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Enhancing Communication and Language Development in Young Children With Developmental Delays and Disorders

Steven F. Warren and Paul J. Yoder

In this article, we present an overview of past and present research on early communication and language intervention at the John F. Kennedy Center for Research on Human Development. First, we present three basic premises that inform most research on early communication and language intervention at the Kennedy Center. Second, we present brief summaries of seven lines of contemporary research by Kennedy Center investigators that have and continue to influence the development of effective communication and language intervention approaches. Several basic findings that have emerged from this

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research are described. We conclude with brief descriptions of some of the problems that Kennedy Center scientists are presently investigating.

Research on ways to enhance communication and language development in young children with developmental delays has been a mainstay of the Kennedy Center since its founding. In the late 1960s and early 1970s, the groundbreaking efforts of Diane and Bill Bricker resulted in one of the first comprehensive early language intervention curricula (Bricker & Bricker, 1974). During this same period, the work of Jim and Lee McLean provided part of the conceptual foundation for a shift from structurally oriented (e.g., teaching the rules of syntax) to more pragmatically oriented (e.g., teaching basic communication functions) approaches for children (and adults) with severe disabilities (McLean & Snyder-McLean, 1978).

The departure of the Bricker and McLean research teams in the mid-1970s had predictable effects on communication and language intervention research at the Kennedy Center. The arrival of new researchers—Ann P. Kaiser, Steve Warren, and Paul Yoder—in the early 1980s, however, helped to revive the Center's efforts, as did the addition of Steve Camarata in 1991. From the initial efforts in the 1960s through the research on communication intervention being conducted today at the Center, substantial support from the National Institutes of Health (principally the National Institute of Child Health and Human Development [NICHD] and the National Institute on Deafness and Communication Disorders) and the Office of Special Education Programs of the U.S. Department of Education has played a critical role.

The purpose of this article is to provide an overview of past and present research on early communication and language intervention at the Kennedy Center. First, we present the basic premises that guide most research on early communication and language intervention at the Kennedy Center. Second, we summarize seven lines of contemporary research by Kennedy Center investigators that have heavily influenced the development of naturalistic communication and language intervention approaches. We briefly summarize a number of basic findings that have come out of this research and then describe several of the problems on which Investigators are presently focused.

Basic Premises

The research on early communication and language intervention at the Kennedy Center has been based on a small set of basic premises that have

been modified but not fundamentally altered over the past 30 years. Three of these premises are discussed here.

Premise 1

Premise 1 is that an individual's ultimate ability to communicate effectively will disproportionately determine his or her success in school, work, and social relationships. In recent years, children's communication and language skills have been linked by researchers to a range of problems experienced by school-age children, including behavior disorders (Baker & Cantwell, 1987; Trautman, Giddan, & Jurs, 1990) and reading difficulties (Fey, Catts, & Larrivee, 1995). Evidence also suggests that instead of being "subservient" to basic cognitive development, as Piaget (1962) implied, language development drives at least some aspects of cognitive development and clearly plays a major role in the development of at least some higher level cognitive abilities (Bates, 1979; Bates, Thal, & Marchman, 1991). Finally, our increasingly technological world assumes an advanced level of communicative competence in workers, particularly when compared to the level of communication skills needed by workers in the past. Indeed, individuals' communication abilities will determine to a large extent the nature of their work and job prospects, social and educational opportunities, and overall quality of life. Conversely, individuals who fail to acquire effective communication skills will likely endure lives of undue dependency, social isolation, and restricted opportunities, irrespective of whatever other abilities they may possess.

The fundamental truth of this first premise may seem so obvious that it does not even need to be stated. Nevertheless, communication and language skills are often treated as just one of many curriculum domains in early intervention programs—a status that belies their overwhelming importance relative to virtually all other domains of development.

Premise 2

Premise 2 is the earlier we intervene to enhance communication and language development, the better. As logical as this premise seems, we are only gradually coming to understand its true importance in research and in practice. Much of the research on language intervention that was done 20 or more years ago was carried out with older children and adolescents (Schiefelbusch & Lloyd, 1974; Warren, 1993). Even during the past decade, the preponderance of published early intervention research concerns chil-

dren age 3 or older, yet a typical 3-year-old has already acquired most of the basic language system and is usually an incipient talker. Furthermore, it is becoming increasingly clear that waiting to intervene until a child is 3 or more years of age may cause us to miss much of what may be an optimal period in terms of brain development.

For decades, researchers have sought to determine if there is a “critical period” for language acquisition in human beings—a period after which it becomes virtually impossible to acquire language. Little evidence for such a rigid, deterministic period has emerged (Newport, 1990). Nevertheless, the notion of an optimal period—a period during which language acquisition proceeds quicker and easier than at other times—has received increasing theoretical and empirical support, at least in terms of the development of morphology and phonology (Locke, 1994; Mogford & Bishop, 1988). Brain development peaks by 48 months, about the same time that most grammatical structures have been acquired and concurrent with the onset of a period of stabilization and automatization in linguistic and cognitive events. After 4 years there is a slow monotonic decline in synaptic density and overall levels of brain metabolism corresponding with a gradual increase in the “accessibility” of complex grammatical forms and a slow decrease in the capacity of second language learning and recovery from aphasia (Bates et al., 1991).

Is this first 48 months a period of optimal development, a period when intervention can have its greatest impact on a child’s overall communication abilities at the least cost? The logical answer to this question, is “Yes, of course.” Unfortunately, we do not yet have an empirical answer because most language intervention research has been conducted with children who were 3 years old or older at the start of intervention. Locke (1994) noted that “behavior constantly pushes the young brain around, and it is eminently reasonable to suppose that remediation—undertaken early and pursued rigorously—reorganizes the brain” (p. 614). This notion certainly supports the premise of the earlier the better. However, both researchers and practitioners are having to redefine what is implied by the term *early* in early intervention. In practice, this term has often meant “at age 3 or older.” Increasingly, research on early brain development suggests that early needs to mean as close to the typical genesis of communication (i.e., 9 months in a typical child) as possible. The issue of how early is early enough leads directly to our third basic premise.

Premise 3

Premise 3 is that the quality and quantity of input the young child receives from his or her environment is crucially important. The assump-

tion underlying this premise is that inadequate input may cause or contribute to language delay and, conversely, that enhanced input might have a remedial effect on development. There is substantial evidence that typically developing young children experience vast differences in terms of the quantity and quality of linguistic input they receive and that these differences generally correlate with various measures of development later in childhood (Hart & Risley, 1992, 1995). Perhaps because they often display low rates of initiation and responsiveness (Rosenberg, 1982; Yoder, Davies, & Bishop, 1994), young children with developmental delays are even more likely to experience input that differs substantially in quantity and quality from the input that high-achieving, typically developing children receive.

From birth, an individual swims in an ocean of language interaction. He or she is exposed to the language acquisition curriculum 14–16 hr per day, 365 days per year. Furthermore, much of this curriculum is specifically adjusted and fine tuned (Bruner, 1975; Sokolov, 1993) to the child's language level. Children who experience a relatively depressed rate of input or relatively poor quality input, gradually (day by day) build up a cumulative input deficit of staggering proportions (e.g., differences of many thousands of hours of quality interaction and exposure to millions and millions of meaningful words and sentences; Hart & Risley, 1995). As there is more of a deficit over time, it represents an increasingly difficult wall to climb in terms of compensatory experience. Meanwhile, the window of optimal development (i.e., the first 4 years of life) is gradually closing. If the child enters first grade with a serious deficit in skills and experiences, that child will obviously be at risk for failure in a grade-based system that assumes a certain minimum language competency as a basis for learning to read.

The three premises that early language intervention is based on—language skills are critically important to optimal development in general, the earlier intervention starts the better, and the environment can make a big difference (either positively or negatively)—can be defended logically, theoretically, and empirically. Perhaps, more important, they all seem like good candidates to pass the “Grandma test.” That is, if you suggested to your grandmother that these things might be important to development, the probable response would be something like “Sure. Now tell me something I don't already know.” Despite Grandma's observation, however, each of these premises has been the subject of intense debate, research, and discussion over the years.

Contributions to Science and Practice

Initial efforts to enhance communication and language development tended to be highly structured, with a heavy focus on the form and structure of language as opposed to the function and use of language and other forms of communication (e.g., Gray & Ryan, 1973; Kent, Klein, Falk, & Guenther, 1972). Many factors (e.g., restricted generalization of effects, growing emphasis on the pragmatics of language, studies of how mothers typically interact with young language learning children, etc.) influenced a small group of researchers to begin developing and testing more naturalistic methods of language intervention in the late 1970s and early 1980s. This movement was also heavily influenced by a series of studies conducted by Betty Hart and Todd Risley (1975, 1980) at the University of Kansas on a set of procedures they termed *incidental language teaching*. In the early 1980s, these procedures were complimented by several closely related techniques (e.g., time delay, mand-model) that gradually coalesced into a general approach to early language intervention known as *milieu teaching* (Kaiser & Warren, 1988; Warren, 1991).

Milieu teaching procedures share a set of common features: (a) teaching is based on following the child's attentional lead and establishing joint attention; (b) teaching episodes are brief, positive, and embedded in and distributed across developmentally appropriate activities that occur throughout the child's day; (c) form, content, and function are taught simultaneously; (d) general communication forms and functions (e.g., nouns, verbs, requests) that are on the cutting edge of the child's productive communication competence are explicitly targeted; and (e) directives (e.g., questions, mands, models) are utilized as necessary to elicit production of targets related to the child's focus of attention. On a continuum of intervention approaches running from highly unstructured "responsive interaction" procedures (e.g., MacDonald, 1989) to highly structured "direct teaching" procedures (e.g., Englemann & Osborn, 1976), milieu teaching falls roughly in the middle (Fey, 1986; Warren & Yoder, 1994). The majority of early communication and language intervention research at the Kennedy Center since 1982 has concerned a set of issues growing out of the development of milieu teaching techniques or approaches that contrast in some key way with these procedures. Seven lines of research heavily influenced by the movement (exemplified by milieu teaching) toward naturalistic language intervention approaches are briefly described next.

Development of Basic Milieu Intervention Techniques

The specification of the basic milieu teaching techniques and the determination of their short-term, generalized effects on a wide variety of communication and language targets were conducted almost exclusively via the use of single-subject research methodology, with a substantial number of replications across targets and subjects (Kaiser, Yoder, & Keetz, 1992). Using this methodology, generalized effects of milieu teaching intervention have been reported with basic vocabulary (Warren, 1992) and basic semantic relations (Warren & Bambara, 1989; Warren & Gazdag, 1990; Warren, Gazdag, Bambara, & Jones, 1994). Effects have also been reported on such general measures of development as mean length of utterance, rates of initiation, and responsiveness in obligatory speech situations (e.g., Warren & Bambara, 1989; Warren, McQuarter, & Rogers-Warren, 1984). A thorough review of the effectiveness of milieu teaching is provided by Kaiser et al. (1992).

Parents as Milieu Language Teachers

The use of milieu teaching as a form of parent-based intervention makes sense on a number of dimensions. Parents obviously play a key role in their children's early language development and are heavily invested in assuring their children's optimal communication development. Also, some of the features of milieu teaching (e.g., an emphasis on the function of communication, following the child's attentional lead, embedding teaching on ongoing interaction) are basic components of typical parent-child interaction (Hart, 1985). Kaiser and her colleagues have investigated the effects of parent-based intervention in a series of studies (Alpert & Kaiser, 1992; Hemmeter & Kaiser, 1994; Hester, Kaiser, Alpert, & Whiteman, in press; Kaiser, Hemmeter, Ostrosky, Alpert, & Hancock, 1995; Kaiser, Hester, Alpert, & Whiteman, 1995). This research has demonstrated that parents can be trained to be effective milieu teachers for their own children and, most important, that parent delivered milieu teaching can enhance children's language development in important ways.

Prelinguistic Milieu Teaching

As we noted earlier, logic, theory, and an increasingly diverse set of data indicate that language intervention may be more effective if it starts as early in the development of communication as possible and as near to the genesis

of the child's delay. Warren and Yoder developed a set of procedures designed to enhance the frequency and clarity of intentional prelinguistic communication functions such as requesting and commenting. Their initial investigations of the effects of this approach demonstrated unusually strong generalization (Warren, Yoder, Gazdag, Kim, & Jones, 1993; Yoder, Warren, Kim, & Gazdag, 1994). Based on the promising nature of this work, they are presently conducting a longitudinal experimental analysis of the effects of prelinguistic milieu teaching on the language development of 60 young children with mental retardation with grant support from NICHD and the Office of Special Education Programs.

Effects of Growth Recasts

A growth recast is a simple but powerful technique in which an adult repeats a child's previous utterance, adding an important bit of syntactic, semantic, or phonological information. For example, the child might say "ball" and the adult recasts his statement via a question—"You want the ball?" Recasts naturally occur in adult-child interactions and appear to be a primary vehicle by which children learn increasingly complex forms of language (Nelson, 1989). Camarata and his colleagues (Camarata, 1993, 1995; Camarata, Nelson, & Camarata, 1994) have been systematically studying the effects of recasts and other elements of responsive interaction interventions. They have demonstrated some impressive effects of recasts on the development of syntactic and semantic structures and on intelligibility in specific language impaired children at this simple sentence stage and beyond. Yoder, Spruytenburg, Davies, and Edwards (1995) found that a combination of growth recasts and topic-continuing questions had a powerful and generalized effect on the length of utterance in children with mental retardation.

Getting Children to Talk to Adults

Because growth recasts can only be used when the child talks, it is important to get children with language delays to talk to the parents and professionals who are responsible for their development. Yoder and his colleagues (Yoder, Davies, & Bishop, 1994; Yoder, Davies, Bishop, & Munson, 1994) found that adult questions that continued the children's established topic encouraged children with developmental delays in the one- and two-word language stage to continue talking about the topic. In addition, these children were found to talk more frequently and more intelligi-

bly about very familiar topics than about less familiar ones (Yoder & Davies, 1992a, 1992b).

Generating Transactional Effects

Children engage in interactions all day long in which they have the potential to learn and refine new communication and language skills. Meanwhile, even naturalistic forms of intervention that are designed to be embedded in ongoing interaction are likely to represent only a tiny portion of the child's total interaction. Therefore, changes in child behavior that naturally elicit language teaching from adults may lead to powerful, longitudinal changes in communication development (Warren, 1993). The determination of such transactional effects has been at the heart of several investigations conducted by Yoder and his colleagues. One way to determine how children influence the adults around them to use behaviors that in turn facilitate the children's language development is to examine what types of utterances or communication acts mothers typically respond to using language-facilitating behaviors. For example, Yoder and colleagues found that mothers are most likely to respond to prelinguistic communication acts that show attention to both the adult and the object of interest (Yoder & Munson, 1995; Yoder, Warren, Kim, & Gazdag, 1994). In fact, when Yoder, Warren, Kim, and Gazdag (1994) facilitated such communication acts in four prelinguistic children with developmental disabilities, the mothers not only used more responses, but increased the proportion of child acts to which they responded.

Another example of such transactional effects occurs during the early language period. Remember that adult topic questions elicit children's conversational participation. Yoder, Davies, and Bishop (1994) found that adults use topic-continuing questions after children's intelligible and topic-continuing utterances more than any other type of utterance. In addition, Yoder, Klee, Hooshyar, and Shaffer (in press) found that mothers naturally recast multiword intelligible utterances more than shorter, less intelligible utterances. The next logical step is to attempt to facilitate the child's use of utterance types that mothers naturally respond to with language-facilitating utterances such as topic-continuing questions and growth recasts.

Relative Efficacy of Interventions

The specification and development of basic intervention protocols and procedures have allowed investigators to begin asking questions about the

relative efficacy of different approaches (e.g., milieu teaching vs. a responsive interaction approach). In addition to well-developed intervention protocols, efficacy studies necessitate relatively large numbers of subjects and rigorously implemented experimental designs complete with random assignment of subjects to conditions. Yoder and his colleagues conducted comparative analyses of milieu teaching with two other primary language intervention approaches: a didactic (i.e., drill and practice) approach and growth recasts. In both cases, the children had global developmental delays, and their language targets were semantic or grammatical. The relative efficacy of the language intervention approaches in both cases depended on the developmental level of the children. In both studies, children in the single-word stage of language acquisition with vocabulary goals benefitted most from the milieu teaching approach (Yoder, Kaiser, & Alpert, 1991; Yoder, Kaiser et al., 1995). In contrast, children in the simple sentence stage of language acquisition with grammatical goals benefitted more from growth recasts (Yoder, Kaiser et al., 1995). With regards to the drill-and-practice program, children whose speech was very intelligible and who self-initiated a large proportion of their utterances benefitted more from the drill-practice program than from the milieu approach. Examining children with specific language disorder in the simple sentence stage or beyond, Camarata et al. (1994) found that growth recasts were more efficient than a drill-and-practice method that emphasized only productive training in facilitating spontaneous use of grammatical targets.

Some Representative Findings

Summarizing the findings of several multifaceted long-term research programs in a few pages is a daunting task. Nevertheless, at the risk of leaving out many important findings and overgeneralizing several others, we attempt to reduce this rich knowledge base to seven statements:

1. Milieu teaching is particularly effective (compared to direct teaching or responsive interaction approaches) at facilitating the development of a range of target skills that typically emerge during the one- and two-word stage of productive language development (i.e., vocabulary, basic semantic relations) and can be effectively used by parents, teachers, and other interventionists.
2. Prelinguistic milieu teaching can be used effectively to increase the frequency and clarity of basic communication functions such as requesting and commenting. These effects appear to generalize broadly.

3. Young, typically and atypically developing children initiate more frequently and use more complex language within routines, when adults follow their attentional lead, and in response to questions concerning topics with which they are already engaged. These findings are important because these represent fundamental elements of milieu teaching interventions.

4. Transactional effects (e.g., changes in parent behavior in response to changes in child behavior) are particularly striking early in communication development.

5. Recasts, a fundamental element of responsive interaction interventions, are relatively more effective with children at the simple-sentence stage or beyond in language development.

6. Longitudinal and general effects of early communication and language intervention remain unclear. Few research studies have investigated these issues to date.

7. The extent to which the techniques described previously have been transferred into actual practice in the field and have increased the effectiveness of early communication and language intervention for young children remains largely unknown.

Some Future Directions

Research on communication and language intervention by Kennedy Center Investigators is presently adequately funded, expansive, and focused on several populations of young children with substantial needs, including children with specific language impairments, mental retardation, autism, phonological disorders, and behavior disorders. A decade ago, research aimed at developing specific intervention procedures under tightly controlled conditions using single-subject designs was predominant. In contrast, most of the present work uses longitudinal experimental designs with random assignment and focuses on questions concerning relative effects and mediating variables (e.g., parents, etc.). Such studies have the potential to reveal both the overall impact of interventions and those factors that lessen or enhance these effects. The mere fact that such studies are now possible reflects the maturing of this area of behavioral research. Examples of research efforts presently underway or in the early stages include the following:

1. Yoder and Warren are investigating the longitudinal effects of prelinguistic milieu teaching and the language development of young children with mental retardation. Their investigation includes an analysis of mediating role of child-parent interactions in terms of the longitudinal effects

observed. As a next step, Yoder and Warren proposed to determine the effects of a prelinguistic intervention that would combine prelinguistic milieu teaching procedures applied by interventionists and enhanced maternal responsiveness to determine whether this generates relatively more robust effects.

2. Kaiser is proposing to examine the effects of milieu teaching on the social and communication behavior of children with communication-related behavior disorders and with high-functioning young autistic children.

3. Yoder, Warren, and Camarata are proposing to investigate possible effects of facilitating the intelligibility and complexity of children's language on their mothers' use of recasts and on subsequent growth in children's grammar.

4. Camarata is proposing to determine the longitudinal effects of recasting on the grammatical development of children with specific language impairments. He and Keith Nelson are also proposing a longitudinal comparative analysis of the effects of imitation-based versus conversation-based language intervention on the language development of children with specific language impairment.

Conclusion

Research on early communication and language intervention has been a cornerstone of the behavioral research program of the Kennedy Center since its inception 30 years ago. Over this span of time, intervention procedures have been developed and refined, and researchers are using these methods more often to ask sophisticated questions about the overall impact of such approaches on the development of children with mental retardation and other developmental disorders. Theory and research are increasingly supportive of the potential of such techniques to alter the developmental trajectories of children's language development in meaningful ways.

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