impairment in Autism Spectrum Disorder

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This article describes effective communication-related practices by reviewing specific evidence-based techniques, sharing how these techniques have been used in various treatment approaches, and discussing a constellation of general principles vital to treatment success. A comprehensive model of service delivery is provided to illustrate these key features of effective practice within the ecological and cultural contexts of families and their everyday lives.

According to the American Speech-Language-Hearing Association (ASHA, 2006), communication and social impairments constitute a core component of autism spectrum disorders (ASDs). Although evident along a continuum of severity, the communication and social deficits of persons with ASDs almost always place them at significant risk for failure and social isolation. Furthermore, long-term positive outcomes with this population are highly correlated with the acquisition of functional communicative abilities (Koegel, Koegel, Yoshen, & McNerney, 1999). Accordingly, the development of effective communication-related intervention practices has become a national priority.

What are effective communication-related practices for individuals with ASD? A simple response might include a discussion of discrete evidence-based intervention techniques such as prompting, modeling, and visual supports. Although these and other techniques are critical to many successful interventions, in isolation they fail
to constitute effective practices. As authors, we propose that effective practices are best understood when viewed from a broad context that includes treatment techniques, approaches, and guidelines. Driving our view of effective practices is the underlying assumption that treatment must make a difference. That is, treatment must target meaningful outcomes (see Figure 1).

This article describes effective communication-related practices by reviewing specific evidence-based techniques, sharing how these techniques have been used in various treatment approaches and discussing a constellation of general principles vital to treatment success. A comprehensive model of service delivery is provided to illustrate these key features of effective practice within the ecological and cultural contexts of families and their everyday lives.

EFFECTIVE COMMUNICATION PRACTICES

Treatment Techniques

During the past three decades, theorists have utilized principles underlying popular models of speech and language acquisition to propose interventions for the social and communicative impairments evident in individuals with ASD. Results have generated a variety of techniques and strategies that have been applied across interventions. In the nonexhaustive review that follows, some of the more commonly used treatment techniques and strategies are presented and evidence related to their effectiveness is provided.


**Prompting**

In treatment contexts, prompts are stimuli that increase the probability of desired responses (Alberto & Troutman, 1986). Prompts can include verbal, visual, or physical cues and are often used in a hierarchical manner. That is, a less directive verbal prompt, if unsuccessful, may be followed by a visual and then physical prompt.

Prompts are common techniques used by interventionists who are targeting communication-related gains in individuals with ASD. Prompting has been a critical component of treatments promoting sign use (Barrera, Labato-Barrera, & Sulzer-Azaroff, 1980), speech comprehension (Egel, Shafer, & Neef, 1984) and speech production (Koegel, Camerata, Valdez-Menchaca, & Koegel, 1998). Prompts have also been used to promote augmented communication (AAC; Hamilton & Snell, 1993; Keen, Sigafoos, Woodyatt, 2001) and to replace problem behaviors (Horner & Budd, 1985).

**Modeling**

A model is a specific type of prompt used to encourage communication, among other skills. Models may occur alone (the production of a target sign during a training sequence) or may occur with other prompts (e.g., “Look at me” followed by the production of a target sign). Models can make imitation of desired behavior more likely and eventually lead to imitations of nontargeted behaviors (Baer, Peterson, & Sherman, 1967).

Modeling is another technique that has shown considerable promise when training individuals with ASD to use communication. Modeling has been used to facilitate comprehension (Egel et al., 1984), the production of gesture (Buffington, Krantz, McClannahan, & Poulson, 1998), and the production of speech (Koegel et al., 1998; Koegel, O’Dell, & Koegel, 1987). Modeling has also been suggested as a primary technique when promoting the use of voice output communication devices. Romanzi and Sevcik (1996) used modeling in their application of the System for Augmented Language with 13 participants, including two with ASD. Verbal modeling was thought to be instrumental in the increased speech production of over half of participants.

**Shaping**

Shaping has been described as the “reinforcement of successive approximations to a desired behavior to teach new behavior” (Alberto & Troutman, 1986, p. 23). Examples of shaping in communication instruction include rewarding inarticulate speech efforts and then successively rewarding more intelligible productions; or responding to primitive gesture use, then only responding when those gestures are accompanied by vocalizations. In both these examples, existing behaviors are “shaped” into more sophisticated, new behaviors.

Although shaping is a part of many communication training efforts, few studies have clearly identified it as a treatment variable. Koegel, O’Dell, and Dunlap (1988) compared the effectiveness of reinforcing verbal behavior and the shaping of motor
aspects of speech production on affect ratings and phonemic production scores. Their findings were not conclusive.

The authors of this article are aware of many uses of shaping to promote successively more sophisticated communicative behaviors from persons with ASD. For example, shaping is often used as an instructional technique to improve speech production and unaided and aided AAC use. Unfortunately, published data on these efforts are lacking.

**Time Delay**

As an instructional strategy, time delay can be best described as expectant waiting. When attempting to encourage a communication behavior, time delay can be used after verbal or gestural prompts/models or simply after “loading” environments with opportunity. The opportunity, delay, and expectant posture of the partner will often be enough to evoke communicative behavior.

Time delay has been a central component of many communication treatments for individuals with ASD. Time delay has been used to promote requesting (Charlop, Schreibman & Thibodeau, 1985), positive expressions of affect (Charlop & Walsh, 1986), and social speech (Matson, Sevin, Box, Francis, & Sevin, 1993). Time delay has also been reported to be effective with efforts to replace challenging behaviors that serve communicative purposes (Durand & Carr, 1987; 1992).

**Reinforcement**

According to Alberto and Troutman (1986) reinforcement is the arrangement of consequences that alter behavior. Reinforcement can be positive in that it involves the contingent presentation of consequences that increase behavior, or it can be negative, involving the contingent removal of unpleasant stimuli. Alberto and Troutman noted that reinforcement is a naturally occurring phenomenon that can be applied in systematic ways to promote behavior change.

During the past 50 years, numerous, if not all, research efforts have used reinforcement in one way or the other to promote positive communicative change in individuals with ASD. Reinforcement has been cited as an independent (treatment) variable of studies promoting sign language (Wherry & Edwards, 1983), speech (Koegel et al., 1988), and gesture (Buffington et al., 1998). Most of these studies reported gains in target behaviors.

In sum, the techniques described thus far have an impressive track record when used to promote communicative behaviors in persons with ASD. Although effective individually, they are often applied in concert. For example, treatment sequences may begin with the provision of an opportunity to communicate, followed by time delay, a prompt, a model, shaping of behavior, and some form of reinforcement.

The treatment techniques discussed above have largely arisen from behavioral theory. Other techniques or strategies have their roots in learner characteristics frequently associated with ASD.
Other Treatment Techniques/Strategies

In an extensive review of learner characteristics associated with ASD, Schuler (1995) reported the presence of central deficits with information processing and preferences for static visual stimuli. The authors of this article suggest that these characteristics have been addressed by two frequently used treatment techniques/strategies: routines and visual supports.

Routines

Information processing deficits make individuals with ASD appear disengaged and can contribute to aberrant behavior. Most interventionists have stories to tell about persons with ASD that fail to attend to instructions, seem confused by novel activities, or become unsettled by schedule changes. While the apparent need for routine can be troubling and disruptive in everyday activities, routines can be used to promote expectancy and participation in communication-related treatments.

The use of routine in communication intervention has its origins in the transactional approach to early language training proposed by McLean and Snyder-McLean (1978). These theorists suggested that communication occurs within everyday routines that have identifiable cycles and involve recognizable turns for participants.

Snyder-McLean, Solomonson, McLean, and Sack (1984) first proposed the use of routine as a framework for communication treatment. Routines seemed to be a logical choice due to their predictable nature and clear turn-taking opportunities. Furthermore, the naturalness of routines encouraged the extension of treatment beyond traditional settings. In the decades that followed, others noted the therapeutic value of routines and extended their use (McLean, McLean, Brady, & Etter, 1991; Siegel-Causey & Guess, 1989; Yoder & Warren, 2002).

The predictability inherent in routines makes them a natural way to address the processing limitations of persons with ASD and their potential consequences. In addition, routines have recently been used with individuals with ASD and other developmental disabilities to promote emergent nonsymbolic communication (Brady, Steeples, & Fleming, 2005), speech (Yoder & Stone, 2006), AAC use (Mirenda, 2001), and social communication skills (Thiemann & Goldstein, 2004).

Visual Support

Quill (1995) described visually supported communication guidelines. Objects, photos, line drawings, and text can thus be used to promote both understanding and expression in individuals with ASD and visual schedules can assist with transitions throughout the day. Visuals can also be used to augment speech input (Preis, 2006), illustrate curricular concepts, and prompt social behaviors.

Visuals are a critical component of many communication output systems; that is, AAC. Mirenda (2001) described numerous studies in which individuals with ASD are taught expressive abilities through the use of aided communication (i.e., devices or systems external to the user). She noted that objects (partials and whole), photographs,
and line drawings have been successfully used to promote functional communication gains. Others have reported that the expressive use of visual communication aids can contribute to reductions in undesirable behavior (Frea, Arnold, & Vittimberga, 2001) and increases in rates of social interaction (Garrison-Harrell, Kamps, & Kravits, 1997).

The techniques and strategies described above have found broad applications in various treatment approaches designed to address the communication impairments of individuals with ASD. What follows is a discussion of these techniques as applied to general and specific treatment approaches. Once again, this review only represents some of the more commonly used treatments available today.

### Treatment Approaches

In a review of communication-related treatments in ASD, Prizant, Wetherby, and Rydell (2000) described three general approaches available to interventionists. These included Discrete Trial Training (DTT), Contemporary Applied Behavioral Analysis (CABA), and the Developmental Social Pragmatic (DSP) model. DTT has its origins in behavioral theory and has emerged as a popular approach for addressing communication impairment in ASD because of the work of Ivar Lovaas. Lovaas (1977) advocated the use of one-to-one massed trial drill to teach receptive and expressive speech as well as other developmental and self-help skills. DTT initially addresses readiness abilities such as attention and eye contact, and eventually progresses to imitation and receptive/expressive language, among other higher-order skills. In DTT, a “trial” consists of the presentation of a stimulus, a child/adult’s response, and a consequence. During trials, instructions are given once by the teacher and child/adult actions are judged as correct or incorrect and are consequently reinforced or corrected. Off-task responses, even if communicatively relevant, are ignored or redirected. Training, at least initially, is highly structured, controlled by the trainer, and conducted in restrictive contexts. One of the most structured aspects of DTT is the application of behavioral treatment techniques.

Numerous criticisms have been raised specific to DTT, including limited generalization of treatment gains and the lack of communicative flexibility/spontaneity post-training (Koegel, 1995). Prizant et al. (2000) cited the limitations of DTT and advances in behavioral practices as driving forces in the emergence of CABA.

CABA was designed to address communicative impairments in ASD through the use of behavioral strategies and more natural procedures consistent with a transactional view of language acquisition. Prizant et al. (2000) noted that the most well-known CABA approaches include Incidental Language Teaching (Hart, 1985), Natural Language Paradigm (Koegel & Johnson, 1989), and Milieu teaching (Kaiser, Yoder, & Keetz, 1992). CABA approaches recognize the instructional value of natural routines, the caregiver child dyad, and the creation of typical communication opportunities as the primary instructional context.

CABA training typically occurs in a natural setting loaded with communicative opportunities. After introducing the learner to the treatment setting, the trainer follows their lead or directs them to activities of interest. Training consists of engagement within a routine format that involves turns. For example, the trainer may initiate turns blowing bubbles, rolling a ball, turning pages of a book, and so on. After turns are
established with expectancy, the trainer creates a communicative opportunity (possibly through time delay) and utilizes a training sequence consisting of behavioral techniques such as prompting, modeling, shaping, and reinforcement. After responses are obtained, the routine is continued, followed by new training opportunities.

Prizant et al. (2000) reported that CABA approaches differ from DTT in that training is no longer controlled by the trainer, activities reflect high-interest areas for the child/adult, the child/adult’s attentional lead is often followed, and all communication attempts are recognized and rewarded. The authors noted, however, that CABA approaches continue to present interventionists with challenges specific to eliciting, recording, and evaluating responses.

Most recently, theorists have begun to consider approaches that are embedded throughout a child or adult’s day. Such efforts do not rely on scripted or scheduled treatment times but support interventions that take place during natural interactions and require high levels of coordinated caregiver participation and support. Prizant et al. (2000) noted that these approaches share a developmental social-pragmatic orientation and are characterized by their emphasis on promoting initiation and spontaneity, following the child/adult’s attentional focus, building on current communicative repertoires, and using natural activities and events.

The DSP approach that has received the broadest acceptance is the Social Communication, Emotional Regulation, and Transactional Support (SCERTS) model (Prizant, Wetherby, Rubin, Laurent, & Rydell, 2006). This comprehensive, multidisciplinary educational approach addresses social communication, emotional regulation, and transactional support in an effort to promote communication and social-emotional abilities in individuals with ASD. SCERTS emphasizes daily activities and familiar partners in intervention contexts and relies on a team of professionals who work in concert with parents and family members.

The three domains of SCERTS address core deficits evident in individuals with ASD. The social communication domain strives for social competence and active participation in social activities by promoting joint attention and symbol use. Emotional regulation, in contrast, supports the control of emotional arousal. Such control allows the child/adult to be “optimally available” for interaction. Finally, transactional support encourages skill training and carryover across partners and settings.

Application of the SCERTS model to address communication supports requires a systematic assessment and goal-setting process that is team driven and family friendly. Initially, the communication stage of participants is determined. Three communication stages are used that reflect expressive abilities at either nonsymbolic, emergent symbolic, or conversational levels. Depending on an individual’s communication level, information is elicited or observed to assist with goal setting. Once goals are selected, they are listed on activity planning forms that represent the child or adult’s day. Goals may relate to partner or child/adult needs and are addressed by a variety of partners across the day. Partners are encouraged to utilize transactional supports such as natural opportunities, modeling, and play to promote treatment gains. Other therapeutic techniques (those mentioned earlier in this article) are also used, although SCERTS is not prescriptive with respect to techniques.

The SCERTS model and DTT represent opposite ends of a treatment continuum. Prizant and Wetherby (1998) suggested that the three treatment approaches addressed
thus far can be ordered based on philosophical orientation from traditional behavioral to social-pragmatic, with CABA squarely in the middle. Later Prizant et al. (2006) suggested that additional continua could be applied, including flexibility of instruction, the use of partners, problem behavior strategies, naturalness, the roles of peers, regulatory issues, and focus on spontaneous communication. With each of these parameters, DTT represents one end of the continuum, followed by CABA and DSP. That is, DTT would be considered less flexible, less amenable to partner involvement, less natural, and so on, than CABA and DSP.

Thus far, this review of treatment approaches has emphasized three broad-based options that share commonalities but are best viewed on the continua mentioned above. Heflin and Simpson (1998) provided a review of numerous other more specific treatments for communication and other deficits in ASD. Two of these methods are particularly utilitarian.

The Picture Exchange Communication System (PECS; Bondy & Frost, 1994) uses pictures and other symbols to promote functional communicative abilities in children with ASD. This step-by-step program promotes communication through picture/symbol exchange. PECS has been used most often to encourage emergent communication, although its later steps address greater language complexity. A variety of partners can implement the program (e.g., teachers, parents, peers), which uses several behavioral instructional techniques, including shaping and prompting. PECS has been praised for its promotion of functional communication and its “easy fit” in educational settings (Earles, Carlson, & Bock, 1998).

Social stories have become a popular approach to addressing higher-order social language deficits in ASD (Gray & Garland, 1993). Individualized stories are presented that provide guidelines for communication use in specific social situations. Stories can be implemented by any communicative partner and are typically rehearsed in a routine fashion. Children and adults may prompt social or communication participation among learners with ASD, using story cues as a guide.

The review of approaches provided here is limited. It does, however, illustrate that many treatments available today differ more with respect to their philosophical orientation than their techniques. It appears to the authors of this article that the aggregate treatment continua represent a general broadening of efforts over the past 30 years. This broadening includes an easing of control and prescriptiveness and treatments that are more comprehensive, collaborative, and based on natural patterns of communication.

The plethora of treatments often leaves practitioners confused. Given that the techniques and strategies used across treatments are often similar, one might question what guidelines are available to assist with treatment choice.

Guidelines Promoting Effectiveness

In an effort to respond to questions regarding treatment efficacy and choice, the National Research Council (NCR) of the National Academy of Sciences convened a committee of experts in ASD that represent a variety of disciplines and philosophical
TABLE 1
National Research Council’s Recommendations/Instructional Priorities

1. Early entry into intervention (by age 3).
2. Active engagement in intensive instruction (25 hours per week or more).
3. Repeated, planned teaching opportunities with low student-to-teach ratios.
4. Systematic developmentally appropriate instruction with identifiable objects.
5. Inclusion of family.
6. Ongoing assessment that result in programming change when needed.

*Note.* Adapted from National Research Council (2001).

orientations (NRC, 2001). Table 1 presents this group’s recommendations and instructional priorities.

Inspection of Table 1 provides specific direction to practitioners. Clearly, preference should be given to treatments that are applicable across the lifespan (especially with very young children), systematically organized, and supportive of parents and families. Preferred treatments should also be designed so that they can be applied intensively throughout the day and assessed in an ongoing manner. Priority should be given to treatments that are functional and pursue spontaneous communication within natural peer interactions including play. Treatments must also be flexible enough to address behavior in a positive manner and interface with academic, vocational, and community priorities. Finally, preferred treatments should support new skill learning, generalization, and maintenance.

ASHA’s Ad Hoc Committee on ASD noted that, even with the guidelines and priorities of the NRC, there are no data supporting the efficacy of one treatment approach when compared to others (2006). This group also reported that research is not available to predict which interventions will work best with which individuals with ASD.

The ASHA Committee suggested that decisions about the appropriateness of treatments should be closely tied to outcome measures. The reader will remember that the pursuit of “meaningful outcomes” was identified early in this article as a critical component of effective interventions (see Figure 1). Meaningful outcomes are ecologically and socially valid and thus make a difference in that they result in skills that promote daily communicative success across environments. This conceptualization of treatment outcomes forces practitioners to question the practice of pursuing discrete, sequential goals without considering their broader impact. ASHA’s Ad Hoc Committee (2006) also offers questions to assist practitioners with decision making that address both the findings of the NRC and the need for meaningful outcomes and outcome measures.

Clearly, practitioners should use the guidelines of the NRC and ASHA to choose effective intervention programs that will promote meaningful outcomes for individuals with ASD. When selected, these approaches will have to be implemented within the broad fabric of life. To assist with successful treatment, we propose a comprehensive model of service delivery that takes into consideration three spheres of influence that directly impact communication-based treatments.
A COMPREHENSIVE MODEL OF INTERVENTION

If the goal of intervention is to align effective practices with the changing needs of an individual, practitioners must recognize and embrace a number of influences that interact with treatment. The relationship between the influence spheres and intervention is illustrated in Figure 2.

Effective communication-based practices are at the center of a “goodness of fit” between a child and environmental demands, culturally competent family centered practices, and ecological intervention perspectives. These bidirectional spheres all influence each other and, in turn, impact intervention.

Acknowledging these intervention influences broadens the possibilities available to interventionists. The focus of intervention shifts from intrinsic deficiencies to a broader array of contexts in which intervention is posited (i.e., family, friends, and neighborhood). The remainder of this article focuses on the influences that form a comprehensive model of intervention: “goodness of fit” (Talwar, Nitz, Lerner, & Lerner, 1991), ecological systems theory (Bronfenbrenner, 1979), and culturally competent family centered practice (Dunst, Trivette, & Deal, 1988). A structure for implementing comprehensive intervention services is also provided.

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FIGURE 2 A comprehensive model of communication-based intervention.
Goodness of Fit

All too often, incongruence exists between environmental expectations and the abilities of an individual. There may be either consonance or dissonance between the demands of a particular setting in which a child or adult interacts and their abilities. To meet these demands, goodness of fit implies an individual's intervention program is adequate to address the opportunities and changing demands of the environment (Talwar et al., 1991).

When an individual enters a setting (treatment or otherwise), there are previously established demands and expectations, based on knowledge, values, and beliefs, to which the child or adult must fit their unique behavioral attributes (Lerner, Windle, Hooker, Lenerez, & East, 1986). Attention to setting (e.g., environmental) variables that effect person-environment fit represents a shift toward an interactional view of intervention. This shift is based on the assumption that there may be unique and significant differences between settings that may interfere with an individual's successful communication.

Matching an individual's communication/language needs to present and future settings is a complex procedure that involves close examination of the child or adult's abilities and the environmental demands to which they will be exposed. Successful intervention is based largely on the individual's ability to fit the criterion of present/future environments and the ability of these environments to adapt to the changing behavior of the individual. The match between an individual's ability and the demands/expectations of a home, a school, and/or a community environment may have a profound influence on a person's communication and language development.

Ecological Systems

An ecological systems approach emphasizes the bonds between individuals within environments that foster growth and development. As originally proposed by Bronfenbrenner (1979), ecological systems are best illustrated by a series of concentric circles in which the smallest circle in the center represents the child or individual. Encircling the individual are concentric rings, representing environments that may interact or influence an individual. In the inner-most rings, bidirectional interactions occur between the individual and environmental demands. Parents, teachers, and anyone in a close relationship with the individual reside in the first concentric ring. To understand development at this level is to accept the bidirectional influences that exist. Interactions affect a person's behavior and, in turn, an individual's abilities and social competence affects the behavior of others they encounter (Broemmel & Briscoe, 2001). As the circles move outward from the individual, less direct, but still powerful pressures influence development such as health care systems, values and customs, and so on.

Intervention within an ecological framework is predicated by an assumption that social relationships and environments influence development (Whittaker & Tracy, 1989). Following the tenants of an ecological approach, emphasis is placed on providing intervention, services, and support for an individual within a family and community.
setting. Whether environments in which the person interacts are supportive entities or threaten development must be closely weighed by interventionists and families alike.

Culturally Competent Family Centeredness

A paradigm shift occurred in parent-professional relationships with the introduction of early childhood special education legislation in the mid-1980s. Nowhere was there a more active philosophy of bridging the parent-professional gap in addressing the multifaceted needs of children and families. It was the harbinger for other disciplines working with children and individuals to actively involve parents as equal partners.

Involvement and parental contribution in the intervention process tends to empower the parent and enhance optimism regarding the individual’s opportunities. Professionals and parents should establish reciprocal relationships, listen and respond in a nonbiased manner, and integrate and adapt this information to assist with intervention.

Over the course of the past two decades there has been a movement toward broadening the parameters in which intervention strategies are delivered. Moving from an individual-interventionist model to one that includes parents and significant others in the planning and implementing of interventions, brings full circle the tenants that underlie the philosophies of goodness of fit, ecological systems approach, and culturally competent family centeredness.

Implementing a Comprehensive Model of Intervention

Intervention must be both dynamic and flexible to meet the changing demands of environments and individuals. The authors of this article suggest the use of a matrix that identifies (1) therapeutic objectives and the ancillary techniques/strategies to meet those objectives, (2) environments in which an individual interacts, and (3) specific objectives to be met within specific different environments. Using the matrix, practitioners would select communication/language objectives and ancillary techniques/strategies based on needs/opportunities presented in daily environments. More than one, but not all, objectives could be addressed in an environment, with the selection of objectives being limited to those providing direct benefit to the child and enhancing the social validity of intervention (i.e., contributing to meaningful outcomes). In addition, a variety of techniques/strategies could be employed to address selected objectives across environments. Within a particular environment, more than one objective could be addressed, each using a different technique/strategy, or a different technique/strategy could be employed for the same objective but in a different environment. Techniques and strategies could be applied from varied orientations reflecting the numerous continua described earlier. This application would depend on the needs of the child or adult and the various spheres of influence impacting intervention. Of course, the results of intervention would have to be measured in an ongoing fashion specific to their communication improvement contributions.

The provision of effective communication-based practices in ASD is not a simple task. The framework provided in this article is an active yet flexible approach...
to practice that allows for the ever-changing dynamics of individuals, environments, and newly acquired behaviors. The authors of this article are not naïve and recognize the complexities of comprehensive interventions. Simply stated, these types of interventions require extraordinary time and collaboration. That said, we believe the communicative success of individuals with ASD warrants their serious consideration.

REFERENCES


