The Dissertation Committee for Sue Ellen Seely

certifies that this is the approved version of the following dissertation:

VOCA Use as a Communicative Repair Strategy: How Will It Generalize?

Committee:

Keith Turner, Supervisor

Jeff Sigafoos

Melissa L. Olive

Mark R. O'Reilly

S. Natasha Beretvas

VOCA Use as a Communicative Repair Strategy: How Will It Generalize?

by

Sue Ellen Seely, B.S.; M.Ed.

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VOCA Use as a Communicative Repair Strategy: How Will It Generalize?

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Sue Ellen Seely, Ph.D.
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Supervisor: Keith Turner

Without intervention to teach alternative forms of communication, preschoolers with developmental disabilities may rely on prelinguistic communication behaviors. Reliance on prelinguistic forms may be problematic because the communicative intent of these behaviors is often difficult to interpret, resulting in communication breakdowns. The purpose of this study was to teach young children who use prelinguistic communication forms to use a voice-output communication aid (VOCA) to repair communication breakdowns that arise when the child's prelinguistic initiations go unrecognized or are misunderstood. This study expanded the pilot work by Sigafoos, O'Reilly, Drasgow, Halle, Seely-York, Edrisinha, and Andrews (2004). Participants were 4 young students who experienced communication breakdowns due to their use of prelinguistic communication forms. Intervention occurred during various times throughout the day when the students had the opportunity to access preferred items through prelinguistic behavior. Effects of the intervention were evaluated in a multiple baseline design across three participants

with a delayed baseline for a 4th participant. Generalization probes were implemented to assess generalization of repair strategies across various conditions related to (a) nonattending listeners and (b) misinterpretation of the child's communicative intent. All students learned to use the VOCA to repair communication breakdowns. As the participants began to use the VOCA to repair, they also began to use it to initiate requests for reinforcers. VOCA use as a repair strategy generalized to other breakdown conditions as well. The intervention appeared to be a useful approach for teaching young children who use prelinguistic communication forms an alternative method for repairing communication breakdowns.

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CHAPTER 1

INTRODUCTION

Young children's communication skills develop dramatically during the first 2–3 years of life (Sigafoos, Drasgow, & Schlosser, 2003). Children with developmental disabilities, however, may fail to make this dramatic growth and without specific interventions designed to improve their communication proficiency, many children with developmental disabilities will remain in the early stages of communication (Reichle, 1997). Therefore, early intervention is important for children with developmental disabilities.

Early intervention may focus on a variety of communication skills, including prelinguistic forms of communication. Children functioning at the prelinguistic level of communication development do not use verbal language to communicate (Keen, Sigafoos, & Woodyatt, 2001). Common prelinguistic communication components are reaching for, pointing to, or guiding a person's hand toward an object (Siegel & Cress, 2002). Many children with autism and other developmental disabilities rely on such prelinguistic communication acts to meet their needs (Sigafoos et al., 2004). In fact, Rimland (1988; as cited in Carr & Kemp, 1989) found that 56% of 8,400 children with autism between the ages of 3 and 5 displayed autistic leading, or guiding a person's hand toward an object. Thus, this behavior is a very common form of requesting in young children with autism.

Without receiving an intervention designed to teach alternative forms of communication, young children with developmental disabilities may continue to use

prelinguistic communication forms (Sigafoos et al., 2004). When the prelinguistic behavior is considered socially or developmentally inappropriate (e.g., guiding another person's hand to desired item), the child may be socially stigmatized (Carr & Durand, 1985). Other, more acceptable prelinguistic communication forms (e.g. pointing, reaching) may not be as socially stigmatizing, but may not result in a successful communication exchange. Exclusive reliance on prelinguistic communication forms may result in frequent communication breakdowns (Houghton, Bronicki, & Guess, 1987) due to the nondiscrete nature of prelinguistic acts.

A communication breakdown occurs when a communicator initiates an interaction that goes unnoticed or is not reinforced (Brady & Halle, 2002). Communication breakdowns may occur if the listener does not realize the communicator is trying to communicate, does not attend to the communicator, or is unable to decipher the message (Halle, Brady, & Drasgow, 2003). Breakdowns in communication may result in frustration on the part of the communicator, and even increased rates of challenging behavior (Carr & Durand, 1985).

A communicative repair has been defined as "the ability to persist in communication and to modify or revise a signal when faced with a failure to communicate" (Alexander, Wetherby, & Prizant, 1997). A competent communicator may repair a communication breakdown in a number of ways (Schegloff, Jefferson, & Sacks, 1977), including repeating, recasting, or intensify the original communication act (Brady, McLean, McLean, & Johnston, 1995). Repetition of the original utterance is the most basic type of repair strategy and involves persisting with the original communication act. Recasting involves changing to some other form of

communicative behavior. Intensification involves amplifying the intensity of the communicative behavior.

Learning to repair communication breakdowns is an integral part of the language acquisition process and is easily accomplished by typically developing children (Brinton, Fujiki, Winkler, & Loeb, 1986). However, it is likely that children with developmental disabilities will be faced with the need to repair communication breakdowns more often than typically developing children because their communicative attempts are usually less sophisticated and more difficult to interpret (Wetherby, Alexander, & Prizant, 1998). Children with developmental disabilities may also have more difficulty learning to repair communication breakdowns than typically developing children (Brinton et al., 1986). Such problems can contribute to a high rate of communication failure which may result in frustration or even challenging behavior (Carr & Durand, 1985). For these reasons, teaching an alternative form of communication that might be better interpreted by listeners should be considered when working with children with developmental disabilities who use prelinguistic communication forms.

For students who use prelinguistic communication forms, augmentative and alternative communication (AAC) modes may be used to provide another method of communication (Reichle, Beukelman, & Light, 2002). Of the various AAC options, including manual sign, picture-based systems, and the Picture Exchange Communication System (PECS; Bondy & Frost, 2001), voice-output communication aids (VOCAs) present a particularly useful alternative communication modality (Sigafoos, Didden, & O'Reilly, 2003).

There are several advantages to using VOCAs as opposed to other AAC options (Schepis, Reid, & Behrman, 1996). First, the voice-output feature may provide the listener with a more natural and understandable communication signal. Second, the voice-output feature is an inherent attention-gaining feature. Combining an attention-gaining feature with a communicative act may increase listener attention to the communicative act. And last, the messages programmed in a VOCA may be made precise enough (e.g., "I want more") to decrease misunderstandings of the communicative attempt. The use of VOCA to repair communication breakdowns is appropriate because it addresses the problems of nonattending listeners, listeners who are not facing or looking at the communicator, and listeners who are at a far distance from the communicator.

Significant research has been done to understand how children with specific language impairment and children with developmental disabilities use repair strategies (e.g., Brinton & Fujiki, 1991; Brinton, Fujiki, Winkler, & Loeb, 1986; Geller, 1998; MacLachlan & Chapman, 1988; Paul & Cohen, 1984). Research with children who use prelinguistic forms of communication has also been done to understand how they repair communication breakdowns (e.g., Brady, McLean, McLean, & Johnston, 1995; Calculator & Delaney, 1986; Golinkoff, 1986). However, only two studies were found that taught children how to repair communication breakdowns; only one of these studies used VOCAs (Sigafoos et al., 2004).

Sigafoos and his colleagues (2004) taught 2 participants with developmental disabilities to repair a communication breakdown using a VOCA. The purpose of the present study was to extend the work of Sigafoos and his colleagues (2004) by

assessing generalization of repair strategies across various breakdown conditions related to (a) nonattending listeners and (b) misinterpretation of the communicative intent. Limitations of the study by Sigafoos et al. (2004) were addressed by increasing the number of participants, extending the findings to younger participants, assessing generalization across various breakdown conditions, and collecting follow-up, treatment fidelity, and social validity data.

CHAPTER 2

REVIEW OF RELATED LITERATURE

The following is a review of previous research on communication breakdowns and repairs of individuals with varying linguistic abilities. Studies were categorized according to the communication proficiency of their participants. Due to the minimal number of studies which included young participants, studies which included participants of all ages were included. Therefore, study participants in this review ranged in age from 12 months old to 58 years old. Although different in age, the participants in the included studies were all beginning communicators, all had communication impairments, and all experienced communication breakdowns to some degree.

As previously mentioned the reviewed literature was categorized according to communication proficiency of participants. First, research on the communication breakdowns and repairs of individuals with specific language impairment (SLI) and developmental disabilities is discussed. Next, research on the communication breakdowns and repairs of prelinguistic communicators is discussed. Finally, studies that sought to teach individuals to repair communication breakdowns are presented.

Communication Breakdowns and Repairs of Individuals With Specific Language Impairment (SLI)

Several aspects of conversational ability in school-age children with SLI have been identified as deficient. These children have been found to be impaired in their ability to take an assertive position in conversation, to use advanced syntactic and

morphological structures, to retrieve words, to formulate useful descriptions, and to repair communication breakdowns (Bryan, Donahue, & Pearl, 1981; MacLachlan & Chapman, 1988).

MacLachlan and Chapman (1988) compared communication breakdowns of typically developing children and children with SLI in two speech sampling conditions: conversation and narration. Three groups of children, 7 in each group, participated in the study. The children with SLI ranged in age from 9 years, 10 months to 11 years, 11 months (M = 10 years, 8 months) and were all receiving speech and language services in school. Their mean length of communication unit (MLCU) in conversation averaged 5.84 morphemes per communication unit, ranging from 4.70 to 7.57. This group was matched with a group of 7 typical children, equivalent in chronological age, ranging from 10 years, 7 months to 10 years, 11 months (M = 10 years, 8 months). A second control group of 7 typical children ranging in age from 3 years, 7 months to 5 years, 8 months (M = 4 years, 8 months) was matched with the SLI group based on MLCU (4.96 to 7.21; M = 5.96).

An examiner interviewed each child across conversation and narrative conditions. In the conversation condition, the examiner and child entered into a dialogue on such topics as the child's family, hobbies, sports, and daily events at school and home. In the narrative condition, the child was asked to retell a favorite movie or television program. The examiner negotiated the child's narrative with such prompts as "Tell me more" and "Can you think of anything else?"

When compared with age-matched typically developing peers and MLCU-matched younger children, the children with SLI displayed higher rates of

communication breakdowns in narration than in conversation. The lack of discourse support, the requirement for more complex syntax, and the more difficult organization problems may have contributed to the higher rates of communication breakdowns.

Brinton et al. (1986) compared 10 typically developing children and 10 children with SLI from each of the following age levels: 4 years, 10 months to 5 years, 10 months; 6 years, 10 months to 7 years, 10 months; and 8 years, 10 months to 9 years, 10 months, for a total sample of 60 participants. All of the children with SLI had normal comprehension skills and a significant expressive language delay (significance reflected by a score of more than one standard deviation below the mean or a delay of 1 year). All typically developing children were achieving at grade level academically.

Each child was examined individually, sitting across from the investigator. A cardboard screen with a small slot at the bottom was placed between the investigator and the child. The investigator gave the child 20 picture cards (10 control pictures alternating with 10 experimental pictures) in an envelope, one at a time, through the slot. The child was told that the investigator could not see the pictures. The child was asked to tell the investigator about each picture. The investigator responded to the child's descriptions of the control pictures with statements of acknowledgment (i.e., "uh huh"). The investigator responded to the child's descriptions of the experimental pictures with a stacked sequence of repairs (e.g., first repair opportunity signaled by "Huh?," second repair opportunity signaled by "What?," and third repair opportunity signaled by "I didn't understand that").

Results indicated that children with SLI produced more inappropriate responses or failed attempts to repair communication breakdowns in a stacked sequence than typically developing peers. The authors hypothesized that the children with SLI may not lack the ability to repair, but the persistence necessary to negotiate a repair.

Preschoolers with SLI have been found to be deficient in repair strategies when compared to typically developing children at the same communication level. Gallagher and Darnton (1978) examined the communicative repairs of 12 preschoolers with SLI, 4 at each of Brown's (1973) developmental language Stages I, II, and III. Brown's Stages are based on average mean length of utterance (MLU; Brown, 1973). For Stage I communicators, the average MLU is 1.75. For Stage II communicators, the average MLU is 2.25. And for Stage III communicators, the average MLU is 2.75.

All children in the study performed at least 1 year below chronological age level on expressive and receptive language measures and received speech and language intervention in their public school or at a university speech clinic. A 1-hour spontaneous language sample was collected from each child during a play session with the examiner. The examiner pretended that she did not understand what the child had said, and asked "What?" 20 times during the course of the hour. The probe occurred approximately once every 3 minutes.

Results indicated that the participants repeated repairs less often than they modified them. However, their modifications did not assume typical developmental patterns. The participants used equal proportions of phonetic additions, reductions,

and changes across all stages and rarely used substitutions, which would be expected to increase as the children moved through Brown's Stages. The authors concluded that preschoolers' with SLI use of repair strategies was unsystematic and did not fit in the linguistic stages in the way they did for typically developing children (Gallagher & Darnton, 1978).

Overall, these findings indicate that when compared to typically developing peers, children with SLI may experience more communication breakdowns in narration than conversation, possibly due to the complex nature of narration. Also, children with SLI may exhibit more inappropriate responses and failed attempts to repair communication breakdowns than did their typically developing peers. Additionally, young children's use of repair strategies may be unsystematic and may not follow a typical developmental sequence.

Communication Breakdowns and Repairs of Individuals With Developmental Disabilities

In addition to studies looking at repair strategies used by children with SLI, several studies have examined repairs used by individuals with developmental disabilities. Brinton and Fujiki (1991) compared 22 adults living in a community placement (M = 30 years of age; M = full scale IQ 61.45) and 22 adults living in an institutional placement (M = 28 years of age; M = full scale IQ 62.23). Nearly all of the participants living in the institutional placement displayed challenging behaviors such as aggression, antisocial behavior, or sexually aberrant behavior. Participants in the two groups were individually matched on the basis of IQ to within 7 IQ points.

A 30-minute language sample was collected for each participant through a mock job interview interaction with an investigator. Using similar methods as those employed by Brinton et al. (1986), 10 stacked repair sequences were distributed throughout the language sample. Participants' responses to requests for clarification were recorded.

Results indicated that all participants responded to some requests by repairing their original messages. However, a relatively high proportion of inappropriate responses to the request for clarification was noted for both groups. Furthermore, inappropriate responses increased as the request sequence progressed.

Interestingly, differences were found in the types of modifications used by both groups. The participants living in the community placement were more likely to add information to their modifications than the institution group. The authors concluded that adding information to modifications may be influenced by experiences with more and diverse stimuli, as would be the case for those living in the community (Brinton & Fujiki, 1991).

Paul and Cohen (1984) compared 8 adults with pervasive developmental disorder (*M* performance IQ = 63.3) and 8 adults with mental retardation (*M* performance IQ = 68.3). Participants were matched on performance IQ. Data were gathered by engaging participants in 10- to 15-minute conversations about various topics, such as pets, work assignments, or an object brought by the researcher.

Three communication breakdowns were targeted: (a) *clarification yes/no* (e.g. Speaker 1: "I ate a hamburger for lunch." Speaker 2: "You ate a hamburger for lunch?"); (b) *clarification neutral* (e.g. Speaker 1: "I ate a hamburger for lunch."

Speaker 2: "What?"); and (c) *clarification specific* (e.g. Speaker 1: "I ate a hamburger for lunch." Speaker 2: "You ate what for lunch?"). The researcher injected four of each communication breakdown in random order into the conversations. Participants' responses were recorded.

Results indicated that both groups responded to communication breakdowns 93% of the time. However, the participants with pervasive developmental disorder were significantly less likely to give a specific response to a request for clarification than participants with mental retardation. The participants with pervasive developmental disorder tended to repeat or revise their utterance. The authors suggested that the participants with pervasive developmental disorder were unable to determine which piece of information needed clarification.

Geller (1998) studied the communication breakdowns and repairs of five school-aged children with autism. All participants met *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edition (*DSM-III*; American Psychiatric Association, 1987) criteria for Developmental Disorders for Childhood, Early Infantile Autism. Their ages ranged from 7 years, 10 months to 12 years, 9 months. Each child was videotaped during two 30-minute free-play sessions involving adult-child interactions with toys. Play was child centered, and the adult was responsive to the child's self-initiated verbal and nonverbal behaviors.

Aspects of language use were the main focus of this study; therefore, communication breakdowns and repairs were analyzed retrospectively. The investigator had no preconceived plan for responding to or eliciting communication breakdowns or repairs. In regards to the participants' use of repair strategies, results

indicated that the participants tended to attempt to repair communication breakdowns but did not add specific linguistic information to clarify their original message.

Coggins and Stoel-Gammon (1982) studied the communication breakdowns and repairs of five preschoolers (*M* age = 5.4 years) with Down syndrome. All participants were in Brown's (1973) Stage I, the earliest stage of language development. All participants had a mild deficit in adaptive behavior as measured by the AAMD Adaptive Behavior Scale (Grossman, 1977) and were enrolled in a preschool program.

Language samples were collected for all participants during six one-on-one (investigator and child), 30-minute play sessions over a 4-week period. A transcript was prepared for all clarification episodes that occurred naturally during the play sessions. Each child's response to the adult's clarification request was classified as a repetition, a revision, or no response.

Results indicated that 3 of the participants used significantly more revisions than repetitions. One participant used revisions and repetition equally. All participants, therefore, perceived communication breakdowns during the play sessions and used strategies in an effort to repair the breakdowns. The authors suggested that Gallagher's (1977) conversational imperative—revise your utterance when the listener does not understand—may be operating for young children with Down syndrome or for Stage I communicators.

Overall, these findings indicate that individuals with developmental disabilities may respond to some requests by repairing their original messages. However, they may also use a higher proportion of inappropriate responses to

requests for clarification (Brinton & Fujiki, 1991). Furthermore, individuals with pervasive developmental disorders and autism may be less likely to give a specific response when faced with a communication breakdown than individuals with other developmental disabilities, such as Down syndrome.

Communication Breakdowns and Repairs of Individuals Who Use Prelinguistic Forms of Communication

A few studies have focused on communication breakdowns and repairs for preverbal and nonverbal communicators. Golinkoff (1986) sampled the communication of 3 typically developing children at 12 months, 14 months, and 16 months of age. The children (2 girls and 1 boy) and their mothers were videotaped in their homes during lunch. The mothers were instructed to behave as they normally would during lunch.

By analyzing the videotape, Golinkoff (1986) discovered that 49% of the communicative interactions between mother and child were negotiations, 38% were immediate successes, and 13% were missed attempts. Negotiations occurred when the mother helped the child make his or her intentions known. Immediate successes occurred when the mother immediately comprehended her child's communicative intent. Missed attempts occurred when the mother did not permit negotiation to occur because she failed to respond to the child's initial signal.

The proportion of immediate successes increased, while the proportion of negotiations and missed attempts decreased from the first to the third sample. Golinkoff (1986) concluded that children's repair attempts increase as they develop during the preverbal stage of communication. These findings indicated that even with

a familiar adult, typically developing children are often faced with communication breakdowns.

Calculator and Delaney (1986) compared the repairs of 5 verbal and 5 nonverbal adults with moderate to severe mental retardation. Comparison with verbal communicators was possible because each participant constructed syntactic forms and had an MLU that corresponded to Brown's (1973) Stages II and III with communication boards.

Each subject was engaged in an informal conversation with a familiar adult for approximately 75 minutes. Topics for conversation were the participants' families, interests, likes, and dislikes. An observer, located behind and to the side of the participant, cued the examiner when to request clarification and then coded the participant's responses. Clarification requests were nonspecific (e.g., "What?" or "Huh?") and occurred every 90 seconds. Forty clarification requests were issued to each participant. The examiner verbalized the nonverbal participants' board-conveyed messages so that the observer could code the response.

Both groups were equal in their responsiveness to requests for clarification. Both groups rarely changed the topic of conversation or ignored the listener. Both groups used more repetitions than would be expected from typically developing children operating at comparable levels of language development. The authors concluded that both groups were unable to evaluate why their messages were misunderstood by the listener and therefore, could not repair them.

Participants in the nonverbal group used communication boards. Slow rates of transmission and frequent breakdowns in communication are common with

communication board users (Yoder & Kraat, 1983). The authors found that all of the participants in the nonverbal group changed modality 14% of the time and went from board to nonboard (e.g., gesture) and vice versa equally. Participants in the verbal group rarely changed modality.

Brady, McLean, McLean, and Johnston (1995) studied the repairs of 28 individuals (*M* age = 34 years old) who were nonverbal and who had severe to profound mental retardation. All participants communicated intentionally but not symbolically; that is, with nonsymbolic gestures and vocalizations, but without symbolic vocalizations or manual signs.

A brief interactive routine between participant and experimenter was established. For example, the experimenter gave a novel wind-up toy to the participant. The experimenter helped the participant activate the toy, if necessary. As soon as the participant demonstrated s/he had learned the routine by appropriately interacting with the materials, the experimenter would initiate the test trial. The test trial always involved a violation of an expectation that had been established during the brief interactive routine (e.g., wind-up toy was placed in a sealed plastic bag).

Participants were each given five opportunities to repair when requests for help and attention to an object or event were not responded to or were misunderstood by the experimenter in various ways (e.g., experimenter *ignores* with competing activity, experimenter *ignores* without competing activity, experimenter produces a *spoken request for repair*, experimenter produces a *gestural request for repair*, and experimenter *gives a wrong response*).

Results indicated that all but 3 of the participants emitted at least one repair and most participants responded to three or more types of communication breakdowns. Twenty-three of the participants repaired at least 50% of their breakdowns, and 10 participants repaired 100% of their breakdowns. Participants were more likely to repair breakdowns with revisions or repetitions than with additions and there were no differences noted in the number of participants repairing across conditions.

Overall, these findings indicate that individuals who are preverbal and nonverbal use repair strategies when faced with communication breakdowns. Some evidence indicates that repetition may be the most likely repair strategy to be used by nonverbal communicators with developmental disabilities (Brady et al., 1995; Calculator & Delaney, 1986). However, Coggins and Stoel-Gammon (1982) reported opposite findings for children with Down syndrome at Brown's (1973) Stage I. Taken together, these findings suggest that developing the active use of repair strategies in individuals with disabilities is an important "next step" in the current research on repair strategies.

Teaching Repair Strategies to Individuals With Disabilities

Duker, Dortmans, and Lodder (1993) taught 5 residents of a facility for individuals with mental retardation to repair communication breakdowns by repeating their initial signed requests. All participants were functioning at severe and profound levels of mental retardation, according to American Association on Mental Retardation (AAMR) criteria (Grossman, 1977) and had at least seven manual signs

in their repertoire. The participants were reinforced for accepting a requested item and rejecting an unrequested item. If the participant accepted an unmatched referent (e.g., signed I WANT BLOCKS, was given modeling clay instead, and accepted the modeling clay), s/he was taught to repeat the original sign as a way of repairing the breakdown. Results indicated that the procedure was effective in establishing and increasing the repetition of a request when a trainer delivered an unrelated item.

This approach is effective only if the receiver is present and the student signs well enough to be understood. This approach, however, would not be effective if the receiver was not in the student's immediate presence or the student did not sign well enough to be understood or used prelinguistic forms of communication to request. Sigafoos et al. (2004) addressed this potential problem by teaching 2 students with developmental disabilities to repair communication breakdowns by revising their behavioral indication (Drasgow, Halle, & Sigafoos, 1999) using a voice-output communication aid (VOCA).

Two students who did not speak, relied primarily on prelinguistic behaviors to communicate, and had no prior experience with VOCAs participated in this study. The 1st participant was a 16-year-old boy diagnosed with pervasive developmental disability not otherwise specified (PDD/NOS) based on criteria from the *DSM-IV* (American Psychiatric Association, 1994) and mental retardation with pervasive support needs based on AAMR (1992) criteria. He was nonverbal and communicated mainly through facial expressions, a few manual signs, screaming, and by guiding another person's hand to a preferred item. The 2nd participant was a 20-year-old woman diagnosed with autism, mental retardation, and bilateral hearing loss. She was

nonverbal and communicated mainly through reaching and guiding another person's hand to a preferred item.

Breakdowns occurred when the listener failed to attend to the learner's initial request. Results indicated that during baseline, both participants used prelinguistic forms of communication (e.g., reaching, guiding trainer's hand, etc.) to request access to preferred reinforcers. Although the students had access to the VOCA, neither student used the VOCA at any time during baseline. The students typically repaired by persisting with, intensifying, and/or revising their request into some other form of prelinguistic communication.

During intervention, the investigator ignored the student's request by feigning that he did not realize the student was making a request. This was done in order to create an "ignore" communication breakdown. The student was reinforced if the VOCA was used to repair the communication breakdown. If the student did not use the VOCA to repair the communication breakdown, the investigator prompted the student to use the VOCA using the least amount of physical guidance necessary. Prompted VOCA use was also reinforced.

Results indicated that the students correctly repaired their responses 80–100% of the time. Another, unexpected effect was observed: As they began to use the VOCA as a repair strategy, overall use of prelinguistic communication forms during the study decreased.

The results of these two studies indicate that AAC modalities can be used to teach students with developmental disabilities to repair communication breakdowns. The need for further development of these types of interventions is especially

important for students functioning in the prelinguistic stages of development, given the frequency of communication breakdowns that might be expected for this population (Houghton, Bronicki, & Guess, 1987).

Statement of Purpose

The purpose of this research was to extend the work of Sigafoos et al. (2004) by assessing generalization of repair strategies across various conditions related to (a) nonattending listeners and (b) misinterpretation of the child's communicative intent. Preschoolers with developmental disabilities were participants because of the minimal previous research in this area focusing on this particular age group and because of their use of prelinguistic communication forms. Limitations of the study by Sigafoos and his colleagues (2004) were addressed by increasing the number of participants, extending the findings to younger participants, assessing generalization across various breakdown conditions, and collecting follow-up, treatment fidelity, and social validity data.

Research Questions

The following research questions were addressed: "What are the effects of teaching preschoolers who use prelinguistic forms of communication to repair communication breakdowns using a VOCA?" and "How does the ability to repair communication breakdowns using a VOCA generalize across breakdown conditions?"

CHAPTER 3

METHODS

Participants

Five individuals who used prelinguistic communication forms to communicate began the study. Four of the 5 completed the study. Developmental age ranges are not given for the participants because that information was not available in their school records.

Will

Will was a 4-year-old Caucasian boy who communicated through the use of gestures and reaching for and waving his hand toward a preferred item. His teacher reported that he rejected objects and activities by crying and collapsing to the floor. No other challenging behaviors were reported. School records indicated that he had a speech and language impairment and was functioning below age level on all preschool domains (i.e., cognitive, language, motor, social, and self-help skills). He received special education services from the local school district for 5 ½ hours a day, 5 days a week in an inclusive preschool classroom. During school hours, he also received speech therapy, occupational therapy, physical therapy, and school psychological services. Will had a behavioral intervention plan that focused on following teacher directions, working for praise, and engaging in nonpreferred activities in order to obtain preferred activities. Records indicated that school personnel were currently completing assistive technology and autism evaluations for

Will. The home language survey in his school records indicated that English was his first and only language and the language spoken at home. Will's teacher indicated that at the start of the study he was beginning to use one-word utterances, but very sporadically. For example, she reported that he said "juice" one day at lunch, but was never observed saying it again. Will had never used a VOCA prior to this study.

Marco

Marco was a 3-year-old Hispanic boy who communicated through use of gestures. He did not point or attempt to gain others' attention in any way. His teacher reported that he did not display joint attention behaviors and did not imitate body movements. She also reported that he rejected objects and actions by crying and screaming. No other challenging behaviors were reported. Marco had been evaluated by a private physician and the school district and had been diagnosed with autism and a speech and language impairment. He displayed self-stimulatory behaviors, such as shaking his hands while looking at them and making repetitive vocalizations that could best be described as squeals. He did not play or engage with others. His teacher reported that his play schemes were stereotypical (e.g., instead of rolling toy cars on the ground, he collected all of them and lined them up in a row). School records indicated that he was functioning below age level on all preschool domains. He received special education services from the local school district for 5 ½ hours a day, 5 days a week in an inclusive preschool classroom. During school hours, he also received speech therapy, occupational therapy, physical therapy, and school psychological services. Marco had a behavioral intervention plan that focused on

following teacher directions and increasing interactions with peers and adults. Records indicated that school personnel were currently completing an assistive technology evaluation for Marco. The home language survey in his school records indicated that English was his first and only language and the language spoken at home. Marco's parents had provided him with a Go Talk 9+ (Attainment Company, Inc.), an augmentative communication device. Observations of Marco in the classroom and in his home revealed that he did not use the device unless presented with it and then he only used it for choice making and never for initiations or repairs.

Alex

Will's brother, Alex, was a 6-year-old Caucasian boy who communicated by vocalizing, pointing, and using gestures and gross motor movements, such as jumping up from his chair and falling to the ground. His teacher reported that Alex rejected objects and actions by crying, avoiding eye contact, and turning his body away from the unwanted object or person. She also reported that Alex did not display challenging behaviors. School records indicated that he had autism, a speech and language impairment, and was functioning below age level on all preschool domains. He received special education services from the local school district for 7 hours a day, 5 days a week in a self-contained classroom for children with autism. During school hours, he also received speech therapy, occupational therapy, physical therapy, adaptive physical education (PE), and school psychological services. He also was included in an inclusion kindergarten classroom as appropriate. "Appropriate" was not defined in his Individualized Education Plan (IEP). Alex had a behavioral

intervention plan that focused on following teacher directions and interacting with peers. The home language survey in his school records indicated that English was his first and only language and the language spoken at home. Alex's teacher indicated that at the start of the study he was beginning to use more symbolic vocalizations, but they were difficult to understand especially for someone unfamiliar with Alex or without knowledge of the context. Alex had never used a VOCA prior to this study.

Jaxson

Jaxson was a 3-year-old Caucasian boy who communicated through the use of gestures and guiding an adult's hand. His teacher reported that he rejected unwanted objects and actions by crying. She also reported that he was typically easy to calm and that he did not engage in challenging behavior. Jaxson had been evaluated by a private physician and the school district and had been diagnosed with autism and a speech and language impairment. School records indicated that he was functioning below age level on all preschool domains, except for gross motor. He received special education services from the local school district for 5 ½ hours a day, 5 days a week in an inclusive preschool classroom. During school hours, he also received speech therapy, occupational therapy, and school psychological services. Jaxson had a behavioral intervention plan that focused on following teacher directions, increasing parallel play, and decreasing stereotypical play with toys (e.g., lining up blocks instead of building with them). The home language survey in his school records indicated that English was his first and only language and the language spoken at home. His parents reported that he was on a gluten-free/casein-free diet and was

undergoing chelation treatments to remove heavy metals from his bloodstream. Jaxson had never used a VOCA prior to this study.

Katie

Katie was a 3-year-old Caucasian girl who communicated through use of gestures, pointing, and guiding her mother's hand to a preferred item. Her teacher reported that she rejected unwanted objects and actions by crying and running away from the person making the demand or offering the unwanted object. Her teacher reported no other challenging behaviors. School records indicated that she had a speech and language impairment and was functioning below age level on all preschool domains. She received special education services from the local school district for 5 ½ hours a day, 5 days a week in an inclusive preschool classroom. During school hours, she also received speech therapy, occupational therapy, and physical therapy. The home language survey in her school records indicated that English was her first and only language and the language spoken at home. She had no system for communicating other than the prelinguistic forms previously mentioned. Katie had never used a VOCA prior to this study.

Katie was dropped from the study when it became apparent that she engaged in severe challenging behavior when faced with demands. When faced with a demand (e.g., sit at a table and work with an adult), Katie threw her body to the floor, cried, screamed, and banged her head on the floor. At times, she banged her head on a table as well. On numerous occasions, Katie was observed to have a bruise on her forehead, most likely due to her head banging. Although previous studies have

included participants with challenging behavior (e.g., Sigafoos et al., 2004), Katie's behavior was considered too dangerous to warrant inclusion in the study. Neither Katie's parents nor her teacher reported challenging behavior during the participation nomination process. However, when asked about challenging behavior after it had been observed, both Katie's parents and teacher confirmed that Katie did indeed engage in head banging. Informal observations of Katie at home and in her classroom revealed that her parents and teacher almost never placed demands on her, perhaps in an effort to avoid situations that might elicit challenging behavior.

Setting and Instructional Contexts

Sessions for Will, Marco, and Jaxson were run in a preschool classroom during other students' ongoing educational programming. Group instruction with large groups of children (10–12 students in each group) was conducted at this time. Classroom teachers requested that sessions be run at this time because the participants' IEP objectives were not the focus of this group instruction. Therefore, their participation in something else at this time would not interfere with their ongoing educational programming. Training for Will, Marco, and Jaxson was conducted in a one-to-one setting.

All sessions for Alex were run in his classroom. Depending on the class schedule and the needs of the teacher for a particular day, sessions for Alex were conducted with and without other students present. Prior to the study, Alex took a brief nap in the afternoon while his classmates were included in general education

classes. When Alex began to transition out of this daily nap time, sessions were run at this time.

Session Schedule and Data Collection

Data were collected during brief, 5-minute sessions. The number of sessions conducted per day depended on behavior of the participant. If the participant was engaged in the activity, sessions were continued. If the participant indicated that he was not interested in the activity by leaving the table, for example, sessions were stopped and continued the following day or at the next available opportunity. On occasion, Alex remained engaged with the activity for up to 10 minutes. The other participants typically participated in the activity for approximately 5 minutes.

Within each session, the researcher provided 12 opportunities for the participant to access reinforcers. Three types of opportunities (Standard Opportunities, Repair Probes, and Generalization Probes) occurred within each session. All sessions were videotaped and scored at a later time by the researcher and a trained observer to record presence or absence of target behavior.

Target Behaviors and Communication Breakdown Conditions

Target Behaviors

Five target behaviors were defined: (a) behavioral indication (Drasgow, Halle, & Sigafoos, 1999), (b) VOCA use, (c) vocalization, (d) behavioral indication + VOCA use, and (e) VOCA use + vocalization (see Table 1).

Table 1

Target Behaviors and Their Definitions

Target Behaviors	Definition
Behavioral indication	Participant attempted to gain preferred reinforcers using prelinguistic communication acts (i.e., reaching for them, walking around the table to get to them, or guiding the researcher's hand toward them).
Voice-output communication aid (VOCA) use	Participant pressed the VOCA with sufficient force to produce the recorded message.
Vocalization	Participant vocalized in an attempt to gain preferred reinforcers.
Behavioral indication + Vocalization	Participant simultaneously used both behavioral indication and vocalization in response to an opportunity.
VOCA use + vocalization	Participant simultaneously used the VOCA and vocalized in an attempt to gain preferred reinforcers.

Following procedures used by Sigafoos et al. (2004), the target behaviors were further classified as either *First Response* or *Correct Repair.* The first target behavior to occur for each opportunity was considered a *First Response.* During Standard Opportunities, a *First Response* was reinforced with a preferred reinforcer. During Repair and Generalization Probes, the researcher responded to the *First Response* according to breakdown condition to simulate a communication breakdown. A *Correct Repair* was recorded if the participant used the VOCA (alone or in conjunction with another target behavior) during Repair and Generalization Probes.

Communication Breakdown Conditions

Four communication breakdown conditions were assessed: (a) ignore, (b) spoken request for repair, (c) give wrong response, and (d) give wrong item (see

Table 2). These communication breakdown conditions were adapted from Brady et al. (1995) and were thought to be representative of the kinds of breakdowns the participants would encounter on a daily basis.

Table 2

Definitions of Communication Breakdowns and Explanations of When Each Was Used: During Repair or Generalization Probes

Breakdown condition	Definition	Type of probe
Ignore	Researcher responded to the student's request for a reinforcer by pretending not to hear the student's communicative attempt.	Repair
Spoken request for repair	Researcher responded to the student's request for a reinforcer by looking at the student and saying, "What?"	Generalization
Give wrong response	Researcher responded to the student's request for a reinforcer by giving a relevant, but incorrect response.	Generalization
Give wrong item	Researcher responded to the student's request for a reinforcer by giving the student an unrelated item.	Generalization

Experimental Design

This study involved four phases: (a) baseline, (b) intervention, (c) 2-week follow-up, and (d) 4-week follow-up. These were arranged in a multiple-baseline across 3 participants (Will, Marco, and Alex) and a delayed baseline across a 4th participant (Jaxson). Jaxson's baseline was delayed because he did not turn 3 until Will had completed intervention and Marco and Alex had almost completed intervention. It was important to wait for Jaxson to turn 3 to start intervention,

because the researcher had approval from the University IRB and the school district IRB to work with students ages 3–6.

Procedures

Pre-Baseline Assessments and Materials

AAC assessment. Prior to baseline, information was gathered from the participants' teachers and families to determine type of VOCA to be used. The strengths and needs of each participant were assessed using questions adapted from Beigel (2000) and Judge (2002) (see Appendix A). Families and teachers of Will, Alex, and Jaxson suggested that simple-to-use and inexpensive VOCAs were preferred. Teachers recommended using a BIGmack® switch (AbleNet, Inc.) because it was considered easy to use. Teachers also reported that they had access to BIGmack® switches through the special education department in their school district. Due to the relative low-cost, durability, accessibility, and ease of operation of the BIGmack® switch, it was considered to be an appropriate augmentative communication device for a beginning VOCA intervention and for this study.

The BIGmack® switch measured 12.7 cm in diameter. A male child from Will's class recorded the message "I want more" into the device. This is the message that played when the switch was pressed. The switch required less than 3 ounces of weight to activate the prerecorded message. A black and white line drawing representing "want" from the *Mayer-Johnson Picture Communication Symbols*

Combination Book (Mayer-Johnson Co., 1994) was attached to the switch with Velcro.

As previously mentioned, Marco's parents had provided him with a Go Talk 9+ (Attainment Company, Inc.). Although observations of Marco in the classroom and in his home indicated that he was not proficient at using the device, his parents and teacher requested that the use of the device be continued due to concerns about introducing a new device.

The Go Talk 9+ had 12 cells across five levels. Nine of the cells could be changed from level to level, allowing for 45 choices. The remaining three cells remained the same across the levels. These cells contained Mayer-Johnson symbols and pre-recorded messages representing "all done," "more," and "I want." Marco's parents provided picture boards for each level of the device. For example, one board was for breakfast food choices, another was for lunch food choices, another was for toy choices, etc. The boards contained up to nine digital pictures of various items. Marco's father prerecorded the messages for each cell.

Reinforcer survey. An assessment to determine participants' preferred reinforcers was also completed prior to baseline. The Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996) was used to gather information from teachers about participants' preferred reinforcers (see Appendix B). Based on responses from the survey, potential reinforcers were identified for each participant, and their preference was formally assessed using a multiple stimulus without replacement assessment procedure.

Multiple Stimulus Without Replacement Procedure

Using methods described by DeLeon and Iwata (1996), items identified by the RAISD were assessed. Each participant was given the opportunity to interact with each item for 15 s. All items were then placed in an array in front of the participant and he was allowed to choose one item. Once the participant had consumed the item or interacted with the item for 15 s, the item was removed and the array of items was again presented to the participant in a different order, without the previously chosen item present. This process continued until all items were selected or until the participant stopped making selections for 30 seconds or more. The array of items was presented five times per session across four sessions.

Preference of items was determined by calculating the number of times an item was selected first, second, third, and so on. Items selected first were scored 1/1 (i.e., item selected once out of one opportunity), items selected second were scored 1/2 (i.e., item selected once out of two opportunities), and so on. Each score was calculated and then multiplied by 100. All scores for an item were averaged and then ranked from highest average to lowest average. Items receiving highest averages were considered preferred.

General Procedures

For each session, the researcher sat at a small table, adjusted to the height of the participants. Will, Alex, and Jaxson sat at the table with the researcher. Marco stood at the table and walked to and from the table to a magnet board that he used with his reinforcers. The magnet board was approximately 3 feet away from the table.

Preferred reinforcers were placed on the table or on a chair near the table, out of reach of the participants, but in view. The VOCA was placed within reach of the participant and on a particular side if the participant had a hand dominance.

All sessions began by giving the participant a small sample of or an opportunity to engage with a reinforcer (e.g., one goldfish cracker, 15-second opportunity to view a video). The researcher then removed the reinforcer and said, "Let me know if you want more." The beginning of an opportunity was determined by the participant responding with one of the target behaviors. When a target behavior occurred, the researcher immediately gave the participant a reinforcer (Standard Opportunities) or simulated a communication breakdown for 10 s, creating an opportunity for the participant to repair (Repair and Generalization Probes). A 10-second delay was used to establish a need for the participant to repair and to increase the time between the first response and the repair opportunity.

Baseline

Baseline sessions consisted of six Standard Opportunities, three Repair Probes in the *ignore* condition, and three Generalization Probes (one probe in each condition). The sequence of Standard Opportunities, Repair Probes, and Generalization Probes varied randomly across sessions. For each Standard Opportunity, the participant was given access to a preferred reinforcer immediately after engaging in a target behavior. For Repair and Generalization Probes, the researcher responded according to the breakdown condition (e.g., ignored the participant, asked the participant "What?," gave the participant a related response, but

not the item requested, or gave the participant an item not requested). The simulated communication breakdown lasted for 10 s. After 10 s, the participant was given a preferred reinforcer regardless of behavior. The purpose for the 10-second delay was to simulate a communication breakdown and to give the participant time to respond to the breakdown. For the 1st and 4th participants, baseline was concluded when a stable trend in behavior was noted. For the 2nd participant, baseline was concluded when intervention effects were noted for the 1st participant. For the 3rd participant, baseline was concluded when intervention effect were noted for the 2nd participant.

Intervention

Intervention sessions consisted of three Standard Opportunities, six Repair Probes in the *ignore* condition, and three Generalization Probes (one probe in each condition). Increasing the number of Repair Probes provided more opportunities to teach VOCA use as a repair strategy. The sequence of Standard Opportunities, Repair Probes, and Generalization Probes varied randomly across sessions.

The procedures during Standard Opportunities and Generalization Probes were identical to those used during the baseline phase. That is, the participant was reinforced upon display of any target behavior. However, for the Repair Probes during intervention, the procedure was slightly different. The researcher ignored all behaviors that did not involve the correct repair response (VOCA use) for 10 s, pretending to be occupied with something else. If the participant engaged in VOCA use after his first response was ignored, a correct repair was counted and the participant was given a reinforcer. If a correct repair did not occur within 10 seconds

of the first response, the researcher prompted the student to produce the target behavior to repair the communication breakdown. Level of prompting varied across participants, but a least-to-most prompting hierarchy was used for each participant. Prompting varied from simply pointing to the VOCA to gently moving the participant's hand to the switch and assisting the participant in pressing the switch. Prompted repairs were reinforced by giving the participant a preferred reinforcer, but were not counted as correct responses. The intervention phase concluded when the participant used the VOCA to repair 100% of the time across three consecutive blocks of 12 opportunities.

Follow-Up

Follow-up probes for evaluating maintenance of skills were implemented 2 and 4 weeks after completion of intervention to determine if participants had maintained VOCA use to repair communication breakdowns. Follow-up sessions consisted of six Standard Opportunities, three Repair Probes in the *ignore* condition, and three Generalization Probes (one probe in each condition). Procedures during follow-up sessions were identical to baseline procedures; that is, no teaching prompts occurred during follow-up sessions.

Interobserver Agreement

All sessions were videotaped and scored at a later time to record presence or absence of the target behavior. The researcher, who was the primary coder, and another observer independently recorded target behaviors from the videotapes for at

least 30% of the sessions. The researcher taught the other observer the operational definitions of the target behaviors and gave examples of each. Data from the two observers were compared for agreements and disagreements. An agreement was scored if each observer recorded the same behavior for each opportunity. Any discrepancy between the two observers was counted as a disagreement. Interobserver agreement was calculated on an opportunity-by-opportunity basis using the formula: Agreements/(Agreements + Disagreements) x 100. Overall agreement was coded for an average of 40.25% (range 30–50%) of sessions for all participants and was calculated to be 98.8% (range 95.8–100%). The overall percentages of sessions and individual reliability scores are presented for each participant in Table 3.

Table 3

Interobserver Agreement for Will, Marco, Alex, and Jaxson With Total Percentage of Sessions Coded for Each Participant

Phase	Will	Marco	Alex	Jaxson
Baseline	100.0%	100.0%	97.2%	100.0%
Intervention	100.0%	100.0%	97.3%	100.0%
2-Week follow-up	97.9%	100.0%	97.9%	100.0%
4-Week follow-up	100.0%	100.0%	95.8%	95.8%
Percent of coded reliability sessions	45.0% (*R* = 30–50%)	41.3% (*R* = 32–50%)	43.3% (*R* = 35–50%)	46.3% (*R* = 35–50%)

Note. R refers to range

Treatment Fidelity

Evaluation of treatment fidelity was conducted by randomly selecting at least 31.1% (*R* = 31.1–50.0%) of the intervention sessions for each participant and having an observer score the sessions using a five-question treatment fidelity checklist (see Appendix C). The observer was trained using videos of the intervention sessions and was told what to look for and how to use the checklist. Following this instruction, the observer watched a video and scored the sessions using the five-question treatment fidelity checklist. The observer scored a plus (+) or a minus (-) depending on what occurred in each opportunity. For example, if during a Repair Probe, the observer observed the researcher ignoring the participant for 10 s, a plus (+) was marked. If the time given to simulate a breakdown was observed to be less than 10 s, a minus (-) was marked. Treatment fidelity was calculated on an opportunity-by-opportunity basis using the formula: Pluses/(Pluses + Minuses) x 100. Following the recommendation of Gresham (1977), condition and session treatment fidelity scores were calculated as well. Condition treatment fidelity was calculated in the same way as overall treatment fidelity, but across each type of opportunity. That is, treatment fidelity scores were individually calculated for Standard Opportunities, Repair Probes, and Generalization Probes in each condition across sessions. Session treatment fidelity was also calculated in the same way as overall treatment fidelity, but within each session. That is, a treatment fidelity score was calculated for each session observed. Overall treatment fidelity was calculated to be 93.8%. Treatment fidelity scores are presented for each participant in Table 4.

Table 4

Overall, Condition, and Session Treatment Fidelity (TF) Scores for Will, Marco, Alex, and Jaxson, Average Scores Included

		Condition TF					Session TF	
				Generalization Probes				
Participant	Overall TF	Standard Opportunities	Repair Probes	Spoken request for repair	Give wrong response	Give wrong item	Percentage of sessions observed	TF per session
Will	95.0%	100.0%	93.3%	100.0%	80.0%	100.0%	50.0%	100.0% 91.7% 91.7% 100.0% 91.7%
Marco	93.3%	100.0%	90.0%	100.0%	80.0%	100.0%	31.3%	91.7% 91.7% 91.7% 91.7% 100.0%
Alex	93.3%	100.0%	90.0%	100.0%	100.0%	80.0%	35.7%	83.3% 100.0% 91.7% 100.0% 91.7%
Jaxson	93.3%	100.0%	90.0%	80.0%	100.0%	100.0%	35.7%	91.7% 91.7% 91.7% 91.7% 100.0%
Average	93.8%	100.0%	90.8%	95.0%	90.0%	95.0%	37.5%	93.8%

Social Validity

Social validity information was gathered from teachers of the participants using the Behavior Intervention Rating Scale (BIRS; Von Brock & Elliott, 1987; see Appendix D). The BIRS was slightly adapted so that the questions captured the teachers' perceptions of the actual study, rather than of a study they had only read

about. Teachers were asked to respond to 24 questions using a 6-point Likert scale to evaluate intervention acceptability and intervention effectiveness. The overall mean rating for acceptability was 4.6. The overall mean rating for effectiveness was 3.2. Social validity scores for each participant's teacher are presented in Table 5.

Table 5

Social Validity Scores Derived From the Behavior Intervention Rating Scale

Rater	Acceptability	Effectiveness
Will's teacher	4.9	3.8
Marco's teacher	2.9	2.7
Alex's teacher	5.6	2.6
Jaxson's teacher	5.0	3.7
Overall	4.6	3.2

CHAPTER 4

RESULTS

Reinforcer Assessment

Table 6 shows the selection ranking obtained for Will, Marco, Alex, and Jaxson. For Will, preference was assessed for goldfish crackers, Golden Graham™ cereal, and a clicker toy. The clicker toy was actually a hand-held counter typically used by admissions personnel at parks or sporting events to count number of people entering. Will clearly showed a preference for goldfish crackers (M = 100%), choosing them first during every opportunity of the reinforcer assessment. He consistently chose Golden Graham™ cereal (M = 50%) second and the clicker toy (M = 33%) third. Will was reinforced with goldfish crackers during the course of this study.

Table 6

Multiple Stimulus Without Replacement (MSWO) Procedure Preference Assessment Results for Will, Marco, Alex, and Jaxson

Rank	Will	Marco	Alex	Jaxson
1	Goldfish cracker	Magnetic letters	Video	Box job piece
2	Golden Graham™ cereal	Video	Raisin	Raisin
3	Clicker toy	Cookie	Goldfish cracker	Stickers
4	—	Fruit Loops™ cereal	Bank	—
5	—	Cheerios™ cereal	Bubbles	—

Marco showed a clear preference for magnetic letters (*M* = 100%). When given a letter, he walked approximately 3 feet over to a magnetic board and put the letter on the board. He then walked back to the researcher's table to obtain another letter. He consistently chose to watch a video (*M* = 50%) second and a cookie (*M* = 33%) third. The cover of a video represented watching a video in the array of presented items. His preference for Fruit Loops (*M* = 22.75%) and Cheerios™ cereals (*M* = 22.3%) was not as clear. Marco was reinforced with magnetic letters during the course of this study.

Alex showed a clear preference for watching a video (*M* = 100%). A remote control represented watching a video in the array of presented items. He consistently chose raisin (*M* = 50%) second and goldfish cracker (*M* = 33%) third. His least preferred items were a bank (*M* = 25%) in which he put coins and bubbles (*M* = 20%). Alex was reinforced with opportunities to watch a video during the course of this study.

Items assessed for Jaxson were box job pieces, raisins, and stickers. The box job pieces were plastic disks, similar to checkers. Jaxson was given the opportunity to choose one of the disks and place it in a hole in the lid of a box. He had a clear preference for the box job pieces (*M* = 80%). He typically chose raisins (*M* = 42.5%) second and stickers (*M* = 37.4%) third. When he chose a sticker, he was given a sticker that had been pulled off of its backing and he stuck it onto his folder. Jaxson was reinforced with opportunities to place a box job piece in a hole in the lid of a box during the course of this study.

Graphic Display of Results

Figures 1–8 show complete results. Figures 1, 3, 5, and 7 show the results for Will, Marco, Alex, and Jaxson, respectively, for first responses and Repair Probes. For Will, Marco, and Jaxson, the upper panel of each figure shows the percentage of first responses that involved behavioral indication and VOCA. For Alex, the upper panel shows the percentage of first responses that involved behavioral indication, vocalization, behavioral indication + vocalization, VOCA use, and VOCA use + vocalization. Data are plotted in blocks of 12 opportunities, corresponding to the number of opportunities for a first response in each session. Percentage of Alex's first response behaviors across phases of the study are also shown in Table 7.

The lower panel of each figure shows the percentage of correct repairs in the ignore condition. A correct repair was scored when the participant independently used the VOCA within 10 seconds of the first response being ignored. Correct repairs were not possible during Standard Opportunities. Percentage correct was calculated for each block of 12 Repair Probes.

Figures 2, 4, 6, and 8 show the results for Will, Marco, Alex, and Jaxson, respectively, for Generalization Probes. Each figure shows the percentage of correct repairs in the three generalization conditions (spoken request for repair, give wrong response, and give wrong item). A correct repair was again scored when the participant independently used the VOCA within 10 seconds of the first response. Percentage correct was calculated for each block of four Generalization Probes for each condition.

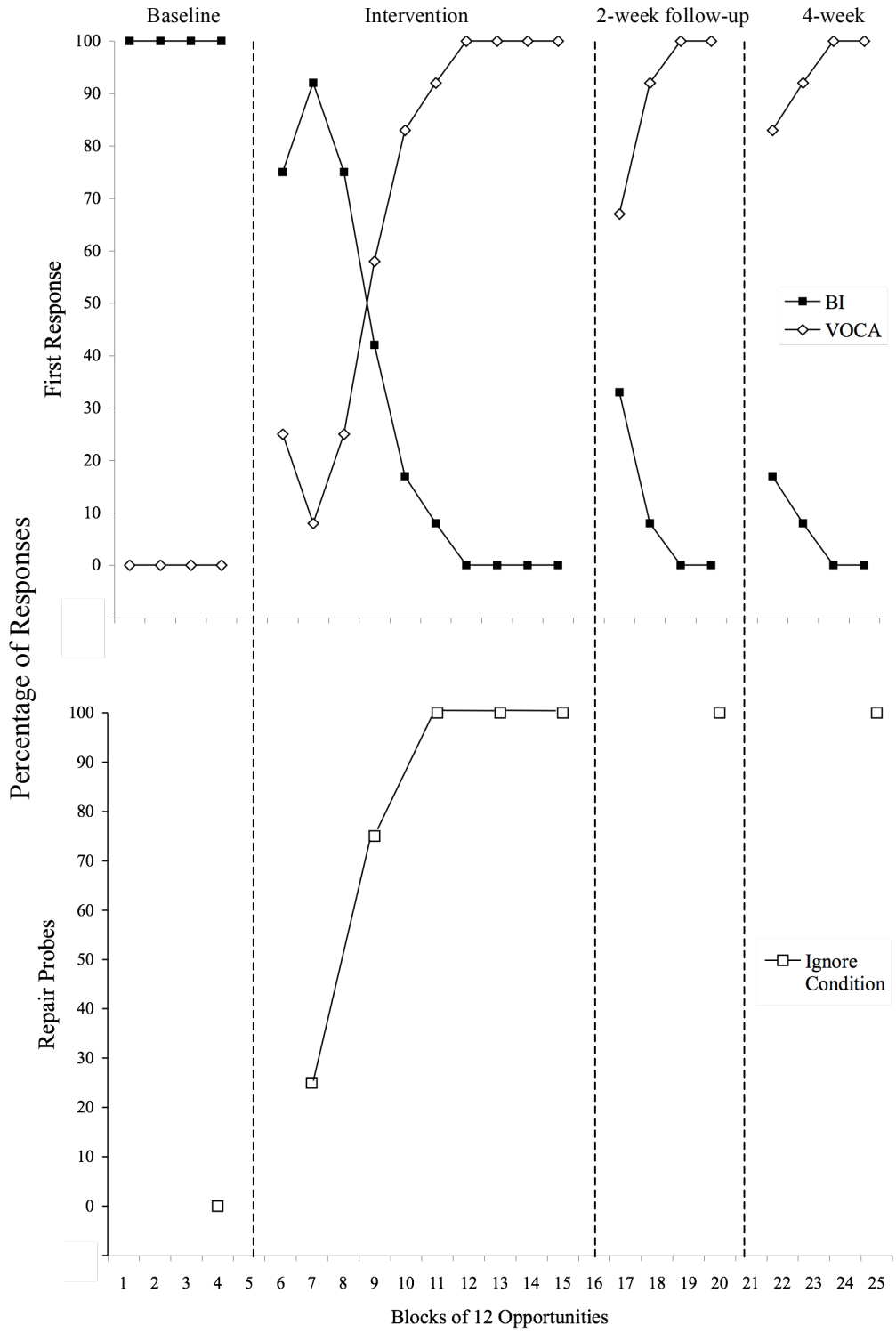

Figure 1. Percentage of first responses (upper panel) with behavioral indication (BI) and voice-output communication aid (VOCA) use and percentage of correct repair in ignore condition (lower panel) across blocks of 12 opportunities for Will.

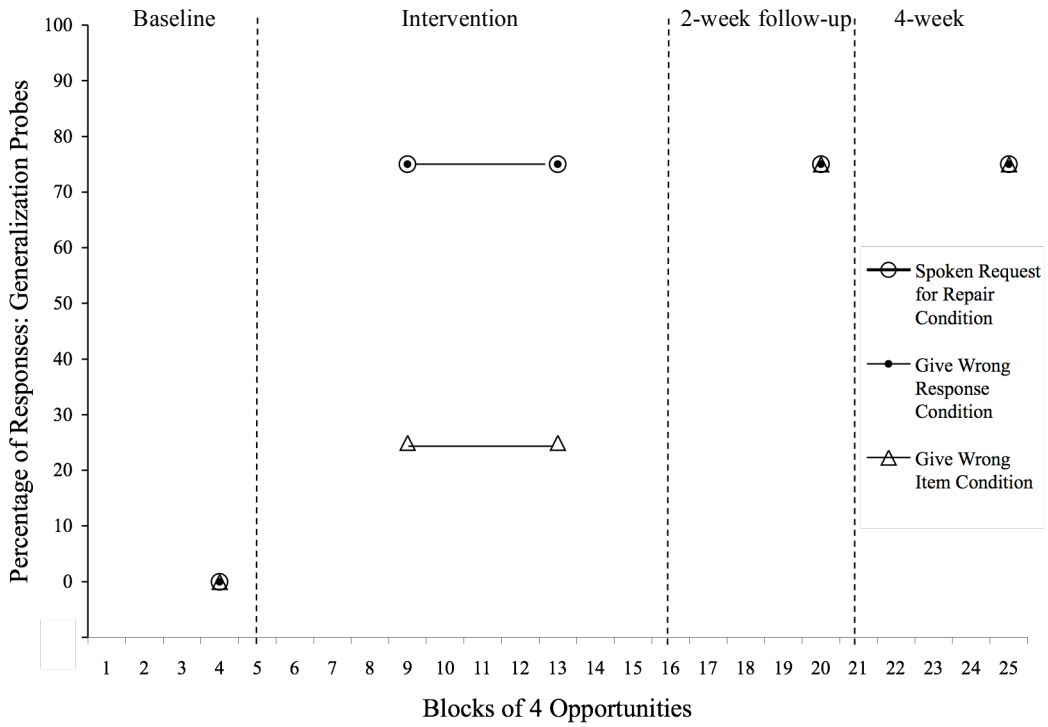

Figure 2. Percentage of correct repair in generalization conditions across blocks of four opportunities for Will.

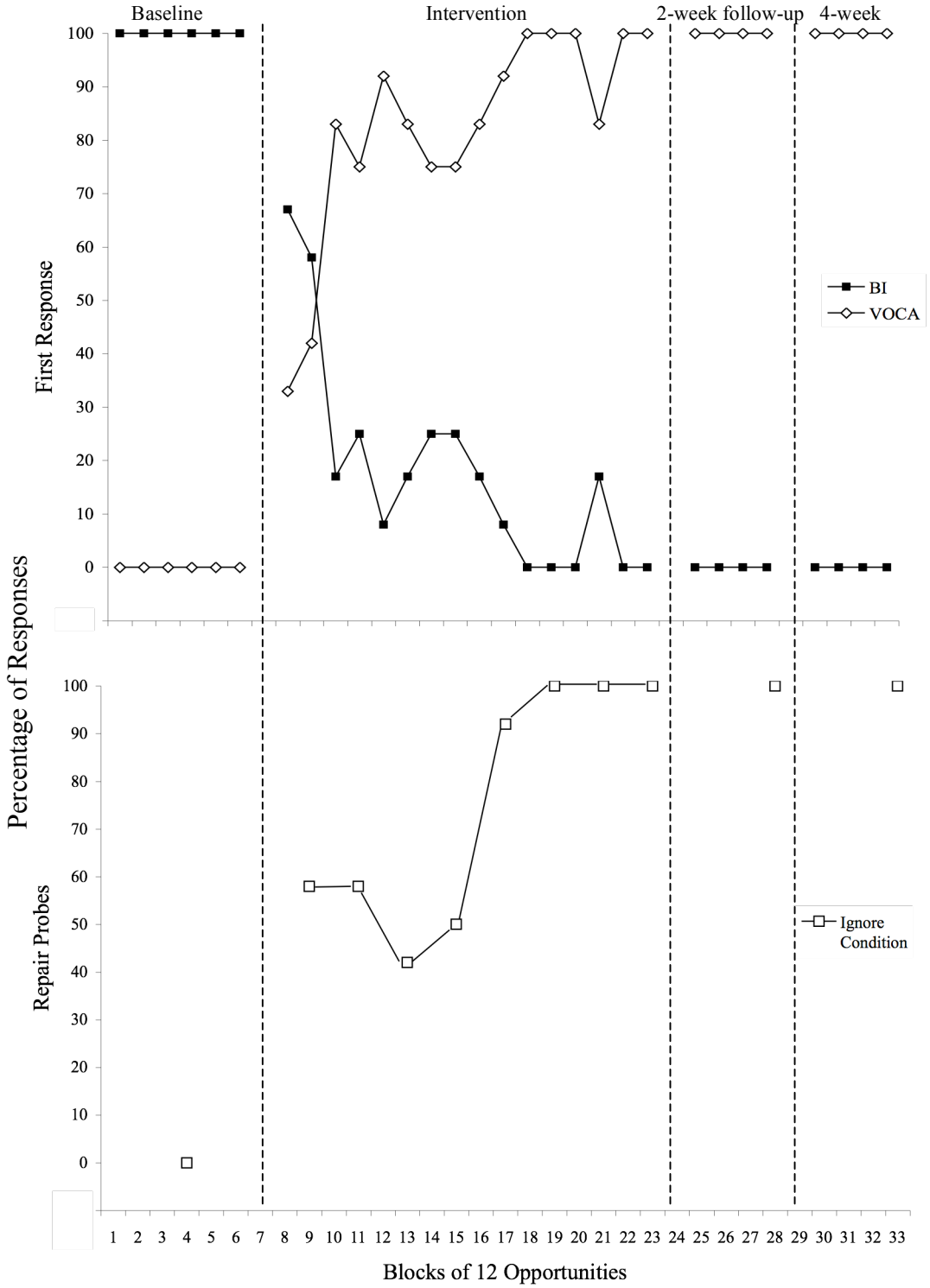

Figure 3. Percentage of first responses (upper panel) with behavioral indication (BI) and voice-output communication aid (VOCA) use and percentage of correct repair in ignore condition (lower panel) across blocks of 12 opportunities for Marco.

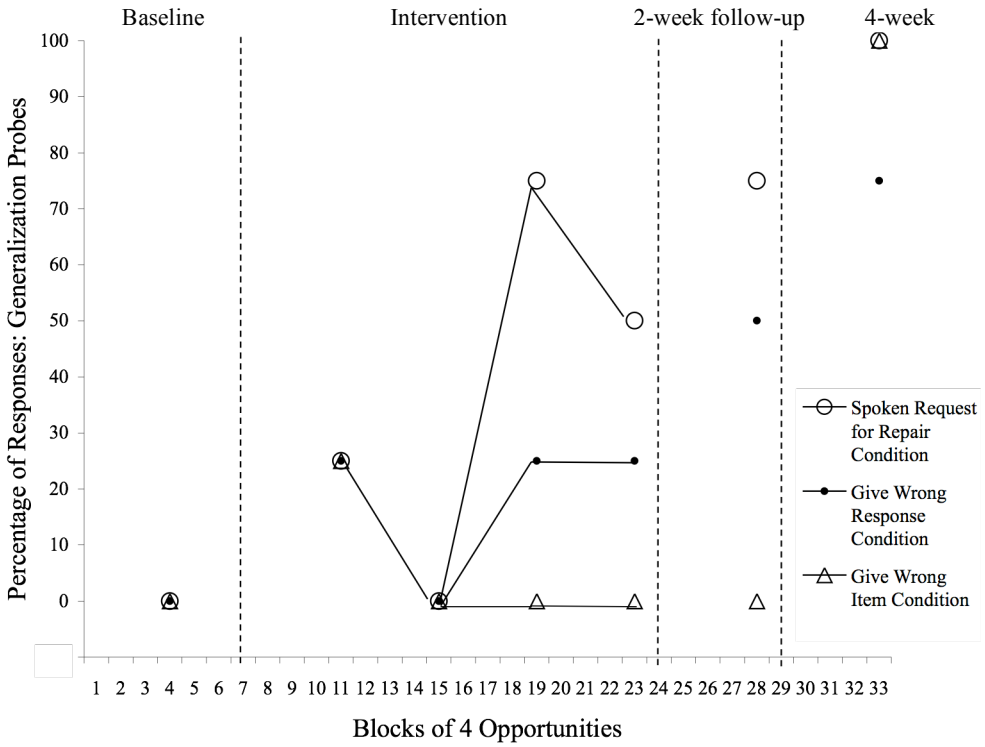

Figure 4. Percentage of correct repair in generalization conditions across blocks of four opportunities for Marco.

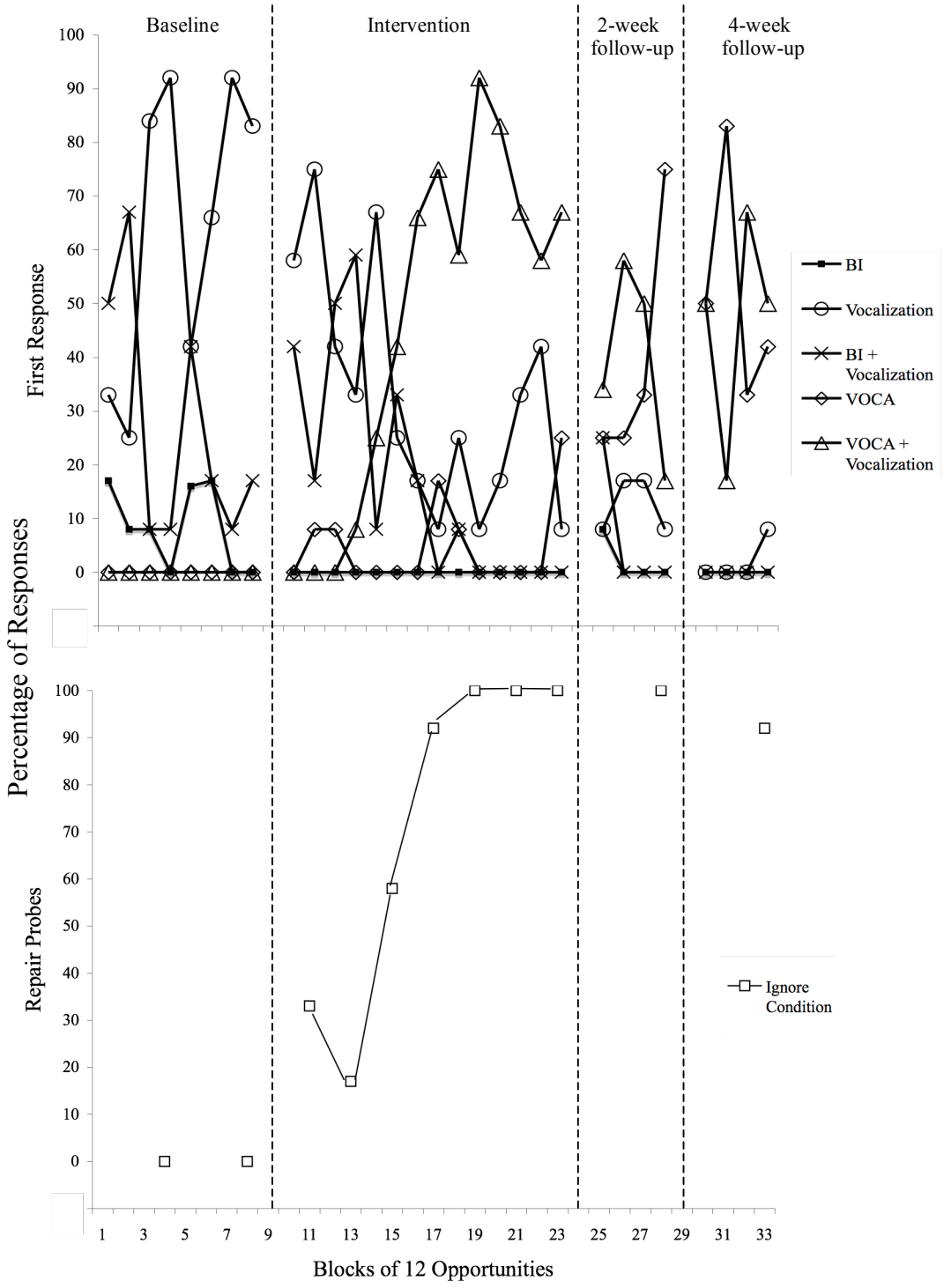

Figure 5. Percentage of first responses (upper panel) with behavioral indication (BI), vocalization, behavioral indication (BI) + vocalization, VOCA use, and VOCA use + vocalization and percentage of correct repair in ignore condition (lower panel) across blocks of 12 opportunities.

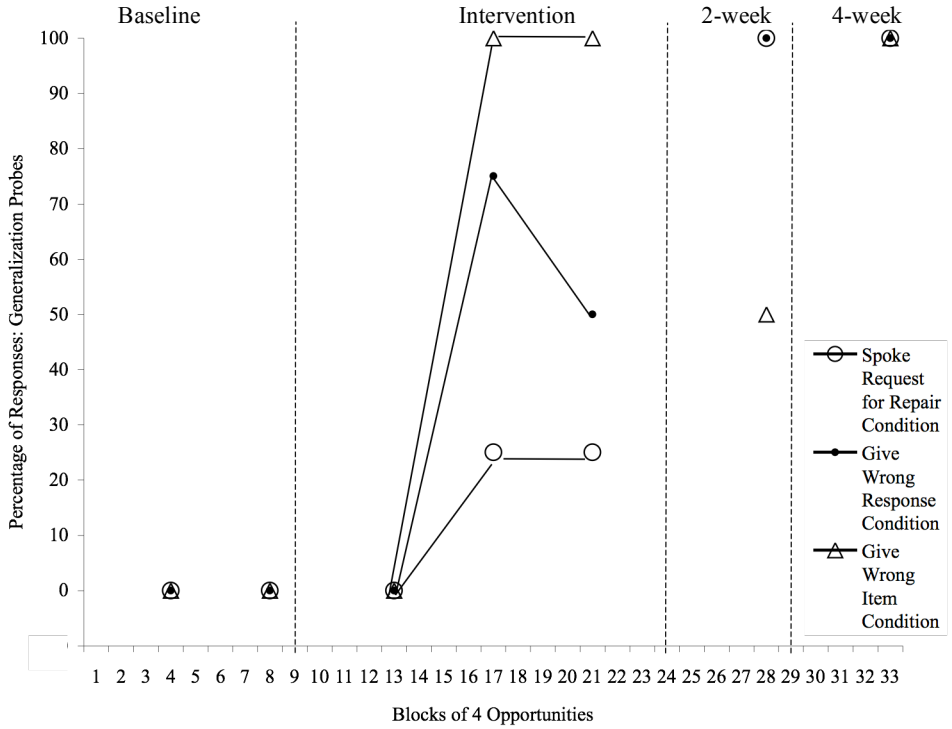

Figure 6. Percentage of correct repair in generalization conditions across blocks of four opportunities for Alex.

Table 7

Percentage of First Responses, Including Behavioral Indication, Vocalization, and Voice-Output Communication Aid (VOCA) Use, Across all Phases of Study for Alex

Phase	Behavioral indication	Vocalization	Behavioral indication + vocalization	VOCA use	VOCA use + vocalization
Baseline	8.3% (*R* = 0-17%)	64.6% (*R* = 25-92%)	27.1% (*R* = 8-67%)	0%	0%
Intervention	0%	32.7% (*R* = 8-75%)	16.7% (*R* = 0-59%)	4.7% (*R* = 0-25%)	45.9% (*R* = 0-92%)
2-Week follow-up	2.0% (*R* = 0-8%)	12.5% (*R* = 8-17%)	6.3% (*R* = 0-25%)	39.5% (*R* = 25-77%)	39.7% (*R* = 17-58%)
4-Week follow-up	0%	2.0% (*R* = 0-8%)	0%	52.0% (*R* = 33-83%)	46.0% (*R* = 17-67%)

Note. R refers to range.

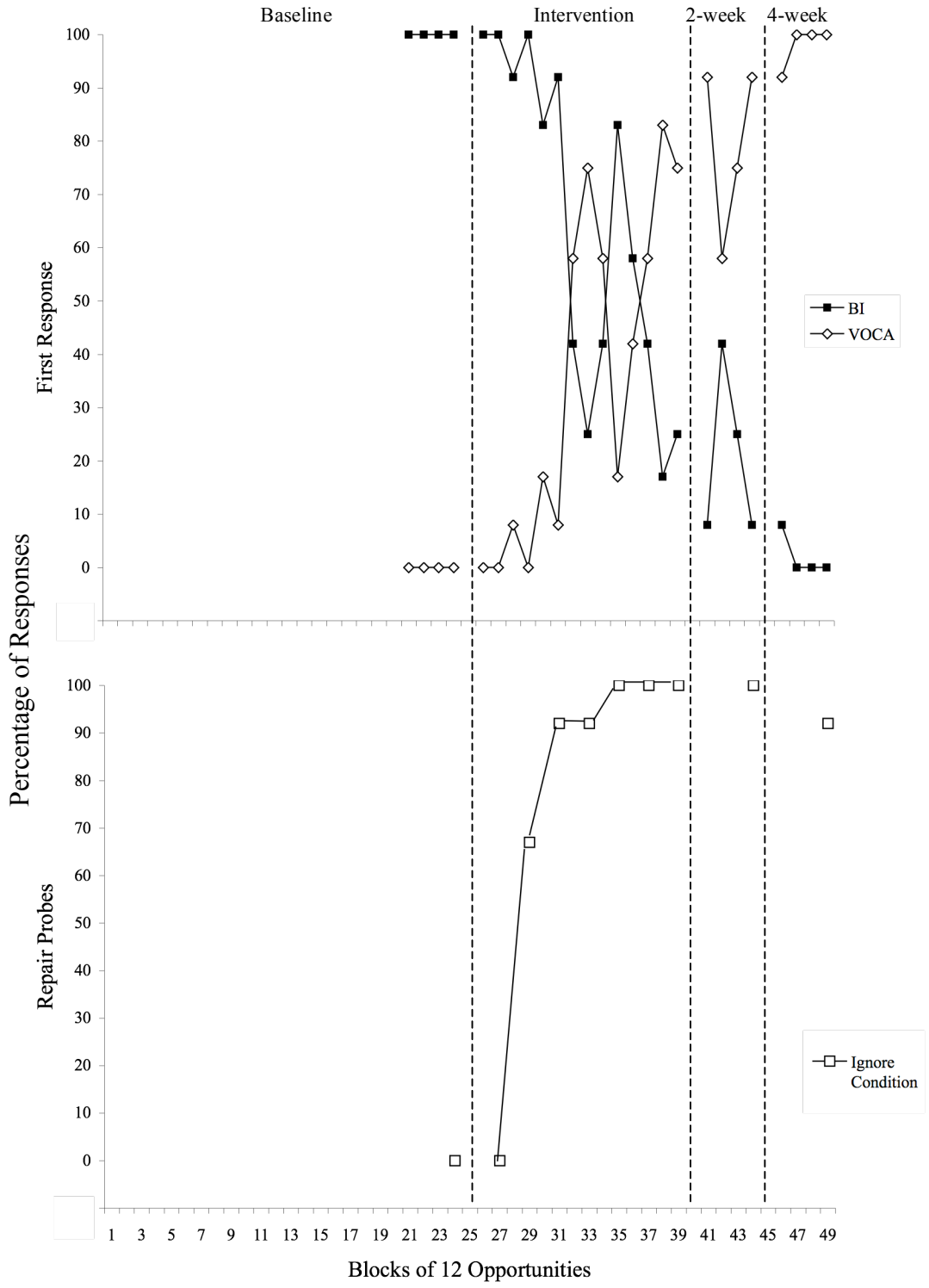

Figure 7. Percentage of first responses (upper panel) with behavioral indication and voice-output communication aid (VOCA) use and percentage of correct repair in ignore condition (lower panel) across blocks of 12 opportunities for Jaxson.

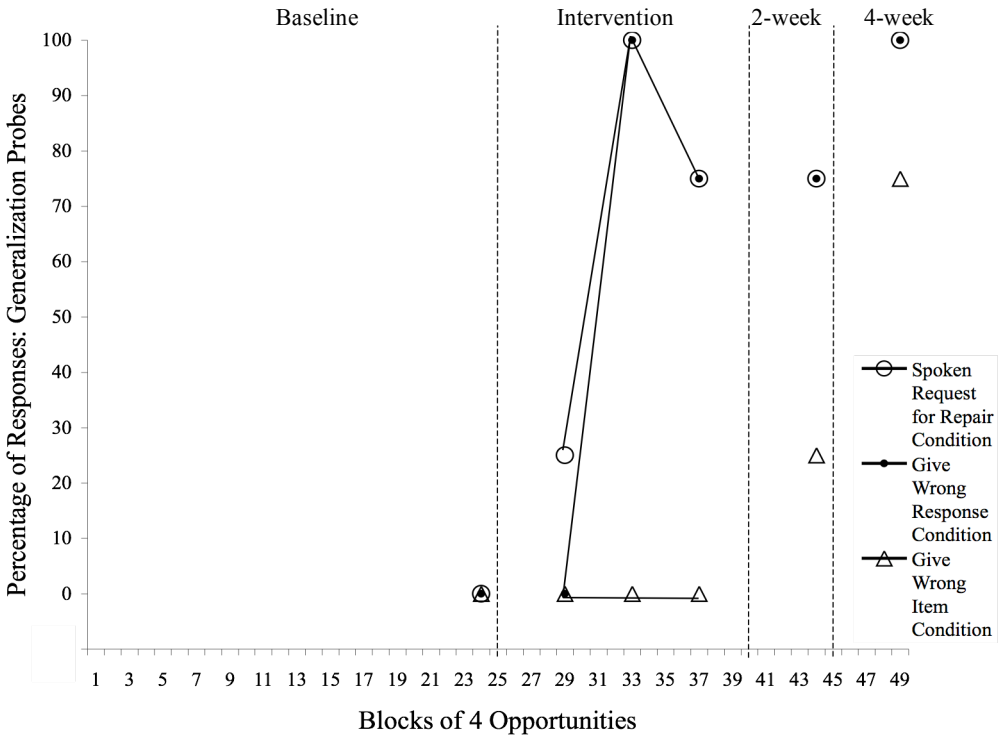

Figure 8. Percentage of correct repair in generalization conditions across blocks of four opportunities for Jaxson.

Baseline

During baseline, Will, Marco, and Jaxson consistently used behavioral indication as their first response. On average during baseline, Alex used behavioral indication in 8.3% (range 0–17%) of responses, vocalizations in 64.6% (range 25–92%) of responses, and behavioral indication + vocalization in 27.1% (range 8–67%) of responses. The participants did not use the VOCA at any time as a first response during baseline. This was expected for Will, Alex, and Jaxson, since none of them had any experience with a VOCA. Although Marco had prior experience with a VOCA, this was also expected for him because observations in the classroom and in his home indicated that he did not use the device unless presented with it, and then he

only used it for choice making and never for initiations or repairs. Additionally, the participants did not use the VOCA during Repair or Generalization Probes during baseline.

Intervention

During intervention for Will, the percentage of correct repairs in the *ignore* condition increased to an average of 80% (range 25–100%). The percentage of correct repairs during Generalization Probes increased to an average of 75% for the *spoken request for repair* and the *give wrong response* conditions and 25% for the *give wrong item* condition.

For Marco, the percentage of correct repairs in the *ignore* condition increased to an average of 75% (range 42–100%). The percentage of correct repairs during Generalization Probes increased to an average of 37.5% (range 0–75%) for the *spoken request for repair* condition, 18.8% (range 0–25%) for the *give wrong response* condition, and 6.25% (range 0–25%) for the *give wrong item* condition.

For Alex, the percentage of correct repairs in the *ignore* condition increased to an average of 71.4% (range 17–100%). The percentage of correct repairs during Generalization Probes increased to an average of 16.7% (range 0–25%) for the *spoken request for repair* condition, 41.7 (range 0–75%) for the *give wrong response* condition, and 66.7% (range 0–100%) for the *give wrong item* condition.

For Jaxson, the percentage of correct repairs in the *ignore* condition increased to an average of 78.7% (range 0–100%). The percentage of correct repairs during Generalization Probes increased to an average of 66.7% (range 25–100%) for the

spoken request for repair condition and 58.3% (range 0–100%) for the *give wrong response* condition. Jaxson did not use the VOCA to repair in the *give wrong item* condition during intervention.

As the participants began to use the VOCA as a repair strategy (middle panel), changes were observed in the pattern of their first responses (upper panel). In general, participants displayed behaviors that did not include VOCA use as the first response to initiate requests during baseline. However, these behaviors began to give way to behaviors that included VOCA use as the first response during intervention.

While he used the VOCA as a first response during baseline in 0% of baseline sessions, Will used the VOCA as a first response during intervention in an average of 69.1% (range 8–100%) of sessions. Marco also never used the VOCA as a first response during baseline, but used it in an average of 82.3% (range 33–100%) of intervention sessions. While Alex used the VOCA as a first response during baseline in 0% of sessions, during intervention, he used the VOCA by itself as a first response for average of 4.7% (range 0–25%) of sessions and combined with vocalization as a first response for an average of 45.9% (range 0–92%) of sessions. Taken together, Alex's first response involved behaviors that included VOCA use (with and without vocalization) for an average of 50.6% (range 0–92%) of intervention sessions. Jaxson also never used the VOCA as a first response during baseline, but used it in an average of 35.6% (range 0–75%) of intervention sessions.

Follow-Up

Two weeks and 4 weeks after completion of the intervention, Will continued to use the VOCA to repair in 100% of Repair Probes. He used the VOCA to repair in 75% of all Generalization Probes.

Two weeks after completion of the intervention, Marco continued to use the VOCA to repair in 100% of Repair Probes. He used the VOCA to repair in 75% of the *spoken request for repair* Generalization Probes, 50% of the *give wrong response* Generalization Probes, and 0% of the *give wrong item* Generalization Probes. Four weeks after completion of the intervention, Marco continued to use the VOCA to repair in 100% of Repair Probes. He used the VOCA to repair in 100% of the *spoken request for repair* and *give wrong item* Generalization Probes and 75% of the *give wrong response* Generalization Probes.

Two weeks after completion of the intervention, Alex continued to use the VOCA to repair in 100% of Repair Probes. He used the VOCA to repair in 100% of the *spoken request for repair* and *give wrong response* Generalization Probes and 50% of the *give wrong item* Generalization Probes. Four weeks after completion of the intervention, Alex used the VOCA to repair in 92% of Repair Probes and 100% of all Generalization Probes.

Two weeks after completion of the intervention, Jaxson continued to use the VOCA to repair in 100% of Repair Probes. He used the VOCA to repair in 75% of the *spoken request for repair* and *give wrong response* Generalization Probes and 25% of the *give wrong item* Generalization Probes. Four weeks after completion of the intervention, Jaxson used the VOCA to repair in 92% of Repair Probes. He used

the VOCA to repair in 100% of the *spoken request for repair* and *give wrong response* Generalization Probes and 75% of the *give wrong item* Generalization Probes.

All participants continued to use the VOCA as a first response in varying degrees during follow-up. Will used the VOCA as a first response for an average of 89.8% (range 67–100%) of sessions 2 weeks after completion of the intervention and for an average of 93.8% (range 83–100%) of sessions 4 weeks after completion of the intervention. Marco used the VOCA as a first response for 100% of all follow-up sessions. Alex used the VOCA by itself as a first response for an average of 39.5% (range 25–75%) of sessions 2 weeks after completion of the intervention and for an average of 52% (range 33–83%) of sessions 4 weeks after completion of the intervention. He used the VOCA combined with vocalization as a first response for an average of 39.8% (range 17–58%) of sessions 2 weeks after completion of the intervention and for an average of 46% (range 17–67%) of sessions 4 weeks after completion of the intervention. Taken together, 2 weeks after completion of the intervention, Alex's first response involved behaviors that included VOCA use (with and without vocalization) for an average of 79.3% (range 17–75%) of sessions. Four weeks after completion of the intervention, Alex's first response involved behaviors that included VOCA use (with and without vocalization) for an average of 98% (range 17–83%) of sessions. Jaxson used the VOCA as a first response for an average of 79.3% (range 58–92%) of sessions 2 weeks after completion of the intervention and for an average of 98% (range 92–100%) of sessions 4 weeks after completion of the intervention.

CHAPTER 5

SUMMARY AND DISCUSSION

The purpose of this study was to teach four young children who used prelinguistic communication forms to repair communication breakdowns using a VOCA and to assess generalization of VOCA use to repair communication breakdowns across various conditions. Baseline data suggested that Will, Marco, and Jaxson used behavioral indication to access preferred reinforcers. Alex's baseline data suggested that he used behavioral indication, vocalization, or a combination of the two to access preferred reinforcers. No participants used the VOCA to access preferred reinforcers as a first response or during Repair and Generalization Probes during baseline.

During intervention, all participants learned to use the VOCA during Repair Probes and even began to use the VOCA during Generalization Probes. The intervention appeared to be successful in teaching VOCA use as a communicative repair strategy. Participants also began to use the VOCA as a first response to initiate requests.

Much like participants in previous research (e.g., Ohtake et al., 2005; Sigafoos et al., 2004), the participants in this study did indeed attempt to repair communication breakdowns in baseline, although without the use of the VOCA. When their first response was unsuccessful, the participants in this study used a combination of strategies to gain access to preferred reinforcers. For example, Will's first response typically involved reaching for a goldfish cracker to indicate he wanted one. When

this first response was unsuccessful, Will altered his behavioral indication by waving his arm while reaching for the cracker. Marco's main form of behavioral indication was reaching across the table for a magnetic letter. When this first response was unsuccessful, he walked around the table in an attempt to access the magnetic letters. Jaxson consistently repeated his first response (e.g., reaching for a box job piece) in an attempt to gain reinforcers during Repair and Generalization Probes in baseline.

Alex's dominant form of requesting a preferred item was vocalization. It should be noted however, that Alex's vocalizations were difficult to understand and it was not until 20 opportunities had elapsed that the researcher and an observer were able to understand what he was saying. In spite of his unintelligibility, Alex used vocalization alone and in combination with behavioral indication for the majority of his first responses during baseline. When these behaviors were unsuccessful at gaining preferred reinforcers, Alex altered his behavior in a number of ways. For example, Alex attempted to gain reinforcers by reaching for the television. When this was unsuccessful, he was observed trying to press a button on the remote control in an attempt to turn the video back on. Additionally, he was observed tapping the researcher on the arm, perhaps in an attempt to gain the researcher's attention and therefore, gain access to preferred reinforcers. Alex was also observed to alter his first response through intensification. That is, his second response increased in magnitude from his first response. For example, Alex was observed to request preferred reinforcers by vocalizing. When this was unsuccessful, Alex jumped up from his chair and vocalized louder.

Alex's repair attempts might be considered substitutions (Brady & Halle, 2002). That is, when one behavior was unsuccessful at gaining access to reinforcers, he substituted another behavior. His use of various repair strategies might be explained by Golinkoff's (1986) finding that substitutions increase with age and may reflect an increase in verbal skills. Recall that Alex was the oldest participant and the only one who used vocalizations.

The repair strategies used by all of the participants might be explained by the extinction paradigm. That is, the relationship between breakdowns and repairs may be compared to the relationship between extinction and an extinction burst (Halle et al., 2003; Ohtake, 2005; Sigafoos et al., 2004). An extinction trial was represented by the 10-second delay during Repair Probes. This delay led to an extinction burst characterized by increased frequency (repetition), variety (recasting), and force (intensification) of repair topographies (Lerman & Iwata, 1996).

Intervention data suggested that young children who use prelinguistic communication forms could be taught to use a VOCA to repair a communication breakdown. As VOCA use as a repair strategy increased, use of other repair forms, such as repetition or intensification, decreased. A potential reason for this is the timing of the VOCA response during Repair Probes. At the beginning of intervention, the participants typically persisted with behaviors other than VOCA use (i.e., behavioral indication, vocalization, or vocalization combined with behavioral indication) during the entire 10-second interval before the prompt to use the VOCA was given. Once the participants learned to use the VOCA to repair, they typically used it approximately 2–3 seconds after the first response was ignored. Therefore, it

is possible that using the VOCA as a repair strategy was a way for the participants to gain access to preferred reinforcers more quickly. This, and the participants' increase in use of VOCA as a first response might be explained in terms of response efficiency (Horner & Day, 1991). That is, as the participants learned that using the VOCA during Repair Probes allowed for quicker access to preferred reinforcers, perhaps they applied this knowledge to first response opportunities as well. This use of the VOCA as a first response when only taught as a repair could also be viewed as response generalization (Sulzer-Azaroff & Mayer, 1977) and could imply that initiation and repair are not independent (Sigafoos et al., 2004).

The participants in this study were taught to use a VOCA to repair a communication breakdown in one condition. Then, probes were conducted to determine if VOCA use to repair a communication breakdown had been generalized to other conditions. VOCA use to repair communication breakdowns generalized to other conditions for all participants in varying degrees. Will very quickly began to use the VOCA during Generalization Probes during intervention. He had greater success at repairing Generalization Probes in the *spoken request for repair* and the *give wrong response* conditions than in the *give wrong item* condition. Marco had varied success at repairing Generalization Probes during intervention. He used the VOCA to repair the most in the *spoken request for repair* condition, followed by the *give wrong response* condition, and then the *give wrong item* condition. Alex also used the VOCA to repair Generalization Probes, but his results were the opposite of Marco's. He displayed the most correct repairs in the *give wrong item* condition and the fewest correct repairs in the *spoken request for repair* condition. During intervention, Jaxson

never used the VOCA to repair in the *give wrong item* condition. However, he did use it in the other generalization conditions.

Overall, participants had the most success during the *spoken request for repair* probes. This is not surprising, considering that requests for clarification (e.g., "What?") are obvious indicators of a communication breakdown (Brady & Halle, 2002). Previous research indicates that requests for clarification may be more compelling and therefore, may be responded to more often than other types of breakdowns (Gallagher & Darnton, 1978; Tomasello, Conti-Ramsden, & Ewert, 1990).

Previous research has also shown that individuals with developmental disabilities have the most difficulty repairing breakdowns in the *give the wrong response* condition (Tomasello et al., 1990). However, in this study, only Alex had the greatest difficulty in the *give wrong response* condition. The other participants had more difficulty in the *give wrong item* condition. These findings might be explained in two ways. First, when given a wrong item during Generalization Probes, Will, Marco, and Jaxson typically indicated that they did not know what to do with the wrong item. At times, they interacted with it. At other times, they put it down on the table and then looked to the researcher, perhaps for guidance or for a reinforcer. Alex reacted to the wrong item differently. He typically laughed when given a wrong item and would hit the VOCA with the item. Because a correct repair was scored whenever a participant used the VOCA, when Alex hit the VOCA with the item, it was considered a correct repair. A different operational definition of "correct repair,"

one that required the VOCA to be hit by only one's hand and not an item, would have altered the results of this study.

Another way to explain the generalization findings is through the rules of conversation (Brady & Halle, 2002). The rules of conversation previously mentioned (i.e., individuals may respond to requests for clarification more often than other breakdowns, individuals may have difficulty repairing breakdowns in the *give wrong response* condition) may not necessarily apply with young children. Young children may not comprehend the semantics and pragmatics of these rules (Wilcox & Webster, 1980); therefore, these results should be viewed as preliminary. Further research is needed to understand how young children generalize VOCA use as a repair strategy across breakdown conditions.

All participants reached 100% during Repair Probes across three blocks of 12 opportunities and may have continued to do so had intervention continued. Although the participants learned to use the VOCA to repair breakdowns during Generalization Probes, they did not all reach 100% accuracy across all conditions. Alex reached 100% accuracy in the *give wrong item* condition across two blocks of four opportunities. Jaxson reached 100% accuracy in the *spoken request for repair* and the *give wrong response* conditions, but only across one block of four opportunities.

This discrepancy between percentage of correct repairs in Repair and Generalization Probes may be due to not having trained enough exemplars to ensure generalization. In this case, the *ignore* condition was the only condition in which training took place. Perhaps, if another condition had been trained as well, the participants would have generalized VOCA use as a repair strategy more accurately

across other conditions. Although training sufficient exemplars is a well-documented technique for promoting generalization (e.g., Anderson & Spradlin, 1980; Schlosser & Lee, 2000; Stokes & Osnes, 1988), the number of exemplars "sufficient" for generalization varies and is most likely influenced by the task to be accomplished and the participant's skills prior to intervention (Stokes & Baer, 1977). Because this was the first intervention designed to study how VOCA use as a repair strategy generalizes across breakdown conditions, the sufficient number of exemplars needed to promote generalization was unknown prior to the start of this study.

Follow-up data indicated that all but 1 of the participants increased their use of VOCA to repair breakdowns across generalization conditions after completion of the intervention. As he did during intervention, Will continued to use the VOCA to repair across generalization conditions in an average of 75% of responses. All of the other participants' correct responses increased during Generalization Probes. Jaxson even began to use the VOCA to repair during the *give wrong item* probes, while he had never used it in that condition during intervention. This development is important for two reasons. First, because most of the participants showed increases in their use of VOCA to repair across generalization conditions from intervention to follow-up, perhaps training only one condition, *ignore*, was sufficient to promote generalization. Second, this improvement in performance from intervention to baseline may be due to delayed treatment effects. Further investigation is needed to determine how and why this improvement in performance from intervention to baseline was observed for 3 of the 4 participants.

Every effort to improve the generality of results was made during the implementation of this study. For example, to increase generality, communication partners in research situations should be asked to perform at levels consistent with typical situations (Schlosser & Raghavendra, 2003). In this study, a 10-second delay to simulate a communication breakdown in this intervention was considered more appropriate than a longer delay, because listeners in typical situations do not wait much longer than 10 seconds during a communicative exchange (Sigafoos, Laurie, & Pennell, 1996).

Although AAC interventions may be better conducted in settings with minimal distractions, these settings are not consistent with the settings in which young children who use prelinguistic communication forms are typically educated. This study was conducted during naturally occurring events in the participants' classrooms. Taking into account how close the fit between research settings and settings in which children are educated increased the generality of these results.

The VOCAs used in this study were inexpensive, easy to use, and considered practical for use by students who use prelinguistic communication forms (Sigafoos et al., 2004). Reinforcers used were common items which occurred naturally in the participants' classrooms. The use of common and easily accessible materials also increased the generality of results of this study.

The study's small sample size might be considered a limitation. However, because it was a systematic replication of previous research by Sigafoos and his colleagues (2004), the results will add to the literature on communication breakdowns

and repairs. In addition, this study included 4 participants, while previous research by Sigafoos and his colleagues (2004) studied 2 participants only.

Another possible limitation involves the 5th participant, Katie. Katie was dropped from the study due to challenging behavior, which might indicate that this intervention is not appropriate for all children who use prelinguistic communication forms. Perhaps an intervention designed to rapidly decrease challenging behavior would have been more appropriate for Katie. Another limitation might be Marco's previous experience with a VOCA. However, this did not appear to alter his results, as he never used the VOCA during baseline.

It is important to note that social validity data were gathered from only one source, the participant's teachers. Teachers were considered the best source of social validity data because they were present while intervention was occurring and had knowledge of the participants' communication skills. However, Marco's teacher's results should be interpreted with caution. Marco's teacher was observed to become easily frustrated with Marco and was heard on occasion to voice her frustration in negative ways. For example, she was observed to raise her voice and speak forcefully when giving Marco a direction. She was not observed to do this with any other students, even students with similar skills as Marco. Conversations with Marco's teacher revealed that she felt unequipped to implement the objectives in Marco's IEP, due to their behavioral, rather than academic, nature. It is possible that the results of her BIRS reflect the frustration she felt with Marco and not necessarily her ratings of the acceptability and effectiveness of the intervention.

VOCA use to repair communication breakdowns appeared to generalize to other breakdown conditions to some degree. However, information about generalization of skills to other settings was not gathered. This is particularly important in early childhood interventions, as the home and community are considered as important as the classroom for students of this age (Barnett & Carey, 1993).

To further examine how children who use prelinguistic communication forms repair communication breakdowns, future research should explore other issues related to this study. For example, future research could be designed to (a) teach VOCA use as a repair strategy while also quickly decreasing challenging behavior, (b) focus on repair strategies related to communicative functions other than requesting, such as commenting, (c) focus on understanding the relationship between initiation and repair, (d) create situations in which generalization across breakdown conditions is more likely, (e) create opportunities for teachers and family members to implement the intervention, and (f) extend these findings to different settings, such as the participants' homes and communities.

Although this line of research is just emerging and there is a need for future research, the results of this study extend the literature on communication breakdowns and repairs. It is just the second study to teach VOCA use as a repair strategy. Like previous research (Sigafoos et al., 2004), this study employed the multiple baseline across subjects design which allowed for increased experimental control. Together with the results of previous research (e.g., Sigafoos et al., 2004), the results of this study indicate that children who use prelinguistic communication forms can indeed be

taught to repair communication breakdowns with a VOCA. Although VOCA use was only taught as a repair strategy, for all participants it came to be used as an initiation strategy as well. These results and those of Sigafoos and his colleagues (2004) indicate that as students begin to use the VOCA for one communicative function (e.g., repair), that skill can generalize to another communicative function (e.g., initiation). These findings are particularly important when viewed in the context of sequence of intervention. That is, what communicative functions are taught first, second, and so on.

Follow-up data indicate that the learned skill of using a VOCA to repair communication breakdowns can maintain for at least 4 weeks after the completion of intervention. Maintenance of skills is an important variable when determining appropriateness and usefulness of a particular intervention (Barrios & Hartmann, 1988).

Although the participants learned to use the VOCA as a repair strategy more quickly and accurately in the trained condition, they did generalize this newly learned skill to the generalization conditions. This is the first study to examine the effects of training VOCA use as a repair strategy on untrained conditions. These findings suggest that not only can young children who use prelinguistic communication forms be taught to use a VOCA to repair communication breakdowns, but generalization of skills should be a focus of interventions of this type.

APPENDIX A

AAC ASSESSMENT

1. Does the child currently have a system for communicating? If yes, describe the system.

2. Does the child have purposeful motoric movement?

3. Is the child aware of cause/effect? For example, does the child turn things on or off intentionally or build a block tower and knock it over intentionally?

4. Does the child recognize and discriminate simple line drawings?

5. From how many items can the child choose? For example, when given four options for lunch, can the child choose one? Or is the child more successful when choosing from only one or two options?

6. Are there any special considerations I should be made aware of when deciding on type of VOCA to use?

APPENDIX B

THE REINFORCER ASSESSMENT FOR INDIVIDUALS WITH SEVERE DISABILITIES (RAISD)

PARTICIPANT'S NAME:_____DATE:_____

NAME OF REPORTER:_____

The purpose of this structured interview is to get as much specific information as possible from the teacher regarding what they believe would be useful reinforcers for the student. Therefore, this survey asks teachers questions about categories of stimuli (e.g., visual, auditory, etc.). After the teacher has generated a list of preferred stimuli, as additional probe questions to get more specific information on his/her preferences and the stimulus condition under which the object or activity is most preferred (e.g., What specific TV shows are his favorite? What does she do when she plays with a mirror? Does she prefer to do this alone or with another person?)

I would like to get some information on _____'s preference for different items and activities.

1. Some children really enjoy looking at things such as a mirror, bright lights, shiny objects, spinning objects, TV, etc. What are the things you think _____ most likes watch?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

2. Some children really enjoy listening to different sounds such as music, car sounds, whistles, beeps, sirens, clapping, people singing, etc. What are the things you think _____ most likes to listen to?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

3. Some children really enjoy different smells such as perfume, flowers coffee, pine trees, etc. What are the things you think _____ most likes to smell?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

4. Some children really enjoy certain foods or snacks such as ice cream, pizza, juice, graham crackers, McDonald's™ hamburgers, etc. What are the things you think _____ most likes to eat?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

5. Some children really enjoy physical play or movement such as being tickled, wrestling, running, dancing, swinging, being pulled on a scooter board, etc. What activities like this do you think _____ most enjoys?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

6. Some children really enjoy touching things of different temperatures, cold things like snow or an ice pack, or warm things like a hand warmer or a cup containing hot tea or coffee. What activities like this do you think _____ most enjoys?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

7. Some children really enjoy feeling different sensations such as splashing water in a sink, a vibrator against the skin, or the feel of air blown on the face from a fan. What activities like this do you think _____ most enjoys?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

8. Some children really enjoy it when others give them attention such as a hug, a pat on the back, clapping, saying "Good job," etc. What forms of attention do you think _____ most enjoys?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

9. Some children really enjoy certain toys such as puzzles, toy cars, balloons, comic books, flashlights, bubbles, etc. What are _____ favorite toys or objects?

_____
_____
_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

10. What are some other items or activities that _____ really enjoys?

_____

RESPONSE TO PROBE QUESTIONS:

_____
_____

After completion of the survey, select all the stimuli that could be presented or withdrawn contingent on target behaviors during a session or classroom activity (e.g., a toy could be presented or withdrawn, a walk in the park could not). Write down all of the specific information about each selected stimulus on a 3 x 5 inch index card (e.g., "Having a female adult read him the 'Three Little Pigs' story"). Then have the teacher select the top 16 stimuli and rank then using the cards. Then list the ranked stimuli below.

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
15.	16.

APPENDIX C

TREATMENT FIDELITY CHECKLIST

1. Were students reinforced regardless of behavior during Standard Opportunities?

2. Was student behavior ignored for 10 seconds during Repair Probes?

3. Was student reinforced during Repair Probes after using the VOCA (prompted or unprompted)?

4. Did researcher respond according to breakdown condition during Generalization Probes?

5. Was student given reinforcer after 10 seconds during Generalization Probes?

APPENDIX D

THE BEHAVIOR INTERVENTION RATING SCALE

DATE:_____ STUDENT'S NAME:_____

Teacher's Name:_____

Your student has just completed an intervention designed to improve communication skills. Please evaluate the intervention by circling the number which best describes *your* agreement or disagreement with each statement. You *must* answer each question.

Score each question using the following scale:
1=Strongly Disagree **2**=Disagree **3**=Slightly Disagree **4**=Slightly Agree **5**=Agree **6**=Strongly Agree

1. The intervention quickly improved the student's communication skill.	1 2 3 4 5 6
2. Soon after the intervention, I noticed a positive change in the communication difficulty.	1 2 3 4 5 6
3. Most teachers would find this intervention appropriate for the communication difficulty described.	1 2 3 4 5 6
4. The intervention was a good way to handle this student's communication difficulty.	1 2 3 4 5 6
5. I would suggest the use of this intervention to other teachers.	1 2 3 4 5 6
6. This intervention should produce a lasting improvement in the student's communication skill.	1 2 3 4 5 6
7. Most teachers would find this intervention suitable for the communication skill described.	1 2 3 4 5 6
8. Using the intervention not only improved the student's communication skill in the classroom, but also in other settings (e.g., home, community).	1 2 3 4 5 6
9. The intervention did *not* result in negative side effects for the student.	1 2 3 4 5 6
10. The intervention was a fair way to handle the student's communication difficulty.	1 2 3 4 5 6

11. When comparing this student with a well-communicated peer before and after use of the intervention, the student's and peer's communication skill are more alike after using the intervention.	1 2 3 4 5 6
12. I like the procedures used in the intervention	1 2 3 4 5 6
13. Overall, the intervention was beneficial for the student.	1 2 3 4 5 6
14. The intervention improved the student's communication skill to the point that it is not noticeably different from other peer's communication skills.	1 2 3 4 5 6
15. The intervention would be an appropriate intervention for a variety of students.	1 2 3 4 5 6
16. The student's communication skill remained at an improved level even after the intervention was discontinued.	1 2 3 4 5 6
17. The intervention has proved effective in improving the student's communication skill.	1 2 3 4 5 6
18. The intervention is reasonable for the communication difficulty described.	1 2 3 4 5 6
19. Other communication skills related to the communication difficulty improved due to the intervention.	1 2 3 4 5 6
20. The student's communication difficulty was severe enough to warrant use of this intervention.	1 2 3 4 5 6
21. This would be an acceptable intervention for the student's communication difficulty.	1 2 3 4 5 6
22. The intervention produced enough improvement in the student's communication skill so the communication is no longer a concern at school.	1 2 3 4 5 6
23. The intervention is consistent with those I have used in classroom settings.	1 2 3 4 5 6
24. I would be willing to use this in the classroom setting.	1 2 3 4 5 6

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VITA

Sue Ellen Seely was born in San Antonio, Texas, on May 17, 1973. She is the daughter of Myrle and Claxton B. Seely. After graduating from Tom C. Clark High School in 1991, she attended the University of Texas at Austin where she earned a Bachelor of Science degree in Communication Sciences and Disorders in 1995. After studying at the University of Guanajuato in Guanajuato, Mexico, she attended the University of Houston and earned a Master of Education degree in Educational Psychology/Special Education in 1998. She taught in a Preschool Program for Children with Disabilities in the Leander Independent School District from 1998 until 2001. In September 2001 she entered the Graduate School at the University of Texas at Austin and began privately consulting for school districts and families. While still in graduate school, she returned to the L.I.S.D. as a special education teacher from 2003 until 2005. She has published various peer-reviewed research articles and continues to consult with school districts and families.

Permanent Address: 8404A Cima Oak Lane, Austin, TX, 78759

This dissertation was typed by the author.