

A Parent-Implemented Intervention to Improve Imitation Skills by Children with Autism: A Pilot Study

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Abstract The purpose of this exploratory study was to examine the effects of a modified reciprocal imitation training (RIT) on the imitation skills of children with autism. Two parents were trained and coached to use the modified RIT with their young children with autism in home settings. The modified RIT was composed of contingent imitation, descriptive language, object imitation, and gestural imitation strategies. A multiple baseline design across strategies was used to examine the parents' competence in learning and implementing the modified RIT. Results indicated that both parents learned to use the intervention strategies, and children showed improvements in their imitation skills.

Keywords Autism · Imitation · Reciprocal imitation training

Introduction

Imitation is a primary skill that promotes children's engagement in social contexts and supports them in learning new behaviors (Ingersoll 2012; Vanvuchelen et al. 2011). For example, Ledford and Wolery (2011) reported that teaching children with disabilities imitative behaviors

promotes the acquisition of language and social behaviors, maximizes children's benefits from intervention programs, and supports their learning from the environment. Delays in imitation skills are one of the signs that predict the development of autism in later years, and predict communication delays and problems with social responsiveness (Vanvuchelen et al. 2011). Studies show that deficits in imitative behaviors discriminate children with autism from typically developing children and children with other disabilities (Ingersoll 2010). Given the importance of imitation, many researchers have focused their efforts on teaching children with disabilities imitation behaviors using different approaches (Ünlü and Diken 2010).

The use of operant conditioning to teach imitation to children with autism has been reported in the literature (Ünlü and Diken 2010). For example, Reciprocal Imitation Training (RIT) has resulted in positive outcomes for young children with autism (Ingersoll 2010, 2012; Ingersoll and Gergans 2007). RIT is a play-based intervention that emphasizes the role of imitation as a vehicle for promoting social responsiveness (Ingersoll 2010). In RIT, adults are coached to use reciprocity strategies (i.e., contingent imitation and descriptive language) and novel materials to support dyadic interactions. Also, RIT incorporates the use of modeling, prompting, and reinforcement of correct responses to increase children's rate of spontaneous imitative behaviors. In RIT, dyadic interactions provide children with opportunities to develop social motivation, which thereby supports them in imitating their play partners (Ingersoll 2010).

The Division for Early Childhood (DEC 2014) emphasizes the role of natural environments in providing children with learning opportunities, which promote children's engagement, social competence, and social connection with their surroundings. Interventions provided in natural

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environments address children's needs in the context of their families, where caregivers are the primary agents for implementing interventions on a regular basis. In this vein, DEC highlights the role of families in identifying natural learning opportunities within daily routines and activities, and the support required to promote knowledge and skill development.

In the past two decades, training parents to implement evidence-based strategies has drawn attention from researchers and practitioners (Kemp and Turnbull 2014). However, this approach entails a linear relationship between professionals and families, and lacks flexibility, dynamic interactions, and attention to parents' knowledge as a foundation for skill development. On the other hand, family-centered practices, a central component in early intervention, honors parenting knowledge and skills, and provides them with opportunities to select the learning mode that will help them strengthen their skills in addition to gaining new knowledge (Bailey et al. 2012; Dunst and Trivette 2009). Family-centered practices highlight the partnership between professionals and parents, including shared decision-making, trust, respect, and open communication (Dempsey and Keen 2008; Shelden and Rush 2001; Woods et al. 2011). Rush et al. (2003) introduced coaching as an alternative concept to parent training. They believed that coaching is an interactive process, where learners are provided with multiple opportunities to examine their practices, explain them from their perspective, and propose solutions to problems. Kemp and Turnbull (2014) stressed the need for more research on the use of coaching in early intervention and specifically coaching in the context of home visits.

Given the promising results of RIT for children with autism in clinical settings and during naturally occurring interactions, this study extends the literature by examining the effectiveness of modified RIT strategies to teach imitation skills to young children with autism in home settings. Research questions addressed were: (a) What is the impact of training and coaching on parents' use of modified RIT strategies in the home? and (b) How effective is a parent-implemented intervention in improving object and gestural imitation for children with autism?

Method

Participants

Participant criteria included: (a) an educational or medical diagnosis of autism, (b) the child's age between 2 and 5 years old, (c) the child had no vision, hearing, or physical problems, (d) the primary language spoken at home was English, (e) the child exhibited low rates of imitative

behaviors on the Motor Imitation Scale (MIS, Stone et al. 1997), (f) the parents agreed to participate in two weekly intervention sessions, and (g) the parents allowed video recording of all parent–child sessions. After 8 months of recruitment efforts only two of 30 families qualified and agreed to participate in the study. One parent from each of two families was identified to serve as the primary interventionist throughout the study.

The Green family included 37-month old Jason, his parents, and two older stepbrothers (one of whom also had autism). Jason's social and language age based on the Child Development Inventory (Ireton 1992) was less than 12 months, and his score on the Childhood Autism Rating Scale (CARS; Schopler et al. 1988) fell within the mild to moderate range. Based on the MIS (Stone et al. 1997), Jason did not engage in object or gestural imitation. He relied on pushing things away or crying to make his needs known. Jason signed "more" and was learning to communicate using The Picture Exchange Communication System (Bondy and Frost 1994). At the beginning of the study, Jason was receiving developmental, speech, and behavioral therapy. During the study, he was enrolled in an early childhood program part-time. Ron agreed to be his primary interventionist. As a stay-at-home father, he attended most of Jason's therapy sessions; Ron was not involved in other parent training during this study.

The Davis family included 60-month old Daniel, his adoptive parents, and six siblings (two of his biological siblings also had disabilities). Daniel was an active child who mouthed almost anything he touched. Daniel used no vocalizations consistently and did not use a formal communication system to express his needs. Daniel's score on the CARS put him in the severe range of autism. Based on the mother's responses on The Vineland Adaptive Behavior Scales (Sparrow et al. 1989), Daniel received low scores on all domains. According to the MIS (Stone et al. 1997), Daniel did not use object or gestural imitation. At the start of the study, Daniel attended an inclusive kindergarten, where he received speech therapy 40 min/week and occupational therapy 20 min/week. Daniel started receiving private behavioral therapy (10 h/week) as this study started. Marcy agreed to be her son's primary interventionist. She stayed at home with Daniel and his siblings, and attended all of his therapy sessions. She was not involved in additional parent training or support groups.

Settings

This study was conducted in two home settings, and parents selected the location where the experimental conditions were delivered. For Jason, all sessions took place in his bedroom. While Daniel's sessions took place in the family's living room. A babysitter came to Daniel's home

to take care of the other children when he and his mother were working with the first author.

Materials

The parents and children interacted using seven sets of play materials: (a) nesting and stacking toys, (b) blocks, (c) balls, (d) musical toys, (e) dolls and stuffed animals, (f) pretend food, and (g) vehicles and people. Prior to baseline, the parents were asked about their children's favorite toys, and asked to provide a list of materials that belonged to each set. They were encouraged to choose materials that had multiple functions (e.g., a cup can be used as a drum or for drinking). The parents were encouraged to choose materials that were interesting but not overly engaging, so children would interact with the parents without being completely absorbed by the materials. These play materials were brought to the home during all baseline and intervention sessions. The materials always consisted of 10 pairs of toys (e.g., two sets of blocks, two drums), that could each be categorized into one of the seven sets mentioned earlier.

A digital video camera, mounted on a tripod in a corner of the room, was used to capture parent–child interactions. The first author did not respond to the children to avoid encouraging them to look at or communicate with him during video recording. He also informed the parents that he would not communicate with them while video recording.

Modified Reciprocal Imitation Training

The training consisted of: (a) contingent imitation and descriptive language, (b) object imitation strategies, and (c) gestural imitation. For this study, RIT was modified in two ways: (a) the number of object and gestural imitation models was decreased to two models, and (b) the wait time between models was lowered to 3 s. According to Neitzel and Wolery (2009) researchers, along with teachers, should consider child characteristics (e.g., the severity of the disability) and task characteristics (e.g., the sophistication of the task) in determining the response interval. Considering the baseline data in the current study, a 3 s response interval was deemed feasible. Therefore, the intervention used in this study is referred to as modified RIT.

Coaching Parents

Coaching by the first author occurred prior to each intervention session. The coach was a doctoral student at the time the study was conducted. He received extensive training in the area of early childhood special education including implementing evidence-based strategies,

analyzing learning contexts, using reflective practices, and providing feedback to adult learners in home and center-based programs. At the onset of each experimental condition, he met each parent individually for 30 min and provided details about the condition. Coaching sessions, which were audio recorded to assess fidelity, were conducted in the families' homes during a convenient time for the parents. The coaching components included providing the parents with a manual, which described the strategies, rationale, significance for learning the strategies, and anticipated outcomes of using the strategies to teach their children imitation skills. The first author showed the parents short video clips that featured correct and incorrect use of the strategies. These videos featured parents and children who did not participate in this study. After discussing the manual content and video clips with the parents, the first author answered questions. The parents were asked to read the manual on their own and contact the first author with any questions or concerns.

During coaching sessions the first author provided an explanation of the strategies, and answered questions. Afterward, he modeled the strategies with the child for 5–10 min, described his use of them, and explained the child's responses. Then parents had an opportunity to practice the strategies with their children, while the first author provided coaching and feedback. Parents were encouraged to ask questions throughout the training. Following coaching (approximately 15 min), parent–child interactions were recorded for 10 min, during which time feedback was not provided. The coaching procedure used in this study differed from the one used in Ingersoll and Gergans's study (2007) in that all the coaching sessions were implemented in home settings, and video clips were used to describe correct and incorrect use of target strategies.

Experimental Design and Conditions

A multiple-baseline design across strategies (Kazdin 1982) was employed to evaluate the effects of modified RIT on improving the object and gestural imitation of two children with autism. The four experimental conditions were introduced in the following order based on research about the importance of this sequence in promoting child's responsiveness: (a) baseline, (b) contingent imitation and descriptive language, (c) object imitation, and (d) gestural imitation. Data were gathered from the entire 10-min session across the different experimental conditions.

Baseline

During baseline ten pairs of toys (e.g., two sets of blocks, two drums), drawn from the list created in collaboration with the parents, were brought into each home. The parents

were asked to interact with their children as they usually did for 10 min. Baseline sessions occurred twice a week until a trend was established.

Contingent Imitation and Descriptive Language

These strategies included imitating the child's play with toys, using gestures and body movements, and making vocalizations. The strategies also included describing the child's play using simple language, slow speech, repetition, stressing specific words, and language expansion. Both types of reciprocity strategies (imitation and language) were introduced to the parents at the same time.

Object imitation strategies included: (a) modeling an action using identical toys, (b) providing a verbal label with the action, (c) providing verbal and physical prompts, and (d) praising the child when she or he imitated the parent's model. A handout was provided to help parents recall the strategies and the wait time. The handout was faded once parents reported that they did not need this visual prompt anymore. Parents were instructed to end a trial if the child lost interest in the toy. They also were told to continue using contingent imitation and descriptive language strategies, when they were not using object imitation strategies with their child. Finally, parents were encouraged to follow their child's lead and model one-step actions (e.g., hit drum).

In the gestural imitation condition, the parents used the same strategies (i.e., model, prompt, praise) that were used in the object imitation condition. A handout was provided to remind parents to allow enough wait time and to use the model, prompt, praise sequence; it was faded as the parents mastered the use of gestural imitation strategies.

Data Collection

Parent and child data were gathered across all baseline and intervention sessions. Data were gathered on parents' use of contingent imitation, descriptive language, object imitation, and gestural imitation. Children's object and gestural imitation skills were assessed. Partial interval time sampling was utilized to code parent and child data every 30 s (Kazdin 1982).

Parent Strategies

Parent data were gathered on the percentage: (a) of intervals in which contingent imitation strategies were implemented, (b) of intervals in which descriptive language strategies were implemented, and (c) of correct episodes of object and gestural imitation strategies. Two dependent variables assessed children's responses to the modified RIT: (a) percentage of correct responses using object

imitation and (b) percentage of correct responses using gestural imitation.

Object imitation occurred when the parent modeled an action with an object and the child imitated it within 3 s without a prompt. Gestural imitation occurred when the parent modeled a gesture and the child imitated it within 3 s without a prompt. Gestures included actions, descriptions, pantomime, affection, or conventional gestures. Definitions and examples of gestures were adopted from the RIT manual developed by Ingersoll (2008).

Procedural Reliability

Procedural reliability checklists were developed for the parent training sessions as well as the review and coaching parts of the intervention sessions. A graduate student conducted fidelity checks on all parent training sessions and 25 % of the review and coaching parts of the intervention sessions. Procedural reliability was 100 % for all sessions.

Interobserver Reliability

To assess interobserver reliability, an observer coded 25 % of randomly selected video clips across the two dyads. For Ron, interobserver agreement on correct use of contingent imitation averaged 80 % (range 40–95 %), and correct use of language strategies averaged 80 % (range 50–95 %). Interobserver agreement on Ron's correct episodes of object and gestural imitation averaged 67 % (range 0–94 %). For the episodes of object and gestural imitation on which the reliability observers agreed, interobserver agreement on Ron's use of object imitation averaged 84 % (range 67–100 %), while gestural imitation averaged 85 % (range 69–100 %). Interobserver agreement on Jason's object imitation averaged 88 % (range 50–100 %), while correct use of gestural imitation averaged 92 % (range 83–100 %).

For Marcy, interobserver agreement on correct use of contingent imitation averaged 86 % (range 70–100 %), and correct use of language strategies averaged 88 % (range 73–100 %). Interobserver agreement on Marcy's correct episodes of object and gestural imitation averaged 66 % (range 0–100 %). For the episodes of object and gestural imitation on which the reliability observers agreed, interobserver agreement on Marcy's use of object imitation averaged 82 % (range 71–100 %), while reliability on gestural imitation strategies averaged 100 %. Interobserver agreement on Daniel's object imitation averaged 97 % (range 86–100 %); there were no occurrences of gestural imitation.

Social Validity

Following intervention, a graduate student who was naïve to the purpose of the study interviewed both parents to assess the social validity of the modified RIT in increasing children's imitation skills. Each audio recorded interview lasted approximately 30 min. Parents were asked about (a) their learning and use of the strategies, (b) their child's social engagement, communication, and play with objects, (c) their child's imitation skills, (d) parents' use of the strategies outside the intervention sessions, and (e) any feedback the parents had about the intervention. Another graduate student transcribed all interviews.

Results

Green Family

Contingent Imitation and Descriptive Language

During baseline, Ron's correct use of contingent imitation and language strategies averaged 40 % (range 10–75 %) and 65 % of intervals (range 50–80 %), respectively (see Fig. 1). Training resulted in an increase in Ron's imitation of Jason's play with objects, gestures, and verbalizations. During the six sessions following training, Ron's correct use of contingent imitation averaged 90 % (range 80–100 %), where his correct use of descriptive language averaged 79 % of intervals (range 55–95 %).

Imitation Training

During baseline, Ron displayed variability in correctly using object imitation (see middle leg of Fig. 1), averaging 22 % (range 0–100 %). During the six sessions following training, his correct use averaged 65 % (range 38–100 %). While Ron never used gestural imitation in baseline (see third leg of Fig. 1), he demonstrated an immediate, stable, and substantial increase after he was taught these strategies. His correct use of gestural imitation averaged 79 % (range 70–89 %) during the gestural imitation training condition.

With the introduction of object imitation, Ron's correct use of contingent imitation and language strategies declined to 63 % (range 35–75 %) and 73 % (range 55–85 %), respectively. Also with the introduction of gestural imitation (see bottom leg of Fig. 1), his correct use of contingent imitation dropped below baseline levels and averaged 34 % (range 25–40 %). However, Ron's correct use of descriptive language when gestural imitation was introduced averaged 89 % (range 85–95 %) while his correct use of object imitation declined to an average of 44 % (range 0–75 %).

Child Behavior

Jason's data show no changes in object imitation across phases (see Fig. 2). Also, he did not engage in gestural imitation until Ron was taught these strategies; then an increase was observed as Jason averaged 8 % of the opportunities (range 0–11 %).

Davis Family

Contingent Imitation and Descriptive Language

During baseline, Marcy's correct use of contingent imitation averaged 31 % of intervals (range 20–55 %) and her correct use of descriptive language strategies averaged 61 % (range 35–70 %) (see top leg of Fig. 3). Following training, she increased her imitation of Daniel's gestures, verbalizations, and play with objects. During the three sessions following training, Marcy's correct use of contingent imitation and language strategies averaged 98 % (range 95–100 %) and 90 %, respectively.

Imitation Training

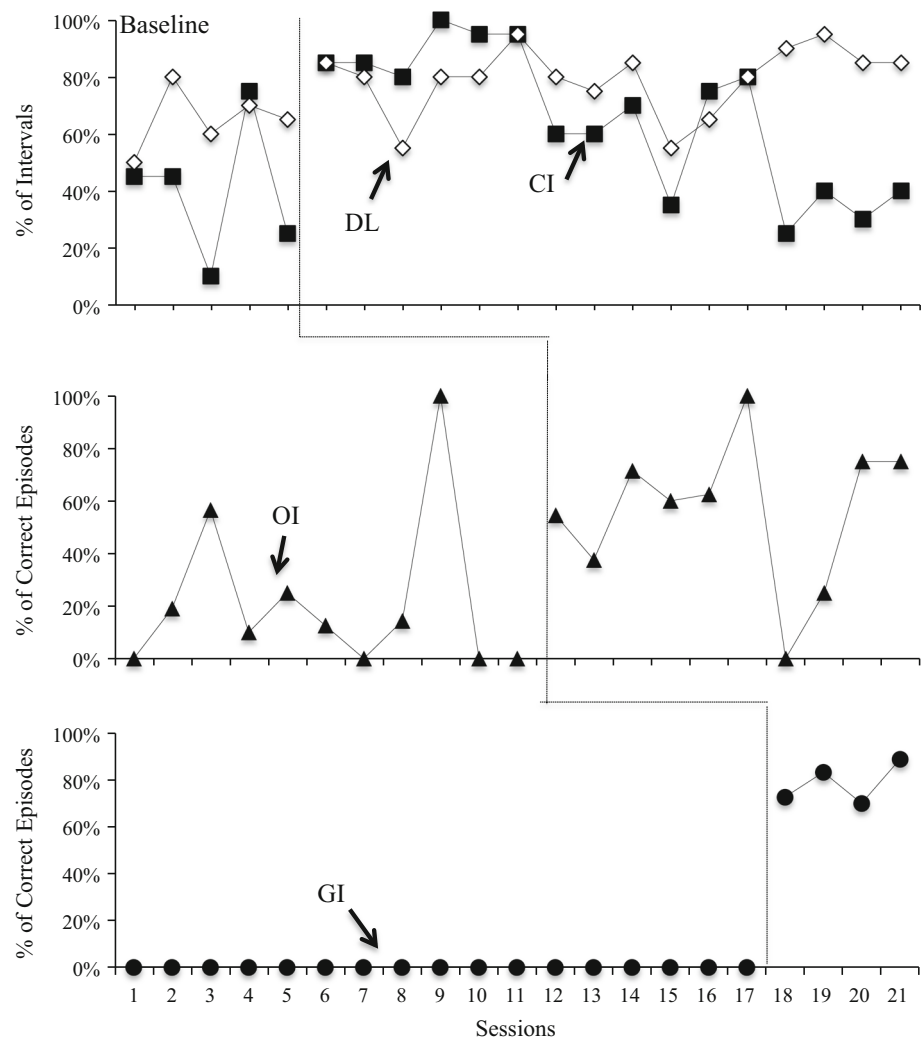
During baseline, Marcy rarely used object imitation ($M = 5\%$; range 0–20 %) (see middle leg of Fig. 3). Following training, Marcy substantially increased her correct use of object imitation over the next 4 sessions to an average of 55 % (range 31–94 %). While Marcy never used gestural imitation in baseline, she demonstrated an immediate but small increase in using gestural imitation following training. Her correct use of gestural imitation averaged 42 % (range 29–67 %) during the gestural imitation condition.

With the introduction of object imitation, Marcy's correct use of contingent imitation and descriptive language strategies declined to 49 % (range 30–65 %) and 68 % (range 50–85 %), respectively. Also with the introduction of gestural imitation, her correct use of contingent imitation dropped to baseline levels, averaging 29 % (range 20–35 %). Marcy's correct use of descriptive language strategies remained above baseline levels when gestural imitation was introduced ($M = 83\%$, range 70–95 %), while her correct use of object imitation declined to an average of 24 % (range 12–36 %).

Child Behavior

Daniel's data show a declining slope in object imitation across sessions ($M = 21\%$, range 5–40 %) in Fig. 4. When his mother was taught the contingent imitation and descriptive language strategies, Daniel did not engage in any object imitation. However, as expected, when Marcy

Fig. 1 Ron's use of contingent imitation, descriptive language, object imitation, and gestural imitation. *CI* contingent imitation, *DL* descriptive language, *OI* object imitation, *GI* gestural imitation



learned the object imitation strategies, Daniel's skills increased ($M = 44\%$, range 14–69%). When gestural imitation strategies were introduced to Marcy, Daniel's object imitation remained above baseline levels ($M = 51\%$, range 29–83%); he only engaged in gestural imitation during one session (8% of opportunities during session 13).

Social Validity

Both parents reported that, prior to intervention, most of their play interactions with their children lacked reciprocity and following the children's lead. They stated that it was not difficult to learn the strategies, however, they also reported that the intervention did not result in dramatic changes in their interactions with their children. Marcy stated that the intervention made her more aware of the need to provide Daniel with time to process and respond to her play bids. She also noted that at times it was difficult to

follow the sequence of strategies (i.e., model, prompt, praise). Ron stated that he usually referred to the handout between interactions to strengthen his understanding of the strategies. Both parents expressed an interest in maintaining their use of the strategies even if their sequence varied from what they learned while participating in the study.

Although the parents attempted to use the strategies with their children at times during the day, significant improvements in their children's imitation or play skills were not observed. Marcy explained that Daniel's play skills were severely delayed, which resulted in limited opportunities to engage him in sustained play. She noted that she could now identify more opportunities where she could follow his lead during play and become engaged with him around toys that interested him. Ron and Marcy could not identify any changes in their children's social engagement as a result of the study.

Finally, both parents stated that they would recommend this intervention to other parents. Marcy said that the

Fig. 2 Jason's correct responses using object and gestural imitation

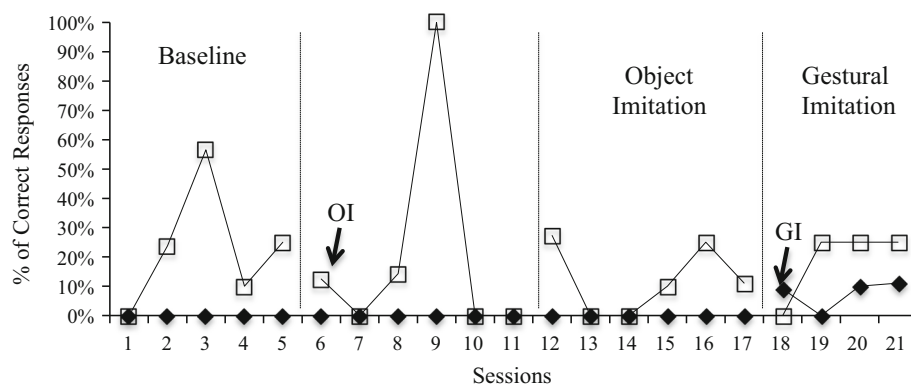
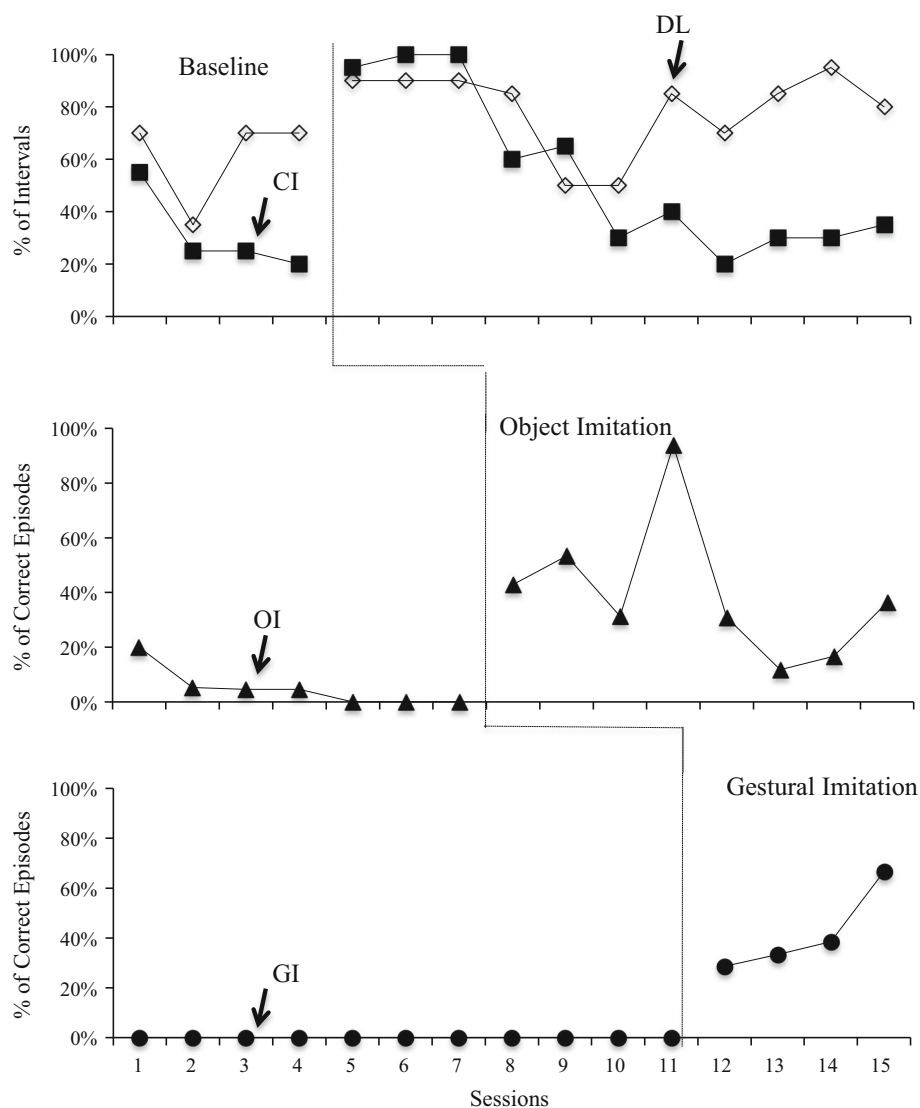


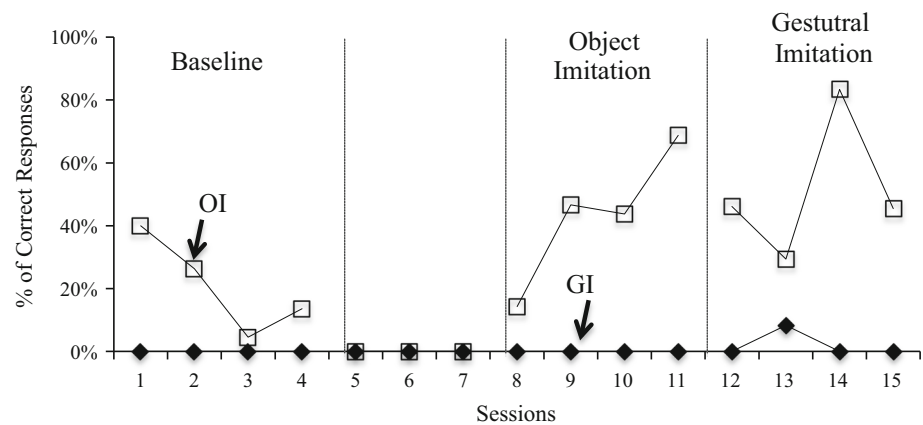
Fig. 3 Marcy's use of contingent imitation, descriptive language, object imitation, and gestural imitation. *CI* contingent imitation, *DL* descriptive language, *OI* object imitation, *GI* gestural imitation



intervention taught her about the importance of imitation skills in facilitating a child's communication development. She felt that the intervention broke down the targeted strategies in a way that made it simple for parents to learn

and use. Ron believed that learning the strategies increased his knowledge and helped him interact more positively with Jason. He also stated that his success in implementing the strategies increased his confidence in using them.

Fig. 4 Daniel's correct responses using object and gestural imitation. *OI* object imitation, *GI* gestural imitation



Discussion

The findings from this pilot study support research that was conducted with parents in clinical settings (Ingersoll and Gergans 2007; Vismara et al. 2009). The data revealed moderate increases in both parents' use of the modified RIT strategies, as they implemented them in their homes with fidelity. However, coaching parents to implement novel strategies at home can be challenging for two reasons. First, the distractions that home environments present are not easy to ignore. For example, while working with the Davis family in the living room, usually there were other family members near by. This was especially challenging for Marcy, because in several instances she needed to respond to family members. Although a babysitter was hired to take care of her other children with disabilities, they often sought out Marcy for comfort. In the case of the Green family, intervention sessions were conducted at times when no other family members were around. However, at times Ron needed to leave the intervention setting to answer the phone, the doorbell, or attend to emergencies. The second reason that coaching parents to implement novel strategies at home can be challenging has to do with child demographics. Jason and Daniel were diagnosed with moderate to severe autism, which meant that they were receiving other therapies as well. The stress that resulted from attending to multiple therapy appointments could have impacted the parents' ability to focus on the task on hand.

The dynamic relationships among family members are an essential component of Family System Theory (Turnbull and Turnbull 2001). Therefore, early interventionists need to embrace the unique characteristics of each family and adjust interventions to improve collaboration with families. One suggestion to accomplish this is to use an embedded intervention approach that takes into consideration home routines, the location of the routines, and the child's goals, and includes family participants in the intervention plan (Shelden and Rush 2001).

Both child participants in the current study had a diagnosis of autism. Research has consistently shown that one of the key characteristics of autism is that children have difficulty imitating gestures and actions on objects (Vanvuchelen et al. 2011). Data from this study indicate that there were minimal improvements in children's imitation skills as a result of the modified RIT. Ledford and Wolery (2011) reported that the results of imitation training varied in studies that used discrete trial, play-based, or classroom-based interventions with the percentage of success with children with autism as 76, 50, and 40 %, respectively. Thus it appears that the results of the current study are consistent with other interventions aimed at teaching imitation skills to young children with autism using play-based interventions.

Having said that, the modest child outcomes realized in the current study might be the result of modifications that were made to the original training protocol. In the current study, the number of object and gestural models provided to target children was lowered from three to two models. Also, the wait time between models was adapted from 10 to 3 s. Many children with autism have difficulty processing visual and/or auditory cues and need more time to process them before responding (Lord and McGee 2001). Therefore, providing a short wait time might not have given the children enough time to process their parents' gestures or actions on objects. In the same vein, providing three models could have provided the parents with more opportunities to practice the strategies with their children, and could have provided the children with more opportunities to practice the imitative behavior.

Another explanation for the modest results could be that the object and gestural models were novel to the children, and according to Bandura and Piaget (as cited in Ledford and Wolery 2011), children are more intrigued to imitate behaviors that are already in their class of responses. Also, research has shown that the probability of successfully imitating actions on objects as opposed to imitating

gestures might be due to the fact that the former are visible to children and provide stimulus discrimination and social referencing compared to gestures that are less visible.

Finally, intervention phases changed based on parent, not child, data. It is possible that parents were not fluent in using one strategy before a new strategy was introduced. Thus, it could be argued that neither parents nor children had enough practice using a strategy to result in observable improvements. It was not feasible to extend the experimental conditions due to parents' reluctance to commit for a longer period of time, and we were mindful of the parent training literature, which indicated that a reasonable duration for parent training should not exceed nine weeks (Ingersoll and Dvortcsak 2006).

Limitations

While some positive effects were realized in this study, it is important to discuss the limitations. First, the small number of participants poses a concern as to whether this study provides enough replications to support the validity of the results. While our results indicate positive changes in parents' use of the strategies, a larger sample could provide stronger evidence of the effectiveness of a modified RIT intervention.

Second, the use of partial interval time sampling to measure parent and child behaviors limits our understanding of the results. An event recording system might be a better method of collecting parent and child data (Gast and Ledford 2010).

Implications for Future Research

Several suggestions can be made when conducting home based parent-implemented intervention research in the future. First, both adult participants were stay-at-home parents who were responsible for taking care of more than one child with a disability. In addition to household chores, they were scheduled and attended therapies as well as individual planning meetings for their children with disabilities. Future research might address the effects of learning new strategies on parents' stress level and feelings of confidence and competence.

Although both parents increased their correct use of the strategies across phases, they could have benefited from more coaching to enhance their play interactions with their children. When each new phase was introduced, a decrease in the parents' correct use of previously learned strategies was observed; this pattern was replicated across both families. A successful coaching approach builds on parents' skills and knowledge, refines them, and encourages self-reflection to promote competence and mastery of new strategies (Rush et al. 2003). In addition, successful coaching increases

parents' competence by explaining relationships between new and existing knowledge and supports them in embedding newly learned strategies within their home routines (Kemp and Turnbull 2014). In a successful coaching model, the coach is responsible for creating a supportive environment where the parent and coach can brainstorm solutions to address challenging situations. The ultimate goal of coaching is to build parental competence and confidence so they acquire and maintain new strategies, and subsequently adapt them to new settings and situations (Rush et al. 2003). Future research might involve refining the coaching component included in the modified RIT.

Another suggestion for future research is to reduce the number of intervention phases. An intervention design that includes a reciprocity phase to support parent–child interaction and social responsiveness, and a second phase focused on either object or gestural imitation based on each child's strengths might be preferable to three phases. When designing the intervention it also would be beneficial to consider the four learning stages that Haring et al. (1978) suggested to increase parent's acquisition, fluency, generalization, and adaptation of the targeted strategies. Further, researchers should set a mastery criterion to guide phase changes (Horner et al. 2005). Including criteria for both parents and children would help parents see improvements in their use of imitation strategies, and consequently changes in their child's imitation skills.

Although some growth was seen in Jason's and Daniel's imitation skills, it is unknown if this effect can be attributed to the modified RIT strategies. As noted, both participants were involved in intensive therapeutic programs. As the study got underway, Jason started receiving behavioral therapy and he entered a half-day preschool program. Daniel was receiving multiple services that included behavioral therapy and attending an inclusive kindergarten. Future research is warranted to consider the effects of such variables on children's imitation skills. Another issue for future research involves exploring the social validity of a modified RIT intervention. Interviews were conducted with the parents to gain their perceptions about the intervention. Given the importance of teaching imitation skills to children with autism, a robust method to evaluate social validity (Kazdin 1982) would increase researchers' confidence in using the intervention. Also, it would be helpful to learn if parents maintain the usage of these strategies over time, and whether parents utilize them in other routines.

Conclusion

This exploratory study demonstrates that teaching and coaching parents to use a modified RIT intervention was effective in helping them learn to use strategies to support

their children's development of imitation skills. Results show that two parents were able to learn the target strategies and implement them in home settings with acceptable fidelity. While the intervention resulted in minimal improvements in children's skills, more research is warranted to examine modified RIT interventions with a larger sample of children and for longer periods of time to better understand the effectiveness of these strategies in improving the imitation skills of young children with autism.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Human and Animal Rights All procedures performed in this study involving human participants were in accordance with the ethical standards of the Institutional Research Board at the University of Illinois at Urbana-Champaign.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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