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ABSTRACT

This report discusses the outcomes of a study that used indirect language stimulation techniques and modeling to encourage language development in a 5-year-old child with cerebral palsy. Initially, the student's communication system had very severe limitations. He used fewer than 10 spoken words which were unintelligible to most listeners. Both low-tech and high-tech devices were employed during a 12-week period. Materials included communication boards printed in black and white with BoardMaker software. The symbols were grouped according to parts of speech and the backgrounds were color-coded to assist visual identification. The boards were clipped to Plexiglas clamped at a 90-degree orientation to his laptray and were accessed with a LiteMaker pointer fastened to a headband. A Macintosh computer with Speaking Dynamically Pro software was also used, with a switch interface. The clinician developed intervention activities, scripts, and graphically labeled communication boards and computer pages, which facilitated the indirect language stimulation techniques. Results from the intervention indicate communication competence improvement in the areas of syntax, semantic relations, length of conversational exchange, and AAC system use to support opinions and options, thereby decreasing distracting and unpleasant behaviors. (Contains 37 references.) (CR)

INDIRECT LANGUAGE STIMULATION (ILS): AAC TECHNIQUES TO PROMOTE COMMUNICATION COMPETENCE

Indirect Language Stimulation (ILS): AAC Techniques to Promote Communication Competence

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Indirect language stimulation (ILS) techniques and modeling have been used successfully for language development with children with language delays and disorders. Similar techniques were employed with both low-tech and high-tech devices, during a 12 week period with a 5;5 year old child with cerebral palsy. Results indicate communication competence improvement in the areas of syntax, semantic relations, length of conversational exchange, and AAC system use to support opinions and options, thereby, decreasing distracting and unpleasant behaviors. While it is not conclusive that these techniques resulted in these changes, the naturalistic communication situations provided an opportunity to observe these communication skills.

Introduction

Communication competence requires language skills, which allow a person to communicate and respond with appropriate intent, in various communication contexts with a variety of communication partners. When interaction is successful, there are positive effects for all individuals involved in the interaction. This type of communication competence may be rare for individuals who are first learning to use an AAC system, as well as for many individuals who have been using AAC systems for years, and so continues to be an area for further development and research.

Social-interactive competence has been described in a similar manner to communication competence by Ylvisaker, Feeney, and Szekeres (1998). They suggest that individuals who are socially-skilled have a high degree of competence and are well liked, facilitating their inclusion in home, educational, and community activities. This type of inclusion has not been easily achieved by individuals who use AAC systems, particularly if they are unable to independently plan and program their own systems. Ylvisaker, Feeney and Szekeres (1998) suggest that communication partners competencies are "critical contributors to an individual's social success" (pg. 271).

Recently, many authors (Light & Binger, 1998; Beukelman & Mirenda, 1998; Glennen & DeCoste, 1997) have described the necessity of increased need for appropriate communication partner training and active involvement in the communication process for successful AAC use. A major part of the communication process is language development, which has been the central issue of various research and discussions. Vygotsky (1962) suggested that language development exists first in a social function and then follows a path to egocentric speech, and finally to "inner speech". This inner speech allows a person to develop a "higher, cultural mental behavior", which will facilitate language comprehension, problem solving, decision making, judgment, and selective attention. Dixon-Krauss (1996) has described these elements as necessary for life activities and educational achievement. Thus, in establishing this study, methods were sought to facilitate language development and communication competence through modeling techniques on AAC devices, which were well-founded, consistent, socially-interactional, and dependent upon communication partner input.

Language intervention literature describes techniques known to facilitate language development in children with typical language learning skills, including adult modeling, indirect language

stimulation and structured listening tasks (Golinkoff, et al, 1994; Fey, 1986; Lucas, 1980; Bloom & Lahey, 1978). Following similar facilitative intervention techniques, children with specific language impairments (SLI) have been observed to exhibit increased lexical, syntactic and pragmatic forms (Nelson, et al, 1995; Rice et al, 1992; Schwartz, et al, 1985). As described, these techniques were used within naturalistic actives, and therefore, were of interest to this present study.

Specific indirect language stimulation techniques include expansions, recasts and build-ups and break-downs. Expansions are verbal responses that repeat an individual's prior utterance, while adding grammatical and/or semantic details (Fey, 1986). Children are more likely to produce imitations spontaneously after adult expansions, than after any other type of conversational act (Scherer & Olswang, 1984). Recast sentences are similar to expansions, except that one changes the mode or voice of the sentence, rather then repeating and adding information (Fey, 1986). Build-up and break-down is a technique used to increase sentence comprehension and emphasize the saliency and boundaries between grammatical classes. The communication partner will first expand the individual's utterance and then break it down into grammatical components. For some, the final sentence will be built-up to its expanded form or for others, it may be left in the individual's original form (Cross, 1978; Fey, 1986).

Limited information is available regarding modeling and language development of children who are preliterate and using AAC devices. These children encounter an additional challenge in discovering the relationship between content and form, as they must contend with visual symbol referents, in addition to auditory referents. Iconicity studies of symbol sets commonly used with AAC systems, illustrate the abstract and lack of transparency of some visual referents (Mirenda & Locke, 1989; Mizuko, 1987). However, auditory symbols (spoken words) are abstract and arbitrary for young children without language or speech difficulties. They learn linguistic meanings and rules for combinations and sequencing, after repetitive modeling of words in a variety of natural contexts (Pease, et al, 1989). It follows that children who use AAC systems, which necessitate simultaneous auditory and visual symbol learning, may also gain similar knowledge from repetitive exposure and stimulation. Even though some authors (Gerber & Kraat, 1992; Romski & Sevcik, 1996) have suggested that the course of language development in individuals who do not speak cannot be compared to that of speaking children, indirect language stimulation techniques, which facilitate both the visual and auditory referent may prove successful in language learning and use. Several authors (Beukelman & Mirenda, 1998; Glennen & DeCoste, 1997; Romski & Sevcik, 1996; Goossens, 1989) have advocated demonstration and modeling symbol selection and symbol sequencing to facilitate language development and novel utterance creation. However, research is not available about the use of well-defined language stimulation routines using the aforementioned techniques (expansion, recast, build-up and break-down), either visually and/or verbally, to establish lexical, syntactic and pragmatic forms in children who use AAC.

The indirect language stimulation techniques, when used in both a visual and auditory manner, appeared to be well-suited for the present study for a number of reasons. These techniques blend individual-oriented productions with trainer-oriented productions, supporting the individual's lead, while affecting change. This approach met well-fostered language intervention expectations as described by Johnston (1985): 1) "fit" (social purposes, emergent meanings, and cognitive style); 2) "focus" (narrowed search for order and rule-formulation); and 3) "functionality" (use of language tools). The approach follows a theoretical model for intervention, which maintains highly natural contexts, yet allows clinicians opportunities to maximize efficiency and generalization of language learning (Fey, 1986). The natural contexts and modeling approach appeared to be easily transferred to different environments and communication partners.

The purpose of this study was to examine the effects of indirect language stimulation on the language growth and functional use of a 5 year old child, who is preliterate and uses an AAC system. The following information will detail the individual, the procedures and techniques, the outcome, and discussion regarding future study.

Method

This study reflects the participation of a five-year, 6-month old boy (C.M.), who has a medical diagnosis of spastic cerebral palsy. C.M. has attended an integrated preschool program for 2 years in a rural community school. He will attend kindergarten during the 1999-2000 school year. He is preliterate at this time; however, he accurately identifies all but 2 upper and lower case letters of the alphabet (errors occur on "q" and "u") and identifies his printed name. C.M. lives with his grandparents and his 9-year old brother.

C.M. uses a manual wheelchair for mobility and has significant fine and gross motor limitations. His postural supports are problematic, so that much of the time he has a body lean to the right. This creates additional visual and attentional difficulties, as well as decreased motor skills. AAC system access continues to be a challenge, secondary to these motor and positional issues.

Initially, C.M.'s communication system had very severe limitations. He used fewer than 10 spoken words (family names, colors, greetings), which were unintelligible to most listeners. He relied on eye gaze, yes/no responses, communication boards with typically 16-20 symbol grid, and limited Macintosh computer software (Speaking Dynamically) for communication. He typically used a light pointer attached to a headband for communication board access and a head switch with scanning for computer access. He also used partner-assisted, manual scanning technique occasionally, giving a "yes" response at the desired message. C.M.'s communication frustration was observed in frequent use of high volume screams and loss of interaction cooperation.

At the onset of the study, C.M. exhibited consistent yes/no responses to concrete, remote events, and non-complex yes/no questions. He identified and accurately used a number of Mayer-Johnson's PCS icons, yet his association and categorization skills were limited. AAC assessment following Glennen's assessment hierarchy (Glennon & DeCoste, 1997), indicated that C.M. was not at the picture symbol sequencing stage. He used single icons to convey messages in the following semantic categories: performative, naming, vocative, object of demand, and negation.

The Peabody Picture Vocabulary Test – Revised (PPVT-R; 1981), Form M, and the Test for Auditory Comprehension of Language – Revised (TACL; 1985) were administered May 6 and 13, 1999, when C.M. was 5;5. He earned an age-equivalency score of 5;0 on the PPVT-R. His overall TACL-R score resulted in a 3;7 - 3;9 age-equivalency score. The tests were adapted by using partner-assisted manual scanning with easel presentation at eye-level. The differences in the test scores supports the contention of picture identification (vocabulary knowledge) and the limitation of higher linguistic understanding, as suggested above.

Materials and Procedures

Materials used in this study included communication boards printed in black and white with BoardMaker software (Mayer-Johnsons, 1995). The symbols were grouped according to parts of speech and the backgrounds were color-coded to assist visual identification. The boards were clipped to plexiglas clamped at a 90 degree orientation to C.M.'s laptray and were accessed with a LiteMaker

pointer fastened to a headband. On some occasions, C.M. would also use his fist to access the board. A Macintosh computer with Speaking Dynamically Pro software (Mayer-Johnson, 1998) was also used, with a switch interface (IntelliKeys adaptive keyboard). Ablenet's jellybean switch on a Slim Armstrong wheelchair mount served as a headswitch used with scanning. Additional materials consisted of toys, books, and other items typically used in play therapy for language intervention activities (e.g. Mr. Potato head, Legos, Blues Clues, snacks).

C.M. met twice weekly for one-hour sessions with one of the authors. He was positioned in either his personal wheelchair or in a Rifton bolster chair with a laptray. The clinician developed intervention activities, scripts, and graphically labeled communication boards and computer pages, which facilitated indirect language stimulation techniques (expansion, recast, build-up and break-down). During the session, the clinician had 3-to-4 activities available with corresponding communication boards or programmed computer pages based upon the scripts. Articles (a, an, the) were included with the nouns on the displays. The verbs were all presented as single symbols, so there were not icons to indicate various tenses (e.g. present, progressive, past).

Each session was initiated by C.M. choosing an activity via eye gaze or partner-assisted manual scanning. As he commented during a naturalistic play routine, the clinician used any one of the 3 indirect language stimulation techniques to model utterances that were more syntactically and semantically complete. All the clinician's utterances were presented verbally and with the symbol sequencing of C.M.'s communication system. For example, when playing with Mr. Potato Head, if C.M. said "eyes", to request that particular body part, the clinician would model an expansion ("I want eyes.") Or if C.M. used the utterance, "I want red lego.", the clinician would recast the sentence by saying "The red lego is the one you want." An example of build-up and break-down might follow C.M.'s "want yellow" utterance during a coloring activity with "You want the yellow crayon. You want to color yellow. Color with the yellow crayon. Want yellow crayon."

Results

The data described in this paper, reflects 12 weeks of C.M.'s participation in this study. Since the onset of indirect language stimulation activities, he demonstrates several measurable language gains. C.M. exhibits increased syntactic complexity, as observed within the clinic session. He expresses 3-to-4 "word" utterances 68% of the time. He uses proper names, as well as first and third person nominal pronouns, but not objective or possessive pronouns. He expresses prepositional phrases consistently. C.M. demonstrates expressive use of action, copular, and auxiliary verbs; however, since his communication displays do not allow for specific verb morphology, his use of auxiliary forms do not include the present progressive verb tense. C.M. uses adjectives infrequently, and they usually describe color and size. He has not been observed using adverbs, as yet. The majority (94%) of his 3-or-more word utterances have an S-V-O structure. Sample utterances include:

"I want [the] hat."*	"Put [the] lego on top."
"I like Blue's Clues."	"He is laugh[ing]."**

*The articles were combined with the nouns on the display.
**Some verb tenses were not possible on the display.

C.M. expresses the following semantic relations: agent-action, action-object, possessive, attributive, recurrence, experiencer, and location-action. The semantic relations were investigated for C.M.'s 2-4 word utterances.

Possibly the most interesting change observed within the 12-week period, involves interaction style. He has become more assertive in his use of device comments, rather than using high volume screams. Although his initiation skills have increased, a skill more consistent with successful communication competence is his increased ability to maintain topics over multiple turns. During some session activities, his attention and discussion regarding the activity was sustained for 15-20 minutes. Additionally, C.M. demonstrates more effective methods for initiating and closing topics.

Secondary Results

Many valuable pieces of information have been observed during this study beyond language development and communication competence indicators. Initially, the device selected for use in this study was a Macintosh computer with Speaking Dynamically Pro software, secondary to the motivation that might be offered via voice output. However, technical issues prevented this device use for the first 9 weeks of the intervention period. The low-tech device (light pointer on communication boards) appeared to function well for modeling a specific, well-defined language technique. Further, C.M. exhibited the skill to shift between low-tech and high-tech devices with this modeling technique. It is possible that with voice output devices, learning may be more efficient; however, it certainly emphasizes the fact that these techniques can be used with any devices. This information is valuable for individuals who may not have access to high-tech devices, who are awaiting access, or who have a temporary separation from devices, secondary to repair.

A second piece of information gained from observation during this study, was the carryover of techniques from clinic-structured activities to communication interactions relevant to real-life events and activities. For example, when C.M. was being evaluated for a power wheelchair and a portion of this evaluation was body part control access, he had been encouraged to use a hand control for the wheelchair. In a session following this assessment process, C.M. was most uncooperative in using his typical head access device and the clinician observed that he was trying to access with his hand. She was able to create communication boards relevant to the hand vs the head-access issue. These boards were used with the same indirect language stimulation techniques for conversations regarding this topic. C.M. consistently produced 2-3 word utterances during these interactions. His facial expressions and attention supported his enjoyment of the power of expressing his own opinions.

A third important element was the ability to observe the change in attitude of C.M.'s family toward his communication skills and hopes for his future. Through interview, family members had indicated that they didn't think C.M. would be able to generate sentences. They believed, regardless of their child's cognitive skills, that he was destined to communicate through pre-programmed messages decided by a teacher or a speech-language pathologist. They have observed the clinician using the indirect language stimulation and modeling techniques and with some direct coaching and cuing by the clinician, they have learned to use the techniques themselves. They have expressed new hope for C.M.'s ability to express his own opinions, thoughts, and feelings, rather than those programmed by someone.

Discussion and Direction for Future Research

Some specific changes and development have been initiated to C.M.'s routine. Methods are being used to assist article and verb tense learning. There are many devices that allow for this to be approached at a later date, such as Minspeak's use of icon combinations for verb tenses and Dynavox's use of the "verb morph" pop-up. Message lines and visual displays will be useful in supporting C.M.'s literacy work, and with the appropriate modeling and support, it is anticipated that

he will initiate the connections between icon symbols and graphic representation. More techniques will need to be developed to support these complex structures, language-literacy learning, and academic support.

The results of the twelve week study have been positive and encouraging; however, as this is just one case study, these results are not generalizable. Nor can one state that C.M.'s language shift is entirely related to the use of communication partner modeling and indirect language stimulation techniques in natural and contextual communication situations. This does require further study and continued use of these techniques with C.M., as well as other young preliterate children who use AAC systems. The use of these techniques, with communication partner modeling provided both verbally and through low-tech and high-tech device demonstration, may well support increases in syntactic and semantic forms and increases in social-interactional use. These elements will lead to improvements in communication competence.

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