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Responses to Communication Breakdowns by Nonverbal Children with Developmental Disabilities

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Abstract: Communication skills are important for children with developmental disabilities to be functional and independent in their own lives. This study examined influences of different types of listener feedback or breakdowns on repair behaviors of nonverbal children with disabilities during semi-structured opportunities at snack time. Three preschool children (3-4 years old) with developmental disabilities participated. An alternating treatments design was used to compare the effect of different types of listener feedback or breakdowns on subjects' communication repairs. Three different types of feedback served to evoke repair attempts by subjects. Results revealed that all three subjects used different repair behaviors across different experimental conditions to achieve their communicative goals during snack routines.

The goal of communication is to convey information to or receive information from another party (Shames, Wiig, & Secord, 1998). Communication is about influencing people via exchange of information, feelings, opinions, and news (Shames et al.). Requesting something, declaring that something is unwanted, kissing, and sharing information can all be communicative behaviors. The requirements of communicative behaviors include a source or sender, a target or receiver, a message, a way or channel for the message to follow, a medium, and an instrument to carry the message accordingly (Shames et al.). Sender is the person who decides what and how to send, and then acts. Message is the whole understanding designed in one's mind. The coded message is produced and conveyed via a channel. The sent message is received, perceived, and interpreted by the receiver. Finally, communication is realized by the feedback which tells if the message is taken or not (Shames et al.).

Successful communication depends on conditions such as participants' motivation to share information, participants' decision on the form of communication to convey the information, participants' awareness about the occurrence of communication breakdowns, and their effort to repair them (Roth & Speakman, 1994; Scudder & Tremain, 1992).

Repairing a communication breakdown is defined as a skill to maintain communication by first noticing that a targeted message is not conveyed and then making necessary modifications (Alexander, Wetherby, & Prizant, 1997). Repairing communication breakdowns is a developmental process, and improves during the phase when children start to establish purposeful communication (McLean, McLean, Brady, & Etter, 1991; Wetherby, Alexander, & Prizant, 1996).

Communication skills are of great importance for children with developmental disabilities to be functional and independent in their own lives (Wetherby et al., 1996). The term 'developmental disabilities' is a self-explanatory term, and infers that these children are late in terms of coping with many skill areas; and communication skills are just one of those areas. Conversation skills are profound land-

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marks among communication skills. Children with developmental disabilities have very limited conversation skills (Scudder & Tremain, 1992). Restricted conversation skills of children with developmental disabilities prevent them from being effective communicators. Being an effective communicator requires fulfilling the roles of speaker and listener efficiently during a conversation (Scudder & Tremain). Also, one has to notice that some messages are vague, or misunderstood by the listener, and then has to clarify or modify the message during the conversation. Since children with developmental disabilities lack these skills, they face communication breakdowns more often than other people (Scudder & Tremain). In addition, communication behaviors utilized by children with developmental disabilities might be harder to interpret than those of without disabilities. Moreover, recent studies show that children with developmental disabilities display problem behaviors when they cannot communicate what they want or when their communication partners cannot understand the intended message (Brady & Halle, 2000). Therefore, it is important to identify how children with developmental disabilities repair communication breakdowns, and to teach them how to make necessary modifications when their message is not transferred to the communication partner.

Literature on repair behaviors of individuals with developmental disabilities reveals only a few studies. Some of these studies have focused on speaking individuals with developmental disabilities (Brinton & Fujiki, 1991; Calculator & Delaney, 1986; Coggins & Soel-Gammon, 1982; Geller, 1998; Paul & Cohen, 1984; Scudder & Tremain, 1992). Other researchers have directed attention toward nonspeaking children with disabilities (Brady, McLean, & Johnston, 1995; McLean et al., 1991).

A study that was conducted with nonverbal adults with severe mental retardation utilized a structured communication sampling procedure to measure the form and functional characteristics of intentional communication behaviors produced by those adults (McLean et al., 1991). Four contact gesture users and four distal and contact gesture users participated. All subjects delivered communication behaviors coded as initiations. Numbers of repair behaviors produced by distal subjects were significantly higher than that of contact subjects. Nevertheless, McLean et al. stated that the intention of the procedures and coding system used in this study was not to arouse or distinguish various types of communication repair strategies.

Brady et al. (1995) recorded and analyzed communication initiations and repairs of nonverbal adults with developmental disabilities by using simulated conditions that elicited comments and requests. The 28 participants were 11 to 58 years old with severe to profound mental retardation. Immediately after initiations of communication by the subject, the experimenter displayed a type of communication breakdown and requested verbal or gestural repair either explicitly (e.g., verbal and gestural) or implicitly (e.g., failure to respond or inappropriate response to the subject's communication behavior). All subjects displayed at least one communication initiation behavior, and 25 subjects repaired at least one communication initiation behavior after breakdowns. Protoimperatives (requests) were produced more than protodeclaratives (comments). The authors stated that repairing breakdowns might diminish frustration and problem behavior provided that the communication partner responds to the repaired communication.

Although Brady and colleagues expanded our knowledge in communication repairs of children with developmental disabilities, this area of research requires extension in several areas. First, the subjects' motivational status for the repair study must be controlled. If the control on motivation or reinforcing value is not settled, the possible failure to repair may be attributed to one's inability to repair or low motivation (Brady & Halle, 2000). Although motivational status of subjects and reinforcing value of assessment items used in the repair study are very important to evoke repair behaviors, neither of them has been addressed in existing literature. Procedures followed for assessing repair behaviors of children with developmental disabilities should involve the preferred stimuli for the subjects to evoke or perform communication behaviors and communication repair behaviors. Therefore, highly preferred activities, objects or edible items

should be assessed and used to create motivating opportunities to increase the possibility of initiating communication repair behaviors.

Second, since it is quite important to know if the subjects' were in a food deprivation or satiation situation when data were collected, information regarding time of data collection should be included in repair studies. In other words, if the procedure created to evoke communication breakdowns includes request edible items or reject edible items, food deprivation and satiation of subjects should be considered. For example, if subjects are in food deprivation, they may not perform communication repair behaviors in response to listener's feedback despite the opportunity created to evoke communication repair behaviors by using individual preferred edible items. In this case, possible failure to repair communication breakdowns may be attributed to one's food deprivation situation.

Third, interactive communication assessment procedure was frequently used in repair studies (Brady et al., 1995; McLean et al., 1991). Interactive communication assessment procedure consists of 10 tasks involving activities and stimuli that previous research has shown to be effective in arousing communication from subjects with cognitive disabilities. Despite the similarities between assessment conditions and natural settings, there is still the risk of excluding repair behaviors that subjects would display in natural settings. Therefore, data collection should be held in natural settings for increasing generability of findings even though the studies utilize structured or semistructured assessment conditions.

This study was designed to extend current research in the area of communication repair behaviors of nonverbal children with developmental disabilities by (a) trying to control motivational status of subjects by assessing individual preferences used to create motivating opportunities for the subjects, and (b) using repair opportunities in the naturally occurring environment and snack routine. Using an alternating treatment design, the purpose was to compare the effects of different listeners' feedbacks to evoke repair behaviors for students with disabilities in the snack routine.

Method

Subjects

Subjects were three preschool children (3 to 4 years old) in a self-contained classroom at a school for students with disabilities at the facilities of Anadolu University in Turkey. Subjects were chosen based on the following criteria: (a) functional vision and hearing abilities within normal limits based on the results of physical examinations, (b) absence of severe behavior disorders that would make participation in this study potentially dangerous, (c) production of at least two intentional communication behaviors during functional analysis of communicative behaviors in prebaseline, and (d) communication through nonsymbolic gestures and vocalizations. Before starting the study, parents of subjects were informed about the study and written permission was obtained for their child's participation. Names were replaced with pseudonyms during reporting.

Subjects' development in general, cognitive and linguistic areas was determined by the Ankara Developmental Screening Inventory Test (AGTE). AGTE consists of 154 items and four sub-tests; cognitive and linguistic development, fine motor skills, gross motor skills, and social and self-care skills. Total score obtained from the sub-tests reflects general development. Cronbach's Alpha coefficients, calculated for general development between 0-11, 13-44, and 45-72 months are high. Test, re-test reliability scores for the same age groups are .99, .98, .88 respectively.

Berrin was a 4 year old girl with developmental disabilities. Berrin was identified as having 30% delay in general, cognitive and linguistic development areas based on AGTE. She basically communicated through gestures, namely 'reaching for', 'pushing away', and 'leading to'. She also vocalized vowel sounds (e.g., "oooooh", "eeehhoooh").

Tamer was a 4 year old boy with developmental disabilities. Tamer was identified as having 30% delay in general, cognitive and linguistic development areas based on AGTE. He communicated with gestures and vocalizations. Gestures in his repertoire included pointing to things, reaching for things, pushing things away, pulling someone's hand to

lead them, and handing an object to a person to make a request. The proximity of his gestures was usually close to or touching a person or object. He also used vocalizations to communicate.

Harun was a 3 year old boy with developmental disabilities. Harun was identified as having 35% delay in general, cognitive and linguistic development areas based on AGTE. He communicated his needs by pointing them, leading the people around him to the object, screaming or grunting.

All subjects were able to complete self-care tasks only with verbal and physical assistance from their parents. Their motor abilities were not limited. They were quite active and had good gross and fine motor skills.

Setting

The study was conducted in a self-contained classroom at the Education, Research, and Training Center for Speech and Language Disorders at Anadolu University, Turkey. It was equipped with toys, books, and a camera. The carpeted classroom was approximately 20 square meters. All experimental conditions were videotaped. The researcher conducted all experimental conditions. An independent data collector, working as a teaching assistant at Anadolu University, collected interobserver agreement and procedural reliability data.

All experimental conditions were conducted during snack time. They lasted between 15 and 25 min depending on responsiveness of subjects, and were conducted once a day, two days a week, as individual schedules permitted.

Snack was served in the class by the researcher. Parents of subjects were told that their children should not eat anything before they came to school.

Response Definition

Dependent variables. Repairs were attempts to make a correction once a communication breakdown had occurred (MacLachlan & Chapman, 1988). In this study, repairs of communication breakdowns were classified in the following three ways. They were adapted from Brady et al. (1995) and Brady and Halle (2000).

Repetition. The same gestures or vocalizations are used for both the first communication behavior and repair communication behavior. In other words, a subject repeats exactly the same thing s/he did before. For example, if the first communication behavior was pointing at the object, a repetition repaired communicative behavior would be that the subject pointed at the object again.

Recast. The subjects change the topography or form of the first communication behavior. In other words, the subject's communication repair does not include any of the same gestures or vocalizations that were observed in the first communication behavior. For instance, if the first communication behavior was pointing at the object, the recast repaired communication behavior would be that the subject touched the object.

Addition and reduction. The subject's communication repair includes some or all of the same gestures/vocalizations that were observed in the first communication behavior, plus additional gesture(s) or vocalization(s). For example, if the first communication behavior was pointing at the object, the addition repaired communication behavior would be that the subject pointed at the object and added a simultaneous vocalization.

On the other hand, reduction is described as any subtraction made from the first communication behavior. Reduction communication repair behavior would be shorter than the first communication behavior. For example, if the first communication behaviors were reaching the object and a simultaneous vocalization, the reduction communication act would be that the subject reached the object.

Recording Strategies

The recording system selected for this study was discrete categorization (Kazdin, 1982). It was used because the communicative behaviors had discrete beginnings and endings, and could be classified as either performed or not performed.

Video recording was used to gather data. Videotapes were watched by the experimenter. If the subject responded by attempting to repair the communication breakdowns, the researcher identified the topography of the repair behaviors and recorded it on the

data sheet (R: Repetition, A: Addition or reduction, T: Recast). If no repair behavior occurred, a minus was recorded to indicate that the subject did not respond to the communication breakdown or the subject attempted to discontinue. Percentages of repair behaviors were calculated by dividing number of repair behaviors by the number of breakdowns. The result was multiplied by 100 and graphed in Figure 1. Also, the percent of repair types were calculated by dividing the number of any particular type by the total number of repair behaviors for each experimental condition. The result was multiplied by 100 and graphed in Figure 2.

Interobserver Agreement

Interobserver agreement was evaluated for each of the subject's communication repair behaviors (repetition, recast, and addition or reduction). Furthermore, to ensure implementation accuracy, procedural reliability was calculated across three experimental conditions, namely *ignore, wrong response, and gestural request* for all three subjects.

Occurrence reliability was calculated on a point by point basis by dividing number of agreements by the number of agreements and disagreements multiplied by 100. Occurrence reliability was calculated since the rate of subjects' repair behaviors were low to reduce chance agreement on occurrence (Kazdin, 1982). Therefore, the expected level of chance might be controlled. An agreement was recorded only if both observers recorded behavior as occurring during the same trials. If one observer recorded a behavior as occurring, and the other did not, a disagreement was scored. If neither observer recorded the occurrence of a behavior the trial was omitted from the assessment.

Occurrence reliability data were collected for at least 20% of all experimental sessions. These sessions were selected randomly. The observer was a research assistant, and was not aware of the purpose of the study. However, the reliability observer was informed about the observation process.

Table 1 shows individual means and ranges of occurrence agreement for each topography of subject's communication repair behaviors (repetition, recast, and, addition or reduction) and listener's feedbacks or breakdowns (gestural request condition, wrong response condition, and ignore condition).

Experimental Design

The alternating treatments design was used to compare the effect of different listener's feedbacks or breakdowns (gestural request condition, wrong response condition, and ignore condition) on subjects' communication repairs. Sequence of experimental conditions was determined randomly. Also, number of each experimental condition was counterbalanced. Therefore, each subject was exposed to the same number of experimental conditions.

The experimenter, materials used, and time of onset were the same across all conditions, and only one condition was conducted a day. The only difference across conditions involved listeners' feedbacks or breakdowns in response to subjects' communication behaviors. Subjects were given ten opportunities per experimental condition for a total of sixty. These opportunities were embedded in the subject's natural snack routines at school.

Pre-baseline. Before targeting to evoke repair behaviors, it is important the child be developmentally able to initiate communicative behaviors at least to request or reject an object or action (Alexander et al., 1997). Therefore, during pre-baseline, two functional assessment procedures (i.e. interviews, observations) were conducted to identify subjects' communicative behaviors. Also, preference assessment procedures were conducted to identify subjects' preferred stimuli so that they can be used to create an opportunity for communication breakdowns.

In the first phase of prebaseline, subjects' parents and teachers were interviewed by using an interview form adapted by Halle, Chadsey-Rush, Collet-Klingenberg, and Reinoehl (1992). In the second phase of prebaseline, observations using ABC (antecedent-behavior-consequence) recording were conducted in the subjects' classroom. In the third phase of prebaseline, paired preference assessment procedure was conducted. Based on results of interviews and direct observations, ten edible items were chosen for each subject. Each edible item was paired with all other edible items at least once. Each subject was asked to iden-

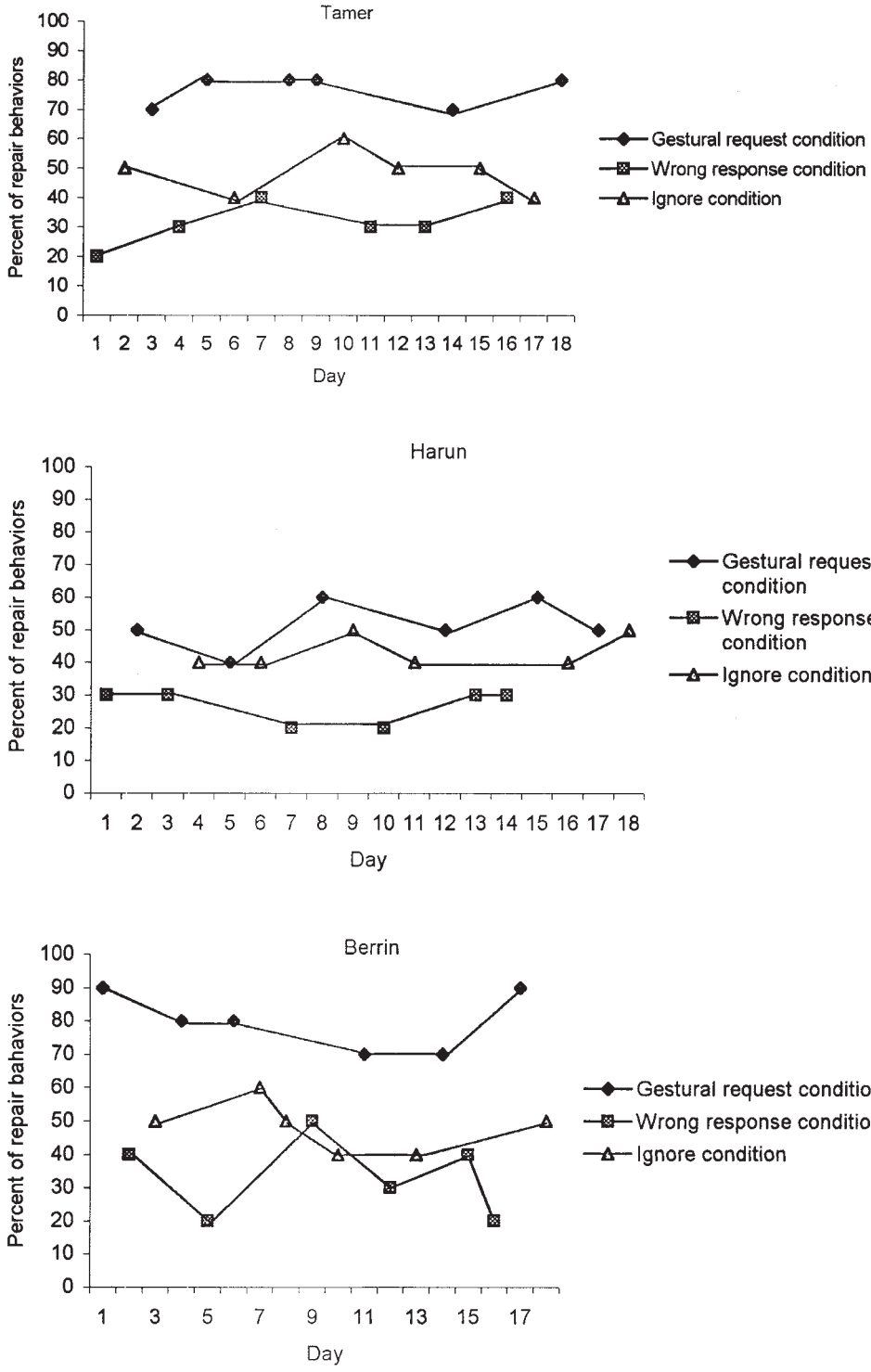


Figure 1. Percent of repair behaviors across experimental conditions.

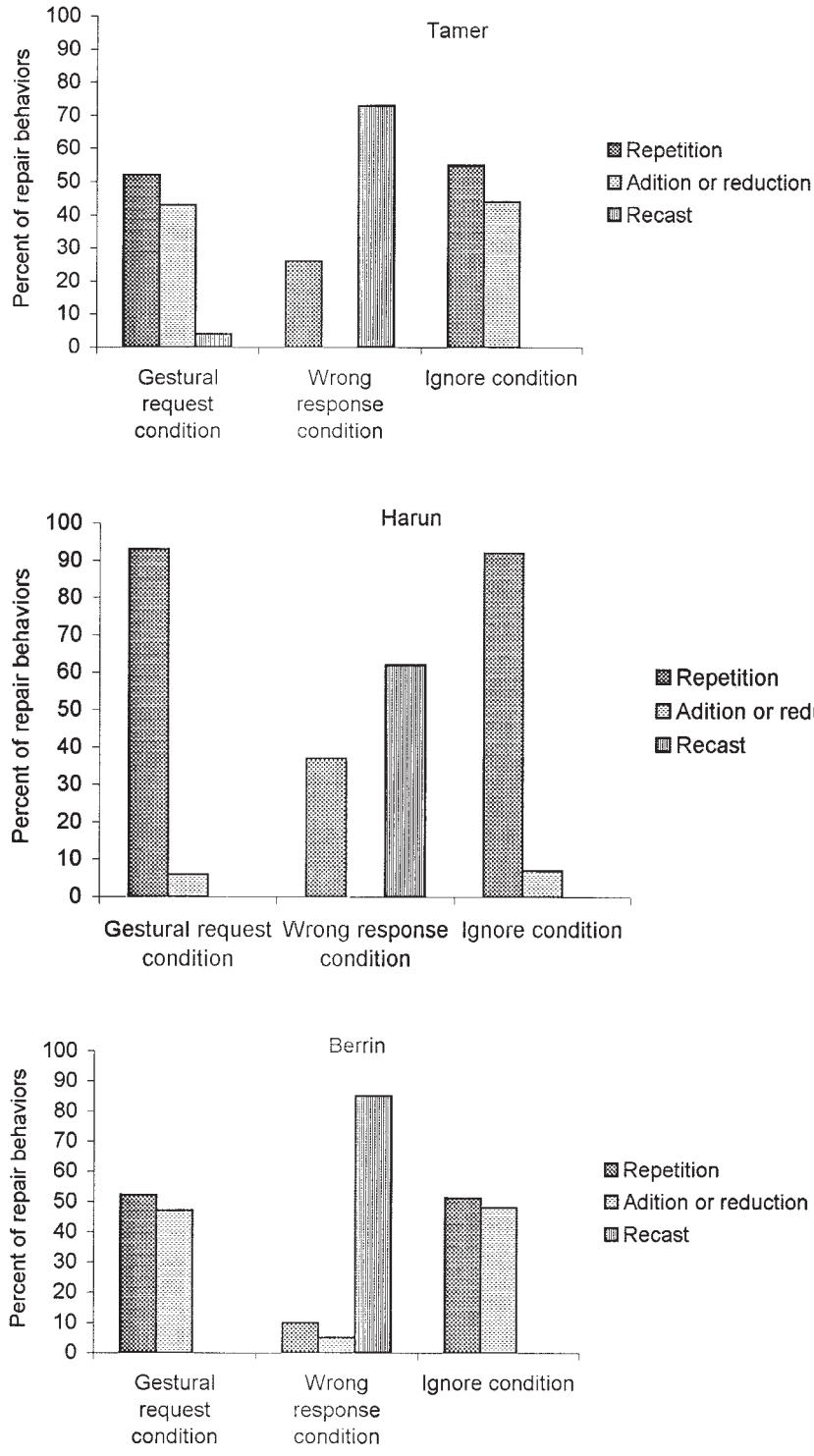


Figure 2. Percent of repair types for each experimental condition.

TABLE 1

Mean Interobserver Agreement

Subjects repair behaviors	*Berrin*	*Tamer*	*Harun*
Repetition	87.66 (87–93)	90 (88–92)	87.33 (83–91)
Addition or reduction	92.66 (88–96)	94.33 (90–98)	88.33 (84–92)
Recast	92 (90–94)	90.33 (88–93)	87.66 (85–91)
Listeners feedbacks or breakdowns			
Gestural request condition	100	99.33 (98–100)	100
Wrong response condition	100	100	100
Ignore condition	100	100	100

tify the preferred item. Based on the subject' responses, his or her preferences were rank ordered. The most highly preferred edible item was used to create opportunities prepared to evoke communication initiations and communication repairs for each subject.

Experimental Conditions

During the study, opportunities with three different types of feedbacks or breakdowns (*gestural request, wrong response, ignore*) served to evoke repair behaviors by subjects.

Gestural request condition. The researcher set up the situation as follows: When the subject was in his chair, the experimenter put a piece of snack on the counter just out of his/her reach, and then looks toward the subject to assist him to see the snack placed out of reach. The researcher stood within reach of subject between his/her chair and food on counter. Then the researcher waited for 10 s. for a communication behavior to occur. The researcher then went on with either of the following steps: 1) After the first communication behavior occurred, the researcher indicated that the request was not accurately received by shrugging shoulders, extending open palms in front of the subject, or looking at him/her with an expectant /questioning look. The researcher then waited up to 10 s. for any type of repair behaviors. If the subject's repair behavior occurred within 10 s., the attempt was honored (give the drink or the food to subject). If no repair behavior was received after 10 s., the trial was discontinued. 2) If the first communication behavior did not occur within 10 s., the experimenter gave a verbal prompt, ("What do you want?) and then the same procedure as in step one was followed. Subjects were given at least ten opportunities per day by repeating the same procedures. (See Table 2 for the protocol for gestural request conditions.)

Wrong response condition. Steps followed in wrong response condition were the same as the ones in gestural request condition, except for step 1. After the first communication behavior occurred, the researcher responded with a *wrong response.* Instead of giving the speaker the requested food, she gave him an object or made a comment about it. For example, if the subject pointed at the food at snack time, the researcher looked at the food and said, "Yes, I see it" but made no attempt to give it to the subject. (See Table 3 for the protocol for the wrong response conditions.)

Ignore condition. Steps followed in ignore condition were the same as the ones in gestural request condition, except for step 1. After the child's first communication behavior occurred, the researcher intentionally did not listen or did not pay attention, did not look at, or did not respond to the subject, and occupied herself with another task until the communication repair behavior occurred. (See Table 4 for the protocol for ignore conditions.)

Results

Percentages of subject's daily repair behaviors produced in response to each of the listener's feedback requests are presented in Figure 1. Total repair behaviors across all conditions were 54% for Berrin, 52% for Tamer, and 40% for Harun.

Results shown in Figure 1 suggest a pattern

TABLE 2

Protocol for Gestural Request Conditions

Opportunities	*The first communication behavior*	*Repair behavior*
Set up the opportunity When the subject is in his/her chair, the experimenter put a piece of snack on counter just out of his/her reach, and then direct eye gaze toward the subject to assist him to see snack placed out of reach. The researcher stood within reach of subject between his/her chair and food on counter.	Wait 10-s. for a communication behavior to occur. Go on with either of the following steps: (a) If the first communication behavior occurs, follow the next column. (b) If the first communication behavior does not occur within 10-s., give a verbal prompt (i.e., "What do you want?) and follow the next column.	After the first communication behavior occurs, (a) Indicate that the request is not accurately received by shrugging shoulders, extending open palms in front of the subject, and looking at him/her with expectant/questioning look. (b) Wait up to 10 s. for any type of repair behaviors. (c) If no repair behavior occurs after 10-s. discontinue the trial. (d) Repeat the same procedure to get ten repair behaviors for each day.

of responses for the subjects. The levels of repair behaviors during ignore condition and wrong response condition was always relatively low compared to gestural request condition. The percent of repair behaviors was 80% in *gestural request condition*, 33% in *wrong response*

TABLE 3

Protocol for Wrong Response Conditions

Opportunities	*The first communication behavior*	*Repair behavior*
Set up the opportunity When the subject is in his/her chair, the experimenter put a piece of snack on counter just out of his/her reach, and then direct eye gaze toward the subject to assist him to see snack placed out of reach. The researcher stood within reach of subject between his/her chair and food on counter.	Wait 10-s. for a communication behavior to occur. Go on with either of the following steps: (a) If the first communication behavior occurs, follow the next column. (b) If the first communication behavior does not occur within 10 seconds, give a verbal prompt (i.e., "What do you want?) and follow the next column.	After the first communication behavior occurs, respond with a *wrong response*. Instead of giving the speaker the requested food, give him an object or make a comment about it. For example, if the subject pointed at the food at snack time, the researcher looked at the food and said, "Yes, I see it" but made no attempt to give it to the subject. (b) Wait up to 10-s. for any type of repair behaviors. (c) If no repair behavior occurs after 10-s, discontinue the trial. (d) Repeat the same procedure to get ten repair behaviors for each day.

Table 4

Protocol for Ignore Conditions

Opportunities	*The first communication behavior*	*Repair behavior*
Set up the opportunity When the subject is in his/her chair, the experimenter put a piece of snack on counter just out of reach, and then direct eye gaze toward the subject to assist him to see snack placed out of reach. The researcher stood within reach of subject between his/her chair and food on counter.	Wait 10-s. for a communication behavior to occur. Go on with either of the following steps: (a) If the first communication behavior occurs, follow the next column. (b) If the first communication behavior does not occur within 10-s., the experimenter gives a verbal prompt (i.e., "What do you want?) and follow the next column.	After the first communication behavior occurs, intentionally do not listen or do not pay attention, do not look at, or do not respond to the subject, and occupy yourself with another task until the communication repair behavior occurs. (b) Wait up to 10-s. for any type of repair behaviors. (c) If no repair behavior occurs after 10-s. discontinue the trial. (d) Repeat the same procedure to get ten repair behaviors for each day.

condition, and 48.33% in *ignore condition* for Berrin; 76% in *gestural request condition*, 31% in *wrong response condition,* and 48 % in *ignore condition* for Tamer; and 51% in *gestural request condition*, 26% in *wrong response condition,* and 43% in *ignore condition* for Harun. The pattern of subjects' repair behaviors in each condition was stable and consistent across the study.

Figure 2 illustrates the topography of subjects' repair behaviors across all conditions During, *gestural request condition*s, percent of repetitions was 52.08% for Berrin, 52.17% for Tamer, and 93.54% for Harun; percent of additions was 47.91% for Berrin, 43.47% for Tamer; and 6% for Harun; and percent of recasts was 0% for Berrin, 4% for Tamer, and 0% for Harun. During, *wrong response conditions*, percent of repetitions was 10% for Berrin, 26.31% for Tamer, and 37.50% Harun; percent of additions was 5% for Berrin, 0% for Tamer, and 0% for Harun; and percent of recasts was 85% for Berrin, 73.68% for Tamer, 62.50% for Harun. During *ignore conditions*, percent of repetitions was 51.72% for Berrin, 55.17% for Tamer, and 92.30% Harun; percent of additions was 48.27% for Berrin, 44.82% for Tamer; and 7% for Harun, and percent of recasts was 0% for Berrin, 0% for Tamer, and 0% for Harun.

All subjects showed repetition more frequently than other repair behaviors across all conditions except for wrong condition. During wrong condition, all subjects demonstrated recast after the researcher did not understand the first communicative behaviors.

Discussion

This study examined influences of different listeners' feedback or breakdowns on repair behaviors of nonverbal children with disabilities in the semi-structured opportunities in snack time. Based on data collected, several findings warrant discussion.

Results show that all subjects used different repair behaviors across different conditions to achieve their communicative goals in snack routines (Figure 2). This is consistent with earlier research demonstrating that children with developmental disabilities have the ability to repair communication breakdowns in response to listener's feedback (Brady et al., 1995; Brinton & Fujiki, 1991; Brinton, Fujiki, Loeb, & Winkler, 1986; MacLachlan & Chapman, 1988; Scudder & Tremain, 1992).

Another finding consistent with earlier studies is subjects produced more repairs in response to gestural request condition than to

other conditions (Figure 1). Percent of repair was also higher in response to ignore condition than to wrong response condition. This suggests that subjects appear to recognize a difference between those conditions (wrong, ignore, gestural request) and respond to them differently (repetition, recast, addition) (Brady et al., 1995). The other explanation for the pattern of data across the conditions is subjects responding might reflect past experience with different listeners, responding that had been successful in the presence of particular listeners or in the presence of particular breakdowns (Halle, personal communication, 1997). For example, in the presence of a gestural request, the subject might have used a particular recast because it had been effective previously. This might have increased the likelihood of his repeating this same topography in similar contexts.

Based on the results presented in Figure 2, subjects responded to the majority of the different listener feedbacks or breakdowns by providing different types of repair behaviors. This implies that they can detect communication breakdowns and can attempt to correct them. Repetition was the most frequently used type of repair behaviors by the subjects, which is consistent with Alexander et al. (1997), Calculator and Delaney (1986), and Golinkoff (1986). Berrin and Harun used addition as a repair strategy when the initial communication behaviors failed as well.

All subjects utilized recast more than any other repair behaviors in wrong response condition. This pattern of data may be explained by the notion of response class. In this case, all repair behaviors that subjects had in their repertoire served the function of getting what they wanted in snack routine and thus were considered members of the same response class (Halle & Drasgow, 2003; Horner & Day, 1991). In wrong response condition, subjects received punishing consequences for their first communicative behavior since the researcher did not honor their requests. Then, the first communicative topography may not occur again or decrease relative to others in the class of repair responses. Thus, subjects may demonstrate a different communicative behavior, called recast, to achieve their goal (to get what they want in the snack).

Figure 2 shows that the percent of repetition and addition strategies was almost the same for Berrin and Tamer in all conditions except for the wrong response condition. That Berrin and Tamer had vocalizations in their repertoire, and utilized those vocalizations when using addition as repair strategy can be counted as the reason for this result. Berrin generally was more responsive to the repair opportunities than other subjects across all conditions. According to her parents, she has an appetite. This would influence her initiation and repair behaviors across conditions.

Harun made use of repetition strategy more than the others in all conditions except for the wrong response condition. Moreover, addition was the least demonstrated repair behavior in all conditions by Harun. Harun communicated only by using gestures, and this may be the reason why addition was the least used repair behavior. In other words, since Harun did not have any vocalization in his repertoire, he made use of contact or distal gestures when displaying first communicative behavior, and the repair behavior was generally a repetition of the first behavior (contact gesture was used as the repair behavior when first communicative behavior was a distal gesture or vice versa).

Three limitations should be considered when interpreting the present results. First, is that effects of only three types of listener feedback were investigated. If other types of feedback (e.g., nonspecific verbal request, specific verbal request) had been used, results may have been different.

Second, edible items used for opportunities that were designed to evoke repair behaviors from the subjects had been determined according to the result of preference assessment procedure. Literature on preference assessment suggests that preference assessment should consist of two steps. The first step is to try to determine if a variety of stimuli are preferred by the student or not. The second step is to figure out if the identified stimuli serve as reinforcers or not. However, in this study, reinforcing effects of the stimuli were not evaluated in the second step of preference assessment. Therefore, if the stimuli had been tested to function as reinforcers, edible stimuli used to evoke repair behaviors would work as a reinforcer more accurately.

Third, subjects' first communication behaviors were extinguished by not getting what they want in the snack routine. This process is the same as the notion of functional equivalence (Carr, 1988) and/or negative co-occurrence of response class described by Halle and Drasgow (2003). They set forth that a second probable response in the same class is likely to occur in order to accomplish the same function whenever the particular response is punished or extinguished. If the second response is treated in the same way as the first one, then a third most probable response will possibly be displayed (Halle & Drasgow, 2003). However, in this study, subjects did not have a second chance to produce repair behaviors since the trial was discontinued following 10-s. latency for repair behaviors. Therefore, repair behaviors might have been missed in those trials.

There are two implications, which should be helpful to teachers and parents. First, results provide information about effectiveness of different listener feedbacks or breakdowns to evoke subject's repair behaviors. If people in the subjects' environment are aware of them and use them, they will not fail to display repair behaviors. Therefore, they would successfully engage in communicative interactions in snack routine. Second, parents and teachers should also remember that children with disabilities might not possess the skills to respond appropriately to the listener feedback in a communication situation, which is not motivating for the student. In planning intervention programs for communication problems, the teacher should prepare various motivating situations to evoke and encourage students' communication and repair behaviors.

References

Alexander, D., Wetherby, A., & Prizant, B. (1997). The emergence of repair strategies in infants and toddlers. *Seminars in Speech and Language, 18,* 197–212.

Brady, N. C., & Halle, J. W. (2000). Breakdowns and repairs in conversations between beginning AAC users and their partners. In J. Reichle, D. R., Beukelman, & J. C. Light (Eds.), *Exemplary practices for beginning communicators' implications for AAC,* (pp. 323–353). Baltimore: Brookes.

Brady, N. C., McLean, L. K., & Johnston, S. (1995). Initiation and repair of intentional communication behaviors by adults with severe to profound cognitive disabilities. *Journal of Speech and Hearing Research, 38,* 1334–1348.

Brinton, B., & Fujiki, M. (1991). Reponses to requests for conversational repair by adults with mental retardation. *Journal of Speech and Hearing Research, 34,* 1087–1095.

Brinton, B., Fujiki, M., Loeb, D. F., & Winkler, E. (1986). Development of conversational repair strategies in response to requests for clarification. *Journal of Speech and Hearing Research, 29,* 75–81.

Calculator, S. N., & Delaney, D. (1986). Comparison of nonspeaking and speaking mentally retarded adults' clarification strategies. *Journal of Speech and Hearing Disorders, 51,* 252–259.

Carr, E. G. (1988). Functional equivalence as a mechanism of response generalization. In R. H. Horner, G. Dunlap, & R. I. Koegel (Eds.), *Generalization and maintenance: Life-style-changes in applied settings* (pp. 221–224). Baltimore: Brookes.

Coggins, T. E., & Soel-Gammon, C. (1982). Clarification strategies used by four Down's syndrome children for maintaining normal conversational interbehaviors. *Education and Training of the Mentally Retarded, 17,* 65–67.

Geller, E. (1998). An investigation of communication breakdowns and repairs in verbal autistic children. *The British Journal of Developmental Disabilities, 44,* 71–85.

Golinkoff, R. M. (1986). 'I beg your pardon?' The preverbal negotiation of failed messages. *Journal of Child Language, 13,* 455–476.

Halle, J. W., Chadsey-Rush, J., Collet-Klingenberg, L., & Reinoehl, R. B. (1992). *Assessment manual.* Product of U.S. Department of Education Grant # HO86P90024.

Halle, J. W., & Drasgow, E. (2003). Response classes: Don Baer's contribution to understanding their structure and function. In K. S. Budd & T. Stokes (Eds.), *A small matter of proof: The legacy of Donald M. Baer* (pp. 113–124). Reno: Context Press.

Horner, R. H., & Day, H. M. (1991). The effects of response efficiency on functionally equivalent competing behaviors. *Journal of Applied Behavior Analysis, 24,* 719–732.

Kazdin, A. E. (1982). *Single-case research design.* New York: Oxford Press.

MacLachlan, B., & Chapman, R. (1988). Communication breakdowns in normal and language learning-disabled children's conversation and narration. *Journal of Speech and Hearing Research, 53,* 2–7.

McLean, J. E., McLean, L. K., Brady, N. C., & Etter, R. (1991). Communication profiles of two types of gesture using nonverbal persons with severe to profound mental retardation. *Journal of Speech and Hearing Research, 34,* 294–308.

Scudder, R. R., & Tremain, D. H. (1992). Repair

behaviors of children with and without mental retardation. *Mental Retardation*, *30*, 277–282.

Shames, G. H., Wiig, E. H., & Secord, W. A. (1998). *Human communication disorders: An introduction* (5th ed.). Boston: Allyn and Bacon.

Paul, R., & Cohen, D. J. (1984). Responses to contingent queries in adults with mental retardation and pervasive developmental disorders. *Applied Psycholinguistics*, *5*, 349–357.

Roth, F., & Speakman, N. (1994). Assessing the pragmatic abilities of children: Part 1. Organizational framework and assessment parameters. *Journal of Speech and Hearing Disorders, 49*, 1463–1468.

Wetherby, A., Alexander, D., & Prizant, B. (1996). The ontogeny and role of repair strategies. In A. Wetherby, S. Warren, & J. Reichle (Eds.) *Transitions in prelinguistic communication: Preintentional to intentional and presymbolic to symbolic* (pp. 135–159). Baltimore: Brookes.

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