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ABSTRACT

This report discusses the outcomes of a project that examined the acquisition and use of voice output communication aids in naturally occurring routines by four young children (ages 3-5) with autism. The effects of naturalistic teaching and the use of voice output communication aids (VOCAs) on communicative behaviors of the participants as well as the communicative interactions of the teacher and aids were also examined. Finally, an evaluation of the effects of naturalistic teaching and VOCA use on other alternative communicative behaviors of the young children (e.g., gestures, vocalizations, and words) was also conducted. Results demonstrated the efficacy of a naturalistic teaching strategy to teach VOCA communication skills to young children with autism. All participants demonstrated the skills to use the VOCA to request items and respond to questions from classroom staff during the natural routines of snack and play. The majority of the VOCA communication responses for all participants were not physically guided by staff. All participants also showed some increase in other communicative behaviors, such as gestures, words, or vocalizations, when they had access to the VOCA. Appendices include graphs showing the children's progress, a guide for VOCA use, and the contextual rating survey. (Contains 63 references.) (CR)

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A Comprehensive Evaluation of the Use of Voice Output Communication by Young Children with Autism in Naturally Occurring Routines

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A Comprehensive Evaluation of the Use of Voice Output Communication by Young Children with Autism in Naturally Occurring Routines

The inability to communicate effectively in a socially responsive manner is an often cited characteristic of persons with autism. Many individuals with autism are unable to use speech to communicate and as a result are not afforded typical opportunities to communicate with speaking individuals. Research regarding communication deficits of children with autism indicate that over 50% of these children are mute (Rimland, 1964) and in some reports up to 61% do not have functional communication skills (Fish, Shapiro & Campbell, 1966; Paluszny, 1979). Those individuals who do have vocal speech are often echolalic (Carr, Schreibman, & Lovaas, 1975; Schreibman & Carr, 1978; Rimland, 1964) or do not use speech in a fluent manner (Fay & Schuler, 1980). Typically individuals who are capable of speech do not readily initiate spontaneous interactions with others (Lovaas, 1966; Carr & Kologinsky, 1983).

Difficulty in using speech to communicate significantly impacts the overall participation of individuals with autism in activities of daily life. In response to this deficit, communicative needs are frequently at the forefront of teaching concerns for this population (Rutter, 1983). Initial attempts at training communication skills to individuals with autism have focused on the mode of speech. For the most part early studies utilized behavioral techniques to increase verbal imitation skills (Kozloff, 1974; Lovaas, 1977; and, Wolf, Risley & Mees, 1968). The findings of these studies indicated that the extent to which speech imitation training contributed to the functional communication of persons with autism was minimal. Other research involving speech training attempted to teach labeling and requesting responses in an effort to tie meaning to imitative speech (Lovaas, 1977; and, Sulzbacher & Costello, 1970). Although these programs

were successful in achieving isolate labeling and requesting responses, participants did not generalize the use of these skills to other situations or use the speech spontaneously (Lovaas, 1977; Lovaas, Koegel, Simmons, & Stevens-Long, 1973; and, Secan, Egel & Tilley, 1989). Based on the finding of these studies the acquisition of labeling and requesting responses by persons with autism did not greatly impact their ability to use the speech responses to functionally communicate with others.

In the last decade developments in the area of augmentative and alternative communication (AAC) have produced an array of communicative options for non-speaking persons, including individuals with autism. AAC is broadly defined as "techniques that supplement speech for communication" (Musselwhite & St. Louis, 1988). A communication system is further defined as "an integrated network of techniques, aids, strategies and skills that a person uses to communicate" (Musselwhite & St. Louis 1988). Many forms of AAC systems have been introduced with people with autism (Alpert & Warren, 1985; Carr, 1986; Beukelman & Mirenda, 1992, for reviews). Examples of these systems include manual sign language (Carr & Kologinsky, 1983; Carr, Binkoff, Kologinsky, 1983; Konstantereas, 1987; McClean & McClean, 1974; Schepis, et al., 1982), and photo or graphic symbols (Hunt, Alwell & Goetz, 1991; Reichle & Brown, 1986; Ricks & Wing, 1975).

Although graphic and sign systems are useful AAC options for some persons with autism, the lack of speech output of these systems may limit communicative exchanges between an AAC user and speaking individuals. For example, a graphic system may provide a clear representation of a specific item but not convey an individual's communicative intent in regard to the item (Calculator & D'Altilio-Luchko, 1983). Graphic and sign systems also require visual

orientation of the communication partner, and obstructed vision or lack of physical proximity may inhibit a communicative exchange (Bryen, Goldman, & Quinlisk-Gill, 1988; Calculator & Dollaghan, 1982). Relatedly, individuals unfamiliar with the AAC user may not understand the communicative intent of idiosyncratic manual signs or gestures.

In light of the limitations of non-vocal communication systems, an AAC user of non-speech systems may only experience successful communicative exchanges with individuals who are especially familiar with the AAC user. In order for an AAC system to be truly functional, an individual should be able to communicate his/her wants and needs in a way that is recognized, acknowledged, and responded to by other individuals (i.e., a social exchange). In particular, to be effective and practical from a communication perspective, an AAC system should allow an individual to engage in social exchanges with familiar as well as unfamiliar people (Calculator, 1988). In this respect, the speech output feature of a VOCA emulates natural speech and hence, may increase day-to day interactions between persons with multiple disabilities and speaking individuals (see Schepis & Reid, 1995, for preliminary results).

Communication-related assistive technology devices, specifically voice output communication aids (VOCAs), represent a potentially advantageous alternative to non-vocal communication systems. A VOCA utilizes a graphic-based system providing pre-recorded or programmed speech output in the form of words, phrases or sentences. The speech output of a VOCA may offer a more natural, understandable system, thereby eliminating communication barriers, experienced by graphic and sign users. VOCAS may also enable an individual to evoke attention and communicate a specific response simultaneously, unlike graphic and sign systems that require a user to initially gain the attention of a communication partner (Reichle & Karlan,

1985). The speech output feature of a VOCA may also reduce the need for training potential communication partners to recognize and respond to VOCA communication relative to other AAC approaches.

Despite the potential benefits of VOCAs for facilitating communication, relatively little research has been directed to the application of this technology to people with severe disabilities, including young children with autism (Light, 1988; Romski & Sevcik, 1988). Of the studies that have examined VOCA use among people with varying types of severe disabilities, results have been encouraging in regard to the potential communicative utility of VOCAs (Dattilo & Camarata, 1991; Durand, 1993; McGregor, Young, Gerak, Thomas, & Vogelsberg, 1992; Soto, Belfiore, Schlosser, Haynes, 1993; Schepis & Reid, 1995; and, Schepis, Reid, & Behrman, 1996). The speech output of a VOCA may reduce the complexity of the communication for persons unfamiliar with the AAC user and thus facilitate a communicative exchange (Schepis, Reid, & Behrmann, 1996).

Persons with severe disabilities have acquired VOCA skills through the use of a graduated guidance and time delay strategy in a formal training setting and subsequently used these skills to make requests in non-training settings (Schepis, Reid & Behrmann, 1996). Individuals with disabilities have also been shown to increase initiations of communicative behavior when using a VOCA (Schepis, Reid, & Behrmann, 1996; Soto, Belfiore, Schlossler, & Haynes, 1993). Increases in communicative responses by support personnel has also been identified in conjunction with VOCA use by persons with severe disabilities (Schepis, & Reid, 1995).

Operant training procedures have been effective in improving the overall functioning of young children with autism (Simeonnson, Olley, Rosenthal, 1987; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). Specifically in regard to communication training, naturalistic strategies such as time delay (Halle, Baer & Spradlin, 1981; Charlop, Shreibman, & Thibodeau, 1985; Schwartz, Anderson, & Hall, 1989); incidental teaching procedures (Schepis, et al., 1982; McGee et al., 1987; Haring, Neetz, Lovinger, 1987); and interrupted behavior chain strategy (Goetz, Gee, & Sailor, 1985; Hunt, Goetz, Alwell, & Sailor, 1986; Hunt & Goetz, 1988; Gee, Graham, Goetz, Oshima, & Yoshioka, 1991; Hunt, et al., 1991) have provided a basis for the analysis of variables that lead to increases in communication between individuals with disabilities and other communication partners. The most significant finding related to the use of naturalistic teaching procedures is the fact that the use communication responses acquired by individuals using these techniques are sometimes generalized to other people and settings (Charlop, Schreibman, & Thibodeau, 1985). The use of an AAC system such as a VOCA, that offers speech output, coupled with effective naturalistic teaching strategies, may result in an increase in communicative exchanges between speaking individuals and VOCA users.

Questions still remain regarding the efficacy of voice output systems for enhancing the social competence of persons with disabilities. Currently the majority of research related to using AAC by persons with disabilities has been conducted with adults and only recently have these addressed the use of voice output as an AAC system. The purpose of this study was to examine the acquisition and use of voice output communication aids by young children with autism in naturally occurring routines. The effects of naturalistic teaching and VOCA use on communicative behaviors of the participants as well as the communicative interactions of the

teacher and aides were also examined. Finally, an evaluation of the effects of naturalistic teaching and VOCA use on other alternative communicative behaviors of the young children (e.g., gestures, vocalizations and words) was also conducted.

Method

Participants and Setting

Four children, Ben, Cory, Lynn and Ian with a diagnosis of autism in the severely autistic range, with scores of 38.5, 48.5, 43.5, and 42, respectively, as rated by the CARS (Childhood Autism Rating Scale, Schopler, Reichler, & Renner, 1988) participated in the study. Each participant was ambulatory and all children with the exception of Lynn displayed independent toileting skills. The study was conducted in a classroom for children with autism, in a local, community school. The children had opportunities to engage in interactions with children without disabilities in the cafeteria, and children without disabilities visited each day for an activity (e.g., color bingo) that typically lasted 30 min. All children had access to a picture schedule in the classroom for communication purposes but were never observed using the schedule during baseline or intervention conditions.

Ben was 5 years old, vocalized infrequently, using a few words (e.g., "see you later") in an echoic manner. Ben's primary mode of communication was gesturing or taking a person by the hand to indicate a request for an object out of reach, but he did so on a limited basis. During independent play, Ben showed a preference for at least three activities available in the classroom and typically chose among these when given the opportunity. He required verbal and some physical prompting from classroom staff to complete academic-related tasks. He did not engage in any challenging behaviors with the exception of occasional non-compliance to teacher

requests.

Cory was 5 years old, and made infrequent vocalizations which were usually in the form of a cry. He rarely gestured or attempted to physically interact with others. Cory engaged in head slapping, although this behavior was assumed to be associated with medical problems and gradually decreased during the course of the study. Cory exhibited finger flicking that sometimes interfered with his participation in activities. During leisure time, he typically played with one or two items (e.g., tape recorder, cars and trucks) among those available in the classroom. He was able to work on simple work tasks with verbal and physical prompting from classroom staff.

Lynn was 3 years old, and rarely made any sounds or gestures in an attempt to communicate. Occasionally she took an individual by the hand to indicate a request for an item. During independent play Lynn typically chose the same activity among those available in the classroom and infrequently explored other activities. Lynn did not engage in work-related tasks without physical prompting from classroom staff.

Ian was 3 years old, and infrequently used vocalizations or took individuals by the hand to communicate a request. During play time, Ian typically chose among three activities out of all activities in the classroom. He was able to perform work tasks with verbal and physical prompts from classroom staff.

These individuals were selected for participation in the study based on pre-baseline observations that indicated they engaged infrequently in communicative interactions and were recipients of limited communicative interactions from classroom staff.

Classroom staff included one certified Special Education Teacher with six years of

teaching experience and three aides, with 16 years, 2 years, and 1 year experience in educational settings.

Communication Assessment

Prior to the study, the experimenter conducted a communication assessment with each participant, which included direct observation during classroom routines and interviews with the teacher to determine child preferences and current modes of communication (e.g., gestures, use of pictures, vocalizations and words). Additionally, in regard to selection of the type of VOCA to be used, each child was assessed as to his/her ability to activate (press) and visually scan different VOCAs as well as size, number and types of graphic representations (e.g., photographs and line drawings). Equipment features of VOCAs, classroom environmental considerations, teacher training and preference issues and cost factors contributed to the selection of the VOCA for each participant.

Training Stimuli and Equipment

Based on assessment information, a VOCA known as a Cheap Talk was selected for use in the study. This device is relatively inexpensive (less than $100), offers several options in terms of number of messages, is easy to record, and all participants were able to activate the device and scan the array of symbols. Black and white line drawings (4 cm x 4 cm) with colored backgrounds (based on grammatical category, e.g., all verbs were pink) representing each message were placed on an 8-choice or 4-choice Cheap Talk depending on the number of messages determined appropriate for a child. During the last four observations in the VOCA snack routine, Ben used a Black Hawk which operates in same manner as the CheapTalk but offers the option of expanding messages from 16 to 64 messages. Two additional messages were

added to Ben's Black Hawk (total of 10 messages) and black and white line drawings without colored backgrounds were reduced in size to fit the template of the VOCA (2 cm x 2 cm).

Ben had 8 messages which included snack, drink, thank you, more, I'm finished, yes, no, and bathroom available during the VOCA snack condition. During the last four observations in the snack routine, Ben used a Black Hawk with two additional messages ("hi" and" have a nice day"). Cory's four messages during the snack routine were yes, no, snack and drink. Lynn and Ian's messages for snack included yes, no, I'd like a snack, and thank you. Ben and Cory's messages during the play routine included yes, no, more, please, thank you, I need help, play dough, and let's do something else.

During baseline and intervention, observations of each participant were conducted in the classroom at snack and play time. During the snack and play routines, depending on the day, there were 5 or 6 other children with an autistic diagnosis present, and 1 teacher and 1 or 2 aides. Snacks items varied from day to day and included a food and drink item provided by the school cafeteria and occasionally by the classroom staff or the experimenter. The play routine occurred either before or after the snack routine each day. Different toy items were available in the room and were accessible to the children during the play time.

Behavior Definitions

Definitions for each of the dependent variables were as follows: Teacher/Aide communicative interaction: any intelligible verbalization other than verbal prompts to communicate, directed toward a target child (the individual is near the target child and eye contact is made during the interaction or the child's name is said). Separate interactions were scored if at least 5s occurred between a verbal response or if a new person interacted with the

target child. Any type of verbalization denoting approval, disapproval, or neutral comments were scored as communicative interactions;; Verbal prompt to communicate: The teacher asks the child to make a communicative response, e.g., requesting the target child say a specific word, point to a picture, sign a word, press the VOCA or use the device.

Student communicative interaction: The child is near another individual and makes eye contact directing the communication (see categories below) to that person. Separate interactions were scored if at least 5s occurred between a communicative response or if a target child interacted with a new person, or the type of communicative changed (e.g., from a gesture to a VOCA). Communicative response categories for a target child were: VOCA: The student activates the VOCA by pressing the template; Word vocalization: An utterance that is recognizable as a word in the English language and is directed to another person; Non-word vocalization: An utterance that is not recognizable as a word of the English language, and intent is unclear but is directed to another person, excluding crying, breathy sounds and laughing; Gesture: The target child extends his hand toward another person or object in the presence of another person or touches the hand or arm of the person; Picture: The student points to a picture the is used as a symbol to communicate; and, Physical prompt to communicate: The teacher touches some part of the target child's hand or arm to guide the response of pressing the VOCA or pointing to a picture.

Observation System and Interobserver Agreement

Data on target behaviors were collected with a notebook computer. A software application programmed in BASIC was used to collect occurrence data on each of the target behaviors in real time. Upon the occurrence of a target behavior, a keystroke identified with that behavior was entered into the computer. Observation sessions for snack time averaged 11 min

(range 6-19 min) and for play time averaged 9 min (range 5-12).

Reliability observations occurred during at least 17% of the sessions involving all conditions and all participants. Agreement for target behaviors was scored if both observers entered the code for the same target behavior within 2s of each other (cf. Lalli, Casey, Goh & Herlino, 1994). Occurrence reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100% for each of the dependent variables.

During reliability observations in the snack routine for Ben and Caleb, and Ian, there was no occurrence of communication behaviors whereas in the naturalistic teaching and VOCA condition, the reliability for occurrence of communication behaviors was 100% and 84% (range 66-96), and 89% (range 88-89) respectively. Reliability for occurrence of communication behaviors for Lynn during baseline snack condition was 100% for occurrence and 85% during the naturalistic teaching and VOCA condition. Baseline occurrence of staff communicative behavior was 100% for Ben, and Cory and 96% (91-100) and 100% for Lynn and Ian, respectively. Baseline occurrence for staff communicative behavior for Cory was 67% and 88% during the naturalistic teaching and VOCA condition. There was no occurrence of gestures, words or vocalizations for Ben, Cory, or Ian during baseline. During the naturalistic teaching and VOCA condition, for Ben occurrence reliability for VOCA behaviors was 100% and there was no occurrence of other communicative behaviors. Occurrence of other communicative behaviors for Cory during the naturalistic teaching and VOCA condition was 47% (range 0-100)for gestures, no occurrence for words, 35% for non-word vocalizations, and 84% (66-93) for VOCA behavior. Reliability for occurrence of other communicative behaviors during baseline

for Lynn was 100% for gestures and non-word vocalizations. There was no occurrence of gestures or words for Lynn, 100% occurrence reliability for non-word vocalizations and 88% for VOCA behaviors in the naturalistic teaching and VOCA condition. Occurrence reliability for Ian was 100% for gestures and non-word vocalizations, no occurrence for words, and 100% for VOCA behaviors during the naturalistic teaching and VOCA condition.

The low percentage of occurrence reliability for gestures and non-word vocalizations for Cory can be explained due to the few instances of occurrences of these behaviors. To illustrate in at two of the occasions there was only one occurrence of the behavior scored and on two occasions only 2 occurrences scored.

For Ben, during the baseline play routine, there was 100% occurrence reliability for total communication behaviors and 95% (range 89-100) during the naturalistic teaching and VOCA condition. There was no occurrence of communication behaviors for Cory in the baseline condition and 84% (range 67-96) reliability occurrence during the naturalistic teaching and VOCA condition. For Ben there was 100% reliability occurrence for gestures, and no occurrence of words or non-word vocalizations in the baseline play routine. During baseline play routine there was no occurrence of gestures, words on non-word vocalizations for Cory. Reliability occurrence for gestures, words, non-word vocalizations and VOCA behaviors during the naturalistic teaching and VOCA condition were 75% 100% and 89%, respectively. For Cory there was no occurrence for words and reliability occurrence for gestures, non-word vocalizations and VOCA behaviors were 47% (range 0-75), 100% and 91% respectively, during the naturalistic teaching and VOCA condition.

Reliability occurrence for staff communicative behaviors for Ben during the baseline

snack and play routine were 100% and 82% (range 50-100). Baseline occurrence reliability for staff communicative behaviors for Cory during the snack and play routine were 67% and 73% (range 50-80). During the naturalistic teaching and VOCA for snack and play reliability occurrence for staff communicative behaviors for Ben was 96% (91-100). For Cory during the naturalistic teaching and VOCA for snack and play routine reliability occurrence was 89% (range 86-91). Reliability occurrence for staff communicative behaviors for Lynn and Ian during the snack baseline and naturalistic teaching and VOCA was 100%. There were no occurrences of staff providing specific verbal prompts to communicate in any observations.

Experimental Conditions

Baseline for snack routine. During baseline probes the students were typically sitting in one large group or two smaller groups at one or two tables. Prior to baseline observations, classroom staff had been inserviced on using different strategies to promote communicative responses by children during snack time (i.e., by individuals responsible for providing consultative services to the classroom relating to educational services for children with autism), and a picture communication system was available in the classroom for all the students. During snack time, food and drink items were available and provided to the students by classroom staff. Data were collected on target behaviors for classroom staff and the target student, with the exception of VOCA behaviors. Sessions lasted as long as the teacher provided snack or the student left the table.

Baseline for play routine. Probes conducted during the play routine were similar to the snack routine. Classroom staff and 5 or 6 other students were typically present in the room and the target student had access to play items, either provided by the teacher or selected by the

student from the array of items available in the classroom. The amount of time allotted for play for each student was regulated by the teacher.

Classroom Staff Training. After baseline was conducted for a target student in the snack or play routine, the experimenter conducted an inservice with classroom staff on naturalistic language teaching procedures (Halle, 1987; Halle, 1982) and the use of the VOCA. The inservice was approximately 30 to 45 min in length and focused on the target student and routine selected for VOCA intervention. At the beginning of the inservice, classroom staff were asked their opinion about the types of items or activities a particular student preferred in relation to the routine being discussed (i.e., snack or play). The experimenter also provided information regarding student preference based on direct observation in the classroom. Based on student preferences and the targeted routine, classroom staff and the experimenter discussed the type of messages that would be most useful to the student. The type of symbol representation (e.g., pictures, photographs) for each message for the student was also decided.

The inservice included both written and verbal examples of how to increase the number of opportunities a student would have to initiate a communication interaction using the VOCA. Three of the main features of naturalistic teaching strategies provided to staff during the inservice included: 1) using child-preferred stimuli and stimuli available within the natural routine; 2) using child-initiated responses as the point of intervention; and, 3) providing verbal and gestural prompts with minimal use of physical guidance. Natural cues such as physical approach, expectant delay or questioning looks and eye contact were described as ways to elicit a student initiation of a communication response. If a child initiated a response such as a vocalization or gesture, classroom staff were told to make a gesture to the appropriate picture on the device.

Classroom staff were also given examples of the types of questions to ask the student, if he/she did not respond to less intrusive natural cues. If the student did not respond to questions such as "What do you want?" or "Do you want a cookie?", classroom staff were told to use the least amount of physical guidance to assist the student in using the VOCA to communicate. For example, if a child raised his hand toward a cup, the teacher would ask the child "Would you like a drink?" and, if necessary would gesture toward the correct symbol on the VOCA. If the child did not respond to less intrusive prompting, such as gesturing or naturalistic question-asking, classroom staff would then use the least amount of physical guidance to elicit the student response. The classroom staff were given multiple examples of different types of communicative interactions based on the experimenter observations of the student during the targeted routine. The classroom staff also learned how to record messages and store the VOCA when not in use.

Naturalistic VOCA training. In the VOCA condition, the student was provided with the VOCA during the targeted routine. At the beginning of the first experimental session for a target student, the classroom staff modeled the use of the VOCA by pressing and commenting on what each symbol/message set represented. The student was then allowed to freely explore the VOCA, pressing switches and listening to messages for approximately 1-2 min. Following the initial session demonstration of the VOCA, classroom staff merely provided the VOCA to the student by placing it on the table at the beginning of snack or play. Classroom staff used the techniques suggested during the inservice such as questioning looks, asking questions, and provided minimal physical guidance as described above. Data were collected in the VOCA condition as described in baseline, with the additional VOCA related responses.

Social Validity /Contextual Ratings

Three to five days after the initial introduction of the VOCA for a target student, classroom staff were asked to rate the contextual appropriateness in relation to communicative interactions with the staff following a VOCA session in a target routine. A 7-point Likert questionnaire was used with response options ranging from (1) "extremely appropriate" to (7) "extremely inappropriate".

Experimental Design

A multiple probe design across participants and routines (Horner & Baer, 1978) was used to evaluate the effects of VOCA use on the communicative behavior of the children and the classroom staff.

Results

The rate per minute of communicative interactions for Ben and Cory and the teacher and aide in two different classroom routines is presented in Figure 1. The rate per minute of communicative interactions for Lynn and Ian and the teacher and aides in one classroom routine is represented in Figure 2. All participants, including the teacher and aides displayed an increase in rate per minute of communicative interactions during the VOCA condition, relative to baseline in both routines. In the snack baseline, Ben averaged a rate per minute of gestures of .03 (range 0-.1), words averaged .02 (range, 0-.1), and vocalizations did not occur. During the snack VOCA condition, Ben averaged a 2.63 VOCA communicative behaviors per minute, with an average of 2.51 of these being non-physically guided and .13 physically guided. He also showed an increase in the VOCA condition for the average rate per minute of other communication behaviors with gestures averaging .08 (range 0-.6), words .07 (range 0-.6), and vocalizations .06 (range 0.3) as compared to baseline. Cory showed a low average rate per minute of

communicative behaviors in the snack baseline, with an average of .02 (range 0-.1), 0, and 0 for gestures, words and vocalizations, respectively. During the snack VOCA condition, Cory showed a rate per minute of VOCA communicative behaviors averaging 2.02, with an average of 1.94 non-physically guided and .09 that were physically guided. Other communicative behaviors in the VOCA snack condition averaged .33 (range 0-.5), 0, and .15 (range 0-.5) for gestures, words and vocalizations, respectively. Lynn averaged .11 (range 0-.6), 0, and .05 (0-.3) rate per minute of communicative behavior for gestures, words and vocalizations respectively, during the baseline snack condition. During the VOCA snack condition Lynn, averaged 3.42 rate per minute of VOCA communicative behavior, with an average of 2.86 being non--physically guided and .56 physically guided. Rate per minute of gestures averaged .11 (0-1.2), words 0, and vocalizations .10 (range 0-.5) in the VOCA condition for Lynn. Ian's baseline rate per minute of communicative interactions during the snack condition averaged .03 (range 0-.2) , 0 and .04 (0 - .2) for gestures, words, and vocalizations, respectivley. During the VOCA snack condition, Ian averaged 1.15 rate per minute of VOCA communication, with an average of .76 not physically guided and .38 physically guided. Ian's average rate per minute of other communicative behaviors was 1.1 (range .5-2.5) for gestures, 0 (range 0-.1) for words, and, 69 (.5-1.9) for vocalizations.

During the play baseline condition, Ben averaged a rate per minute of .05 (range 0-.3) for gestures, 0 for words, and .04 (range 0-.2) for vocalizations. In the VOCA play condition, Ben averaged a rate per minute of 3.08 VOCA communicative behaviors, of which an average of 3.03 were non-physically guided and .05 were physically guided. Rate per minute of gestures averaged .05 (range 0-.1), words .18 (range 0-.6) and vocalizations .24 (range 0-.5) in the VOCA

play condition for Ben. Cory averaged a rate per minute of .11 (range 0-.6) for gestures, 0 for words and .01 (range 0-.2) for vocalizations in the play baseline condition. In the VOCA condition Cory averaged a rate per minute of VOCA communicative behaviors of 2.23 with an average of 2 being non--physically guided and .23 physically guided. Other communicative behaviors in the VOCA play condition averaged a rate per minute of .23 (range o-.4), 0, and .11 (range 0-.3) for gestures, words, and vocalizations, respectively.

To further illustrate the breakdown of communicative behaviors in baseline and the VOCA condition, Figure 3 shows the mean rate per minute of communicative behaviors including gestures, words, vocalizations and VOCA for each of the participants in each condition during each routine. Figure 4, 5, 6 and 7 show the rate per minute of VOCA communication for each participant during each routine that was non-physically guided and physically guided. Ben, Cory, Lynn and Ian's averaged 94% (range 72-100), 95% (range 80-100), 86% (range 60-95), and 49% (range 16-100), non-physically guided VOCA responses, respectively. For Ben and Cory during the play routine, non-physically guided VOCA communicative responses averaged 98% (range 90-100) and 89% (range 76-100), respectively.

Teacher and aide communicative behaviors are also illustrated in Figures 1 and 2 during each of the routines for each participant. For Ben during the baseline snack condition, staff rate per minute of communicative behaviors averaged .51 (range .3-.8). During the VOCA condition for Ben in the snack routine rate per minute of staff communicative interactions averaged 2.83 (range 1.6-3.5). Rate per minute of communicative interactions for staff with Cory during the baseline snack routine, averaged .44 (range .2-.6) and 2.11 (range 1.2-3) in the VOCA condition. During the baseline snack condition for Lynn, staff averaged a rate per minute of .49 (.3-.9) of

communicative interactions with an average of 3.23 (range 1.7-5.2) in the VOCA condition. Rate per minute of communicative interactions of staff with Ian averaged .36 (range 0-.2) in the baseline condition and 3.5 (range 2-5) in the VOCA condition. There were no occurrences of staff providing specific verbal prompts to communicate in baseline or during the VOCA condition.

Figures 8 shows the mean percent contextual ratings of the VOCA communication for Ben and Cory. For the most part, teachers and aides rated the VOCA communication of these two participants as either extremely appropriate, very appropriate, appropriate or somewhat appropriate.

Discussion

Results demonstrated the efficacy of a naturalistic teaching strategy to teach VOCA communication skills to young children with autism. All participants demonstrated the skills to use the VOCA to request items and respond to questions from classroom staff during the natural routines of snack and play. The majority of the VOCA communication responses for all participants were not physically guided by staff. All participants also showed some increases in other communicative behaviors, such as gestures, words, or vocalizations when they had access to the VOCA. Increases, albeit limited in some cases, were seen for all students for other communicative responses (e.g., gesture, words and vocalizations) when they had access to the VOCA. Research on language development suggests vocalizations of infants are an important milestone prior to developing fluent speech (Snow, 1984). Based on the increase in vocalization and other communicative behaviors for some of the participants in the VOCA condition, further research to examine the effect of VOCA use on language development for young children who

have not developed speech but who frequently vocalize seems warranted.

The contextual ratings of the classroom staff indicated that the majority of Ben and Cory's non-physically guided VOCA responses were contextually appropriate. The contextual appropriateness of the participants' communicative responses is particularly encouraging, given the varying communicative functions available on the VOCA. In this regard, the participants had the option of making requests, answering yes and no questions, making social comments (e.g., thank you) and making a declarative statement (e.g. I'm finished). The use of a broader range of communicative functions by young children with autism provides preliminary support for the use of VOCAs to enhance the communicative and social competence of individuals with disabilities, in a way that alternative non-speech systems may not offer.

The increases in classroom staff communication directed to the students during the naturalistic teaching and VOCA intervention offers additional support for the functional utility of VOCAs as an AAC system for young children with autism. Classroom staff responded to the VOCA requests by providing requested items and talking to the students. It appeared participant initiated requests may have functioned to prompt further communicative exchanges between classroom staff and participants. In contrast during the baseline conditions for all participants in all routines, participant vocalizations, gestures or words were infrequent and were infrequently responded to by classroom staff, perhaps due to the unclear communicative intent of these behaviors.

Directions for Future Research

Results of the study indicated the use of a VOCA increased the frequency of specific

communicative behaviors of four young children with autism in one natural occurring routine and for two children in an additional routine. The increases in overall communicative responses by the children suggests the efficacy of using such devices to enhance functional VOCA communication skills as well as other communicative behaviors (e.g. vocalizations, gestures and words). The contextual appropriateness ratings for two of the participants indicated the effectiveness of VOCA use for making a broad range of communicative functions (e.g., requesting, declarations, commenting). The increased frequency of communicative interactions of familiar classroom staff when students used VOCAs suggests the efficacy of a VOCA as an understandable mode of communication that may promote social interactions.

The issue of training communication partners in how to respond to a particular AAC system (e.g., manual sign) is a frequently noted concern (Calculator, 1988). Lack of knowledge of an AAC system by communication partners may reduce the functional utility of an AAC system for an individual because requests may not be understood and therefore not responded to by communication partners. A potential benefit of VOCAs relative to non-speech AAC systems is the relatively minimal amount of time involved in training classroom staff in procedures to allow the students to use the VOCA (approximately 30 min). Additionally, given the easily recognizable speech output of the VOCA, training communication partners in how to respond to VOCA communication may not be necessary.

The acquisition and functional use of VOCA skills to communicate by the students within the conditions of this investigation suggest additional research on the use of VOCAs by children with autism is warranted. In particular, research seems needed to examine the acquisition of a broader scope of communicative functions and use of VOCAs for more extended

periods relative to the somewhat circumscribed sessions targeted in this investigation. The potential for a "novelty effect" should also be examined when introducing a new technology such as a VOCA. That is, classroom staff may initially respond to the communicative behavior of children using a VOCA and then gradually decrease responding to the VOCA communication once the novelty of the device decreases. Research seems warranted to address support personnel issues related to consistently providing an individual access to a VOCA as well as storing, maintaining, and transporting the VOCA. Finally, the use of VOCAs by young children with autism in inclusive settings should be evaluated to determine the extent to which a voice output communication system may enhance interactions between children with disabilities and speaking peers. The ultimate goal of such research would be to determine the benefits and limitations, of VOCAS for allowing children with autism to functionally communicate in diverse settings and with familiar and unfamiliar persons.

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Author Notes

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Footnotes

The Cheap Talk is available from Enabling Devices, 385 Warburton Avenue, Hastings-on- Hudson, NY 10706.

The Black Hawk is available from ADAMLAB, 33500 Van Born Road, Wayne, Michigan 48184.

APPENDICES

Figure Captions

Figure 1. Rate per minute of all communicative interactions for Ben and Cory and teacher and aides for the snack and play routines during baseline and the naturalistic teaching and VOCA condition.

Figure 2. Rate per minute of all communicative interactions for Lynn and Ian and teacher and aides for the snack routines during baseline and the naturalistic teaching and VOCA condition.

Figure 3. Mean rate per minute of gestures, words, vocalizations and VOCA responses for Ben, and Cory for the snack and play routines and Lynn and Ian for the snack routine during baseline and the naturalistic teaching and VOCA condition.

Figure 4. Rate per minute of physically-guided and non-physically guided VOCA responses for Ben and Cory in the snack routine.

Figure 5. Rate per minute of physically-guided and non-physically guided VOCA responses for Ben and Cory in the play routines.

Figure 6. Rate per minute of physically-guided and non-physically guided VOCA responses for Lynn in the snack and play routines.

Figure 7. Mean percent of contextual ratings by teacher and aides for VOCA communication for Ben and Cory in the snack and play routines.

FIGURE 1

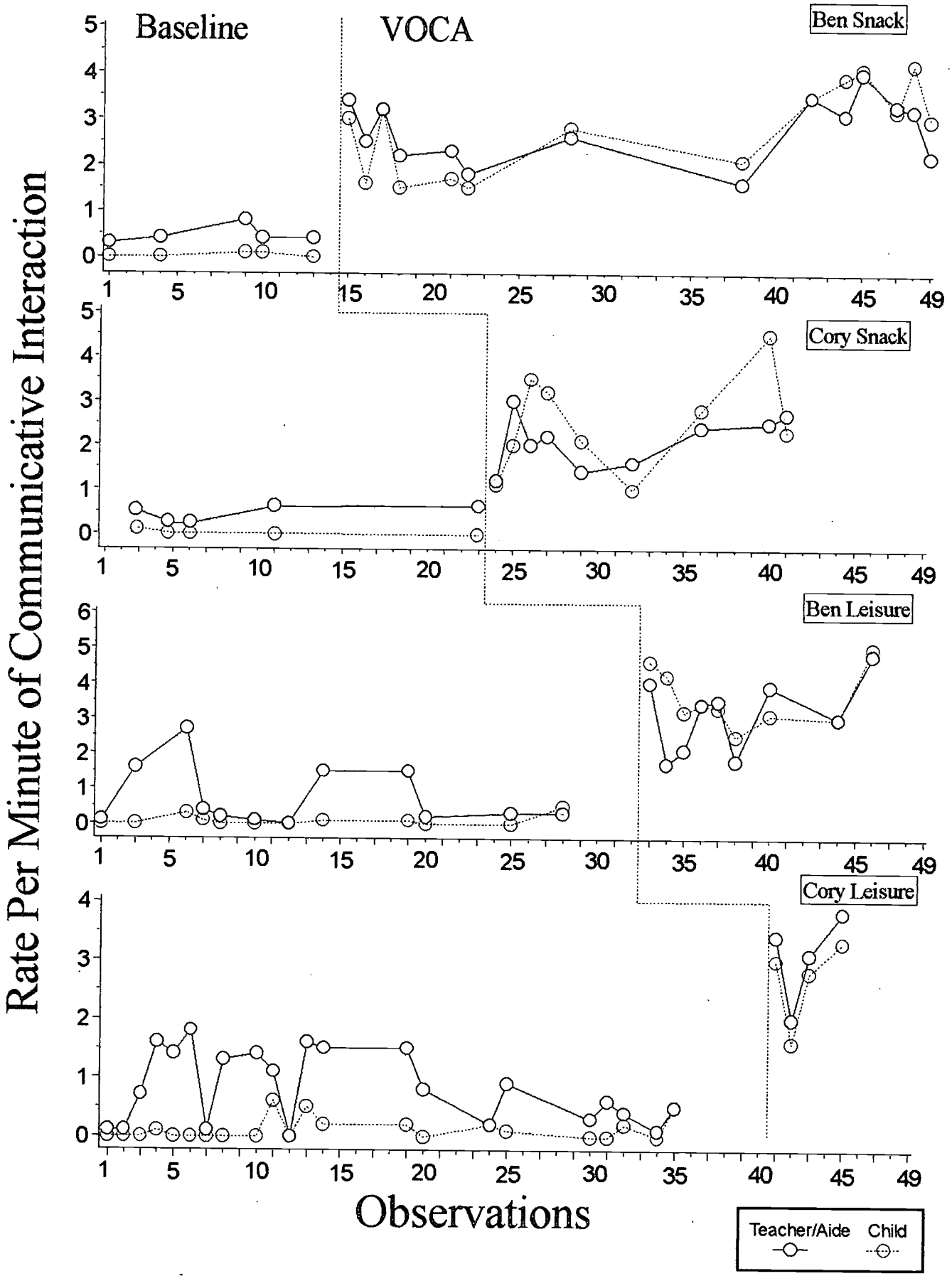

Baseline
VOCA
Ben Snack
Cory Snack
Ben Leisure
Cory Leisure
Rate Per Minute of Communicative Interaction
Observations
Teacher/Aide
Child

FIGURE 2

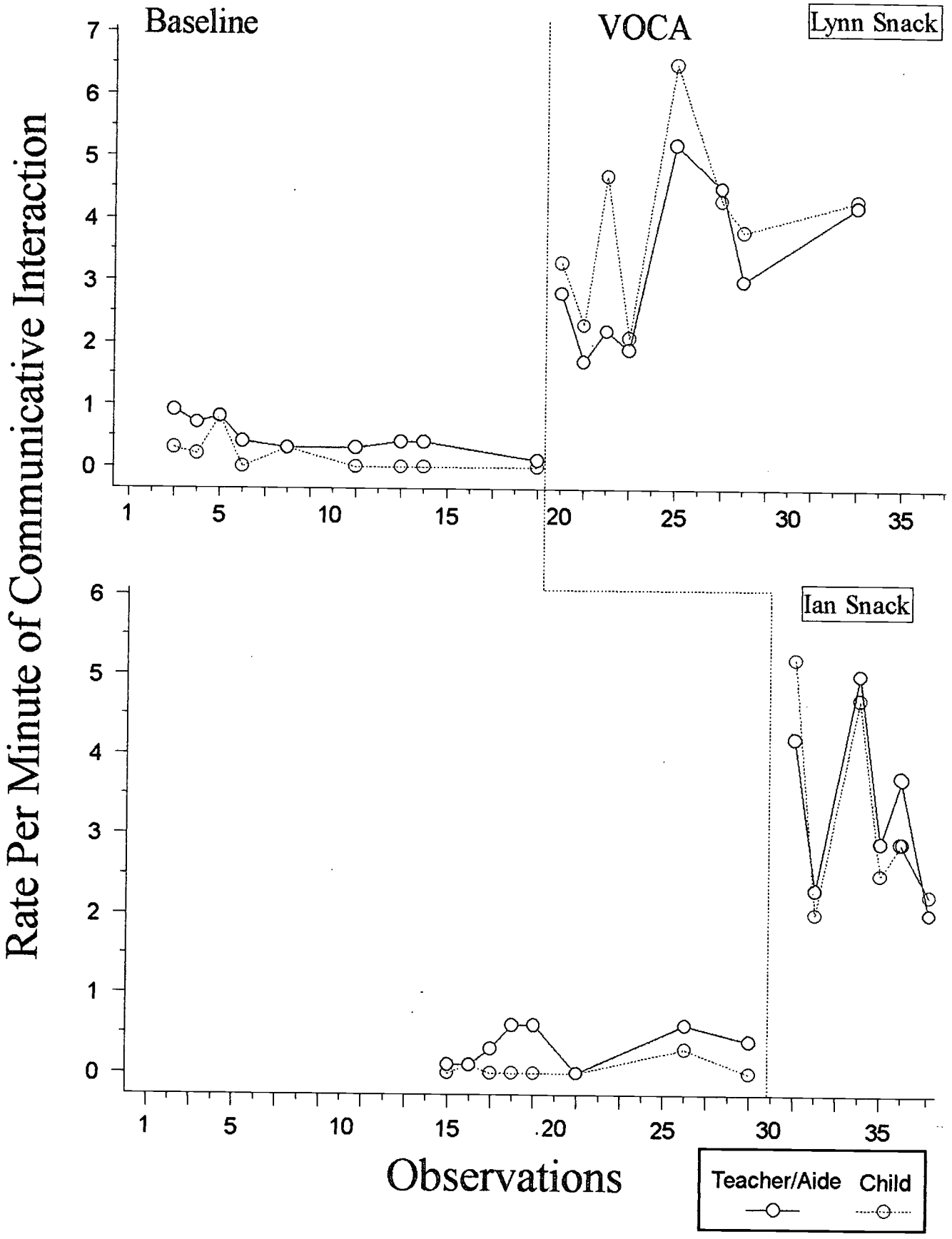

Baseline
VOCA
Lynn Snack
Ian Snack
Rate Per Minute of Communicative Interaction
Observations
Teacher/Aide
Child

FIGURE 3

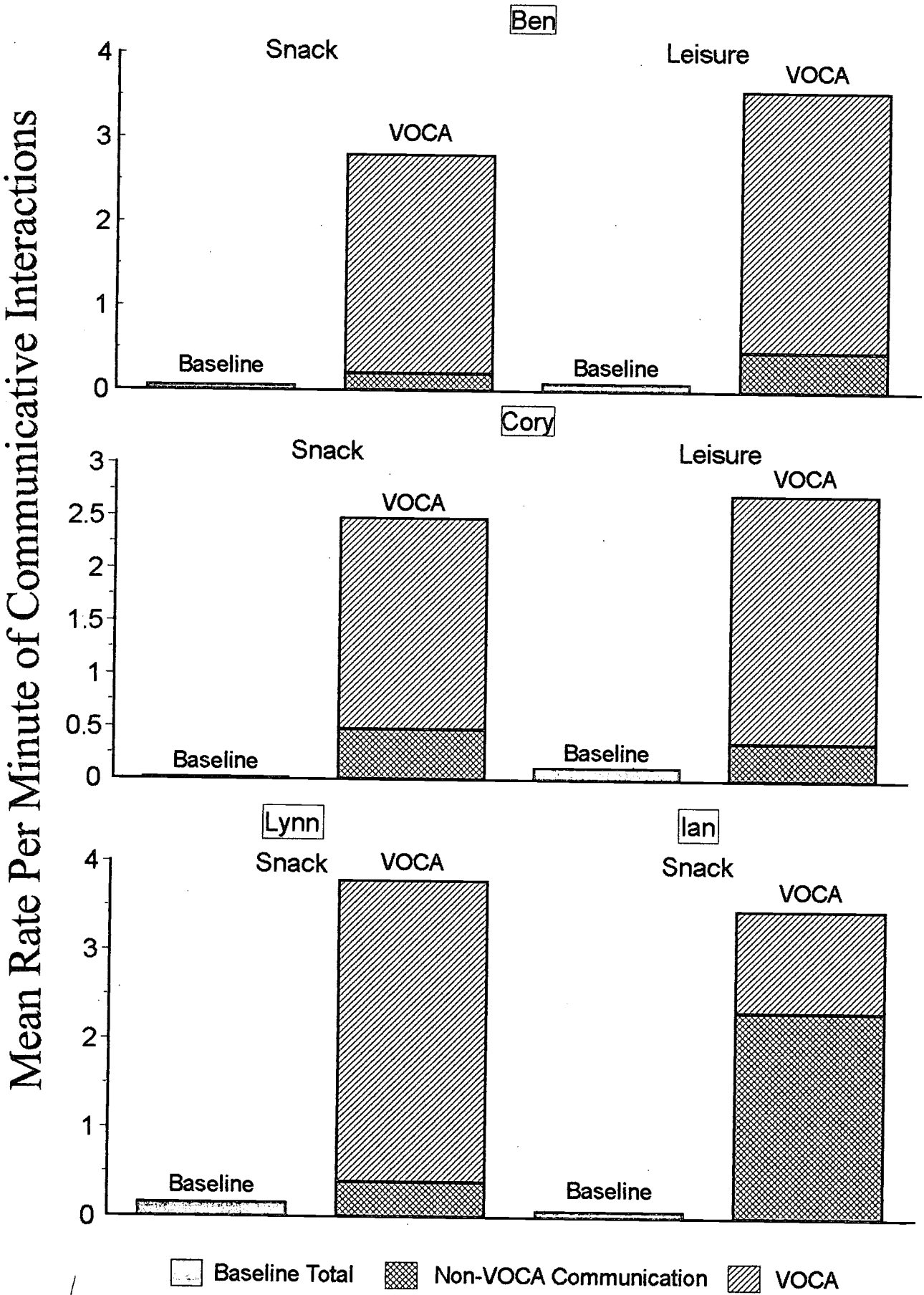

Mean Rate Per Minute of Communicative Interactions
Ben
Snack
Leisure
VOCA
VOCA
Baseline
Baseline
Cory
Snack
Leisure
VOCA
VOCA
Baseline
Baseline
Lynn
Ian
Snack
VOCA
Snack
VOCA
Baseline
Baseline
Baseline Total
Non-VOCA Communication
VOCA

FIGURE 4

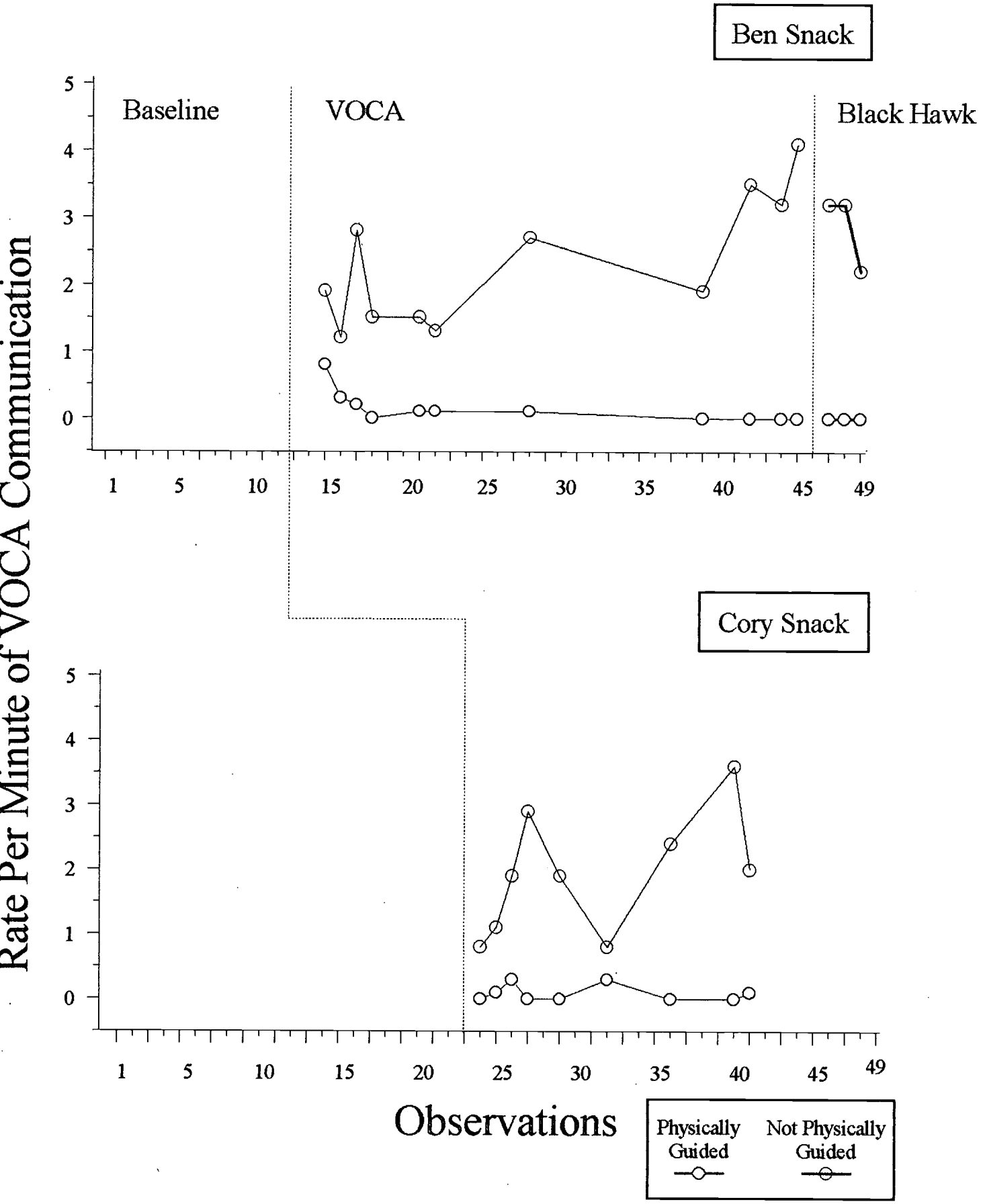

Ben Snack
Baseline
VOCA
Black Hawk
Cory Snack
Rate Per Minute of VOCA Communication
Observations
Physically Guided
Not Physically Guided

FIGURE 5

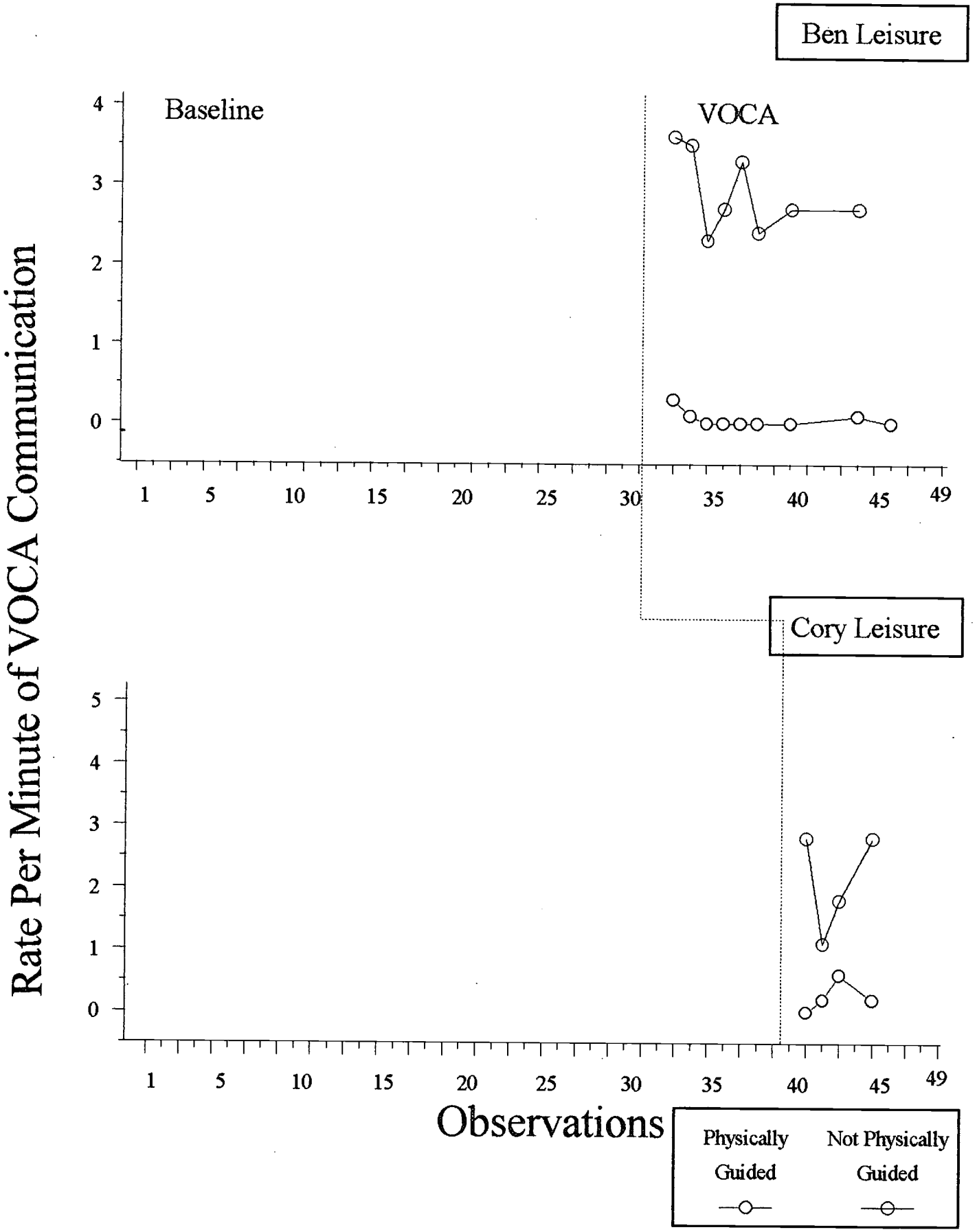

Ben Leisure
Baseline
VOCA
Cory Leisure
Rate Per Minute of VOCA Communication
Observations
Physically Guided
Not Physically Guided

FIGURE 6

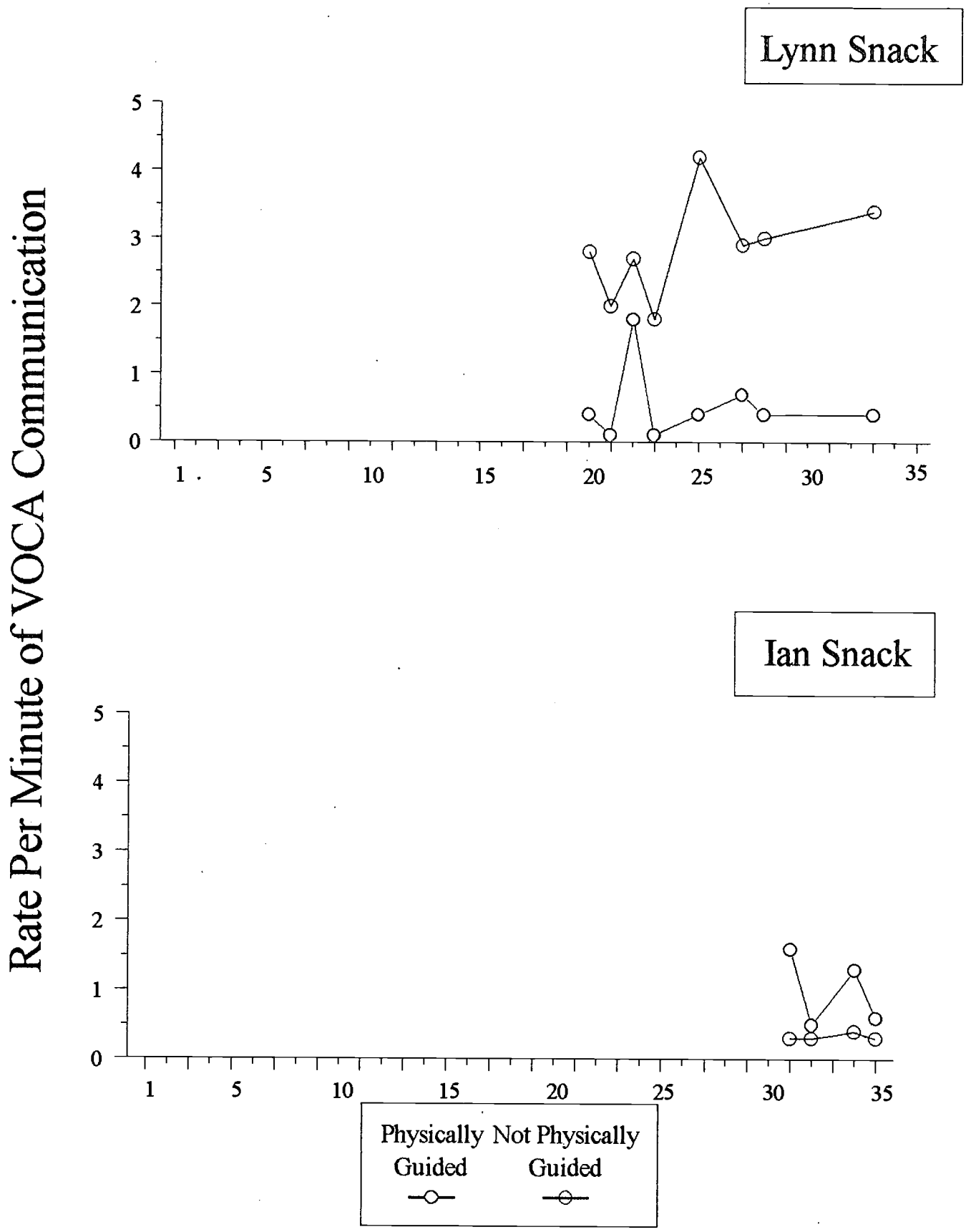
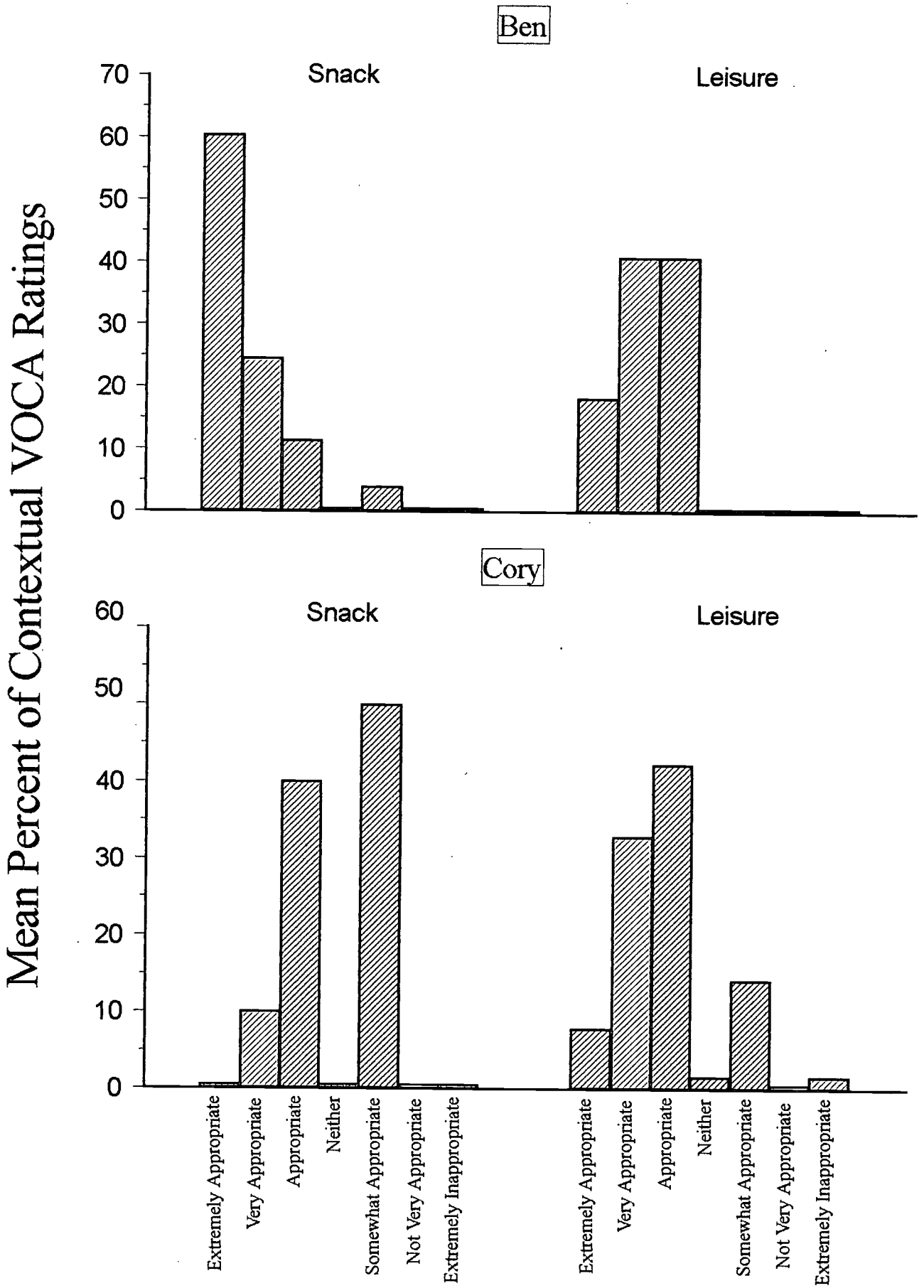

Lynn Snack
Ian Snack
Rate Per Minute of VOCA Communication
0
1
2
3
4
5
1
5
10
15
20
25
30
35
Physically Guided
Not Physically Guided

FIGURE 7


Ben
Snack
Leisure
Mean Percent of Contextual VOCA Ratings
70
60
50
40
30
20
10
0
Cory
Snack
Leisure
60
50
40
30
20
10
0
Extremely Appropriate
Very Appropriate
Appropriate
Neither
Somewhat Appropriate
Not Very Appropriate
Extremely Inappropriate
Extremely Appropriate
Very Appropriate
Appropriate
Neither
Somewhat Appropriate
Not Very Appropriate
Extremely Inappropriate

DISSEMINATION EFFORTS

Dissemination Efforts

Presentations

November 4, 1995, 11th Annual Division of Early Childhood, Council for Exceptional Conference, Orlando, Florida. Acquisition and Functional Use of Voice Output Communication by Young Children with Autism. (Presentation)

February, 22, 1996, North Carolina Association for Behavior Analysis, Asheville, North Carolina An Evaluation of the effects of the Use of Voice Output Communication Aids by Young Children with Autism. (Poster)

Upcoming Presentation:
May 26, 1996, International Association for Applied Behavior Analysis Conference. A Comprehensive Evaluation of the Use of Voice Output Communication by Young Children during Naturally Occurring Routines. (Invited Symposium)

Manuscripts

Voice Output Communication Aids. (A Guide).

Schepis, M. M. & Reid, D. H. (1996) Voice output communication aids: A potential early communication alternative. Manuscript submitted.

Schepis, M. M., Reid, D. H., Behrmann, M. M. & Sutton, K. A. (1966) A comprehensive evaluation of the use of voice output communication by young children with autism. Manuscript in progress.

ACQUISITION AND FUNCTIONAL USE OF VOICE OUTPUT COMMUNICATION BY YOUNG CHILDREN WITH AUTISM

Presentation at DEC, Orlando, Florida
November 4, 1995

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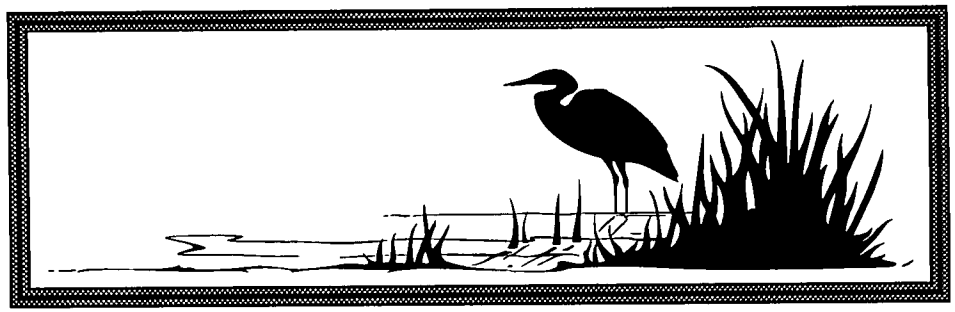

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Acquisition and Functional Use of Voice Output Communication by Young Children with Autism

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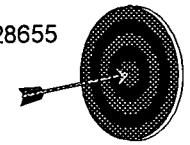
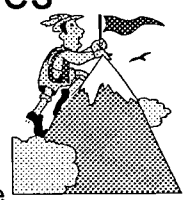


AT Services

- Short and long term goals
- Initial training-consumer and caregivers
- Programming and maintenance
- Integration into routines/environments
- Modifications to system
- Follow along management plan

Outcomes



- Participation
- Interaction
- Control
- Enjoyment
- Independence
- Inclusion

Assistive Technology

- Augmentative Communication
- Computer Access
- Environmental Control
- Seating and Positioning
- Medical Equipment

Legislative Support

- IDEA-1990
- Transition Service of IDEA
- Section 504 of Rehabilitation Act of 1973
- Perkins Vocational Education Act
- ADA

Assessment

- Determine need
- Select device/s
- Select intervention strategies to enhance communicative competence today
- Implement intervention support to future

Augmentative Communication

- Eyegaze
- Gestures
- Sign Language
- Graphic
- Voice Output

Augmentative Communication

- Eyegaze
- Gestures
- Sign Language
- Graphic
- Voice Output

Communicative Indicators

- Indicates pleasure
- Indicates displeasure
- Established preferences
- Consistent, reliable, readable movements and/or sounds

Communicative Functions

- Signals to express needs
- Yes/no
- Requests objects/activities
- Makes simple requests
- Social comments

Voice Output Evaluation

- Preference Component
- Motor Component
- Perceptual Component
- Equipment Component
- Training Component
- Caregiver Issues

Ecological Analysis

- Needs
- Preferences
- Abilities

Preference Component

- Conduct Ecological Analysis
  - Interview consumer and significant individuals
  - Observe consumer and caregivers
  - Review written material
  - Assess routines

Assess Routines

- Frequent
- Multiple Environments
- Age Appropriate
- Consumer Preferred
- Participation

Define Approach Response

- Eye Gaze
- Wheeling to item
- Reaching for item
- Pointing
- Time factor issues

Interview, Read and Observe

- Food and Drink
- Activities
- People
- Settings
- Challenging Behaviors

Selection of Items

- Use highly-preferred/non-preferred item
- Use items easily accessible
- Use items easily represented graphically

Conducting the Session

- Discrete location of items
- Counterbalance location across sessions
- Run 5-10 trials
- Give access to chosen item
- Collect data: record item and engagement

Outcomes of Preference Assessment

- Determine possible reinforcers
- Assess ability to make choices
- Validate interview information
- Validate sensory/motor/social abilities

Perceptual Component

- Target Size
- Type of Graphic
- Number of Choices
- Spacing of Choices
- Background

Equipment Features

- Portability
- Durability
- Expandability
- Complexity
- Cost

Motor Component

- Direct Select
  - Device/switch placement
  - Adaptations to Keyboard
  - Target area size
- Visual/Auditory Scanning
  - Device/switch placement
  - Type of Scanning
  - Target area size

Symbol Choice

- Preferences
- Routine
- Novelty
- Partners

Portability

- Mounts
- Carrying case
- Protection

Durability

- Product
- Individual
- Environment
- Other Individuals

Cost

- Equipment Loan
- Benefit/Use across environments and time
- Funding Sources

Discrimination Training

- Use of a 2 panel voice output rocker switch
- Place picture of object on one switch
- Leave other side blank
- Alternate position of the picture during training
- Collect data

Expandability

- Single hits
- Sequencing
- Multiple levels
- Dynamic screen
- Spelling
- Letter encoding
- Interface with computer/ECU

Family/Caregiver Concerns

- Time
- Program
- Training
- Maintenance
- Acceptability

Graduated Guidance

- Provide the least amount of physical guidance
  to complete correct response
- Block incorrect responses

Time Delay

- Use discrimination setup
- After 80% correct independent in graduated guidance phase begin time delay
- Provide verbal cue and wait

Measuring Outcomes

- Clinical Results
- Functional Status
- Consumer Satisfaction
- Cost Benefit
- Quality of Life-Social impact
- Quality of life-Education/Vocational Impact

Research Questions

- Can individuals acquire VOCA use skills
- Will an individual use a VOCA to request preferred items or events in routine settings
- What effect will the use of a VOCA have on the communicative interactions of other individuals

Incidental Teaching

- Items are in sight but not available
- Client makes a response to indicate he/she may want the item
- Trainer prompts new communicative mode

Writing AT into the IEP/IHP

- As a goal
- As part of the present level of performance
- As a short term objective
- As method and/or material within an objective

Participants and Setting

- 4 children
- ages 3-5
- diagnosis of autism

- 1 special education teacher
- classroom aide

- special education class in home school

Training Stimuli and Equipment

- Black and White Line Drawings of Preferred Stimuli
- Cheap Talk from Enabling Devices
- Leisure Items and Snack Items

Behavior Defintions

Staff

- Verbal
- Verbal Prompt to Touch the Device
- Physical Prompt

Teacher Training

- 30 min inservice on VOCA
- Selected vocabulary and line drawings
- Incidental teaching approach

Behavior Definitions

Child

- Words
- Non-Words
- Gestures
- Voca

Observation and Reliability

- Computer
- Sessions averaged 10 min in length
- Reliability on 20% of observations
- Agreement scored within 2 s

Experimental Design

- Multiple probe across children and routines

RESULTS

- Increase in communicative behavior of children
- Increase in communicative behavior of staff
- Increase in other communicative behavi
- or of children

Mo's Top 5 Points

- Base selection on consumer preferences/need
- Try and see, instead of wait and see
- Try several devices before selecting one
- Emphasize a multi-modal approach
- Collect data

VOCA GUIDE

Voice Output Communication Aids

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Introduction

This guide was written to provide, parents and other caregivers an introduction to the use of voice output communication aids for individuals with communication impairments. A description of the use of AAC systems by individuals with severe disabilities, a description of voice output communication aids, and research related to the use of these devices by persons with severe disabilities is described. A case study highlighting the key components of the assessment and intervention model is also included.

Communication Issues for persons with severe disabilities

Many individuals with severe disabilities are unable to use speech to communicate. Due to the major role language plays in the learning process, the absence of functional communication skills may directly affect the level of participation an individual may have in home, school, work and community activities and perhaps more importantly, social interactions with others. Equipped with functional communication skills, individuals with severe disabilities may be able to participate more actively in interactions with others in multiple environments. Proficient communication skills may also serve to increase the rate as well as the quality of interactions between persons with disabilities and other communication partners. Additionally, substantive improvements in social skills and decreases in challenging behaviors, such as self-injury and aggression, have been observed as collateral effects of teaching functionally equivalent communication behaviors. In light of these benefits, teaching individuals with severe disabilities to communicate effectively may facilitate inclusion into every-day home, education, work, and leisure activities.

AAC as a Bridge to the Speaking Community

Developments in the area of augmentative/alternative communication (AAC) have produced an array of communicative options for non-speaking persons. AAC systems are communicative modes that individuals use to augment or supplement speech. AAC systems for persons with communication disorders have included a combination of vocal, sign language, tactile, graphic, symbol, and written modes. Many individual who are unable to use speech, have fairly discrete ways of attempting to communicate with others. Eye gaze, taking a person by the hand, and pointing to items are some of the ways individuals communicate without speech. However due to a lack of speech output and the unclear intent of non-speech communication systems, many communicative attempts by persons with disabilities may go unnoticed. Attempting to understand and respond to an individual's non-speech attempts to communicate is the first step in teaching a person with disabilities a more systematic way to communicate. For example, a person's eye gaze toward an object may be an indication that he/she would like the object. By providing the object to the person, we are acknowledging the eye gaze response as communicative. At this point, we may begin to use the response of eye gaze to teach the use of a more understandable AAC system, such as use of a voice output device.

Why Choose a VOCA as an AAC Mode

Voice output communication aids (VOCAs)are devices that can be programmed or recorded to provide synthetic or digitized speech. VOCA's may use micro-chip controlled technology, battery or electrical input as the power base. Due to technological advancements in the last ten years there is a wide array of VOCA's available offering diversity in features and cost. The distinct advantage of VOCA's over other AAC systems is the generation of speech

output. By providing speech output, a voice output communication aid (VOCA) may offer a more natural, low-effort system that reduces the complexity of a communicative interaction and eliminates barriers experienced by graphic and sign users. VOCAs may enable an individual to recruit attention and communicate a specific response simultaneously, unlike graphic systems that require a user to initially gain the attention of a communication partner. Communication partners may respond more consistently to the communicative behavior of individuals using an aid more like the conventional mode of speech. The use of voice output may provide opportunities to express a broader array of communicative functions, such as making social comments or information seeking, thus potentially increasing the number of communicative exchanges between the person communicating with the VOCA and other individuals. Furthermore, in view of the communicative nature of some challenging behaviors, the relative efficiency of a VOCA as a communication mode may be useful in establishing adaptive communication skills. Additionally, based on studies supporting the efficacy of using graphic-based systems, the use of VOCAs appears to be a logical communicative extension (i.e., using graphics in combination with speech output).

Effects of VOCAS on Communicative Interactions

Recent research with the use of VOCA's suggests that individuals may increase the use of already existing communicative modes such as gestures, vocalizations and speech as they begin to acquire VOCA skills. For example, if an individual uses vocalizations with an intent to communicate, these vocalizations may increase when the individual uses the VOCA. Similarly, individuals that use gestures to communicate before beginning to use a VOCA, have shown increases in gestures during VOCA use. For the most part, individuals displayed increases in

other communicative modes only if they used those modes to communicate prior to VOCA use.

The reason for increases in alternative modes of communication may be due in part to the increase in communicative interactions of communication partners when an individual uses a VOCA. Research has demonstrated that communication partners show a dramatic increase in communicative interactions with individuals using VOCAS relative to other communication modes. This increase in interactions by communication partners may facilitate the production of more communication behaviors because these behaviors have been recognized and responded to in a way that reinforces the occurrence of further communication behaviors. Preliminary research findings indicate that once an individual uses a VOCA, communication partners begin to respond to other communicative behaviors such as gestures and vocalizations which may have been ignored in the past or not considered communicative.

A Case Study: BEN

Ben is five years old and has a diagnosis of autism. Ben can say a few words, but does so on a very infrequent basis. He also uses gestures to indicate he wants something and will occasionally take the teacher by the hand to request an item. Each day Ben participates in a snack activity with other members of his class. The teacher feels that snack time is an excellent opportunity to incorporate incidental communication training. The teacher uses incidental teaching by providing Ben with items when he points or gestures and provides descriptive praise (e.g., "Ben, thanks for pointing to the cookie"). Although Ben is able to indicate he wants an item when it is visible, he does not have the opportunity to request novel items or to say thank you, or tell the teacher he is finished.

Based on Ben's classroom snack routine, the teacher selected 8 messages including, yes,

no, snack, drink, I'm finished, more, thank you, and please. Black and white drawings with colored backgrounds based on categories (e.g., verbs were blue, nouns were yellow) were selected for each message as Ben had used these types of drawings in a schedule system that was in place in the classroom to indicate activity sequences. A VOCA that offered 8 discrete messages and was relatively inexpensive was chosen as the device. The size of the line drawings did not appear to be an issue as Ben was able to discriminate smaller pictures during other training situations in the classroom. Based on direct observation of previous snack times, a list of Ben's most preferred and non-preferred snack items was generated. Efforts were made to have both preferred and non-preferred snack items available to Ben when the VOCA was introduced.

Using Ben's initiated communicative responses (e.g., pointing) the teacher was able to use these methods of communication as a bridge to using the device. The teacher would acknowledge Ben's pointing behavior and then point to the correct icon on the device. Although the teacher occasionally physically prompted Ben to use the correct icon for the situation, for the most part, the teacher used gestures as well as descriptive praise when Ben used the device correctly. Additionally, the teacher was sure to phrase his questions so that Ben could use the messages recorded on his device.

Ben learned to use what are considered more "abstract" communicative functions such as social commentary of "please" and "thank you" as well as the use "yes" or "no" to indicate whether he wanted a particular food item or drink that was offered. Ben began to use the device in a way that enhanced communicative interactions between himself and the teacher. For example, the teacher would present potato chips and say, "Ben would you like some chips?" Ben in response would press the icon for "No thank you." The teacher would reply, "Ben would you

like some banana pudding?" and Ben would respond, "Yes, I would." The teacher would then provide Ben with the pudding and typically say, "Here you go, Ben, thanks for telling me what you wanted, I thought you liked banana pudding." To which Ben would respond, "Thank you." Additional interactions would include requests for "more", "please," and telling the teacher when he was "finished" with snack.

Ben was also able to use the device effectively during a leisure activity using many of the same messages used during the snack routine and a few novel messages. After several months, it was decided that Ben would benefit from a device that offered a choice of more messages. It was decided that Ben could go to a device that used a smaller icon and had more icons on the face of the template than his current 8 choice VOCA. Issues regarding expandability were also considered and a device that offered different levels or pages for programming and more recording time was recommended. A device that was light in weight, portable in size and proven durable were equipment features that were important to consider due to Ben's mobility and the need to take the device to many different settings.

In Ben's case the words for each of the messages was included above each picture. During the time the VOCA was introduced, Ben began to put letters together to form words in an activity in the classroom. The teacher felt that perhaps Ben was using the words instead of the icons as cues to select his communicative message. The use of words instead of pictures would provide Ben with a higher level communication system and provide literacy training as well.

The new device was first presented to Ben during the same snack routine in which he had learned to use the 8 choice VOCA. Obvious differences were the size and look of the device, the smaller size of the black and white drawing (the color backgrounds were removed), and blank

spaces where more icons could be added. Ben began by pressing each of the icons to listen to the message. He proceeded to use the device in the snack situation in a contextually appropriate way. During the session, Ben began to say something that sounded like "bathroom." He began searching the template of the device and when he did not find the icon, attempted to articulate the word again and motioned to his pants. Given the context of the situation, the teacher immediately reinforced the attempt to say "bathroom" and told Ben he could go. Additionally, on his return the teacher said, "Hi, Ben." He looked at his device and pressed one of the new icons that had been added to his device that said, "Hi." The teacher said, "How are you?" Ben looked at his device and could not find any icon to use in response. He tried to articulate the word "fine." He then looked at the device and found the second new icon and pressed, "How are you doing?" The teacher responded she was "Very fine and very happy." Gradually the messages for learned VOCA responses such as "yes" and "no" were removed from the VOCA and Ben began to say these words clearly in response to question. He continued to use the VOCA to respond "thank you" after being provided with an item.

Final Considerations

A final consideration in selection of any AAC system, including a VOCA, is a commitment to provide the child with training and opportunities to use the system in a functional manner. The selection of a VOCA as an AAC system is only the beginning of a process to develop and foster the communication development of a non-speaking child. The use of a VOCA should not stop communication partners from responding to other forms of communication that are understandable. We all use multiple modes to communicate based on the context of a setting, and young children using AAC systems should be afforded the same

privilege. Ultimately, the key to successful use of any individualized AAC system is the provision of training at the level the child and communication partners require, motivation to communicate, willing communication partners and the availability of numerous and diverse opportunities to communicate.

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Resources

Pre-Made Symbols and Graphic Software

DynaSyms $22.00

Cut and past, over 1,00 black and white symbols, three sizes available

Picture Communication Symbols, Books, 1,2, and 3 $49.00 each

Over 3,000 symbols, organized by categories

Pick 'n Stick average $30.00 per pack

Full-color stickers illustrations for fast food, primary grades, etc.

Available from Don Johnston, Inc. 1-800-999-4660

Communication Displays for Engineered Preschool Environments, Books 1 & 2 $129.00

Displays in black and white to copy based on early school-age routines

PCS Color Stickers average $35.00 per set

Stickers, black and white and color-coded available

Boardmaker for Windows and MacIntosh $399.00

Graphics database containing 3,000 Picture Communication Symbols, 10 languages available for translation, drawing program available

Available from Mayer-Johnson Co. 1-619-550-0084

Cheap Talk

DEVICE	PRICE	# OF CELLS	RECORD TIME	ACCESS	SOURCE
Say it switchplate	$40	1		Direct Select D	Toys for Special Children 1-800-832-8697
Say it rocking plate	$50	2		D	
CheapTalk 4	$45-69	4		D, Scan, Sw	
Cheap Talk 8	$90-120	8		S, Scan, Sw	
Switch Module 4	$45	4		Sw	
BigMAC	$74	1	20 s	D	Ablenet 1-800-322-0956
Hawk	$175	9	5 sec/cell	D	AdamLab 1-313-467-1610
Lynx	$250	4	4 sec/cell	D or Sw	
Pocket Talker	$229	5	32 s	D	Attainment 1-608-845-7880
Pocket Talker Plus	$329	5	60 s	D	
Voicemate 4	$329	4	16 s	D	ACCI 1-800-982-2248
Scanmate 4	$385	4	16 s	D or Scan	
Switchmate 8	$695	8	32 s	D or Sw	
Talk Back III	$300	3	20 s	D or Sw	Crestwood 1-414-352-5678
Voice Pal	$500	10	60s	D, Scan, Sw	AdapTech 1-800-723-2783
Voice Pal Plus	$500	5	60s	Sw	
Message Mate	$500 and up	20-40 can be configued for 1,2, 5, 10	20s-120s	D, Sc	Word + 1-704-433-5302
Alpha Talker	$1500 and up	32 can be configured for 8 and 4	3 to 5-1/4 min	Direct select,optical scan,switch	Prentke-Romich 1-800-262-1984

Maureen M. Schepis, Ph.D. 4-11-95

Author Notes

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Contextual Rating Survey

SI Grant Context Data Sheet

Student:_____Rater:_____

Date:_____Routine:_____

Please rate the student's VOCA communication behavior as to the appropriateness of the responses in relation to the context of the situations presented during the activity.

1 _____Extremely Appropriate
2 _____Very Appropriate
3 _____Appropriate
4 _____Neither appropriate or inappropriate
5 _____ Somewhat appropriate
6 _____ Not very approriate
7 _____ Extremely inappropriate

Student:_____ Rater:_____

Date:_____Routine:_____

Please rate the student's VOCA communication behavior as to the appropriateness of the responses in relation to the context of the situations presented during the activity.

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Student:_____Rater:_____

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1 _____Extremely Appropriate
2 _____Very Appropriate
3 _____Appropriate
4 _____Neither appropriate or inappropriate
5 _____ Somewhat appropriate
6 _____ Not very approriate
7 _____ Extremely inappropriate

Letter of Consent

WESTERN CAROLINA CENTER

300 Enola Road ⊙ Morganton, N.C. 28655-4608 ○ 704-433-2731
Fax 704-438-6591 ○ TDD 704-433-2732

James B. Hunt, Jr., Governor
C. Robin Britt, Sr., Secretary

J. Iverson Riddle, M.D., Director

Dear Parent:

A study is being conducted to evaluate an instructional strategy to teach young children with disabilities to use a voice output communication device (VOCA). Students will learn to use VOCA's to communicate in naturally occurring routines during the day in the classroom.

If you agree, your child will be involved in communication training activities using a VOCA within the course of his/her regular school day and at home. The only information collected will be through direct observation of interactions and videotapes of interactions.

There are no apparent risks or discomforts associated with this study. Your child's participation is voluntary and you may withdraw from the study at any time for any reason. There is no penalty for not participating or withdrawing. The potential benefits of participation include opportunities directed to increase communicative interactions with other people and access to the use of VOCAs, a relatively new method of communicating needs. There are no costs to you or any other party.

All data collected in this study will be confidential and all person-identifiable data will be coded.

This study is being conducted by Maureen Schepis, Ph.D., of the Family, Infant and Preschool Program. She can be reached at 432-5924.

Thank you for your interest in this project.

Sincerely,

Maureen M. Schepis

I agree that my child may participate in the study

Signature_____ Date_____

Witness_____ Date_____

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Division of Mental Health, Developmental Disabilities and Substance Abuse Services
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