

Chapter 2

An Overview of the Early Start Denver Model

The ESDM was developed for intensive delivery of comprehensive early intervention to toddlers as young as 12 months of age. It is a refined and adapted extension of the Denver Model intervention for preschoolers with autism ages 24–60 months. Throughout this text, we refer to the ESDM when we discuss interventions for children younger than 3 years of age. We refer to the Denver Model when we discuss use of the model across the entire preschool age period, encompassing 3- and 4-year-olds as well.

The ESDM is grounded in current empirical knowledge of infant–toddler learning, and of the effects of autism on early development, as reviewed in Chapter 1. Its aim is to reduce the severity of autism symptoms and accelerate children’s developmental rates in all domains, but particularly cognitive, social–emotional, and language domains. In this chapter, we present an overview of the ESDM, describe how it accomplishes its goals, and describe its similarities and differences from other well-known models. We begin with a brief discussion of the key approaches that underlie the ESDM.

FOUNDATIONS OF THE ESDM

Several different, complementary approaches come together to provide the foundations of the ESDM. These include the original Denver Model developed by Rogers and colleagues beginning in 1981 (Rogers, Herbison, Lewis, Pantone, & Reis, 1986); Rogers and Pennington’s (1991) model of interpersonal development in autism; Dawson and colleagues’ (2004) model of autism as a disorder of social motivation; and pivotal response training (PRT), a teaching approach based in applied behavior analysis (ABA) that highlights child initiative and spontaneity and can be delivered in natural contexts (Schreibman & Pierce, 1993; Koegel & Koegel, 1988).

The Denver Model

The Denver Model began in the 1980s, as a developmentally based group preschool program for young children with autism ages 24–60 months (Rogers et al., 1986; Rogers & Lewis, 1989; Rogers, Hall, Osaki, Reaven, & Herbison, 2000). Seeing autism primar-

ily as a failure of social-communicative development, the program focused on building close relationships with children as a foundation for social and communication development. It primarily emphasized lively, dynamic interactions involving a strong positive affect that would lead children to seek out social partners as participants in favorite activities. The technique of “sensory social routines” was developed that highlighted the highly engaging dyadic exchanges that children initiated and continued through nonverbal, and later, verbal communications. As described in more detail in Chapter 6, sensory social routines are a core feature of the ESDM. Experience in the Denver Model also taught that most of the children treated had developmental delays across all domains, thus necessitating a multidisciplinary team approach. Of equal importance, a developmental curriculum systematically assessed all aspects of children’s development, and short-term developmental objectives defined the individual curriculum for each child, intensively taught in individual and small-group settings throughout the day. Teaching followed children’s leads and emphasized language, nonverbal communication, cognition, and play.

Core features of the Denver Model that are retained in the ESDM include (1) an interdisciplinary team that implements a developmental curriculum addressing all domains; (2) focus on interpersonal engagement; (3) development of fluent, reciprocal, and spontaneous imitation of gestures, facial movements and expressions, and object use; (4) emphasis on both nonverbal and verbal communication development; (5) focus on cognitive aspects of play carried out within dyadic play routines; and (6) partnership with parents.

Work over the first 10 years of the Denver Model led Rogers and colleagues to appreciate the profound deficits in imitation that typify young children with autism. This deficit was not mentioned in theories of autism at the time, and there were few studies of imitation in autism. However, the lack of imitation in these little children presented a huge barrier to child learning, and it led to deeper thinking about the role of imitation in early development. Writings by Daniel Stern (1985), Andrew Meltzoff (Meltzoff & Moore, 1977), and others provided compelling arguments for the centrality of imitation in social-communicative development in infancy.

Rogers and Pennington’s Model of Interpersonal Development in Autism

Rogers and Pennington (1991) published a heuristic developmental model of autism strongly influenced by the work of Daniel Stern (1985) and the infant research that occurred in the 1970s and 1980s. In this model, Rogers and Pennington (1991) hypothesized that an early impairment in imitation, a capacity normally available to infants from birth (Meltzoff & Moore, 1977), is present in autism from the beginnings of life and disrupts the early establishment of bodily synchrony and coordination. Such bodily synchrony is the first way in which the infant and caregiver attune to each other’s feelings and states, and impairment in such synchrony was suggested to affect the emotional coordination between them. Emotional coordination may be further affected by the atypical expressions of facial emotion in the infant with autism (Yirmiya, Kasari, Sigman, & Mundy, 1989); and this may prevent the parent from easily mirroring the infant’s emotional states. Impairments in imitation and affective sharing at this level between infant and caregiver create barriers to developing an understanding of both the infant’s and the partner’s feelings and mental states. It also severely affects the develop-

ment of the infant's awareness of and use of intentional communication, for the same reasons. These impediments are seen in toddlers with autism in the behavioral landmarks of intersubjective development that Stern described: delayed and decreased imitation, joint attention, emotion sharing, and intentional communication (Rogers, Hepburn, Stackhouse, & Wehner, 2003; Charman et al., 1998; Seibert, Hogan, & Mundy, 1982; Mundy, Sigman, & Kasari, 1990; Kasari, Sigman, Mundy, & Yirmiya, 1990; Wetherby & Prutting, 1984; Uzgiris, 1973; Stone & Caro-Martinez, 1990; Stone, Ousley, Yoder, Hogan & Hepburn, 1997). A main focus of ESDM treatment is to address these critical developments in the social–emotional–communicative domain, within emotionally rich relationships with responsive, sensitive others. In Stern's (1985) model (and those of many others: Ainsworth, Blehar, Waters, & Wall, 1978; Carpenter & Tomasello, 2000), a sensitive and responsive relationship provided by caregivers is critical for these developments to come about.

The Social Motivation Hypothesis of Autism

The ESDM also has been strongly influenced by research on another core feature of autism: impaired social motivation, discussed at length in Chapter 1. Persons with autism of all ages spend less time than other persons attending to and interacting with other people. This pattern of behavior is present even before imitation and joint attention deficits discriminate infants with autism. Dawson and colleagues (Dawson, Webb, et al., 2002; Dawson et al., 2004; Dawson, Webb, & McPartland, 2005) have hypothesized that the biology of autism involves a fundamental deficiency in social motivation due to the young child's relative lack of sensitivity to social reward. This lack results in a failure of the young child with autism to have a normal preference for and active attention to social information in his or her environment, including other's faces, voices, gestures, and speech. This failure to actively attend to and engage with others contributes to impairments in imitation, emotional sharing, and joint attention, and is a major obstacle to the child's development of social–emotional and communicative skills. As a result, the child with autism becomes more and more removed from the social world around him or her, and from all the crucial learning experiences that exist inside that world. The child falls farther and farther behind because he or she lacks the interactive skills needed to access the ongoing social learning environment in which typical infants, toddlers, and young children are completely immersed. Dawson and colleagues have suggested that this early lack of engagement in the social environment not only alters the course of behavioral development in children with autism, but it also affects the way neural systems underlying the perception and representation of social and linguistic information are developed and organized (Dawson et al., 2005; Dawson & Zanolli, 2003). Several of the strategies utilized in the ESDM, such as the sensory social techniques of the Denver Model and the PRT techniques developed by Koegel, Schreibman, and colleagues (Koegel & Koegel, 1995; Koegel, 2000; Schreibman, 1988), are designed to increase the salience of social rewards and thus enhance the child's social attention and motivation for social interaction.

Pivotal Response Training

A particular method of teaching children with autism using the principles of ABA was developed by Schreibman and Koegel (Schreibman & Pierce, 1993; Koegel & Koegel,

1988) and first published in the 1980s. PRT differs greatly from discrete trial teaching (the method publicized by Lovaas [1987] and described later in this chapter), even though the same core ABA teaching principles underlie both. PRT techniques were developed to optimize children's motivation to interact with adults and engage in repeated learning opportunities. Core motivational and teaching strategies include (1) use of reinforcers that are directly related to the child's goals and responses, (2) incorporating child choice into the teaching episodes, (3) interspersing previously acquired (or maintenance) tasks with acquisition tasks, (4) therapist reinforcement of child's attempts to perform the desired behavior at whatever level of accuracy the child can produce at the moment, (5) using activities that are highly motivating to the child, and (6) sharing control of the materials and interactions with the child. PRT is currently considered one of the empirically supported practices for building communication skills in children with autism, given its long history of published findings documenting enhanced child motivation, spontaneity, and social initiation; improved language, improved maintenance, and response generalization; and for concomitant reductions in unwanted behaviors. PRT strategies are incorporated into the teaching approaches used in the ESDM; their explicit incorporation represents one area of difference between the original Denver Model and the ESDM.

The approaches to autism just described have in common the view that early autism impedes an infant's early interpersonal experiences. In so doing, it creates barriers to social-communicative development, and these barriers result in a greater and greater impairment in the child over time due to the loss of social learning opportunities. The ESDM intervention seeks to stop this negative cascade of effects over time and increase child social learning in two ways: (1) by bringing the child into coordinated, interactive social relations for most of his or her waking hours, so that interpersonal and symbolic communication can be established and the transmission of social knowledge and social experience can occur; and (2) intensive teaching to "fill in" the learning deficits that have resulted from the child's past lack of access to the social world (Rogers et al., 2000). These goals are accomplished through teaching the ESDM curriculum using a specific set of teaching procedures.

THE ESDM CURRICULUM

In the ESDM, we understand autism as a disruption of development that affects virtually all developmental domains. This developmental orientation underlies our understanding of the impairments in the disorder, the curriculum that drives treatment goals and objectives, and the wide array of intervention techniques that are used. The ESDM curriculum is embodied in the ESDM Curriculum Checklist and Item Descriptions (see Appendix A). It lists specific skills sequenced developmentally within domains that include receptive communication, expressive communication, joint attention, imitation, social skills, play skills, cognitive skills, fine motor skills, gross motor skills, and self-care skills. Five of these domains carry particular weight in the ESDM: imitation, non-verbal communication (including joint attention), verbal communication, social development (including emotion sharing), and play.

On entry into the ESDM, children's current skill levels are evaluated using the ESDM Curriculum Checklist. Learning objectives are then written for the child, designed to be achieved within a 12-week period. At the end of 12 weeks, new learning objectives for the next 12-week period are written based on a new assessment with the Curriculum Checklist.

Language Development within a Social Context

The language intervention approach used in the ESDM comes from the science of communication development rather than behavior analysis and recognizes that verbal language develops from nonverbal social-communication behaviors as well as phonemic development (Bruner, 1975; Bates & Dick, 2002; Fergus, Menn, & Stoel-Gammon, 1992; Tomasello, 1992). Both verbal and nonverbal communication coordinate people's activities and allow partners to share their inner lives involving intentions, desires, interests, thoughts, and feelings. The ESDM intervention provides multiple and varied communicative opportunities and elicits many communicative behaviors, both verbal and nonverbal, from the child during each intervention session. The range of communicative, or pragmatic functions (Bates, 1976) is carefully developed so that a child not only requests an activity but also protests, greets familiar adults, shares attention, and comments or narrates during an activity. Spontaneous communication is carefully supported and children's communications exert much control over interactions and activities, thus demonstrating to children the power of communication and ensuring that communication is strongly reinforced. Consistent with the developmental emphasis, the adult's level of language is gauged and fitted to the child's language abilities, both in vocabulary and in the complexity of utterance used.

Building Up Complex Behaviors

The developmental skills that appear most affected in infants and toddlers with autism involve the more complex skills including joint attention, imitation, language, and symbolic play, which we assume require elaborated neural networks and significant brain connectivity to support. We further assume that the connectivity between brain regions required for complex activities needs to be stimulated through experience. Thus, we teach these behaviors by embedding them in highly preferred activities and we build them up from the simplest steps to the most complex. This is done by using a systematic breakdown of the skills based on developmental sequences in typical infancy as well as systematic procedures such as task analysis. These steps are described in detail in Chapter 4. However, we always target more than one skill domain during any teaching episode because we recognize that this is how skills typically develop. For example, in one teaching episode, we might target eye contact, expressive language, and motor behavior while the child is playing with building blocks, rather than teaching eye contact as an isolated behavior.

An Interdisciplinary Approach Underlies the Intervention

Autism is a disorder involving multiple deficits (Goodman, 1989; Happe, Ronald, & Plomin, 2006; Rogers, 1998). The curriculum items were extracted from research in early child development in multiple developmental domains: cognition, expressive and receptive language, social-emotional development, fine and gross motor development, self-care skills, play, and imitation. The curriculum was developed by a team of professionals from disciplines with particular expertise in these areas, including developmental and clinical psychology, ABA, early childhood special education, speech-language pathology (S-LP), and occupational therapy (OT).

Developmental and clinical psychologists contribute to the sequence of acquisition and the normative strategies for interaction, cognitive development, social–emotional development, play, and imitation. Applied behavior analysts contribute empirically derived strategies for effective teaching, and use functional assessment and analysis of behavior to develop approaches for unwanted behaviors and effective teaching practices. Early childhood special educators contribute expertise on early cognition and play, early education, and pre-academic development to develop teaching activities, peer interactions, and developmental sequences. Speech and language pathologists inform the sequence of speech development: oral–motor, phonemic, and word development, semantic development (vocabulary), morpho–syntactic development (grammar and word combinations), the varied pragmatic functions of communication, and use of augmentative and alternative communication approaches. Occupational therapists inform the sequence and content of motor skills, self-care skills, and personal independence, the use of functional activities to build developmental skills, and optimization of arousal and sensory responsivity to facilitate attention and engagement in learning. In addition, consultation with pediatrics contributes knowledge of the health-related concerns of individual children, such as seizures, sleep difficulties, nutrition, and allergies, that can interfere with children’s ability to benefit from the intervention.

In the ESDM, this interdisciplinary team provides oversight and consultation regarding the intervention plan and progress for each child. When the ESDM is delivered mainly through parents or through 1:1 teaching, the direct delivery of the intervention is typically provided by one main professional, working with parents, and, often, therapy assistants. This generalist delivery model (Schopler, Mesibov, & Hearshey, 1995) is felt to keep the intervention approach consistent across treatment sessions and as economical as possible. It also models what parents need to do: address all of the child’s needs. The full team is available as consultants to the primary therapist and family as needed. When the ESDM is delivered in a group preschool setting, the classroom teacher takes the generalist role with a consulting interdisciplinary team. The interdisciplinary team and its members are discussed in more detail in Chapter 3.

Systematic Individualization

There are four main methods of achieving individualization in the ESDM. First is the developmental curriculum, which targets the child’s individual learning needs in each domain as described above. Second is the focus on children’s preferences and interests, which individualizes materials and activities for each child. The third method is by incorporating family values, needs, and preferences into child objectives and parents’ use of the ESDM at home and in other community settings. We discuss these three methods in the section that follows on teaching procedures. The fourth method is use of a decision tree that allows the therapist to make systematic changes in the teaching procedures when progress is too slow; we discuss this in Chapter 6.

ESDM TEACHING PROCEDURES

ESDM teaching is embedded inside play activities, addresses multiple objectives across developmental domains, and occurs at a very high rate. This allows for a great deal of

teaching to occur in a typical play activity, and results in efficient use of the therapist's teaching time and the child's learning time. We emphasize efficient teaching because the children we serve have a great deal of learning to do to fill in the gaps and a very limited window of time in which to do so.

The ESDM uses teaching practices and procedures melded together from three intervention traditions: ABA, PRT, and the Denver Model. The core teaching practices to be used are those defined and assessed using the ESDM Teaching Fidelity Rating System, found in Appendix B.

Teaching Strategies from ABA

According to the basic principles of ABA, three components are necessary for learning. First, some stimulus must serve as a cue for the child to respond—and the child must attend to this stimulus event. Second, the child must emit a behavior immediately following the stimulus. Third, the child must experience some type of consequence or feedback that marks a correct performance (Lovaas, 2002). Over time, we want to see the child emit the new behavior more quickly, frequently, and easily in response to the stimulus, and to use the new skill or behavior in a widening range of appropriate contexts—generalization.

The science of learning goes back to the early 1900s, with psychological experiments and breakthroughs by Watson, Pavlov (classical conditioning), Thorndike (instrumental conditioning), and Skinner (operant conditioning; see Anderson, 2000, for an historical review). Research from the learning theory tradition is the foundation of ABA. Use of this research to help children and adults with developmental disorders began in earnest in the 1960s. It provided successful teaching approaches for persons who had previously been considered unable to learn (see Gardner, 2006, for a history of this development). The first publication describing the successful use of operant teaching procedures for a child with autism occurred in 1964 (Baer & Sherman, 1964), and the discrete trial teaching procedures (also referred to in this text as “massed trials” or the “Lovaas approach”) so popular in autism intervention emanate from this period (Lovaas, 2002; Lovaas, Berberich, Perloff, & Schaeffer, 1966; Lovaas, Freitag, Gold, & Kassoria, 1965). (Note that the children involved were then often referred to as *schizophrenic* rather than *autistic*; the terms were essentially synonymous for a period of time when autism was seen as a type of schizophrenia.)

Basic practices of effective teaching used in ABA are summarized below. They include capturing attention, delivering teaching within an antecedent–behavior–consequence sequence, prompting, managing consequences, fading, shaping, chaining, and functional assessment. If more information is needed, consult excellent texts like Cooper, Heron, and Heward (2006); O'Neill et al. (1997); O'Neill, Horner, Albin, Storey, and Sprague (1990); and Pierce and Cheney (2008).

Capturing Attention

It is crucial to attain and maintain the child's attention until the instruction has been given or the action modeled, the action accomplished, and the reward delivered.

Antecedent–Behavior–Consequence (ABC)

An antecedent is a stimulus that occurs before a behavior. The consequence is an act that directly follows the behavior. Antecedent–behavior–consequence is what defines a three-term contingency and this sequence defines specific learning trials. Learning involves the formation of a new relationship between a stimulus event (the antecedent) and a behavior (or cognition). The nature of the consequence defines the nature of the relationship. Teaching involves manipulating the antecedent and the consequence to either strengthen or weaken the relation between the antecedent and the behavior. Consequences may involve reinforcement, punishment, or extinction (which is not actually a consequence—it is the absence or removal of a consequence that formerly was reinforcing). Increases and decreases in behavior due to the manipulation of the antecedent and consequence are the sine qua non of operant behavioral treatment.

Prompting Desired Behaviors

The learner must emit the behavior being taught in some fashion following the antecedent during the teaching episode so that it can be rewarded and its ties to the stimulus strengthened. Some behaviors are already in children’s repertoires, but the children do not emit them under the appropriate stimulus conditions. Other behaviors are not in the child’s repertoire at all, and the adult must build the behavior. The adult has to find a way to prompt the child to emit the behavior under specified stimulus conditions—the instructions, gestures, or materials that are to serve a stimulus function, or act as an antecedent, for the behavior.

Managing Consequences

Skillfully managing consequences allows children to attain rapid initial learning, to build strong habits that are not easily extinguished, to generalize the behavior appropriately, and to reduce unwanted behaviors. The strength, timing, and frequency of reinforcement delivery affect the quality, consistency, speed, and frequency of the behavior as well as the speed of learning. Different consequent strategies are needed for different learning goals.

Fading Prompts

While prompts are needed to assist a learner emit a new behavior in the presence of a certain stimulus, they have to be systematically faded so that the behavior is emitted in response to the discriminative stimulus rather than the prompt. Careful management of fading is crucial to avoid prompt dependence by children who do not initiate desired behaviors unless prompted by an adult. Fading prompts is one way to teach a child to generalize skills or demonstrate them with other people.

Shaping Behaviors

A child’s performance of a new behavior is often only an approximation of the mature level of that behavior. Early speech of typical toddlers is an excellent example. Once

children have learned to emit an immature version of a behavior, the adult must use careful prompting and reinforcement strategies to gradually shape the immature behavior into a more mature behavior.

Chaining Behaviors

Complex behaviors like speech, dressing, playing games, reading, writing, and so on are built up from individual actions that become linked together to form behavior sequences. Building up these sequences from the individual actions to produce fluent behavioral sequences is called *chaining*, and it requires careful prompting, fading, reinforcement, and task-analysis strategies.

Functional Assessment or Analysis of Behavior

A major tenet of behaviorism is that all behaviors are functional; that is, they are useful in achieving a particular goal and are in the behavioral repertoire because they lead to a reward. In order to replace undesired behaviors with more desirable behaviors, one must first understand what goal is achieved for the individual using that behavior. A functional assessment is a process of determining the functions of a behavior; that is, what goals it meets for the individual, and what reinforcement is maintaining that behavior. It is sometimes the case that functions of a behavior may be too difficult to identify during this type of assessment, and will require a full functional analysis. A functional analysis involves actively testing the effects of a variety of consequences that may be maintaining the behaviors in order to identify which variables are actually supporting it. A functional analysis is the only way to causally define the variables that underlie a behavior; however, it is a highly technical procedure, and requires a fair amount of expertise to design and carry out. There are also ethical implications at times, as when the unwanted behavior involves injury to self or others. Thus, we use functional assessment, rather than functional analysis, whenever possible. Behavioral analysts on the team are well positioned to determine the indicators that a functional analysis, rather than assessment, is needed.

Strategies from PRT

PRT is a treatment based on the principles of ABA and was first published in the 1980s by Robert and Lynn Koegel (Koegel & Williams, 1980; Koegel, O'Dell, & Koegel, 1987; Koegel & Koegel, 1988) and Laura Schreibman (Ingersoll & Schreibman, 2006; Schreibman & Koegel, 2005), who observed improved motivation, behavior, spontaneity, and generalization in children whose behavioral treatment was delivered in a more natural interactive framework rather than an adult-directed, massed trial format. They and their students and colleagues carried out a series of studies in which they demonstrated the efficacy of several additional teaching approaches to the basic principles of reinforcement, prompting, fading, shaping, and chaining discussed above (see Schreibman & Koegel, 2005, for a description of the supporting evidence).

PRT research suggests that two behaviors appear to be pivotal in improving a wide range of behaviors and in determining later adaptive capacities: *motivation* and *response to multiple cues* (Koegel, Koegel, Harrower, & Carter, 1999a; Koegel, Koegel, Shoshan,

& McNerney, 1999b). These behaviors are central to a wide area of functioning, so positive changes in these behaviors should have widespread effects on other behaviors (Koegel & Frea, 1993; Koegel et al., 1999b).

Compared to discrete trial teaching, PRT techniques result in children with more motivation to perform, better generalization of new skills, more spontaneous responding, and less problem behavior (Ingersoll & Schreibman, 2006; Losardo & Bricker, 1994). PRT works to increase motivation by including components such as child choice, turn taking, reinforcing attempts, and interspersing maintenance tasks. PRT builds the child's capacity to respond to multiple cues by varying the antecedents, purposefully setting up stimuli with multiple cues, and teaching children to emit the same behavior in response to varying related antecedents. PRT has been used successfully to target language skills, play skills, imitation, gesture, and social behaviors in children with autism (Koegel & Koegel, 1995; Schreibman & Koegel, 2005). However, PRT is an appropriate teaching method only when the skill to be taught has a direct relationship to a reinforcer (discussed in more depth in Chapter 5).

PRT Principles Used in the ESDM

1. *Reinforce child attempts.* Don't expect children to be able to deliver their best performance all the time. Rewarding attempts enhances motivation and perseverance and decreases frustration and unwanted behaviors.

2. *Alternate requests for new behaviors—acquisition skills—with requests for already learned maintenance skills.* This alternating of more difficult tasks with easy tasks also enhances motivation and decreases frustration. It also keeps learned skills under review, supporting their maintenance.

3. *Reinforcers have a direct relationship to the child's response or behavior.* The reinforcer flows from the child's initial choice and immediately follows the desired behavior. The child reaches for a car and ends up getting the car. The child reaches for your hands to play a game, and in the end you play that game. The child wants to be finished, and the target behavior results in the end of the activity. The reinforcer is a natural part of the activity, not extrinsic to it. This is also true of social or verbal rewards. When a child speaks, in the ESDM we do not respond by saying "good talking" (extrinsic reward). We respond by restating and expanding the child's words and giving the desired object or activity (e.g., child: "Car?"; adult: "Car. Here's the car.>").

4. *Take turns in the activities.* Seek balanced interactions in which each partner has a chance to lead and follow—thus sharing control of the interaction. Taking turns makes the activity social, and it gives the adult access to the child's attention, the opportunity to model a behavior, and the opportunity to elicit a new child communication when it is time for the child's turn. It gives the child the opportunity to request, to imitate, and to see his or her actions mirrored by the adult.

5. *Instructions or other antecedents are delivered clearly.* The adult must have the child's attention and be sure that the antecedent, or stimulus, is appropriate to the task or activity and is present before the behavior is requested.

6. *Give children choices and follow their leads.* By using children's choices as an

opportunity to practice targeted skills, the adult builds child motivation, capitalizes on the strength of the reinforcer selected, and has the opportunity to reinforce children's self-initiated, or spontaneous, behavior.

These PRT principles are a fundamental aspect of the ESDM, and the explicit addition of these is one of the differences between the older version of the Denver Model, published and described before 2002, and the ESDM, developed and described since 2002.

Teaching Practices Developed in the Denver Model

The rest of the teaching practices in the ESDM come from the Denver Model. These focus on the affective and relationship-based aspects of the therapist's work with the child, the emphasis on development of play skills, and the use of communication intervention principles from the field of communication science (Rogers et al., 1986; Rogers & Lewis, 1989; Rogers et al., 2000).

1. *Adults modulate and optimize child affect, arousal, and attentional state.* The therapist skillfully modulates child affect and arousal through choice of activities, tone of voice, and level of adult activity so that the child can more optimally participate in learning. This practice targets affective characteristics as seen in a tired, lethargic, or underaroused child; a passive, perhaps avoidant child; a child who is whining, escaping, frustrated, hurt, crying, or otherwise upset; or an overactive, high-energy child who is not settling into an activity.

2. *Adult use of positive affect.* The adult displays clear, genuine, and natural positive affect throughout the episode matched by child positive affect. Positive affect permeates the episode, is well matched to child needs and capacities, does not overarouse the child, and serves teaching well.

3. *Turn taking and dyadic engagement occurs throughout.* The child is actively involved in adult turns, including giving toys, watching the adult, and showing awareness of both partners' acts. Reciprocity and social engagement between partners permeate the teaching activity.

4. *Adults respond sensitively and responsively to child communicative cues.* This refers to the adult's attunement to child states, motives, and feelings. A sensitive and responsive adult reads the child well and acknowledges communicative cues, whether verbal or gestural, by verbalizing or by acting contingently according to the child's communication so that the child seems to have been "heard." Or, in the face of an affective cue, the adult responds empathically to the child's emotional state by mirroring the emotion and communicating an understanding of it. The adult does not reinforce unwanted behavior, but acknowledges the child's cues and responds appropriately given the situation.

5. *Multiple and varied communicative opportunities occur.* The adult scaffolds multiple communications involving several different communicative functions during each play activity as specified in the child's objectives. Several different pragmatic functions are expressed, including opportunities to request, protest, comment, ask for help,

greet, name, expand, and so on. The range of pragmatic and communicative opportunities fits well with the child's language level. The adult uses a range of techniques including modeling, restatement, expansion of child utterances, and repetition of child utterances embedded in meaningful activities.

6. *Elaboration of activities.* The therapist encourages flexible, elaborated use of actions and materials by using multiple materials and varied schemas, theme, and variation, and/or narrative frames. The adult targets multiple objectives from different developmental domains in a single activity. Even if the child needs more adult-directed, mass trial teaching to learn, activities are still elaborated by having the child help take out, put away, and choose materials, or by interweaving social and communicative exchanges.

7. *Adult language is consistently appropriate developmentally and pragmatically for the child's verbal and nonverbal communicative intent and capacity.* Adults generally follow the one-up rule (i.e., the mean length of the adult's utterances is approximately one word longer than the mean length of the child's utterances), respond to child's communications with appropriate language, and use language to demonstrate a variety of pragmatic functions, semantic relations, and syntactic combinations.

8. *Transitions are effectively managed.* The adult scaffolds the child's shift of interest by closing down one activity and bringing up others, so that the child's interest flows smoothly from one activity to the next with minimal downtime. The timing of the transition is sensitive to the child's attention and motivation. Child independence is fostered and the child is attentive and quickly engaged in the new activity.

Using ESDM Teaching Strategies Together

When combined, the techniques outlined above are designed to engage the child in positive emotional experiences with another person, to draw the child's attention to social stimuli, to make such stimuli rewarding for the child, and to foster the child's motivation to continue such activities. Therapists use these techniques to elicit social and communicative behavior from the child that is as close to "normal" as we can create. We do this because we believe that these experiences are shaping brains as well as behaviors, and we want to stimulate and shape children's neural networks into patterns of greater sensitivity and responsivity to social partners than objects.

Use of Positive Affect

We focus closely on creating positive emotional states in children during social interactions, because we want to enhance the reward value of social interaction and recalibrate children's responsivity to voices, faces, and eyes. This includes the use of very pleasurable sensory social routines, focused on dyadic social experiences, and also on the use of highly preferred object routines that are accompanied and embedded in strongly social and communicative actions. Creating such positive routines also captures children's attention to support information processing of the social-communicative framework.

As mentioned in Chapter 1, research suggests that learning, especially language and social learning, is facilitated when it occurs in the context of an affectively rich and

engaging interaction with another person. Thus, we use techniques in which social and language skills are taught within the context of playful, engaging experiences.

The ESDM's emphasis on positive affect and modulation of affective and arousal states to optimize social engagement and learning directly activates the social brain and its related neurotransmitters to foster the development of social and communicative behavior. The ESDM can improve the child's "social motivation" by stimulating two aspects of the social reward system: "liking" and "wanting," which are not the same thing. We can like things without having the incentive to attain them (want). Some children with autism appear to like social interaction, in that they respond positively to engagement, but they don't appear to seek it out. Others seem neither to like nor to want it. The ESDM addresses both liking and wanting by increasing the reward value of social engagement. During the first interactions, the adult partner focuses on "finding the smile"; in other words, finding sources of pleasure for the child. The goal is to make social engagement an intrinsic part of the reward. For children who do not "like" social engagement, this technique builds reward value through associative learning processes. In other words, social experiences are paired with nonsocial rewards, such as objects, to enhance the reward value of the social experience. We use both operant and classical learning paradigms to increase the reward value of social engagement and establish "liking," which also connotes proximity and attention to the liked stimulus.

The ESDM builds up the "want" by shaping children's self-initiated approach and requesting behaviors as they gain access to social and nonsocial rewards. But their access to desired social rewards needs to be controlled so that they are not satiated by the reward. This also ensures that to attain the reward, children need to intentionally use social and communicative acts.

The teaching approaches used in the ESDM do not only focus on simple stimulus-response associations that are required by a simple new habit. Rather, the approaches are designed to promote complex neural networks, involving a wider range of skills, by promoting skills that recruit neural activity from across brain regions. The types of teaching in the ESDM involve presenting one "theme" and then varying it; they target multiple domains during a teaching task, and involve affective engagement during the teaching of concepts. All of these practices result in increasingly complex neural networks and thus foster greater connectivity across multiple brain regions.

Play as the Frame for Intervention

Joint activity routines (Bruner, 1977) are play activities in which both partners have key roles and build on each other's contributions. The joint activities involve objects and activities that are typically found in natural environments for children of this age. In the ESDM, joint activities are the primary vehicles for teaching. Teaching is embedded in emotionally rich joint activity routines with and without objects. The play interactions are child centered, in that children's choices (i.e., their preferred activities and preferred materials), are featured throughout the activities. The adult shares control of the play by selecting what objects are available as choices for the child, what actions are modeled and reinforced, and how activities are sequenced. All developmental skills that can be taught through play are taught in this way: imitation, receptive and expressive communication, social and cognitive skills, constructive and symbolic play, and fine and gross motor development.

Intensive Teaching

We believe that one cause of the developmental delays in autism is due to a decreased number of learning opportunities, and we teach intensively in order to fill in the learning gaps. Teaching is woven into every social exchange, and accomplished ESDM therapists can deliver a learning opportunity as frequently as every 10 seconds. We expect that most young children with autism will learn quickly when appropriately taught, and intensive teaching is the means by which rapid learning is achieved.

This intensity is based on normal models of infant–toddler experiences. We know from the child development literature that infants and toddlers with a greater degree of interaction with sensitive and responsive caregivers who follow children’s leads and use rich language to narrate the child’s interests and activities have improved language development, more secure social relations with adults and peers, and have more positive social initiations and responses with others. We also know that infants and toddlers spend the majority of their waking hours (roughly 70 hours per week) in direct social interaction with caregivers. Further, we know that infants and toddlers who experience significant deprivation from this kind of social-communicative engagement with others experience lifelong changes in cognitive ability, language ability, social ties, symbolic play, and, in the most deprived children, increases in stereotypic and repetitive behavior. Finally, we know that a significant lack of this type of caregiving experience during the first 5 years of life affects ongoing development. While children never stop learning, the early childhood period is one of special sensitivity for social-communicative learning. If it takes this much social interaction to create “normal development” in typical infants and toddlers, then it is only logical to assume that infants and toddlers with ASD need at least as much of this kind of interactive experience as typically developing children if they are to progress as far as possible in social-communicative and cognitive areas.

Positive Behavior Approaches for Unwanted Behaviors

Unwanted behaviors—those that are aggressive, destructive, disruptive, or overly repetitive—are managed by following the principles of positive behavior approaches (Duda, Dunlap, Fox, Lentini, & Clark, 2004; Powell, Dunlap, & Fox, 2006). In positive behavior approaches, the focus is on replacement of unwanted behaviors with more conventional behaviors, rather than eliminating unwanted behaviors per se. Reinforcement strategies are used to teach alternative or incompatible behaviors, and the replacement behavior is very frequently an intentional communication or a more mature skill level. The overriding goal is to increase, rather than reduce, children’s repertoire of skills in every area by using reinforcement strategies to develop, shape, and increase conventional and appropriate behaviors.

Family Involvement

Parent and family involvement is considered a best practice in early autism intervention (National Research Council, 2001) and it is an essential component of the ESDM intervention. If children with autism are to develop to their greatest capacity, they need to experience the same or more learning opportunities as do children who have no biological impairments that affect their learning. That means we must create social

environments in which children with autism are in interaction with others throughout their waking hours. This can only happen if parents and other caregivers learn how to engage their child in ongoing interactions throughout the day. We, and many others (Schreibman & Koegel, 2005; Koegel, Bimbela, & Schreibman, 1996; Harris, Wolchik, & Weitz, 1981), believe that optimum outcomes for toddlers with autism require parent acquisition of interactive skills so that they can foster interaction throughout the child's waking hours. One major goal of the ESDM work is establishing this type of interactive environment at home and in other daily settings. A large part of the ESDM work with families involves coaching parents in the development and ongoing use of the interaction techniques described in this manual.

However, it is not a one-way street. Family styles, values, preferences, goals, and dreams influence their child's ESDM treatment plan. Parents are the primary teachers of all young children; parental teaching for young children with autism is crucial to child progress. However, autism is a complex disorder and parents typically need guidance, support, and help in order to embed treatment techniques into everyday life. Parents join in formulating priorities for intervention. Parents participate by implementing the teaching plan themselves and by identifying routines or opportunities throughout the day to implement (generalize) these new skills. Parents are co-therapists, both in teaching the developmental curriculum and when working on changing unwanted behaviors. They complete functional assessments of behavior, help generate a plan for teaching alternative behaviors, and implement these plans throughout the child's waking hours at home. The extent to which parents and other family members are involved in delivering the intervention at home varies considerably across families but is expected to involve at least 1–2 hours per day, embedded in natural family activities: mealtimes, play, outings, dressing, toileting, bathing, and bedtime.

The focus on parent-child intervention in the ESDM reflects research in typical child development that illustrates the powerful effect of certain parenting practices on children's communication, play, and social development (Tamis-LeMonda, Bornstein, & Baumwell, 2001). Parenting practices affect children's rate and quality of language development. They affect their school progress. Parenting practices affect children's emotional development and the quality of their important relationships—friendships, future romantic relationships, even parenting relationships with their own children. Parenting style affects children's development across children's lives and across generations (Steele & Steele, 1994).

For a long time we did not know if this would apply to children with autism, whose biological impairments involving social relations were expected to trump individual differences in parenting styles. However, evidence is now accumulating that indeed, the same relations exist for parents of children with autism as exist for children without autism. Children with autism demonstrate variability in their attachment security, and several different groups have found that, as in other groups of children, security was related to their parents' ways of sensitively responding to them (Rogers & Pennington, 1991; Rogers, Ozonoff, & Maslin-Cole, 1993; Sigman & Ungerer, 1984; Sigman & Mundy, 1989; Capps, Sigman, & Mundy, 1994; and see van IJzendoorn et al., 2007, for conflicting findings). There is some evidence that this pattern is also seen in older children with ASD (Orsmond, Seltzer, Greenberg, & Krauss, 2006; Bauminger et al., in review) and that attachment security with parents affects friendship patterns, as it does

in typical development (Bauminger et al., 2008). Three studies have now demonstrated that parental communication styles involving following children's leads, as opposed to directing children's attention, positively contribute to language development for children with ASD over a very long period (Siller & Sigman, 2002; Mahoney, Wheeden, & Perales, 2004), as it does for children with typical development.

There is also new evidence that as parents become more attuned to their child's communications and interests and increase their sensitive responding, children's developmental rates accelerate in language, cognitive, and social development (Mahoney & Perales, 2005; Drew et al., 2002; Vismara & Rogers, 2008). Does this mean that parents of children with autism are less sensitive or responsive than others? No. Many studies have asked this question and all have found that parents of children with autism interact with their children very similarly to other parents (van IJzendoorn et al., 2007; Capps et al., 1994; Kasari, Sigman, & Yirmiya, 1993). However, children with autism as a group differ in their interactions with their parents compared to other children. Young children with autism typically do not initiate much interaction with their parents. They tend not to direct communications to them or share their emotions with them. They frequently do not express emotions clearly in their faces or bodies. They are often slow to develop speech and gesture, and even when they have these ways of communicating, they use them infrequently to share their own experiences with their parents (Kasari, Sigman, Yirmiya, & Mundy, 1994). Thus, while parents are doing their part to interact with their children, the children are not doing their part to initiate and sustain interactions with their parents, and so the number of interactions that occur between parents and children and the communicative content of those interactions is drastically reduced, limiting learning opportunities for children, limiting opportunities for parents to respond sensitively and responsively to child cues, and limiting positive feedback to parents (reinforcement!) that their interactions have been successful.

The ESDM style of intervention focuses on all of these issues. It drastically increases the number of child initiations and responses—child cues—that are occurring, and it shapes those cues into conventional communications that are more easily recognized. It also helps parents draw out and read the subtle cues that are present so that parents can respond sensitively and thus reinforce child communications. Finally, it helps parents detect the often subtle signs that their interactions have been successful, thus reinforcing parents for their interactive efforts.

EVIDENCE OF EFFECTIVENESS

Eight papers describing the effectiveness of the original Denver Model or the ESDM have been published or are in press in peer-reviewed journals at the time of this writing. The first four studies provided consistent evidence of developmental acceleration in a large group of children with ASD in Denver Model classrooms. Rogers and colleagues (Rogers et al., 1986) described the effects of the first iteration of the model, which highlighted a developmentally oriented, center-based, small-group preschool setting model with child:adult ratios of 1:2 and emphasized play, language, cognition, and social relations. Rogers and Lewis (1989) elaborated the above analyses on a larger group and demonstrated gains in symbolic play and social communication as well.

Rogers and DiLalla (1991) compared the effects of the Denver Model on the progress of a group of 49 children with ASD compared to a group of 27 children with other kinds of behavioral and/or developmental disorders but without symptoms of autism. The fourth study (Rogers, Lewis, & Reis, 1987) was a replication study of the Denver Model by five independent agencies, four in rural communities and one urban community in Colorado.

However, the within-group pre–post designs used in the above to evaluate the effectiveness of the Denver Model, while considered at that time to be an acceptable design for assessing effectiveness of early intervention (Fewell & Sandall, 1986) are no longer considered adequate for determining treatment efficacy (Kasari, 2002; Lord, Risi, & Pickles, 2005; Charman & Howlin, 2003). Current research designs in efficacy of early intervention suggest that preliminary positive data from pre–post designs need to be followed by methodologically rigorous controlled designs.

The next three studies published on the model used more rigorous quasi-experimental or experimental designs to examine treatment efficacy. Two recent papers have used single-subject designs to examine effects of the Denver Model or the ESDM on language acquisition of nonverbal young children with ASD (Rogers et al., 2006; Vismara, Colombi, & Rogers, 2009). Both studies involved 1:1 delivery of the model over a 12-week period in one individual therapy hour per week and parent training. Both studies revealed acquisition of single-word speech in most of the children treated in this low-intensity treatment. The 2006 study is the only paper to contrast the Denver Model treatment with another treatment. In this study, children were randomly assigned to either the Denver Model treatment or prompts for restructuring oral phonetic targets (PROMPT therapy) (Hayden, 2004) used to treat children with dyspraxia of speech. The majority of children (80%) in both approaches acquired intentional, spontaneous, communicative words during the course of the treatment, and the parent training component was assumed to play a pivotal role in the children's progress, given the minimal direct treatment provided. Furthermore, many of the children in this study had previously been involved in other language treatments, some for years, but did not acquire speech until this treatment.

The Vismara et al. (2009) paper tested the ESDM parent training content and process and examined its efficacy both in achieving parent implementation of the model and enhancing children's social-communicative development. Using a variety of measurement approaches and careful attention to threats to validity, Vismara and colleagues demonstrated significant gains in child spontaneous speech, social initiative, imitation skills, and parental acquisition of therapy skills in a 12-week period involving one therapy hour per week, focused on parent coaching. This study also demonstrated maintenance and generalization of the treatment effects in both parents and children. This was seen in continued child progress in both communication and social skills during a 12-week follow-up period after the end of treatment. Measurements were made during interactions with parents and also in interactions with an unfamiliar, untrained adult. Parents also demonstrated either stable or increasing skill at using the ESDM during the follow-up period.

The most recent outcome research is a National Institute of Mental Health (NIMH)–funded randomized controlled clinical trial of the ESDM, carried out at the University of Washington (Dawson, principal investigator). Dawson and colleagues (2010) recruited

48 toddlers with idiopathic autism between 18 and 30 months of age who were stratified on two levels of Full Scale IQ (below and above 55) and then randomly assigned to one of two groups: (1) an ESDM intervention group that received, on average, 25 hours of 1:1 delivered ESDM weekly from parents and trained home therapists, for 2 years (15 hours from therapists weekly, on average); and (2) a group provided with assessments and ongoing monitoring and referrals for standard community-based treatments, referred to below as the assessment and monitoring (AM) group. These two groups did not differ at baseline in severity of autism symptoms, gender, IQ, or socioeconomic status. Two-year follow-up data were obtained for 21 community-treated children and 23 ESDM-treated children.

At 2 years after the baseline assessment, the ESDM group showed significantly improved Mullen Early Learning Composite standard scores compared to the AM group. On average, the ESDM group improved 19.1 points compared to 7.0 points in the AM group. The bulk of this change appears due to improvements in both receptive and expressive language, which showed increases of 19.7 and 12.7 points, respectively, for the ESDM group, while the AM group improved 10.6 and 9.2 points, respectively. The ESDM group also showed a 10-point advantage on the Vineland Adaptive Behavior Composite standard scores relative to the AM group (see Figure 2.1). However, for these adaptive behavior scores, the ESDM group showed only 0.5-point improvement while the AM group showed a decline of 11.2 points. Thus, the ESDM group as a whole maintained a normative rate of growth in adaptive behavior compared to the normative sample of typically developing children. On average, they were no farther behind, nor any closer to same-age peers developmentally speaking. In contrast, over this 2-year span the AM group was on average increasingly more delayed in adaptive behavior

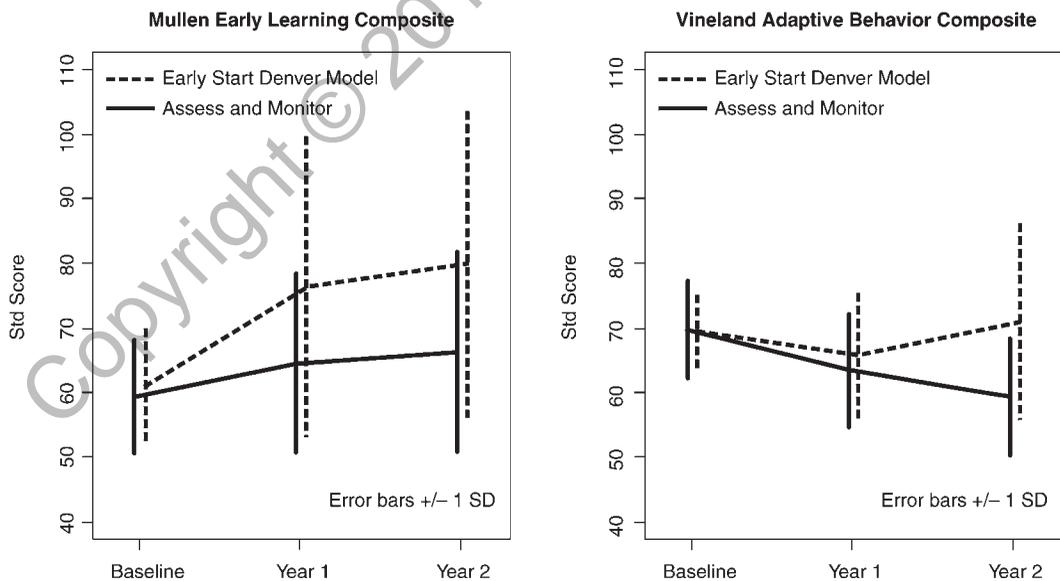


FIGURE 2.1. Comparative results of the ESDM and AM groups after 24 months on measures of development and adaptive behavior.

when compared to the normative sample. Closer examination of the Vineland subscales provides a more complicated picture. Children receiving the ESDM showed significantly better performance than the AM group on communication and motor subscales. Compared to their pretest scores, the ESDM group made substantial improvement in the communication domain but had declines in group means in socialization, daily living skills, and motor skills. The AM group showed no change in communication, but average declines in socialization, daily living skills, and motor skills well over twice that seen in the ESDM group.

Finally, in order to examine severity of autism at follow-up, we compared the clinically assigned diagnoses at both time points, which were made by experienced clinicians blind to group status using all available information to assign the appropriate DSM-IV diagnosis. All children in both groups continued to have some type of ASD diagnosis at Time 2. In terms of diagnostic stability, 15 (71.4%) children of the AM group received a diagnosis of autistic disorder both at baseline and at Time 2. In the ESDM group, 13 of the 23 (56.5%) children retained their diagnosis of autistic disorder from baseline to the 2-year outcome, and one (4.3%) child received a diagnosis of pervasive developmental disorder not otherwise specified (PDD-NOS) at both time points. In terms of increasing symptoms, five (23.8%) children in the AM group received a PDD-NOS diagnosis at baseline and then received a diagnosis of autistic disorder at Time 2. This same pattern was observed in only two (8.7%) children in the ESDM group. In terms of decreasing symptoms, one (4.8%) child in the AM group changed diagnoses from autistic disorder at baseline to PDD-NOS at Time 2 while seven (30.4%) children in the ESDM group experienced this change in diagnosis. This pattern of improvement in overall diagnosis in the ESDM group was assessed using Fisher's exact test on this 2 (treatment group) \times 4 (diagnosis group; autistic/autistic, PDD/PDD, autistic/PDD, PDD/autistic) contingency table and found to be statistically significant ($p = .032$). Thus, children who received the ESDM were more likely to have an improved diagnostic status based on clinical assessment at the 2-year outcome compared to children in the AM group.

Thus, in this rigorous 2-year randomized controlled trial (RCT) that tested intensive delivery of the ESDM at home, we found significant IQ and language differences between groups that compare favorably with those published by Lovaas (1987), and larger and more widespread changes than those from the RCT of Lovaas's approach published by Smith, Groen, and Wynn (2000). We also found core symptoms of autism to be diminished, based on clinical diagnosis after 2 years of treatment, and these findings were achieved while delivering many fewer hours of treatment than the other two studies. While the ESDM needs to be independently replicated before it can be considered an empirically supported treatment for early ASD, these results are certainly consistent with earlier positive findings from the Denver Model studies.

Thus, a variety of studies, including an RCT, indicates that the ESDM is effective for increasing children's cognitive and language abilities, social interaction, and initiative, decreasing the severity of their ASD symptoms, and improving their overall behavior and adaptive skills. While longer-term follow-up studies and replications are necessary to determine the long-term benefits of this treatment approach, the consistency of the evidence across several different types of delivery (classroom, parent-delivered, and intensive at-home delivery) suggests that the ESDM is efficacious in addressing a wide range of early symptoms of ASD and improving child outcomes during the preschool period at least. Additional studies are ongoing.

SIMILARITIES AND DIFFERENCES BETWEEN THE ESDM AND OTHER INTERVENTION MODELS FOR TODDLERS WITH ASD

For those familiar with intervention models for early ASD, the similarities and differences between the ESDM and the other well-known models are likely becoming clear. The ESDM most closely resembles other intervention approaches with a strong emphasis on responsive interactions and a developmental orientation, like the responsive intervention work of Mahoney and Perales (Mahoney & Perales, 2003, 2005; Mahoney et al., 2004), DIR/Floortime (Wieder & Greenspan, 2005), Relationship Development Intervention/RDI (Gutstein, 2005), SCERTS (Prizant, Wetherby, Rubin, Laurent, & Rydell, 2006), and Hanen Centre programs (Coulter & Gallagher, 2001). All these intervention approaches are built on empirical evidence concerning patterns of typical social-communicative development. The ESDM uses a more explicit, behavioral teaching paradigm than is described by the other approaches, is more data driven, and it explicitly covers all developmental domains in its teaching practices, while most of the other models focus on social-communicative development.

The ESDM also has clear ties to the naturalistic behavioral interventions like PRT, incidental teaching (McGee, Morrier, & Daly, 1999), and milieu teaching (Yoder & Warren, 2001; Warren & Yoder, 2003; Kaiser, Yoder, & Keetz, 1992). Like the ESDM, these interventions use a child-centered, natural language frame delivered using careful behavioral teaching strategies. The ESDM differs from these interventions in the elaborated developmental curriculum used, the explicit emphasis is on affect and quality of relationships, and the comprehensive developmental framework.

Finally, the ESDM has in common with Lovaas's (1987) approach the use of a curriculum covering all domains of development, intensive teaching, use of behavioral teaching procedures, and a data-driven approach to decision making. It differs in the child- versus adult-centered teaching approach used, the focus on child positive affect, the focus on teaching communication embedded in ongoing social interaction and on nonverbal communication as a precursor of verbal communication, and in the empirical base for the curriculum and approach (i.e., developmental science rather than operant behavioral models).

Why might a person choose the ESDM over these other intervention approaches? First, it has a much stronger base in empirical evidence than do most of these other approaches. Only PRT and Lovaas's approach have as large a body of science behind them as does the ESDM. Second, it is the only autism intervention that focuses on all domains of development and is specifically constructed for toddlers both in curriculum and in interactional teaching styles. Third, it is transportable into every natural environment of toddlers. It does not require a small separate room for teaching, a specifically prepared special classroom, or special materials and visual systems. It uses the natural environment as the teaching environment. Finally, it is fun to do! Its focus on positive interactions provides plenty of reinforcement for parents, children, and therapists, and it uses a style of teaching that is quite familiar to parents and therapists from a number of different disciplines.

Is the ESDM better than other approaches? We have no comparative studies with which to answer that question. However, we assume that there is no one "best" approach for all children, families, and therapists. An intervention approach needs to fit the fam-

ily's preferred way of interacting with children, a therapist's most successful way of interacting with others, and a child's own profile. The ESDM fills a current need in the field for a rigorous, empirically supported intervention that uses a developmental, relationship-based, and data-based approach to address the many developmental needs of very young children with ASD and the needs of their families.

CONCLUSION

The main principles of the ESDM result from a combination of empirical evidence from studies of early autism, studies of typical infant and child development, and studies of learning. The treatment is characterized by a set of principles and practices that underlie both the content and the delivery of the intervention. These involve interpersonal exchange and positive affect, shared engagement with real-life materials and activities, ongoing verbal and nonverbal communication, a developmentally based curriculum addressing all developmental domains, teaching practices based on learning theory and positive behavior approaches, a multidisciplinary perspective, and individualization of each child's program. The model has a long history, with ongoing changes and refinements as new data and new theories about early autism become available. The current model is the latest product of an interdisciplinary team of clinical experts and researchers in early autism at the University of California Davis and the University of Washington, who have been using and examining intervention models and carrying out research into the neuropsychological profile of early autism for a very long time. In the next chapter, we turn to the practicalities of delivering the ESDM.