

Psychology 218  
Directed Assignment A3  
Dr. Peterson

Please read the article by Peterson (2004). Your responses to the following questions must be typed. Please be sure to include an APA-style citation.

1. What is the purpose of this review paper?
2. Describe :
  - incidental teaching
  - mand-model
  - time delay
  - milieu language teaching

How are they the same?

How are they different?
3. What is discrete trial training? How is naturalistic teaching different?.
4. What is generalization in language acquisition? How does naturalistic teaching promote generalization in language acquisition?
5. What were the conclusions of this review?
6. Be sure to provide an APA-style source citation for Peterson (2004) at the end of your paper.

## Naturalistic Language Teaching Procedures for Children at Risk for Language Delays

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Delays in language acquisition can have serious deleterious effects on the education and social development of children. A number of related language intervention procedures have been developed for use in natural settings. These procedures include incidental teaching, modeling, manding, time-delay, and milieu language teaching. The present paper reviews the literature regarding naturalistic language teaching procedures, distinguishes them from discrete trial training, and discusses how these procedures might facilitate the generalization of children's acquired language skills. Problems in achieving generalization are also discussed. Recommendations for future research are made.

Key words: language delay, naturalistic language teaching, incidental teaching, milieu language teaching, mand, model, time-delay.

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Delays in language acquisition can have serious deleterious effects on the educational and social development of children (Goldstein & Kaczmarek, 1992; Ramey & Campbell, 1992; Warren & Kaiser, 1986). Such delays are considered by some to be a "developmental disaster" (Warren & Kaiser, 1986). Delays in language acquisition are considered to be one of the most prevalent disabilities in early childhood. For example, 70% of 3- to 5-year-old children with disabilities have been documented to have language delays (Wetherby & Prizant, 1992).

The contribution of environmental factors to the course of a child's language development has received increased attention in the last 20 years (e.g., Bricker, 1993; Hart & Risley, 1992, 1995; McLaughlin, 1998; Moerk, 1986, 1992; Walker, Greenwood, Hart, & Carta, 1994). Children with disabilities are known to be especially vulnerable to environmental conditions that may inhibit language acquisition (Tannock & Girolametto, 1992). Some of these environmental factors include the caregiver's responsiveness to child vocalizations, reciprocity in verbal interaction between caregiver and child, frequency of verbal interaction, and the availability of stimulating materials (Bradley & Caldwell, 1976; Hart & Risley, 1992; Huttonlocher, Haight, Bryk, Seltzer, & Lyons, 1991). The role of the primary caregiver in language acquisition has received even greater emphasis (Hart, 1991; Hemmeter & Kaiser, 1990; Warren & Kaiser, 1988). Indeed, the caregiver is viewed as having a "critical influence on the child and the child's language learning environment" (Hemmeter & Kaiser, 1990, p. 335). The caregiver or teacher, in her or his interaction with the child, can have either positive or negative effects on the child's acquisition of language (Nelson, 1973). For example, Hart and Risley (1995) reported differences between parents in both the quantity and quality (i.e., richness) of talk directed to their children, as well as

parental responsiveness, feedback tone, and guidance style during the first three years of life were positively correlated with child language outcomes. Children from higher SES families heard 2,150 words per hour versus children from lower SES (AFDC) families who heard 620 words per hour (Hart & Risley, 1995, p. 132). In addition, there was a greater richness of language experience directed toward children in professional families, especially in terms of nouns, modifiers, past-tense verbs, auxiliary-fronted questions, declarative sentences, and multi-clause sentences. Parents in these families also provided more positive feedback to their children, as well as fewer imperatives and less negative feedback. By age three years, children in families providing this kind of language experience had twice the vocabulary as did children from families that did not provide this experience. Furthermore, these language abilities were good predictors of language outcomes at age nine (Walker, Greenwood, Hart, & Carta, 1994).

A number of related language intervention procedures have been developed for use in the child's natural settings, including the child's home, classroom, or child care. These procedures include incidental teaching (e.g., Hart & Risley, 1975), mand-modeling (e.g., Rogers-Warren & Warren, 1980; Warren, McQuarter, & Rogers-Warren, 1984), and delayed prompt or time-delay (e.g., Halle, Marshall, & Spradlin, 1979). Taken together, these procedures might be termed naturalistic language teaching. Naturalistic language teaching approaches have been increasingly viewed as the treatment of choice for children at risk or children with disabilities (Noonan & McCormick, 1993; Tannock & Girolemetto, 1992). The present paper reviews the literature regarding naturalistic language teaching procedures, distinguishes them from discrete trial training, and discusses how these procedures might facilitate the generalization of children's acquired language skills.

#### Incidental Teaching

Incidental teaching (Hart & Risley, 1968, 1974) involves the use of naturally occurring situations and the child's interest to facilitate language learning. Hart and Risley (1975) characterized incidental teaching as "the interaction between an adult and a single child, which arises naturally in an unstructured situation such as free-play and which is used by an adult to transmit information or give the child practice in developing a skill" (p. 411). In this approach, the teacher or caregiver takes advantage of naturally occurring teaching situations to provide language-learning opportunities for the child. The situation or activity is "child selected" (Hart & Risley, 1975, p. 412), with the teacher or caregiver following the child's lead or interest. Following the child's lead should serve to increase the reinforcing value of the teaching situation for the child. Indeed, incidental teaching strategies are designed to maximize reinforcement and facilitate generalization (D. Baer, personal communication, May 30, 1996).

Once a teacher or caregiver identifies naturally occurring situations in which a child expresses interest, she or he then uses a series of graduated prompts to encourage the child's responses (Hart & Risley, 1974, 1975). Hart and Risley (1974) identified four levels of prompts associated with incidental teaching. The level of prompt is dependent on the child's response. A Level 1 prompt involved instituting a 30-second delay when a child

displayed an interest in a specific object or material. At Level 2, the caregiver prompted the child to ask for the desired object. At Level 3, prompts involved a more elaborate request by the caregiver (e.g., the caregiver showed the child the toy and asked "what is this?"). Finally, at Level 4, the correct response was modeled by the caregiver and the child was prompted to imitate the response. Teachers were taught to use the lowest level of prompt that would encourage the correct response by the child.

In one of the first studies of incidental teaching procedures, Hart and Risley (1968) successfully increased preschool children's use of adjective-noun combinations. Children were taught adjective-noun combinations (e.g., "red truck") in a structured group setting. Although children increased their use of these combinations in the structured settings, the behavior did not generalize to free play settings. To increase the "spontaneous" use of adjective-noun combinations in free play settings, access to **desired classroom materials** (e.g., paints) was made contingent on the appropriate use of these combinations. Teachers used graduated levels of prompts similar to those described above to shape the children's verbal behavior.

In a follow-up study, incidental teaching procedures were used to shape children's use of compound sentences during free play (Hart & Risley, 1974). Children were progressively required to increase the complexity of their statements. At first, children were required to simply name objects, then they were to add a descriptive word, and finally they were required not only to name the object but also to describe how they would use that object (a compound sentence). Children participating in the study increased their use of nouns, adjective-noun combinations, and compound sentences.

In another study, Hart and Risley (1975) used incidental teaching procedures to increase preschool children's use of compound sentences directed toward teachers as well as peers in an attempt to facilitate the generalization of language skills. The results showed an increase in compound sentences directed toward both teachers and peers.

#### Mand-Model

The mand-model procedure (e.g., Rogers-Warren & Warren, 1980; Warren, McQuarter, & Rogers-Warren, 1984) is an extension of the incidental teaching model (essentially prompt Levels 2, 3, and 4 of Hart and Risley, 1974). The mand-model procedure involves the teacher or caregiver manding and/or modeling a response from the child. Manding involves requesting a verbal response from the child (e.g., "tell me what you want" or "use words"). If the child responds correctly, the teacher or caregiver praises the child and provides the object of interest. In modeling, sometimes known as child-cued modeling (Alpert & Kaiser, 1992; Kaiser, 1993), the teacher or caregiver observes the focus of the child's interest (e.g., a toy fire truck) and models the correct verbalization (e.g., "that's a fire truck"). If the child makes the correct verbal response (e.g., "fire truck"), the teacher or caregiver then praises the child and provides the object of interest.

The mand-model procedure builds upon the manding and modeling procedures. In this procedure, the teacher or caregiver observes the focus of the child's interest (e.g., the toy fire truck) and mands a response from the child (e.g., "tell me what you want"). If the child makes an incorrect response (e.g., "choo choo train"), the teacher or caregiver then models the correct response (e.g., "say fire truck").

Rogers-Warren and Warren (1980) successfully trained teachers to use the mand-model procedure and contingent praise. Child participants showed an increase in their rates of verbalization in general, as well as in their rates of novel words and novel word combinations. Similarly, Warren, McQuarter, and Rogers-Warren (1984) demonstrated the effectiveness of the mand-model procedure in promoting generalization across settings and maintenance over time by gradually fading the use of this procedure.

One difference between incidental teaching (e.g., Hart & Risley, 1975) and the mand-model procedure is that, as originally conceived, incidental teaching is dependent upon the child's initiations. With the mand-model procedure, the teacher or caregiver more directly controls the number of opportunities for the child to engage in the language interaction (Rogers-Warren & Warren, 1980). This procedure may be useful, then, for children with very low rates of initiation (Rogers-Warren & Warren, 1980; Warren, McQuarter, & Rogers-Warren, 1984).

#### Time-Delay

Another extension of incidental teaching is the time-delay or delayed prompt procedure (e.g., Halle, Baer, & Spradlin, 1981). Time-delay has been defined as "nonvocal cues for vocal language" (Halle, Baer, & Spradlin, 1981, p. 390). In the time-delay procedure, the teacher or caregiver identifies a situation in which the child wants an object or assistance and then waits for the child to make a response. If the child does not respond appropriately, another delay is usually instituted. If this is unsuccessful, the caregiver or teacher will then use the mand-model procedure. The time-delay procedure is especially useful for teaching children to initiate verbal interaction (Noonan & McCormick, 1993).

Halle, Marshall, and Spradlin (1979) used a time-delay procedure to increase children's "opportunity to respond" for two groups of institutionalized children. Initially, meal trays were withheld for 15 seconds. Of the first set of three children, only one appropriately requested the meal tray and then only on a very limited basis. Next, modeling of the correct response was added to the delay resulting in an increase in appropriate responding. A second group of three children, who had observed the contingencies implemented for the first three, then participated in the delay condition. All three children in the second group responded appropriately to the delay contingencies. In addition, some of the behavior of some of the children generalized across meal settings and servers.

Halle and his colleagues (1981) reported two experiments in which they successfully taught preschool teachers to identify opportunities in which time-delay would be effective with their students. Unfortunately, there

was only limited generalization of the delay procedures in untrained situations by teachers. In a second phase of the study it was found that the teachers' behavior did generalize to untrained situations, but did not continue once observers left the classroom. It is interesting to note that in this study teachers were required to drop back to a more teacher-directed modeling procedure if the time-delay was ineffective.

Charlop, Schreibman, and Thibodeau (1985) used a time-delay procedure to increase spontaneous speech in seven young boys with autism. Pretests were given to determine if each child could label certain preferred items and training was provided if the child did not have these skills in his repertoire. Next, training was provided in which the teacher modeled the correct response (e.g., "I want a cookie"). The child would receive the item if he correctly imitated the response. Then a brief time-delay was introduced with delays beginning at two seconds. These were then systematically increased to 10 seconds. All of the children, except one, acquired the target behavior. The one child who did not acquire the target behavior repeatedly demonstrated a specific preference and often said "no want." Although these were not the responses sought by the experimenters, perhaps the child actually generalized the skill more thoroughly than the other children in that he applied manding to items of his own choosing. Ingenmey and Van Houten (1991) also successfully used time-delay procedures to increase spontaneous speech in children with autism.

Ostrosky and Kaiser (1991) described a number of useful strategies for implementing the time-delay procedure in the classroom. These can also be adapted for use in the home. Some of these strategies include placing toys or materials of interest to the child out of reach, giving the child too small an amount of a desired item, or by omitting a necessary item in a multi-step task. Each of these strategies are designed to encourage functional language use on the part of the child by arranging a situation in which the child must initiate a request.

#### Milieu Language Teaching

Incidental teaching, the mand-model procedure, and the time-delay technique have been combined with other strategies to encourage child language in natural environments (Alpert & Kaiser, 1992; Hart & Rogers-Warren, 1978). Hart and Rogers-Warren (1978) termed this approach "milieu language teaching." Kaiser (1993) defined milieu language teaching as "a naturalistic, conversation-based teaching procedure in which the child's interest in the environment is used as a basis for eliciting elaborated child communicative responses" (p. 77). Hemmeter and Kaiser (1994) proposed enhanced milieu teaching as a more comprehensive approach to naturalistic language intervention. There are three components to this intervention model: (1) environmental arrangement, (2) responsive interaction techniques, and (3) milieu teaching procedures.

Environmental arrangement involves the arrangement of the child's environment to facilitate language teaching. The goal is to increase the child's engagement with the environment (Kaiser, 1993), while setting up situations in which the child is more likely to use language. For example, having toys or other objects of interest available in the child's environment will make it more likely that the caregiver or teacher can use the situation to

have the child verbalize a request for that toy or object (see Ostrosky & Kaiser, 1991). Another important part of environmental arrangement is teaching caregivers to provide an "optimal affective environment for the child" (Kaiser, 1993, p. 76); that is, to keep the interaction nurturing and reinforcing for the child.

Responsive interaction techniques were designed to teach caregivers how to engage in a conversational interaction with a child. These techniques include following a child's lead, turn-taking, providing descriptive statements, imitating the child's verbalizations, and expanding on statements that the child previously made (Kaiser, 1993).

The milieu teaching procedures include modeling, mand-modeling, and time-delay. Each of these strategies build upon the previous one, with later procedures incorporating components of earlier ones (Alpert & Kaiser, 1992). Both early childhood teachers (Yoder, Kaiser, & Alpert, 1991) and parents (Alpert & Kaiser, 1992; Kaiser, 1993) have been successfully trained to use milieu language teaching procedures.

Two other language interventions might be described as naturalistic language teaching procedures. These have been termed "pragmatic teaching strategies" (Angelo & Goldstein, 1990) and "natural language paradigm" (Laski, Charlop, & Schreibman, 1988). The pragmatic teaching strategies approach of Angelo and Goldstein (1990) was very similar to milieu teaching, especially time-delay, combined with the use of a communication board. The natural language paradigm approach of Laski, Charlop, and Schreibman (1988) was a combination of the mand-model procedure and massed practice.

Naturalistic language teaching has been found to be effective for children from low-income families (e.g., Hart & Risley, 1975, 1980), children with mental retardation (e.g., Gobbi et al., 1986; Warren, 1992), children with developmental delays (e.g., Angelo & Goldstein, 1990; Oswald, Lignugaris/Kraft, & West, 1990), children with language delays (e.g., Rogers-Warren & Warren, 1980; Warren, McQuarter, & Rogers-Warren, 1984), children with autism (e.g., Charlop, Schreibman, & Thibodeau, 1985; Laski, Charlop, & Schreibman, 1988) and children from at-risk families (Peterson, Carta, & Greenwood, in press). Studies have demonstrated that children were able to acquire and generalize across a range of language targets, including single words (e.g., Charlop, Schreibman, & Thibodeau, 1985; Warren & Gazdag, 1990), combinations (e.g., Cavallaro & Bambara, 1982; Warren & Bambara, 1989), complexity of sentences (e.g., Hart & Risley, 1980), initiations and requests (e.g., Angelo & Goldstein, 1990; Warren, McQuarter, & Rogers-Warren, 1984; Warren, Yoder, Gazdag, Kim, & Jones, 1993), signing (e.g., Carr & Kologinsky, 1983; Kaczmarek, Hepting, & Dzubak, 1996), reading (e.g., Fabry, Mayhew, & Hanson, 1984) and receptive language (e.g., McGee, Krantz, Mason, & McClannahan, 1983; McGee, Krantz, & McClannahan, 1986). In addition, naturalistic language teaching procedures have been successfully implemented across a range settings, including preschools (e.g., Hart & Risley, 1975, 1980; Warren & Gazdag, 1990; Warren, McQuarter, & Rogers-warren, 1984), classrooms (e.g., Angelo & Goldstein, 1990; Charlop, Screibman, & Thibodeau, 1985), residential facilities (e.g., Halle, Marshall, & Spradlin, 1979; McGee,

Krantz, Mason, & McClannahan, 1983), clinics (e.g., Laski, Charlop, & Schreibman, 1988; Matson et al., 1993), and family homes (e.g., Ingenmey & VanHouten, 1991).

#### Naturalistic Language Teaching vs. Discrete Trial Training

Naturalistic language teaching has been compared to discrete trial training, a trainer-directed approach to language intervention (Fey, 1986; Spradlin & Siegel, 1982; Sundberg & Partington, 1998). Discrete trial training is conducted under highly structured conditions, in which the interventionist selects the stimulus items to be used during training, divides the target language skills into a series of independent tasks, presents these tasks in a series of massed trials until criterion is met, and provides an arbitrary reinforcer combined with praise (Sundberg & Partington, 1998, pp. 254-256). In contrast, naturalistic language teaching is considered "looser" (Sundberg & Partington, 1998), with less of an emphasis, at least initially, on the correctness of the child's response. This approach follows the child's lead in terms of the stimulus of interest and provides a "natural reinforcer" (usually the object of interest to the child). The reinforcers delivered in naturalistic language teaching are considered to be more functional in relation to the child's response than in the discrete trial training approach (Sundberg & Partington, 1998).

A number of studies have compared naturalistic teaching with discrete trial training. For example, Miranda-Linne and Melin (1992) found that although children acquired color adjectives faster when taught using discrete trial training, the generalization effects were stronger following incidental teaching. Similarly, McGee, Krantz, and McClannahan (1985) reported that incidental teaching promoted greater generalization across people and settings than did a traditional trainer-directed approach. The authors felt that if they had used more exemplars during incidental teaching, the generalization effects would have been even stronger. Seifert and Schwarz (1991) compared incidental teaching and direct instruction techniques and found that incidental teaching promoted greater generalization across concepts to untrained concepts. Carr and Kologinsky (1983) employed discrete trial training procedures and then faded to incidental teaching to teach signing to three children with autism. The results indicated that discrete trial training was best for training the correct form of signs, incidental teaching was more likely to promote generalization and maintenance. Charlop-Christy and Carpenter (2000) compared discrete trial training, incidental teaching and their modified incidental teaching sessions (a combination of discrete trial and incidental teaching). They found that modified incidental teaching were superior to discrete trial or incidental teaching alone.

In the traditional trainer-directed approach (i.e., discrete trial training), language intervention is typically conducted in a speech therapy room and is highly structured by the interventionist (Fey, 1986; Sundberg & Partington, 1998). Naturalistic language teaching approaches such as incidental teaching or milieu language teaching typically work with the child in his or her natural setting (i.e., classroom or home) and usually follow the child's lead or interest, not in terms of language skill goals, but in relation to toys and other objects of interest to the child. This requires the interventionist to respond more flexibly to naturally occurring language teaching

opportunities as they occur throughout the day. The interventionist must also be able to identify potential reinforcing contingencies that will be functional for the child in other settings (D. Baer, personal communication, May 30, 1996).

In naturalistic language teaching, the role of the interventionist often changes from providing direct intervention to acting as a consultant or trainer of the child's teacher or caregiver, who then implements the procedures (Achilles, Yates, & Freese, 1991; Bunker, McBurnett, & Fenimore, 1987; Cipani, 1989). This change in role can be advantageous in that the teacher or caregiver has far more opportunities throughout the day to engage in milieu language teaching than would a speech and language interventionist in a traditional pull-out program (Fey, 1986). Ideally, the use of these naturalistic language teaching procedures would become "automatic" to the teacher or caregiver and be used naturally throughout the day. Perhaps the most difficult part of this training is teaching caregivers and teachers how to identify naturally occurring opportunities for language interaction.

A number of studies have successfully trained teachers (e.g., Halle, Baer, & Spradlin, 1981; Kaiser, Ostrosky, & Alpert, 1993; Warren, McQuarter, & Rogers-Warren, 1984), therapists and trainers (e.g., Charlop, Schreibman, & Thibodeau, 1985; Hester, Kaiser, Alpert, & Whiteman, 1995; MacDuff, Krantz, MacDuff, & McClannahan, 1988; Warren, 1992), staff (e.g., Halle, Marshall, & Spradlin, 1979), and parents (e.g., Alpert & Kaiser, 1992; Hemmeter & Kaiser, 1994; Laski, Charlop, & Schreibman, 1988; Peterson, Carta, & Greenwood, in press) to implement naturalistic language teaching strategies. For example, Alpert and Kaiser (1992) found that mothers generalized their use of milieu language teaching techniques to other situations in the home. Some studies have reported difficulty in teaching the use naturalistic language teaching skills, particularly those employing younger intervention agents such as siblings (Hancock & Kaiser, 1996) and peer tutors (McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992). For example, in Hancock and Kaiser's (1996) study using siblings as intervention agents, generalization occurred for only one of three target children.

#### Naturalistic Language Teaching and Generalization

Poor generalization of children's language skills following traditional speech and language intervention has been of great concern to researchers and interventionists for some time (e.g., Fey, 1986, 1988; Guess, Keogh, & Sailor, 1978; Warren, 1988). Fey (1986) has called this a "black mark" on the history of language intervention. Stokes and Baer (1977) defined generalization as "the occurrence of relevant behavior under different, nontraining conditions (i.e., across subjects, settings, people, behaviors, and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions" (p. 350). There are a variety of techniques that can be used to transfer stimulus control to nontraining environments.

Stokes and Baer (1977) identified a number of methods that have been utilized to promote generalization.

These included: (a) train the child and hope that the new behavior generalizes to other environments, (b) modify the behavior in every setting in which the behavior is desired, or "sequential modification," (c) introduce behaviors that will contact naturally occurring contingencies of reinforcement in the generalization settings, (d) provide a range of examples of the target behavior, (e) vary the training routine enough to provide the child exposure to a wider range of stimuli, or "train loosely," (f) make it difficult for the child to discriminate the contingencies, possibly through the use of an intermittent schedule of reinforcement, (g) program common stimuli in both the training and generalization settings, (h) mediate generalization via the child's own verbal behavior, and (i) train the child to generalize. These procedures have been discussed in relation to language intervention (e.g., Costello, 1983; Fey, 1986), teacher training (e.g., Halle, Baer, & Spradlin, 1981), social skills training (e.g., Stokes & Osnes, 1986), and even in martial arts training (Harding, 1993; Harding, Wacker, Berg, Rick, & Lee, 2004).

A number of procedures for promoting generalization based on the recommendations put forward by Stokes and Baer (1977) can be applied to the problem of generalization failure in language acquisition. Most of these procedures can be found in naturalistic language teaching techniques.

Taken together, there are a number of common features among naturalistic language teaching procedures. As listed in Kaiser, Yoder, and Keetz (1992, p. 9), these include: (a) language teaching that follows the child's lead or interest, (b) the use of multiple, naturally occurring examples, (c) explicit prompts for the child to use language, (d) the use of natural consequences to reinforce the child's verbal behavior, and (e) the use of **embedded** naturalistic language teaching strategies in the ongoing interactions between caregiver or teacher and child. These features are compatible with the strategies proposed by Stokes and Baer (1977) for promoting the generalization of functional language skills in children (Warren & Kaiser, 1986). Following the child's lead or interest and the use of natural consequences increases the probability that his or her behavior will contact naturally occurring contingencies of reinforcement. The loose structure of this approach makes it more likely that the child will be exposed to multiple exemplars (Laski, Charlop, & Schreibman, 1988), including variations in location, position of trainer, time of day, etc. (see Baer, 1981). This may prevent the behavior from coming under too narrow a range of stimulus control (Kirby & Bickel, 1988). Similarly, the embedded nature of the ongoing teaching interaction may make some of the contingencies less discriminable, perhaps creating "multiple stimulus control" (Skinner, 1957; see also Halle, Baer, & Spradlin, 1981). Furthermore, the fact that training is conducted in natural contexts makes it more likely that stimuli common to a wide range of potential language environments will be present. This is, in effect, a case of "programming common stimuli" (Stokes & Baer, 1977). Finally, it may also be that the language skills taught in the naturalistic language teaching approach, as compared to more traditional speech and language therapy (i.e., discrete trial training), are more functional for the child and, therefore, more likely to facilitate generalization (Fey, 1986; Guess, Keogh, & Sailor, 1978; Sundberg & Partington, 1998).

Skinner's (1957) discussion of verbal behavior may also shed some light on the generalization process in

language intervention. Naturalistic language teaching often takes advantage of mand situations in which an establishing operation is functioning (Sundberg & Partington, 1998). Much of traditional language intervention involves the use of tact training with somewhat irrelevant consequences for the child. Mand training, particularly in naturalistic language teaching, employs the use of consequences that are functional for the child across a range of environments (Sundberg & Partington, 1998). In addition, Skinner (1957) discussed the influence of multiple control in language. Naturalistic language teaching actively attempts to establish situations involving multiple control through its emphasis on multiple exemplars. Finally, Skinner's (1957) concept of automatic reinforcement may encourage generalization because it may bring strong contingencies into the generalization settings.

Some studies of naturalistic language teaching have identified factors that may have facilitated or inhibited generalization effects. Carr and Kologinsky (1983) speculated that the children's initial generalization across adults and settings in their study may have been facilitated by the use of multiple exemplars in training and by the presence of the same "monitors" in both the training and generalization settings (i.e., programming common stimuli). The authors also reported, however, that generalization of children's correct signing decreased when teachers in the generalization setting did not reinforce these new behaviors.

McGee, Krantz, Mason, and McClannahan (1983) found that two children with autism generalized their newly acquired receptive language skills across settings, from the kitchen to the dining room in a group home. It should be noted, however, that the same trainer and objects were used in the generalization setting as in the training setting. This, no doubt, made generalization much more likely. Similarly, McGee, Almeida, Sulzer-Azaroff, and Feldman (1992) believed that the generalization they did achieve was possibly due to the presence of similar stimuli in both the training and generalization environments. In another study, Gobbi et al. (1986) used multiple trainers to facilitate generalization, which was an example of providing multiple exemplars.

Hemmeter, Ault, Collins, and Meyer (1996) reported that children's language skills did not generalize across settings and speculated that this was due to a stimulus control problem. According to the authors, this may have been due to a very different generalization environment that minimized opportunities to use language targets. In an effort to promote independence, materials in the generalization environment were directly accessible to students. In addition, staff in the generalization setting were not trained in naturalistic language teaching procedures. The authors speculated that an environment arranged to foster independence may actually work against an incidental teaching approach in which objects are placed such that students have to ask for them. Cavallaro and Bambara (1983) reported that children's language skills did not generalize following incidental teaching. They speculated that generalization did not occur because too few training sessions were conducted.

Kaiser and Hester (1994) found that children participating in their study showed good generalization of their individual language goals to their parents, but more limited generalization across teachers and peers. The

authors speculated that peers used fewer mands than parents and that teachers were often working with at least two other children during generalization probes whereas the interaction between parent and child was usually one-to-one.

While all three children participating in the Warren and Bambara (1989) study generalized their use of the action-object form to nonobligatory situations, only one participant generalized across settings and adults. Interestingly, Warren and Bambara (1989) noted in their study that the one participant who did generalize across settings and adults had more severe developmental disabilities than the other children in the study and received the fewest training sessions. However, the authors also noted that her teacher (to whom her verbal behavior generalized) was far better at engaging her conversationally than the teachers of the other participants, possibly facilitating generalization. Warren and Gazdag (1990) reported good generalization effects across settings and adults as well as recombinant generalization for two children participating in their study. Warren, Gazdag, Bambara, and Jones (1994) facilitated generalization by having different peers present while target children were receiving milieu language teaching. This strategy could be seen as programming common stimuli (Stokes & Baer, 1977). Similarly, Warren, Yoder, Gazdag, Kim, and Jones (1993) and Yoder, Warren, Kim, and Gazdag (1994) used two different trainers for each child to facilitate generalization. The last two generalization strategies involve the provision of multiple exemplars (Stokes & Baer, 1977).

In a review of the milieu language teaching literature, Peterson (in preparation) found that 94% of the studies measuring for generalization effects demonstrated generalization. In addition, 86% of the studies measuring for maintenance effects reported maintenance. Some limitations were revealed in the literature, however. Problems with generalization were noted if the child's newly learned language skills were not reinforced in the generalization environments (e.g., Carr & Kologinsky, 1983; Warren & Bambara, 1989). In addition, generalization failed to occur if the generalization settings were too dissimilar to the training settings (e.g., Hemmeter, Ault, Collins, & Meyer, 1996; McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992). These are both stimulus control problems (see Kirby & Bickel, 1988). In contrast, some of the studies that reported successful generalization had very similar training and generalization settings (e.g., Carr & Kologinsky, 1983). Limited generalization was also noted when too few sessions were conducted (e.g., Cavallaro & Bambara, 1982). This may have resulted from an insufficient number of exemplars presented during the child's training. The strategies employed that seemed to have promoted generalization in the naturalistic language teaching studies described above include the programming of common stimuli (e.g., McGee, Krantz, Mason, & McClannahan, 1983; Warren, Gazdag, Bambara, & Jones, 1994), the use of multiple exemplars during training (e.g., Carr & Kologinsky, 1983; Warren, Yoder, Gazdag, Kim, & Jones, 1993).

#### Conclusions

Naturalistic language teaching has been demonstrated to be an effective approach to children's language

intervention and may be particularly useful in facilitating the generalization and maintenance of children's language skills following intervention. This conclusion is consistent with those of other authors who have reviewed this literature (Hepting & Goldstein, 1996; Kaiser, Hendrickson, & Alpert, 1991; Kaiser, Yoder, & Keetz, 1992; Warren & Kaiser, 1986). For example, in their review of the incidental teaching literature, Warren and Kaiser (1986) found that this approach was effective in increasing specific language targets and in facilitating generalization. The authors stated that further research was needed to ascertain the more general effects of incidental teaching (i.e., increases in general vocabulary, complexity of language) and that the interaction between child characteristics (i.e., IQ) and incidental teaching be studied. They also recommended that further research was needed to determine the best methods for training teachers and parents to implement incidental teaching. Similarly, Kaiser, Yoder, and Keetz (1992) stated that milieu language teaching was an effective means of increasing children's use of specific language targets. However, they argued that the milieu language teaching research on generalization effects was methodologically weak. For example, Kaiser et al. (1992) argued that across-setting and across-persons generalization data are weak because the settings and persons in the training and generalization contexts are too similar. They also advocated that future research study the effects of different levels of intervention duration and intensity.

Overall, naturalistic language teaching strategies, including incidental teaching, mand-model, time-delay, and milieu language teaching appear to be effective means to promote the acquisition, generalization and maintenance of language skills. Studies comparing naturalistic strategies to other, more trainer-directed procedures (i.e., discrete trial training) found that children who were exposed to naturalistic language teaching were more likely to generalize their use of language (see Peterson, in preparation). Positive effects have been found for a variety of participants, including children from low-income families (e.g., Head Start), children with mental retardation, children with developmental disabilities, children with language delays, children with autism, and children from at-risk families. Successful acquisition, generalization and maintenance of children's language skills was reported across a range of settings, including preschools, classrooms, residential facilities, clinics, and homes and across a range of intervention agents, including teachers, therapists and trainers, staff, and parents. Acquisition and generalization effects were demonstrated for a range of language targets, including single words, combinations, complexity of sentences, initiations and requests, signing, reading, and receptive language.

Some limitations in the existing literature have emerged, however. Although generalization effects were abundant, a number of studies identified problems achieving those effects. First, some stimulus control problems were identified. If the new language behavior was not reinforced in the generalization setting, then generalization was less likely to occur. Similarly, if the generalization environment was too dissimilar from the training environment generalization was not as likely to occur. Many of the studies reporting successful generalization had very similar training and generalization settings. However, this has been criticized by Kaiser, Yoder, and Keetz (1992) as a weak measure of generalization effects. Other research reported difficulties with generalization and maintenance when too few training sessions occurred. In this case, generalization may have failed because

the child was provided with too few exemplars of the new behavior. Despite the advantages of naturalistic language teaching, it is clear that generalization must still be planned for.

Although naturalistic language teaching has been demonstrated both empirically and conceptually to be an effective set of methods for promoting acquisition and generalization, more research is required. First, further research might look more closely at the factors that promote generalization (see Warren & Kaiser, 1986). For example, a systematic comparison of training carried out with varying numbers of sessions, the level or type of the child's language impairment, number of trainers or variety of stimulus examples (i.e., multiple exemplars), different types of procedures, and the quality of implementation or treatment fidelity (Carta & Greenwood, 1989) would be useful in the design of future intervention strategies. In addition, it would be useful to determine how similar the training and generalization environments must be to facilitate generalization. Furthermore, it would be beneficial to ask what is the interaction between discrete trial training and naturalistic teaching? Some interventionists begin intervention with discrete trial training and move to naturalistic teaching as the child acquires more language skills and becomes more engaged. Several questions emerge. When is the optimum time to make this transition? For what types of children is it necessary to begin intervention with discrete trial training and then switch to naturalistic teaching? When is it better to begin with naturalistic teaching?

Second, how naturalistic teaching skills are acquired needs to be examined more fully. Techniques for training teachers and caregivers how to analyze training and generalization environments, how to identify naturalistic language teaching opportunities (i.e., following the child's lead), and how to plan for generalization need to be developed. One might ask why naturalistic teaching comes "naturally" to some parents and caregivers and not to others. What factors might facilitate the acquisition of these skills by teachers and caregivers and what factors might inhibit their acquisition? Future studies might also look at strategies to help caregivers and teachers incorporate naturalistic language teaching into their daily routine (e.g., Laski, Charlop, & Schriebman, 1988).

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