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The effects of adult contingent responsiveness on increasing conversational responses through picture book reading setting in children with autism spectrum disorder.

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Abstract : Children with autism spectrum disorder (ASD) show difficulty in sustained social interaction such as conversation with others. In particular, they often have difficulty responding to conversational initiations. Children with ASD can continue to speak one's favorite things themselves, but it is difficult to keep talking about the same topic or keyword alternately according to the content of others talking. Therefore, teaching conversational responding is important for promoting verbal interaction in children with ASD. Adult contingent response to the child's verbal utterance may function as a reinforcer increasing child's conversational responding. However, it is not known what type of adult contingent responsiveness is effective in promoting child's conversational responding. The purpose of this study is to examine whether adult contingent imitation will increase conversational responding of children with ASD compared with adult contingent response through picture book reading setting. We used a single-subject ABAB design compose of the condition of contingent imitation and contingent response for two preschool children with ASD. For contingent imitation, adult. For contingent response, adult did not repeat but gave a vocal phrase to the child's utterances through conversation immediately, such as "that's good!" or "great!" For contingent imitation, adult immediately repeated all or part of the child's previous utterances. The results demonstrated that adult contingent imitation increased the rate of the child's conversational responding. These findings suggest that contingent imitation increased reciprocal vocal interaction in children with ASD compared with contingent response. These findings also suggest that contingent imitation is a useful early intervention method for children with ASD that can be practiced in a picture book reading setting.

Keywords: children with autism spectrum disorder; contingent imitation; conversation; echoic response; expanded response.

INTRODUCTION

Children with autism spectrum disorders (ASD) show difficulty in sustained social communication, such as a conversation with others. In particular, children with ASD can continue to speak one's favourite things themselves, but it is difficult to keep talking about the same topic or keyword alternately according to the content of others talking. Children with ASD often talks utterly unrelated to the utterance of the others such as off-topic response or self-talking behaviour and have less frequent *echoic and expanded response* to the other's previous utterance, which are necessary for establishing long-term conversation with others (Jones &

Schwartz, 2009; Nadig, Lee, Singh, Bosshart & Ozonoff, 2010; Paul, Miles, Orlovski, Marcinko & Volkmar, 2009).

An increase in echoic and expanded response during conversation is important for promoting social communication and language development in children with ASD (Ishikawa, Omori, & Yamamoto, 2018). The echoic response is a response that includes the same keywords as the previous utterance (Ishikawa et al., 2018). For example, if the adult said "It's a train", the child said "train" or "It's a train" as the echoic response. The occurrence of echoic response ensures that children can listen to other's utterances and keep talking about the same topic. Ishikawa et al. (2018) showed that the acquisition of echoic responses facilitated the improvement of natural conversational skills in children with ASD. An expanded response is a response that added the semantic or grammatical information to the previous utterance (Bohannon & Stanowicz, 1989; McDuffie & Yoder, 2010). For example, if the adult said "It's a train", the child said, "It's a blue train" or "It's a train and rail track" as an expanded response. The occurrence of expanded response seemed to reflect the development of syntactic and semantic forms (Bohannon & Stanowicz, 1989).

Adult verbal responsiveness to the child's verbal utterance during conversation may function as a reinforcer increasing child's conversational responding. For typically developing children, adult verbal responsiveness has been shown to predict early language development (Montag, Jones, & Smith, 2015). For children with ASD, the previous study also showed a positive relationship between adult verbal responsiveness and language development in children with ASD (McDuffie & Yoder, 2010; Venker, McDuffier, Weismer, & Abbeduto, 2012). For example, children of parents trained to respond immediately to their children's utterance were shown to have more child's initial conversations than children of parents who did not receive verbal responsiveness to the child's utterance. However, it is not known what type of adult verbal responsiveness is effective in promoting child's conversational responding.

There are two types of adult verbal responsiveness to the child's verbal utterance; *contingent imitation and contingent response* (Ishizuka & Yamamoto, 2016). Contingent imitation is defined as a verbal response in which an adult immediately returns the same utterance as the child's prior utterance (Dawson & Adams, 1984; Pelaez, Ortega, & Gewirtz, 2011). For example, if the child said "It's a train", the adult said "It's a train" or "Train" as a contingent imitation. Contingent imitation also includes expanded contingent imitation in which an adult repeat all of a child's vocal responses and adds new semantic or syntactic information, pronunciation, prosody, and rhythms (Venker et al., 2012). For example, if the child said "It's a train", the adult said "It's a blue train." On the other hand, the contingent response is defined as a verbal response in which an adult immediately returns verbal utterance, such as verbal praise. For example, if the child said "It's a train", the adult said "That's right!" However, the use of only verbal praise is not sufficient to facilitate imitation and reciprocal interaction because it may be prone to only one direction interaction (Ishizuka & Yamamoto, 2016).

Ishizuka and Yamamoto (2016) found that contingent imitation increased vocal imitation and verbal turn-taking in children with ASD who had restricted verbal utterance compared with the contingent response. The findings indicated that contingent imitation was effective for promoting single syllable word and two-word level communication in children with ASD. However, further research is needed to examine whether contingent imitation is effective for acquiring echoic response during conversation. Moreover, few studies have examined whether an expanded response, which plays an important role in the development of spoken language, is increased by concomitant imitation. In order to confirm that it is important not only to respond to children's utterances contingently but to imitate contingently for promoting conversation, it is necessary to compare both conditions, such as contingent response condition and contingent imitation condition.

Besides, picture book interaction settings may be effective in sustain social communication between children and adults (Fleury, 2015). Parents often read picture books to their children daily. Kindergarten teachers also read aloud to children in their daily activities. This adult-child shared picture book interaction gained continues to be widely recommended to promote language development in children with ASD. Therefore, it is important to use these opportunities to provide educational support that promotes social communication and language development for children with ASD.

Therefore, more is known about the immediate effects of contingent imitation for conversational response for children with ASD. The current study assessed whether contingent imitation increases a

conversational response through picture book interaction setting. Thus, the purpose of this study was to examine whether contingent imitation immediately increase echoic response and expanded response during conversation compared with contingent response conditions using a single subject ABABA design.

METHOD

Participants

The ethical approval was provided for this study in Ethics Review Subcommittee of Keio University Research Ethics Committee (No. 13024). Two 4 years-old boys, John and Paul, who were diagnosed with autism spectrum disorder by a doctor and a clinical psychologist participated in this study.

Table 1. Participants profile

Child	Chronological age (in months)	Developmental Quotient (DQ)			
		Full DQ	Physical-Motion DQ	Cognitive-Adaptation DQ	Language-Sociability DQ
John	49	98	89	93	110
Paul	55	85	-	89	84

Parents provided informed consent for their child's participation in the study. Table 1 provides the profiles of the children. Their developmental quotient scores were assessed using the Kyoto Scale of Psychological Development 2001 (KSPD; Ikuzawa, Matsushita, & Nakase, 2002), which is the official standardized scale in Japan. We assessed the children's developmental quotient using the entire scale, which comprises the following subscales: physical-motion (P-M), cognitive-adaptation (C-A), and language-sociability (L-S). The KSPD can be used to assess children up to 14 years of age for all characteristic types. In Japan, we commonly use the standard scores of the entire scale to determine developmental quotient as a measure of intellectual quotient.

John attended a kindergarten and a public community center which focused on peer training. He also received home-based individual training about academic skills and play skills which not included the content of the training. He could produce at most three-word utterances, but they rarely provided back-and-forth verbal exchanges with parents or teachers. Paul also attended a kindergarten and a public community center which focused on motor skills training. He did not receive any individual training. Paul also could produce at most three-word utterances, but they rarely provided back-and-forth verbal exchanges with parents or teachers.

Settings

Children came to the laboratory once a week. All sessions took place in the testing room at a laboratory. The child and the experimenter faced each other across the table (Figure1). Both children like to see the trains and the Japanese familiar animated cartoon characters by parent's interview. We prepared three picture books of trains and three picture books of the characters. The child selected one of the six books. The experimenter put the picture book on the desk and placed in front of the child. When the child finished looking at the picture book during a session, the experimenter showed another picture book and offered to exchange it. To sustain the child's interest, when the child said that he wanted to see another book during the session, the experimenter showed other picture books, and then the child selected one again.

Experimental design

We used one of the single subject research designs, such as an ABAB design (Kazdin, 2011) to evaluate the effects of the contingent imitation on echoic response and expanded response during conversation in picture book reading setting. The ABAB design is a powerful experimental tool for demonstrating the existence of a functional relationship of dependent variables to an intervention

by repeating the baseline and intervention conditions, even when the number of participants is small. The first, third, and fifth phases were contingent response (A) conditions, in which the experimenter responded to the child's utterance with praise but did not imitate them. The second, fourth, and sixth phases were contingent imitation (B) conditions, in which the experimenter imitated all utterance.

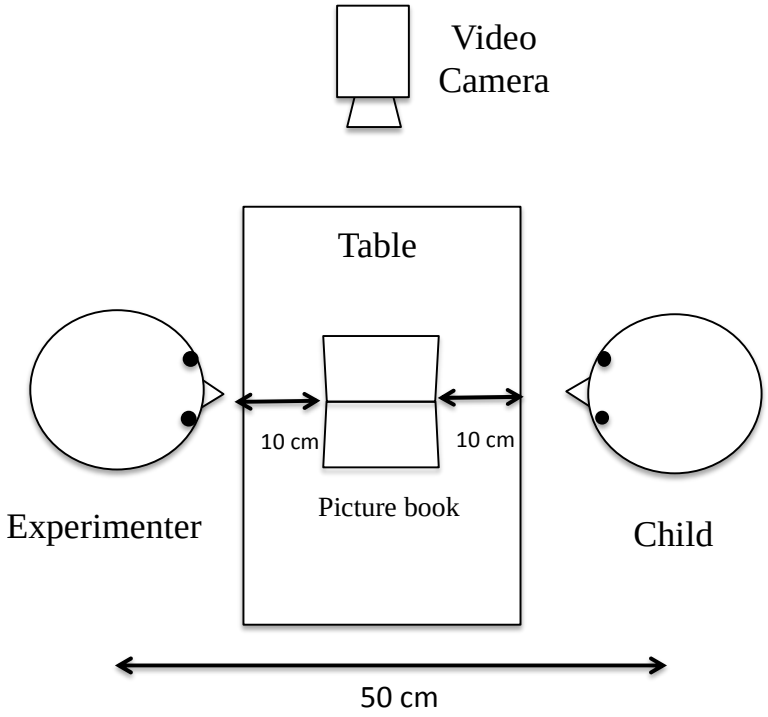

Figure 1. The scene of the experiment.

Procedures

A clinical developmental psychologist implemented all sessions for both children. Each session lasted 3 minutes for each condition. The data were recorded when the child turned to the first page of the picture book. For the contingent response condition, when the child said some words related to the topics of the picture book, the experimenter did not imitate them but immediately returned a general response such as verbal praise. For example, when the child said, "It's a train," the experimenter provided verbal praise such as "That's good" or "That's right!" When the child asked questions, such as "What is this?" or "Is it a train?" the experimenter immediately answered the question such as "It is a red car" or "Yes, right!" but did not imitate the phrasing of the child's question. When the child did not speak within five seconds, the experimenter commented on some topics from the picture book.

For contingent imitation condition, when the child said some words related to the topics of the picture book, the experimenter returned part of the same utterance (partial contingent imitation), same utterance (contingent imitation), or expanded utterance (expanded imitation) as the child's prior verbal utterance. The experimenter performed complete imitation or partial imitation on the child's first utterance. If the child imitated the experimenter's speech, the experimenter made an extended contingent imitation. In order to cause child's utterance to persist, five seconds after child's utterance, the experimenter spoke to the child. For example, when the child said, "It's a train," the experimenter responded, "train (partial contingent imitation)," "It's a train (contingent imitation)," or "It's a red smart train! (expanded imitation)." The experimenter imitated not only the child's utterances but also prosody, rhythms, and pitch. When the child asked a question, such as "What is this?" or "Is it a train?" the experimenter also immediately imitated and expanded the question, such

as “This is a train” or “It is a blue train!” When the child did not speak within five seconds, the experimenter commented on some topics from the picture book.

Dependent measures

All sessions were videotaped. This research observed two types of conversational responses of the children: (1) echoic response and (2) expanded response. Echoic response defines as the child imitates the experimenter’s words or phrases partially or all of them within three seconds of therapist speech. For example, when the experimenter pointed the picture book and said “It's a blue train,” the child said “train,” “It’s a train,” or “It’s a blue train.” If the child could imitate the experimenter’s words or phrases, we counted the correct response as the child’s echoic response. If the child couldn’t imitate the experimenter’s words or phrases such as “Yeah,” we did not count the response as echoic response. We counted the occurrence of echoic response and calculated the average percentage of echoic responses within one session.

Expanded response defines as the child added semantic or grammatical information to the experimenter’s previous utterance. For example, when the experimenter pointed the picture book and said “It's a blue train,” the child said “It’s a blue and cool train,” or “It‘s a blue train and rail track.” If the child could respond by adding the experimenter’s previous utterances, we counted the correct response as the child’s expanded response. If the child couldn’t respond by adding the experimenter’s previous utterances such as “Train” or “It’s a blue train” we did not count the response as expanded response. We counted the occurrence of expanded response and calculated the number of expanded responses within one session.

Interobserver agreement

Inter-observer agreement between the first author and the other observer, who did not know the purpose of this study, was obtained for 25% of observations. The first author and the observer practiced scoring videotaped segments until they reached at least 90 percent agreement for interobserver scoring. We used Cohen’s Kappa coefficients were calculated for echoic response and expanded response using 30 second interval recoding. Cohen’s kappa coefficients were 0.68 for echoic response, and 0.70 for expanded response.

Fidelity of implementation

To ensure the procedural fidelity of both conditions, videotapes of 10 % of all sessions were assessed by an independent observe using 30 second interval scoring. Three questions were used to evaluate the correct implementation of both conditions: contingent imitation (100%) and contingent response (100%).

FINDING AND DISCUSSION

Findings

Figure 2 shows the average percentage of echoic response under all of the conditions. The results demonstrate that for all sessions, the number of echoic response in the contingent imitation condition for both children exceeded the total average percentage of echoic response in the contingent response condition. John’s echoic response averaged 19.1 % (range 17.8 % - 19.6 %) in the first contingent response condition and increased to 35.9 % (range 28.2 % - 45.5 %) in the first contingent imitation condition. During the second contingent response condition, his echoic response decreased to 12.7 % (range 6.0 % - 18.2 %). The second contingent imitation, third contingent response, and contingent imitation condition averaged 27.7 % (range 25.0 % - 31.7 %), 11.3 % (range 9. 4%- 14.3 %), and 43.1 % (range 32 .0 % - 49.0 %), respectively.

Paul’s echoic response averaged 2.3 % (range 0 % - 2.5 %) in the first contingent response condition and increased to 32.1 % (range 20.5 % - 42.9 %) in the first contingent imitation condition. During the second contingent response condition, his echoic response decreased to 4.5 % (range 0 % - 7.9 %). The second contingent imitation, third contingent response and contingent imitation condition averaged 35.4 % (range 27.8 % - 47.4 %), 7.1 % (range 1.1 % -5.7 %), and 22.7 % (range 0.22 % - 0.23 %), respectively.

Figure 3 shows the number of expanded response under all of the conditions. Both children increased the number of expanded response in the contingent imitation condition compared with the contingent response

condition. During the first contingent response condition, John's expanded response averaged 2.3 (range 0 - 4) and increased to 7.7 (range 5 - 11) in the first contingent imitation condition. During the second contingent response condition, his expanded response decreased to 1.3 (range 0 - 3). The second contingent imitation, third contingent response, and contingent imitation condition averaged 5.7 (range 1-10), 1.0 (range 0 - 3), and 8.75 (range 5 - 11), respectively.Paul's expanded response averaged 0.8 (range 0 - 2) in the first contingent response condition, and increased to 11.3 (range 8 - 14) in the first contingent imitation condition. During the second contingent response condition, his expanded response decreased to 0.8 (range 0 - 2). The second contingent imitation, third contingent response and contingent imitation condition averaged 10.3 (range 8 - 9), 1.0 (range 0 - 2), and 7.0 (range 6 - 8), respectively.

Discussion

The purpose of the study was to examine whether contingent imitation immediately increase echoic response and expanded response during conversation compared with contingent response conditions using a single subject ABABA design. The findings of this study indicate that contingent imitation was effective for increasing child echoic response and expanded response during conversation through picture book interaction setting. The study extended the findings of Ishizuka and Yamamoto (2016) by examining the effects on conversational response directly compared with contingent response. The results of this study showed that contingent imitation facilitated child's echoic response at all stages of language development. The echoic response in conversation is an important skill as a listener behavior to ensure that children can listen to other's utterances and keep talking about the same topic. In addition, the results of this study suggest that contingent imitation may promote the grammatical development of speech in children with ASD.

The study indicates that immediate imitation of children's utterance is important to increase child's conversational response. Previous studies have shown that adult verbal responsiveness correlates with social communication and language development in autistic children (McDuffie & Yoder, 2010). However, it was not clear what kind of adult verbal response would be best to encourage a conversational response. Thus, This study assumes that echoic response and expanded response are sensitive to contingent imitation as a reinforcer in children with ASD (Pelaez et al., 2011).

The results of this study may also be influenced by conducting picture book interaction setting. Picture book interaction setting is considered to be advantageous in that children can select a picture book accounting to their interests and adults and children can visually share common topics. It seems that the use of content imitation by setting a scene to share picture books with adults led to an increase in expanded response. Therefore, it is necessary to examine it in daily conversation in the future.

In the future, it will be necessary to examine whether the same effect can be obtained even if parents or teachers of kindergartens implement it. The limitation of this study is that the intervention of contingent imitation was performed for a short period. Thus, further research is needed to conduct long-term interventions and examine whether skill generalization in the home or kindergarten would occur.

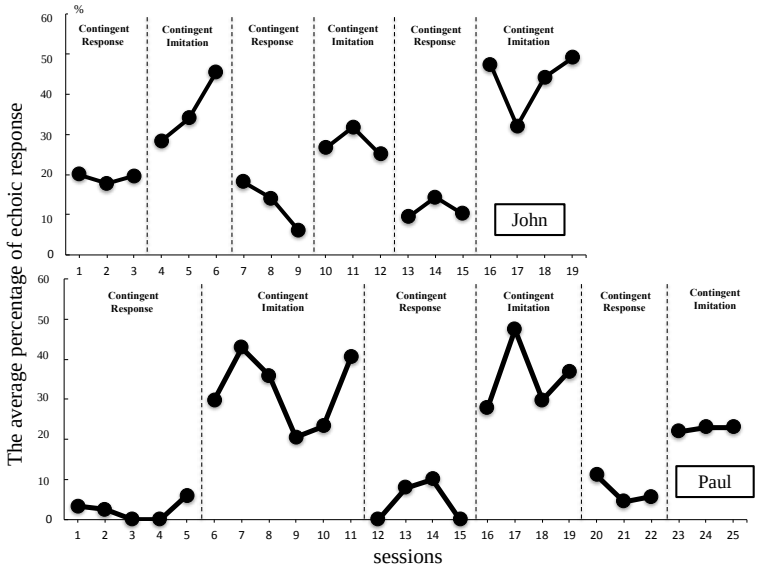

Figure 2. The average percentages of echoic response across contingent response and contingent imitation condition.

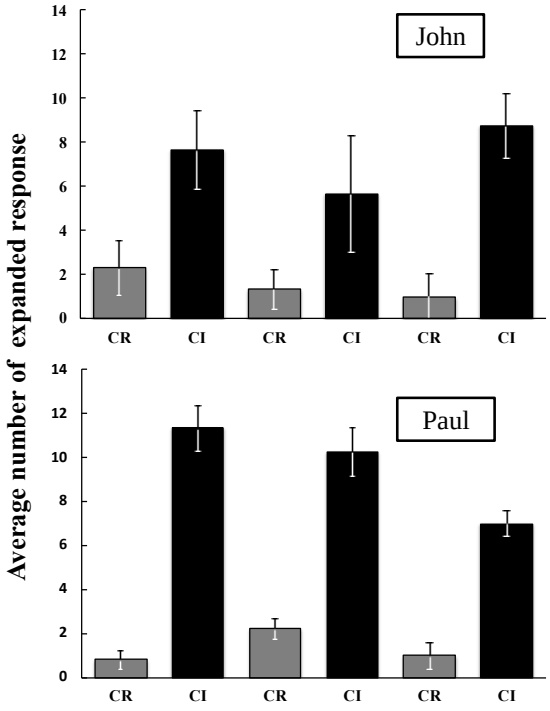

Figure 3. The average number of expanded response across contingent response (CR) and contingent imitation condition (CI).

CONCLUSION

Adult contingent imitation is effective for increasing child's echoic response and expanded response during conversation through picture book interaction setting in children with ASD. This study could contribute to providing an effective and efficient method for practicing a child-initiating early intervention for children with ASD.

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