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# Teaching Social Communication:

# A Comparison of Naturalistic Behavioral and Development, Social Pragmatic Approaches for Children with Autism Spectrum Disorders

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## Abstract

There are a variety of effective treatments designed for increasing social communication in young children with autism spectrum disorders (ASD). Two such treatments, naturalistic behavioral and developmental, social-pragmatic/relationship-based interventions, differ in their underlying philosophy, yet share many similarities in their implementation. They also exhibit critical differences that may impact their effectiveness with children with ASD. This article will provide a discussion of the similarities and differences between these two approaches. Based on this comparison, it will recommend new research directions that should lead to the development of more effective social-communication interventions for young children with ASD.

# Teaching Social Communication:
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Individuals with autism spectrum disorders (ASD) demonstrate significant impairment in social interaction and communication, and exhibit a restricted range of interests and attention. These deficits interfere with learning and disrupt family life. There is considerable agreement in the field of ASD that intensive, early intervention leads to significant improvements in children's functioning and long term outcomes (National Research Council, 2001). Beyond this, there is disagreement regarding the best method of intervention. Clearly, interventions based on the principles of applied behavior analysis are the best studied and empirically-validated interventions for children with ASD to date (see Schreibman & Ingersoll, 2005 for review). While behaviorally-based interventions are currently considered the most effective treatment option for children with ASD (National Research Council, 2001), there are many researchers and practitioners who advocate intervention approaches drawn from the developmental and social-pragmatic literatures.

Both approaches are consistent with the field of positive behavior support in their use of positive teaching strategies to promote communication and social interactions and to increase community participation. However, there has traditionally been little interchange between the behavioral and developmental treatment communities. The main purpose of this paper is to compare the naturalistic behavioral[1] and developmental, social-pragmatic[2] (DSP) approaches as they are implemented with children with ASD.

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[1] Also referred to as normalized behavioral approach (Delprato, 2000).
[2] Also referred to as relationship-based or –focused approach (e.g., Mahoney & Perales, 2003).

Although the approaches differ significantly in underlying philosophy, a close examination of the intervention techniques used in the two approaches should reveal a great deal of similarity (Prizant & Wetherby, 1998). An appreciation of this similarity should foster better communication between disciplines. There are also critical differences in how the interventions are implemented which may impact their effectiveness with children with ASD. An understanding of how these approaches differ should foster research that analyzes the salient and effective features of each approach. Such research is likely to enhance the effectiveness of both approaches.

*Historical and Theoretical Basis of Naturalistic Behavioral Approaches*

The use of behavioral interventions in the treatment of ASD began in the early 1960's (e.g., Ferster & DeMyer, 1961; 1962). All behavioral interventions are based on learning theory and thus share the same core assumptions. The first assumption is that operant behaviors, behaviors that are under voluntary control such as language, play, and social interaction, are learned. The second assumption is that these behaviors are developed and maintained by antecedents and consequences (observable environmental events that come before and after them). Behavioral interventions also share the same assumption that new, appropriate skills can be taught through the manipulation of antecedent variables (e.g., establishing operations, discriminative stimuli) and the systematic application of reinforcement (Cooper, Heron, & Heward, 1987). In addition, they share the use of specific teaching tools such as prompting (presenting a cue that increases the likelihood of specific response), chaining (linking two or more complex behaviors together), and fading (gradually decreasing prompts overtime to encourage spontaneous responding (Cooper et al., 1987).

Early behavioral interventions were highly structured and adult-directed (e.g., Lovaas, 1977; Lovaas, Berberich, Perloff, & Schaeffer, 1966; Lovaas, Freitag, Gold, & Kassorla, 1965; Lovaas, Koegel, Simmons, & Long, 1973). As the field has progressed, behavioral interventions have undergone a number of modifications to improve instructional outcomes and generalization and maintenance of skills. One such modification has been the development of techniques that are more naturalistic and child-centered. The first naturalistic behavioral treatment was designed by Hart and Risley (1968) to teach the use of descriptive adjectives to disadvantaged preschoolers in a classroom setting. This study sought to increase generalization and spontaneous use of skills by teaching them in the context of ongoing classroom activities. Since its original conception, the naturalistic behavioral approach has undergone a variety of procedural elaborations, yielding a number of similar intervention techniques, including incidental teaching (Hart & Risley, 1968; McGee, Krantz, Mason, & McClannahan, 1983), mand-model (Rogers-Warren & Warren, 1980), time delay (Halle, Marshall, & Spradlin, 1979), milieu teaching (Alpert & Kaiser, 1992), interrupted behavior chains (Hunt & Goetz, 1988), and the natural language paradigm/pivotal response training (PRT; Koegel, O'Dell, & Koegel, 1987; Koegel, Schreibman, Good, Cerniglia, Murphy, & Koegel, 1989).

These approaches all share the following basic components. First, teaching occurs in the natural environment during ongoing interactions between the child and the adult, typically during play or daily routines. Second, the child initiates the teaching episode by indicating interest in an item or activity, at which point teaching occurs around the child's expressed interest. Third, the adult explicitly prompts the child to

produce the target behavior . Fourth, the child's production of the target behavior is reinforced with the item or activity of interest. Finally, the adult loosely shapes the child's response into a more complex response, providing reinforcement for attempts to respond (Delprato, 2001; Kaiser, Yoder, & Keetz, 1992).

*Historical and Theoretical Basis of Developmental Approaches*

The use of developmental interventions in the treatment of ASD began in the early 1980's. DSP interventions are based on an integration of Piagetian developmental psychology and psychoanalytic theory (Greenspan & Lourie, 1981; NRC, 2001), as well as the social-pragmatic model of language acquisition (e.g., Bruner, 1983). DSP interventions that have been used with children with ASD include DIR/Floor time (Greenspan & Wieder, 1998), the Denver Model (Rogers & DiLalla, 1991; Rogers & Lewis, 1989), Responsive Teaching (Mahoney & Perales, 2003), Hanen (Manolson, 1992), and SCERTS (Prizant, Wetherby, Rubin, & Laurent, 2003).

The first core assumption of the developmental philosophy is that social-communication skills are learned in a similar developmental sequence by all children, regardless of their ability (Gerber, 2003). Clearly children with ASD and other developmental disabilities do not develop at the same rate as typically developing children; however, the DSP perspective considers the pattern in which they acquire skills to be the same. For this reason, typical development is used to guide intervention targets for children with delays. For example, typically developing infants begin using gestures and other non-verbal communicative behaviors prior to using words. Thus, when working with a non-verbal child with ASD, the therapist would encourage gesture use prior to language. A second core assumption is that children learn through affect-laden

interactions with responsive caregivers. Responsiveness is a complex behavior that involves a variety of interactive components, including reciprocity, contingency, affect, and matching the child's developmental level, interests, and behavioral style (Mahoney, Finger, & Powell, 1985; Mahoney, 1988; Mahoney & Powell, 1988). This assumption is drawn from research on typical development that indicates a relationship between caregivers' responsiveness and their child's level of social-communication development (Bornstein, Tamis-LeMonda, & Haynes, 1999; Hoff-Ginsburg & Shatz, 1982; Mahoney & Perales, 2003; Prizant, Wetherby, & Rydell, 2000; Siller & Sigman, 2002). Thus, DSP interventions typically use facilitative strategies to increase the adult's responsiveness to the child's behavior.

DSP interventions share several common characteristics. First, teaching follows child's lead or interest. Second, all communicative attempts including unconventional (e.g., jargon, echolalia, hand leading, non-verbal protests) and pre-intentional communication (e.g., reaching and grabbing, eye gaze, crying, facial expressions, body postures) are responded to as if they were purposeful (although, at times, the intervention provider may wait for a more complex response). Third, emotional expressions and affect sharing are emphasized by the adult. Fourth, language and social input are adjusted to facilitate communicative growth (Prizant et al., 2000).

<Table 1 here>

*Similarities between Approaches*

Despite differences in underlying philosophies, there are a number of similarities between naturalistic behavioral and DSP approaches in terms of their implementation. First, both approaches are focused primarily on increasing social-communication skills.

The naturalistic behavioral approach has traditionally been used to teach specific verbal language targets, such as vocabulary and language structures (Kaiser, et al., 1993), although more recently studies have focused on teaching non-verbal social-communication skills, such as symbolic play (e.g., Stahmer, 1995), joint attention (e.g., Whalen & Schreibman, 2003), and object (Ingersoll & Schreibman, 2006) and gesture (Ingersoll, Lewis, & Kroman, 2007) imitation. While the DSP approach also addresses communication, it has been more focused on increasing social interactions and general communication ability (i.e., both verbal and non-verbal behaviors) rather than specific language forms.

Second, in both approaches, the intervention is conducted within meaningful activities in the natural environment to the greatest extent possible. For young children with ASD, meaningful activities typically involve play and daily routines. Both approaches also teach parents to be the primary intervention providers (e.g., Mahoney & Perales, 2003; Laski, Charlop, & Schreibman, 1988), although DSP interventions are more likely to be exclusively parent-implemented than naturalistic behavioral interventions. Despite the fact that both approaches advocate teaching parents to provide some or all of the treatment, they differ in their philosophical reasons for doing so. DSP approaches consider the parent-child relationship to be the primary environment in which social-communication develops (Mahoney et al., 1985), whereas the naturalistic behavioral approach has moved towards including parents in the intervention process as a method for increasing generalization (Stokes & Baer, 1977).

A third similarity between the two approaches is that the teaching episodes are initiated by the child based on the child's interest. This is referred to as following the

child's lead in both approaches. Given the focus on child-initiated teaching episodes, teaching materials and activities are selected by the child. Both approaches also use environmental arrangement to elicit initiations from the child. In the naturalistic behavioral approach, these strategies are referred to as environmental arrangement (Kaiser, Ostrosky, & Alpert, 1992), controlling access, or motivating operations (Koenig & Gerenser, 2006) and are used to ensure that the child is motivated by the material prior to presenting a prompt for a specific response. In the DSP approach, these strategies are referred to as communicative temptations (Paul, 2001) —although this term is sometimes used by some naturalistic behavioral approaches as well--or playful obstruction (Greenspan & Wieder, 1998) and are used to encourage the child to initiate or respond to the adult in some way. Unlike the naturalistic behavioral approach, the DSP approach does not typically prompt a more complex response after the child's initiation as will be discussed below.

A final similarity between approaches is the use of natural reinforcement. Both naturalistic behavioral and DSP approaches teach within the natural environment and thus the reinforcement for the child's communication is natural to the interaction. For example, if the child and adult are playing with bubbles, the adult might blow bubbles and wait for the child to respond. If the child looks at the adult and says "buh", the adult would reinforce the child's behavior by blowing more bubbles (natural reinforcement). Both approaches also employ loose reinforcement contingencies. The naturalistic behavioral approach uses loose shaping (Delprato, 2001) and reinforces goal-directed attempts to respond correctly (Koegel et al., 1987) in order to reinforce "trying" and keep the child's motivation high while teaching novel behaviors (Koegel, O'Dell, & Dunlap,

1988). The DSP approach responds to all communicative attempts, including unconventional and pre-intentional communication, as if they were purposeful, and may reinforce any communicative act within an interaction. Thus, the DSP approach shapes skills even more loosely and is more inclined to reinforce unconventional communication behaviors than the naturalistic behavioral approach.

*Differences between Approaches*

In practice, naturalistic behavioral and DSP approaches differ in two significant ways. First, direct prompting is a defined component of all naturalistic behavioral interventions. The use of direct elicitation of specific child behaviors stems from the belief that novel behavior is learned via reinforcement, and thus must occur in order to contact the reinforcer. The goal of the use of prompt strategies is to elicit specific target behaviors that can then be reinforced in order to promote social communication development. The naturalistic behavioral approach uses a variety of prompt strategies to elicit desired behaviors including physical guidance, model, mand-model, interrupted behavior chains, and time delay (Mirenda & Iacono, 1988).

The use of direct prompting is not a defined component of DSP interventions and, in some ways, is considered antithetical to a DSP philosophy. Some proponents of a DSP perspective consider prompting a hindrance to the development of balanced social interactions, by placing the child in a learning role and the partner in a teaching role (Trent, Kaiser, & Wolery, 2005). In addition, prompting is considered a more directive approach and is thus incompatible with adult responsiveness (Mahoney & MacDonald, 2007). However, several DSP approaches advocate the use of "scaffolding," which involves teaching the child a new skill by providing hints or clues for problem solving

that help the child achieve an outcome that is beyond his current ability (Wood, Bruner, & Ross, 1976) and "wait time" which, involves waiting with an expectant look for the child to increase the complexity of his response before responding (e.g., Manolson, 1992). Both of these concepts can be viewed as prompts for a response from a behavioral perspective. . Thus, many individuals using a DSP approach may, in fact, be using direct prompting. However, the rate of prompts is significantly lower in DSP approaches.

The second significant difference between the two approaches is the use of facilitative strategies in DSP interventions. These strategies are drawn from the typical developmental literature and are associated with a responsive interaction style of care-giving. As mentioned previously, caregiver responsiveness is associated with accelerated language and social development in typical children. The goal of the facilitative strategies is to increase the adult's responsiveness to the child's behavior, which should, in turn, promote social communication development. There are a variety of facilitative strategies used to encourage adult responsiveness including contingent imitation of the child's verbal and non-verbal behavior, indirect language stimulation (modeling simplified language around the child's focus of attention and expanding on the child's language behaviors), balanced turns, a focus on emotional exchanges, and heightened animation (e.g., Prizant et al., 2000).

Although the use of facilitative strategies is not a defined component of the naturalistic behavioral approach, one or more of these strategies may be used a way of building rapport with the child (McLaughlin & Carr, 2005). Thus, while the naturalistic behavioral approach does not consider facilitative strategies to be an "active treatment

component," many individuals using a naturalistic behavioral approach employ these strategies within their intervention sessions in order to keep the child's motivation high, although at a significantly lower rate than individuals using a DSP approach.

One final difference between the two approaches is the use of different research methodologies to assess the effectiveness of their interventions. Given its foundation in applied behavior analysis, the naturalistic behavioral approach places a strong emphasis on data collection and has been evaluated primarily with single-subject design methodology. Treatment effects are usually based on changes in rates of specific behavioral targets (e.g., single words, object imitation, pretend play acts) during short-term intervention periods (e.g., several months). A growing number of single-subject design studies have consistently found naturalistic behavioral interventions to be successful for teaching language (e.g., Gillett & LeBlanc, 2007; Laski, Charlop, & Schreibman, 1988) and other social-communication skills, including play (Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995), peer interaction (McGee, Almeida, Sulzer-Azaroff, & Feldman; 1992; Pierce & Schreibman, 1995), imitation (Ingersoll & Schreibman, 2006; Ingersoll et al., 2007) and joint attention (Rocha & Schreibman, 2007; Whalen & Schreibman, 2003) in children with ASD.

In contrast, the efficacy of DSP interventions for children with ASD has been examined primarily using non-experimental designs (e.g., Greenspan & Wieder, 1997; Mahoney & Perales, 2003; 2005; Rogers & Lewis, 1989; Solomon, Necheles, Ferch, & Bruckman, 2007; Wetherby & Woods, 2006), although several controlled studies of DSP intervention have recently been published (Aldred, Green, & Adams, 2004; Hwang & Hughes, 2000; Ingersoll, Dvortcsak, Whalen, & Sikora, 2005; McConachie, Randle,

Hammal, & Le Couteur, 2005). Most DSP intervention studies have measured gains in broad areas of social-communicative functioning using structured observations or standardized assessments during intervention periods of up to a year or more. These studies have found improvements in developmental skills in excess of what would be predicted by the children's pre-treatment functioning level (e.g., Mahoney & Perales, 2005; Rogers & Lewis, 1989) and an association between improvements in child functioning and increases in parent responsiveness (Mahoney & Perales, 2003). There is also empirical evidence that a commonly used developmental strategy, contingent imitation, is effective for increasing eye contact (Tiegerman & Primavera, 1984), positive affect (Harris, Handleman, & Fong, 1987), coordinated joint attention (Ingersoll & Schreibman, 2006; Lewy & Dawson, 1992), and number of play schemes (Dawson & Galpert, 1990; Tiegerman & Primavera, 1981). However, the evidence base for the DSP approach is clearly less developed than the naturalistic behavioral approach.

In summary, the main difference between the naturalistic behavioral and DSP approaches is their underlying philosophy and research base and tradition, rather than the specific intervention techniques employed. The most significant differences in the defined techniques employed in each approach, the use of prompting and facilitative strategies, are a direct result of their differing underlying philosophies; however, in practice, therapists from both perspectives often incorporate strategies from the other approach in order to improve child response.

*Barriers to Cross-Fertilization*

Given their similarities in implementation, there are a number of potential areas for cross-fertilization that could improve the ability of both naturalistic behavioral and

DSP interventions to promote social-communication development in children with ASD. However, a lack of familiarity with each other's literature seems to have limited the necessary dialogue. For example, advocates of the DSP approach criticize applied behavior analysis for a failure to address specific deficits associated with autism and a focus on isolated behaviors, which could lead to difficulty with generalization and maintenance (Rogers & Lewis, 1989; Tsakiris, 2000). These criticisms may be valid in relation to very early behavioral interventions used with children with autism. However, since that time the field has developed technology to enhance generalization and maintenance (Stokes & Baer, 1977) and has begun to focus on improving autism-specific deficits, such as joint attention (Schreibman & Ingersoll, 2005). Thus, these criticisms reflect a lack of familiarity with contemporary behavioral interventions, including naturalistic behavioral approaches. Advocates of the behavioral approach have discounted the DSP approach for its lack of empirical support (e.g., Metz, Mulick, & Butter, 2005; Simpson, 2005; Smith, 1996). Similarly, while there has historically been limited empirical study of developmentally-oriented interventions, there is a growing body of literature that indicates DSP techniques are effective for teaching social communication in young children with developmental disabilities, including ASD (e.g., Aldred et al., 2004; Ingersoll et al., 2005; Mahoney & Perales, 2003; McConachie et al., 2005; Rogers & Lewis, 1989; Wetherby & Woods, 2006).

Therefore, the first step in developing a dialogue is for both disciplines to familiarize themselves with each other's literature. To this end, graduate and professional programs that prepare professionals to work with individuals with autism (e.g., special education, psychology, speech pathology) should consider offering

interdisciplinary courses that cover both the behavioral and developmental literatures as they relate to autism interventions. Another possibility would be to accept (or recommend) instruction on child development as continuing education for the board certified behavior or associate behavior analyst (BCBA/BCABA) credential. Similarly, instruction in behavioral principles could be included in the recommended continuing education requirements of professional organizations whose members are likely to have a strong background in the developmental but necessarily behavioral literature, such as the American Speech-Language-Hearing Association (ASHA). Further, members of each discipline should make efforts to present their research in outlets that are interdisciplinary in nature.

Another barrier to collaboration between disciplines is the use of highly specialized terminology in each discipline which may mask underlying similarities between interventions (Koenig & Gerenser, 2006). For example, behavior analysts refer to "prompting" and developmentalists refer to "scaffolding", when in fact, the two terms can refer to the same behavior on the part of the therapist. To decrease confusion and promote collaboration, both disciplines should examine the degree to which their own terminology captures concepts present in the other's literature. To the extent that they overlap, each discipline should make a concerted effort to describe their intervention techniques in language that is accessible to the other discipline, and to develop a "common language" where appropriate. In light of this recommendation, further discussions will refer to naturalistic behavioral and DSP approaches in terms of their unique intervention strategies, prompting and facilitation, rather than as separate interventions.

A related issue is that intervention providers in each discipline often use strategies that are not defined components of the intervention they are using in order to enhance child response. For example, behavior analyts often talk about being fun as "good teaching," but do not define "being fun" as an active intervention component. It is likely that "being fun" involves facilitative strategies, such as heightened affect, which are defined components of DSP interventions. Similarly, DSP providers are often very contingent about when they reward behaviors, working towards increasing the child's complexity. But DSP interventions do define that aspect of the intervention. Thus, additional similarities in the implementation of the two approaches are likely masked by a failure of both approaches to define some often-used strategies as part of their interventions. If these aspects of the interventions were defined, it would be easier for researchers to look more closely at similarities and differences.

*Future Research Directions*

There are several research directions that have the potential to improve the knowledge base of both approaches as well as the effectiveness of their intervention strategies. First, research should examine the benefits of teaching skills within a developmental framework. Research on early social communication development in autism suggests that in most areas, children with autism exhibit delayed rather than deviant skills, and their developmental trajectories follow similar, yet significantly slower patterns (Morgan, Cutrer, Coplin, & Rodrigue, 1989; Snow, Hertzig, & Shapiro, 1987). In addition, research examining the effectiveness of teaching play skills found that children with autism were able to learn play acts that were appropriate for their developmental age significantly faster than play acts that were appropriate for their

chronological age (Lifter, Sulzer-Azaroff, Anderson, & Cowdery, 1993). These findings suggest that using typical development to guide the selection of teaching targets may be more important that behavior analysts have previously acknowledged (Anderson & Romanczyk, 1999).

Further, over the past two decades, the developmental literature has highlighted a number of early social-communication behaviors that are linked to the development of more advanced social and cognitive skills in typical children, including joint attention (e.g., Bates, Benigni, Bretherton, Camioni, & Volterra, 1979), gesture use (e.g., Özçalişkan & Goldin-Meadow, 2005), symbolic play (e.g., Shore, O'Connell, & Bates, 1984), and imitation (e.g., Uzgiris, 1981). These behaviors are found to be deficient in children with ASD (e.g., Charman & Stone, 2006). Several recent findings indicate that teaching early social-communication skills can lead to increased development of later emerging behaviors in ASD. For example, Whalen, Schreibman, and Ingersoll (2006) found that teaching young children with ASD to make joint attention initiations using a naturalistic behavioral intervention led to increases in language, play, and imitation despite the fact that these behaviors were not directly targeted. Similarly, Ingersoll and Schreibman (2006) found increases in language, play, and joint attention after targeting reciprocal object imitation using a naturalistic behavioral intervention. Further, Kasari and colleagues (2008) found that children with autism who received focused training in either joint attention or symbolic play had greater gains in expressive language 12 months post-intervention than children in a control group. These findings may suggest that teaching skills within a developmental framework, regardless of the teaching technique

(behavioral or developmental), may lead to wider-ranging improvement in social communication.

Second, while the DSP approach is promising, it is necessary to examine the degree to which a purely facilitative approach is effective for increasing social-communication skills in children with ASD using experimental designs. To date, most of the research using these intervention strategies has been conducted with children with language and/or general developmental delay (e.g., Girolametto, Pearce, & Weitzman, 1996; Kaiser et al., 1996). Although there are an increasing number of studies examining the use of DSP approaches with children with autism, the majority of these studies are non-experimental (e.g., Greenspan & Wieder, 1997; Mahoney & Perales, 2003; 2005; Rogers & Lewis, 1989; Solomon et al., 2007; Wetherby & Woods, 2006), and cannot rule out the possibility that child gains are due to maturation or some other confound. Given the fact that children with ASD tend to have specific difficulties with social engagement, it is possible that they might particularly benefit from facilitative techniques. Conversely, it is possible that, since they also tend to have difficulty with initiations, they may be less likely to respond to a purely responsive approach than children with other disabilities (Fey, 1986). A number of randomized control trials aimed at examining the effectiveness of the DSP approach with children with ASD are currently underway (e.g., Autism Speaks, n.d.) that should be able to answer this question.

In addition, as is the case with many comprehensive interventions, it is unknown which specific facilitative strategies are necessary to produce changes. Research that can conduct direct comparisons between individual treatment techniques (e.g., indirect language stimulation vs. contingent imitation) would help determine whether certain

facilitative strategies are more effective than others for promoting social communication. To these ends, single subject designs, often used in the naturalistic behavioral literature, may provide a particularly useful research strategy.

Third, the majority of the studies of DSP approaches have focused on the effect of teaching parents facilitative strategies to increase their responsiveness to their child. These studies have shown that increases in parents' use of facilitative strategies are associated with improvement in children's social-communication skills. Research is beginning to emerge that indicates the use of facilitative strategies by professionals can also be effective for promoting social-communication skills in young children with ASD (Ingersoll et al., 2005) and other developmental disorders (Yoder & Warren, 2001). However, additional research is needed to determine whether the use of a purely facilitative approach is effective as a therapist-implemented procedure. One might argue that the use of facilitative strategies, particularly indirect language stimulation, might be most effective when used throughout a child's day by the child's caregivers, rather than during focused periods of time, such as therapy sessions. However, additional research is needed before concluding that facilitative strategies should be used primarily as a parent-implemented intervention.

Fourth, research should determine whether some social-communication skills are best taught using direct prompting and while others are better taught using facilitative strategies. It might be expected that direct prompting strategies are more effective at increase specific social-communication skills, while facilitative techniques are more effective at improving general social responsiveness. Also, some researchers have proposed that certain facilitative strategies (indirect language stimulation) primarily teach

initiation and commenting skills, whereas prompting strategies primarily teach responding and requesting skills (Salmon, Rowan, & Mitchell, 1998). For example, Salmon et al. (1998) used an alternating treatments design to compare the effectiveness of direct prompting to facilitative techniques in three preverbal children with developmental delays. The results indicated that the children used a greater proportion of responses than initiations and requests than comments in the direct prompting condition; whereas their proportion of responses to initiations and requests to comments was more balanced in the facilitative condition. In a partial replication of this study with two preschoolers with ASD, Ingersoll (2008) found that while direct prompting led to higher rates of total and prompted language, facilitation led to higher rates of comments.

Fifth, research should examine whether direct prompting or facilitative strategies are more effective depending on the child's pre-treatment characteristics. There is some research to suggest that, in children with developmental delays, the effectiveness of prompting and facilitation varies depending on the pre-treatment language age of the child. For example, Yoder, Kaiser, and Goldstein (1995) found that children at lower language levels [mean length of utterance (MLU) above 2.5] responded better to an intervention that used direct prompting (milieu teaching), while children with higher language levels (MLU below 2) responded better to an intervention that used facilitation (responsive interaction). Research that can further compare the effectiveness of prompting and facilitative techniques for children with varying behavioral profiles will likely provide a better understanding of which techniques produce the best outcomes for which children.

Sixth, research should evaluate whether the use of prompting or facilitation is more effective based on family characteristics. Previous research with children with developmental delays suggests that the parent characteristics can have a moderating effect on their child's response to specific intervention strategies. For example, Yoder and Warren (2001) found that children whose mothers were initially more responsive and had more formal education made more progress in a therapist-implemented intervention that used direct prompting (prelinguistic milieu teaching; PMT), whereas children whose mothers were less responsive and had less education made more gains in a therapist-implemented intervention that used adult facilitative techniques (responsive interaction). The authors hypothesized that mothers who were initially more responsive responded more effectively to the emerging communication behaviors that their children learned to use via PMT. This led the authors' to propose adding responsiveness training to parent-implemented PMT in order teach parents to respond to their child's communication, thus facilitating additional communication growth.

A related question is whether one strategy is more likely to be adopted by parents than the other. Preference for naturalistic behavioral or DSP approaches may be due to a preference for the underlying treatment philosophy, may be related to the techniques themselves, or both. It would also be important to determine whether, regardless of preference, parents are able to learn to implement prompting or facilitative strategies with a higher degree of fidelity. It is likely that preference for and ability to use an intervention would be related to specific characteristics on the part of the parent.

Finally, research should examine whether combining prompting and facilitative strategies leads to more powerful interventions. It might be expected that, given the

possibility that prompting and facilitation teach different skills, a combined approach may be able to address a wider range of child behavior. Further, it is possible that facilitative strategies increase the child's general responsiveness to intervention, making him or her more receptive to prompting techniques. Several interventions have combined approaches based on this premise, particularly Enhanced Milieu Teaching (EMT; Kaiser & Hester, 1994), Responsivity Training and Prelinguistic Milieu Teaching (RPMT; Yoder & Warren, 2002), the parent-mediated approach described by Ingersoll & Dvortcsak (2006), and Roger and Dawson's Early Start Denver Model (Smith, Rogers, & Dawson, in press). While studies have demonstrated that these combined interventions are effective for teaching social-communication skills to children with ASD (Hancock & Kaiser, 2002; Kaiser, Hancock, & Nietfeld, 2000) and other developmental delays (Kaiser & Hester, 1994), the combined approach has not been directly compared to either naturalistic behavioral or DSP approaches implemented in isolation.

*Conclusion*

In summary, despite the fact that their theoretical foundations differ considerably, both naturalistic behavioral and DSP approaches share many commonalities that make their interventions quite similar in practice. There are several areas in which the two interventions differ, including the most common focus of intervention targets, the degree of acceptance of communicative behaviors, and most substantially, the use of prompting and facilitative strategies. Despite these differences, intervention providers often use techniques that are not defined as part of the approach they are using.

There are a number of potential areas of cross-fertilization between the two approaches. Increasing familiarity with each other's literature and developing a common

language between approaches, where appropriate, would facilitate collaboration between disciplines and promote research on individual treatment techniques rather than the comprehensive treatment models. This should lead to more fine-grained examination of effective intervention strategies, including which intervention techniques are most effective for teaching specific social-communication skills, which children are most likely to respond to a more directive versus a more facilitative approach, as well as how well parents learn the different intervention strategies and how likely they are to use them. Further, research could examine whether combining important elements of both approaches leads to better outcomes than either approach can provide on its own. These steps will likely lead to the development of better social-communication interventions for young children with ASD.

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