

EMERGING MODEL OF COMMUNICATION AND LANGUAGE INTERVENTION

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Research on methods to enhance and remediate the communication and language development of children with mental retardation and developmental disabilities has been ongoing since the early 1960s. Scores of studies have been conducted over this time period, the vast majority aimed at testing various procedures or intervention "packages" with relatively small numbers of children for very limited periods of time. This "technology building" period is gradually receding and the framework of a developmental model of early communication and language intervention is emerging. This model supports the use of different intervention approaches at different points in a child's development. The purpose of this paper is to describe the basic framework of this emerging model, to provide an overview of the research findings that support it, and to identify high priority areas for further investigation. © 1997 Wiley-Liss, Inc. MRDD Research Reviews 1997;3:358-362.

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PREMISES OF THE DEVELOPMENTAL MODEL

There are two basic premises of the developmental model of communication and language intervention. First, the rate and quality of language input that a child receives is viewed as crucially important to their optimal development. Second, what is the most effective intervention protocol depends on the child's developmental level and the nature of the intervention goal. On the surface, these statements sound simplistically self-evident, but each premise encapsulates much of what has been learned about language development and intervention across three decades of research. Consequently, some discussion of the meaning and interpretation of each is in order.

Input Matters

This premise is important because of the possibility that inadequate input might cause or contribute to language delay and, conversely, that enhanced input (i.e., language intervention) might have a stimulating or remedial effect on development. Since the 1970s, proponents of the social interactionist perspective of language development [e.g., Bruner, 1975; Gallaway and Richards, 1994; Nelson, 1989; Snow, 1984; Tomasello, 1992] have been building the case that adults can play an important role in children's language acquisition. They noted that from birth onward children are exposed to an ocean of language. Hour after waking hour, day after day, month after month, the child encounters the natural curriculum provided by exposure to his/her native language. Furthermore, the millions of words and sentences that children experience are not just undifferentiated sounds. Much of this curriculum is specifically adjusted and fine-tuned [Bruner, 1975; Sokolov, 1993] to the child's language comprehension level. A wide range of teaching devices have been detected in common use by adults, including expansions, models, contingent imitations, growth recasts, use of concrete, simplified vocabulary, slower rate of articulation, use of higher pitch and exaggerated intonation, a focus on objects and events to which the child is attending, etc. [Hoff-Ginsburg, 1986; Menyuk, 1988; Nelson, 1991; Snow et al., 1987; van Kleeck, 1994]. These adjustments, termed "parentese" or "motherese," appear to aid the acquisition of linguistic and communicative competence. The rate at which adults talk to children [Huttenlocher et al., 1991; Hart and Risley, 1995], the rate at which children themselves talk [e.g., Hart and Risley, 1980, 1995; Nelson, 1973], and the responsiveness of parents to their child's communication attempts [Yoder et al., in press] have all been shown to correlate with faster acquisition of various components (e.g., vocabulary growth) of language acquisition.

Counterarguments have been put forth that language input is a relatively unimportant variable. These arguments have largely been based on the fact that most children ultimately acquire language competence (i.e., adult syntax) irrespective of their circumstances or the nature of the input they received as children [Pinker, 1994]. However, such arguments may miss the

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point, at least for children who are at risk for mental retardation and developmental disabilities. There is clear evidence that language input *does* affect the rate and quality of language development for both typical and atypically developing children [Hart and Risley, 1995]. Moreover, development can be enhanced for at least some critical components of the language system (e.g., vocabulary) via modifications in input. Finally, optimal input may have a far greater effect on the ultimate language development of children with developmental disabilities than on typically developing children [Snow, 1994]. The issue, then, from the perspective of language intervention researchers is not “does input matter?” but rather how can it be made to matter the most.

How Input Is Provided Matters Too

Once the premise that input matters is accepted, we can examine the second premise—that the most effective form of intervention depends on the developmental level of the child. The first premise has been accepted as an article of faith by interventionists for decades. This second premise is a more recent addition and its importance is only beginning to emerge as a result of studies of the relative treatment effectiveness of different intervention protocols. The mere fact that such studies are now being conducted is evidence of the field’s movement beyond the initial technology-building stage.

Twenty-five years ago language intervention approaches were developed almost independent of any concern about how they might best match up to different phases in the child’s development or different characteristics of the language skills to be mastered (e.g., pragmatics vs. syntactic rules). However, as an increasingly wide array of approaches and techniques have become available, families of techniques have emerged that vary along a small number of dimensions. Some of the key variables include whether the procedure is based on “following the child’s attentional lead,” whether specific or general goals are targeted, whether elicited imitation prompts are used, whether growth recasts are used, etc. We briefly review the support for three of the primary “families” of techniques that have emerged from the research. These are the responsive interaction approach, milieu teaching, and direct instruction. We selected these intervention approaches because they differ from one another in theoretically important ways that exemplify how different approaches can have differential

effectiveness along the developmental continuum.

Responsive interaction

Many terms are used to describe the responsive interaction approach in the literature, including the interactive model [Tannock and Girolametto, 1992] and the conversational model [MacDonald, 1985]. This approach is widely used in parent training throughout North America. Its major immediate goal is to increase the child’s social communication skills by enhancing the quality of interaction between the adult and child. Interaction is usually initiated and controlled by the child. Adults follow the child’s attentional lead and respond contingently to the child’s behavior in a manner that is congruent with the child’s immediate interest. Modeling, recasting, and expansions of the child’s communication attempts are encouraged [Nelson, 1989], while the use of directives (e.g., elicited imitation, mands, testing questions) is discouraged because it is assumed that they will disrupt the flow of interaction and the child’s attentional engagement [Harris et al., 1986]. Thorough descriptions of the responsive interaction approach can be found in Nelson [1989] and Wilcox and Shannon [in press].

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Responsive interaction approaches are particularly well suited for facilitating the acquisition of higher level morphological and syntactic skills that can be made salient through growth recasts [Nelson, 1989]. A growth recast is a specific expansion or modification of a child’s immediately preceding utterance in which new syntactic or semantic information is added. Theoretically, the

temporal proximity and semantic overlap of the recast and the child’s utterance aids the child in making comparisons between his/her own utterance and the recast. Such comparisons may make differences between the two utterances salient. If this comparison is made at a time when the child is “ready” to acquire the new semantic or grammatical structure [Nelson, 1989], or if the child notices this difference repeatedly in similar linguistic contexts [Camarata, 1995], the child should acquire the structure. Finally, responsive interaction approaches are relatively easy to learn and can be used virtually anywhere, at any time.

Several recent studies have found that responsive interaction approaches are more effective than milieu teaching (discussed below) with children who have a mean length of utterance (MLU) above 2.5, but less effective than milieu teaching with children who have an MLU under 2.0 (the treatments are nonsignificantly different between MLU 2.0–2.5) [Yoder et al., 1995]. Children with MLUs above 2.5 likely have the attentional and memory resources necessary to efficiently learn from recasts that require them to compare their own utterance with the following adult utterance [Yoder et al., 1995].

The relative ineffectiveness of the responsive interaction approach below MLU 2.0 may be due to the avoidance of elicited production prompts (e.g., elicited imitation, test questions, etc.). During this period of development, these types of prompts may be significant contributors to language acquisition. Imitation seems to be a particularly powerful learning strategy at this point in development [Speidel and Nelson, 1989]. Also, a growing body of literature demonstrates that the use of directives (as opposed to redirectives like “look here”) in the context of joint-attention routines (interactions in which both the child and adult focus their attention on the same action or activity) aids learning and social engagement in both typically and atypically developing children [McCathren et al., 1995]. Finally, test questions about the child’s attentional focus (e.g., “What is that?” “What are you doing?”) may aid children in verbally participating in activities while giving adults a window into the child’s thoughts that allow them to construct teaching episodes about the child’s focus of attention [Yoder et al., 1994a].

Milieu teaching

Milieu teaching subsumes several specific techniques, including incidental

teaching [e.g., Hart and Risley, 1980], the mand-model procedure [Warren et al., 1984], and time delay [e.g., Halle et al., 1979]. These procedures share several common features, including 1) teaching follows the child's attentional lead; 2) child production can be prompted indirectly through environmental arrangement or directly through explicit prompts, as necessary; 3) natural consequences are used; 4) specific skills are targeted (e.g., vocabulary growth; two-term semantic relations; prelinguistic communication functions); and 5) teaching episodes are embedded in ongoing interaction. Responsive interaction and milieu teaching approaches are similar in many ways but vary substantially on one very important dimension. Responsive interaction emphasizes the use of adult expansions and recasts to teach new responses, whereas milieu teaching uses elicited prompts for the initial production of target forms and/or functions. In a typical interaction, the adult's decision to elicit a more complete response from the child (e.g., with a mand) is incompatible with expanding what the child said; you can do one or the other, but not both within the same episode. For example, the child might initiate the word "push," to which the adult might respond, "Push what?" in milieu teaching (an elaborative question), or "push car" (an expansion) in responsive interaction.

Fey [1986] categorized milieu teaching as a "hybrid" intervention approach representing a selective blend of techniques long used by behavior analysts (e.g., elicited imitation) with other techniques (e.g., basing teaching on the child's attentional lead, a technique with roots in the Vygotskian influenced mother-child interaction literature [Bruner, 1975]). Thorough descriptions of milieu teaching approaches can be found in Warren and Kaiser [1988] and Warren [1991].

As noted above, milieu teaching interventions seem to be particularly effective in teaching basic vocabulary and initial two- and three-term semantic relationships (e.g., agent-action-object) to children with MLUs under 2.0 [Kaiser et al., 1992; Wilcox et al., 1991]. This is probably due to the constraints in children's attentional and memory resources at this point in development, which make elicited production techniques relatively more effective when combined with the conversational scaffolds that are part of milieu teaching (e.g., modeling, time delay). Like responsive interaction techniques, milieu teaching can be embedded into routines at home [e.g., Kaiser, 1993]

in activity-based preschool curriculum models [e.g., Bricker and Woods-Cripe, 1992] and in book-reading formats [e.g., Whitehurst et al., 1989] and can be intensely applied in contexts that support a high degree of social interaction (e.g., game-playing routines) or spread episodically across the day [Hart, 1985].

Despite the fact that children at risk for mental retardation often show clear delays in critical foundational communication skills during their first year of life [see McCathren et al., 1996, for a review], research on prelinguistic communication intervention is a relatively recent phenomena. There are less than half a dozen published studies of prelinguistic communication intervention with young children at present. Nevertheless, the research is quite promising. An adaptation of the basic milieu teaching model, termed prelinguistic milieu teaching, has been shown effective in establishing clear, frequent prelinguistic requesting and commenting in young children at risk for mental retardation [Warren et al., 1993; Yoder et al., 1994b]. An adapted version of responsive interaction that is very similar to prelinguistic milieu teaching has also been shown to be effective [Wilcox and Shannon, in press]. However, due to both treatment's relative youth, comparative intervention studies of prelinguistic intervention approaches have not yet been reported in the literature.

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Milieu procedures have three main limitations. First, they may represent a relatively inefficient means of facilitating grammatical development because it is more difficult to find mands (questions that prompt a specific response in an

ongoing interaction) on the fly that elicit a specific grammatical rule. Second, milieu procedures attempt to elicit production of specific sentences and phrases, thus possibly drawing the child's attention to the example phrases, rather than the underlying rule that is the real target of the intervention. Third, fluid and effective use of these procedures may be difficult to maintain at home or in the classroom [Roberts et al., 1991].

Direct teaching

Direct teaching, sometimes referred to as didactic instruction, has a long history as a language intervention approach [e.g., see Schiefelbusch & Lloyd, 1974]. It is typically characterized by the use of specific prompts and reinforcement, rapid massed trial instruction, the frequent direct assessment of learning, and the use of task analysis to break targeted skills down into small, easily learned parts [e.g., Guess et al., 1974]. In contrast to responsive interaction and milieu teaching, direct teaching is adult-directed and the specific content of teaching is carefully prespecified. It is assumed that child engagement will be maintained by well-organized instructional materials, rapid pacing, and immediate, contingent feedback [Klinder and Carnine, 1991]. Well-developed curricula, most notably the DISTAR Language Program [Englemann and Osborn, 1976], have been widely utilized in schools to teach higher-level language skills at the early childhood and elementary school levels. Carefully prescribed programs have also been developed for children with moderate to severe levels of mental retardation [e.g., Guess et al., 1974].

Direct teaching has some clear strengths. With language instruction, it can be used to assure that specific skills and concepts that are difficult to teach conversationally are actually taught and learned by children with mental retardation. Indeed, the more abstract and specific the skill, the more effective direct instruction may be [Connell, 1987; Cole, 1995]. Research has indicated that direct instruction is relatively more effective than milieu teaching [Yoder et al., 1991] and either equal to or more effective than mediated instruction (an approach that is very similar to responsive interaction) [Cole and Dale, 1986; Cole et al., 1991; Mills et al., 1995], particularly with relatively higher-functioning children. The results of these studies run counter to the conventional wisdom that children who are more severely retarded benefit more from greater amounts of structure

and children who are high-functioning are more equipped to learn from interactive, child-directed instruction [Snow, 1989]. It may be because highly structured and scripted interventions are difficult for lower-functioning children because they are less able to follow the adult's lead [Cole, 1995], while milieu teaching approaches are easier for them to learn from because they are based on following the child's lead.

An impressive amount of research has supported the efficacy of direct teaching with children with mild levels of mental retardation and MLUs above 2.5 [see Klinder and Carnine, 1991, for a review]. On the other hand, direct teaching is not likely to be effective in most circumstances at the prelinguistic or early language levels because it requires attentional resources and other cognitive skills (e.g., ability to learn from a decontextualized format) that developmentally young children typically have not acquired. Indeed, Yoder et al. [1991] found that milieu teaching was more effective than direct instruction for teaching early vocabulary. Furthermore, direct instruction is likely to be of little use for teaching pragmatic skills and its inherent emphasis on structure and form may impede generalization of learning if it is not supplemented by activities designed to make newly taught skills meaningful for children [Spradlin and Siegel, 1982].

A DEVELOPMENTAL MODEL OF INTERVENTION

Our intention in this brief review has been to trace the outlines of an emerging model of communication and language intervention that is based on what types of "input" are optimally effective at different points in development. This model posits that no single approach or family of techniques (e.g., milieu teaching) is appropriate for the wide range of skills that develop as the child progresses from initial prelinguistic communication to sophisticated linguistic development and reading. Instead, a continuum of specific approaches is likely to be optimal, particularly when applied against the backdrop of an environment populated with highly responsive adults who continually engage the child in positive, stimulating forms of social interaction. This continuum favors specific approaches during prelinguistic and early language development that utilize elicited production prompts, models, and contingent input techniques intended to foster initial receptive and productive vocabulary development and two- and three-term semantic relationships. As the child's

MLU exceeds 2.0, emphases should switch from elicited production techniques to techniques such as growth recasts that require a child to compare their utterance and the adults recast of it. Finally, as the child's syntactic skills advance and their language becomes increasing decontextualized and abstract, either responsive interaction techniques such as growth recasts or direct teaching techniques (or both) may be utilized to facilitate the acquisition of specific forms.

A Meta-Strategy

At the most general level, only two strategies exist for facilitating communication and language acquisition from initial prelinguistic development to linguistic competence: 1) attempt to directly teach communication and language skills; 2) teach adults (e.g., parents and teachers) who interact frequently with the child to be highly responsive to the child's communication attempts whenever possible and to use relatively simple techniques such as linguistic mapping and recasting to help strengthen the child's skills. These strategies are not mutually exclusive and a truly comprehensive, longitudinal intervention program should utilize both strategies to the degree possible. In fact, there is evidence that these two strategies complement each other in important ways. For example, Warren and Yoder [in press] have reported that the effects of prelinguistic milieu teaching were greatest for children with mothers who were above average on a measure of maternal responsivity to child communication acts. Conversely, adult responsivity to children's communication attempts has been shown to have minimal effects on language development in the absence of specific elicitation techniques [Tannock and Girolametto, 1992; Yoder et al., in press, Wilcox et al., in press].

The emerging model of communication and language intervention posits that continuous exposure to highly responsive adults is a necessary, but not sufficient component of an optimally effective early intervention program. However, when high levels of adult responsivity are combined with the appropriate specific intervention strategy, an optimal outcome for a given child should result in terms of their communication and language development.

FUTURE RESEARCH DIRECTIONS

The development of optimally effective communication and language intervention approaches has proceeded

steadily for the past three decades. Much of the emphasis during this period has been on the construction and evaluation of specific techniques and procedures. This initial technology-building period has relied on studies with limited numbers of subjects and short durations. With the possible exception of the prelinguistic period, the field is nearing the end of this phase in its evolution. If substantial further progress is to be made, researchers must turn their efforts toward conducting comparative, longitudinal intervention studies that are complicated, lengthy, and relatively expensive to conduct. A modest number of well-executed studies of this nature could lead to refinement and confirmation of the emerging model of intervention that we have framed above. The ultimate effectiveness of each stage of this emerging model suggests a range of questions concerning the relative efficacy between different treatments (is treatment A more effective than treatment B at this point in development?) and between a given treatment and the characteristics of the learner (e.g., young children with Down syndrome vs. autism) the target (e.g., specific motor or phonemic requirements), and the instructional context (home vs. classroom). Ideally, comparative studies might follow a component analysis logic in which the interventions being compared are as similar as possible except on one critical dimension that both theory and previous research has indicated may be pivotal in terms of effectiveness at that stage of development (e.g., elicited imitation vs. growth recasts). Research is also needed on the effects of hybrid interventions that integrate particularly effective components that have been previously studied in limited contexts. One example of such a hybrid is Kaiser's "enhanced milieu teaching" in which parents are taught a complementary combination of milieu teaching and responsive interaction techniques [Kaiser, 1993].

For communication and language intervention research to generate important new knowledge in the future, investigators need to move beyond simple "main effects" analyses aimed at showing that "more is better" or "earlier is better." These are not trivial questions, but a more sophisticated knowledge of how intervention can interact with the forces of the natural environment and the child's own emerging abilities may be achieved by pursuing theory-driven aptitude by treatment interactions. These types of analyses can lead to more precise, elegant interventions that are truly cost-

effective for young children and a society with limited resources. ■

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