Parent Implementation of RECALL: A Systematic Case Study

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Abstract: This systematic case study utilized a repeated acquisition design to investigate the impact of a caregiver-implemented RECALL (Reading to Engage Children with Autism in Language and Learning) on the correct, unprompted responses of a young child with autism spectrum disorder (ASD). RECALL is an adapted shared reading intervention that includes a least to most prompting hierarchy, visual supports, and additional instructional supports known to enhance the learning of children with ASD. Following training, the caregiver implemented RECALL with her child for 6 weeks, and results showed that the child improved his correct, spontaneous responding, and that the caregiver was able to implement RECALL with integrity. Positive maintenance and social validity data are also reported.

Foundational to autism spectrum disorder (ASD) are difficulties developing joint attention, social reciprocity, and language/communication (ASHA, 2006). These challenges place children with ASD at risk for future reading failure, especially in the area of comprehension (Mundy, Mastergeorge, & McIntyre, 2012). That is, the problems children with ASD experience acquiring reading skills have been linked to language development (Brown, Oram-Cardy, & Johnson, 2013; Lucas & Norbury, 2014; Nation, Clarke, Wright, & Williams, 2006) and social communication (Jones et al., 2009; Ricketts, Jones, Happe, & Charman, 2013). Therefore, it is essential that early intervention for children with ASD emphasize the emergent literacy skills necessary for future reading development (ASHA, 2006; Kaiser, Roberts, & McLeod, 2011).

Shared reading interventions may be one way to target the communication challenges that influence the future reading development of children with ASD, as meta-analyses documenting the impact of shared reading interventions on the language skills of young children report moderate effect size gains in oral language and expressive/receptive vocabulary (Mol Bus, & de Jong, 2009; NELP, 2009). Therefore, it is possible that targeting emergent literacy skills through shared reading in the early years may limit later comprehension problems (Cain & Oakhill, 2007).

Three studies have targeted shared reading for preschool children with ASD (Bellon, Ogletree, & Harn, 2000; Fleury, Herriott Miramontez, Hudson, & Schwartz, 2014; Whalon, Martinez, Shannon, Butcher, & Hanline, 2015). Following participation in shared reading interventions, children with ASD have increased their spontaneous verbalizations (Bellon et al., 2000; Fleury et al., 2014; Whalon et al.) and correct responding (Whalon et al.).

Dialogic reading (DR) is a shared reading intervention that specifically addresses the language skills that influence later reading comprehension (Hogan, Bridges, Justice, & Cain, 2011). The What Works Clearinghouse identified DR as a promising intervention for children with language disorders (WWC, 2010), and Swanson and colleagues (2011) found DR studies provided more causal evidence than other shared reading interventions with moderate to large effects on a number of measures including vocabulary and comprehension. The instructional components of DR facilitate an interactive dialogue about text (Pentimonti, Justice & Piasta, 2013). That is, in DR, books are repeatedly read and the adult asks questions, adds information (expansions), prompts the child to elaborate comments/responses, and provides praise. Fleury and colleagues found that DR improved the verbal participation of children.
with ASD, and children regularly responded to questions, but not all question types (Fl-eury, et al., 2014). To fully engage in language and literacy interventions, many children with known disabilities such as ASD will require additional instructional strategies and supports (Kaiser et al., 2011).

Reading to Engage Children with Autism in Language and Learning (RECALL) is an adaptation of DR (Whalon, Hanline, & Delano, 2013). RECALL combines the prompts and instructional sequence found in DR (Whitehurst et al., 1994) with systematic instructional procedures shown to support the learning of children with ASD (See Wong et al., 2015) including visual supports, prompts to promote joint attention (e.g., Look! while pointing to the book and gazing back at the child; intentional pause while looking expectantly at the child just before or immediately after turning a page), and least-to-most prompting hierarchy. After participating in RECALL, four 4-year-old children with ASD and varying levels of expressive language ability increased their correct, spontaneous responding to fact- and inference-based questions, and 3 of the 4 children with ASD increased the frequency of their initiations (Whalon et al., 2015).

Currently, there are no studies investigating caregiver implementation of shared reading interventions with young children with ASD. This is unfortunate as literacy experiences children have within their homes influence early emergent literacy skills as well as later literacy skill development (Senechal & LeFevre, 2001). Findings from a research synthesis showed engagement in parent-child shared reading is positively related to language and literacy skills of 18 to 63-month old children with and without disabilities (Dunst, Valentine, Raab, & Hamby, 2013). Further, a meta-analysis that included studies involving young children with and without disabilities found that early expressive language development was facilitated by parent-mediated joint reading strategies that promoted children’s active participation in book reading. Strategies included, for example, open-ended questions, attention-getting, and positive feedback (Trivette, Dunst, & Gorman, 2010). Other studies have shown that parents who promote children’s language development during shared reading foster more advanced language development in their children (e.g., Karrass &Braungart-Rieker, 2005; Sénéchal, 1997, Valdez-Menchaca & Whitehurst, 1992). Of particular interest to young children with ASD, parent-child reading can be adapted to meet an individual child’s abilities and intervention goals (Kaderavek & Justice, 2002), allowing for intervention to occur in the child’s natural environment.

Therefore, the purpose of this systematic case study was to determine: (1) the impact of caregiver-implemented RECALL on the percentage of correct, unprompted responses of a child with autism; and (2) the extent to which a caregiver is able to implement RECALL procedures with fidelity.

Method

Participants and Setting

The participating mother and child dyad was recruited from a southeastern United States agency that provides direct services to families of children with ASD. Jayden was a 4-year-old male diagnosed with autism by the local school district. Prior to the study, Jayden received special education services in a preschool self-contained classroom for young children with ASD. To estimate Jayden’s current level of language, the Preschool Language Scales 5th Edition (PLS-5; Zimmerman, Steiner, & Pond, 2010) was administered. Jayden scored a 63 (mean of 100 and SD of 15) on the Auditory Comprehension and a 69 on the Expressive Communication subtests, and his Total Language Score was a 64; thus, Jayden scored greater than 1 SD below the mean on both subtests and the composite language score. In addition, the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) was given to describe Jayden’s early literacy skills (mean 100 and SD of 15) on the Auditory Comprehension and a 69 on the Expressive Communication subtests, and his Total Language Score was a 64; thus, Jayden scored greater than 1 SD below the mean on both subtests and the composite language score. In addition, the Test of Preschool Early Literacy (TOPEL; Lonigan, Wagner, Torgesen, & Rashotte, 2007) was given to describe Jayden’s early literacy skills (mean 100 and SD of 15). Jayden’s Early Literacy Index was an 87. His scores on the Print Knowledge (102) and Phonological Awareness (99) subtests were both in the average range, and his score on Definitional Vocabulary was 70. The Gilliam Autism Rating Scale 3rd edition (GARS-3; Gilliam, 2013) was completed with Jayden’s mother, and the Autism Index was 109, indicating the probability of ASD was very likely.
Jayden lived with his mother, father, maternal grandmother, aunt, uncle, and younger sister. Jayden’s mother, Jessica, served as the intervention agent. Jessica was a 26-year-old white/American Indian female. When asked Jayden’s race, his mother reported white, black, and American Indian. Both Jessica and Jayden’s father graduated from high school, and his father completed some college. Jessica was employed as a house cleaner; his father, as a cook. Jayden’s parents identified the household income as between $25,000-34,999 a year. Prior to the study, Jayden’s mother reported that she read aloud and worked on Jayden’s sight word recognition for approximately 30 minutes a day. Jessica stated that she decided to participate in RECALL to better prepare Jayden for kindergarten. All testing and intervention sessions occurred in Jayden’s home during the summer between preschool and Jayden’s first year of kindergarten.

**Study Design**

A repeated acquisition design (RAD; see Butler, Brown, & Woods, 2014; Dennis, in press; Spencer et al., 2012) was employed to show replication over time by measuring the same skill (i.e., responses to comprehension questions) with different response sets. This design was useful in monitoring the impact of repeated readings over time by collecting pre-test (after an initial reading) and post-test data (after three readings with the caregiver) for each reading. The RAD shows repeated demonstration of comprehension by comparing pre- and post-test responses from each book introduced. Instead of a repeated baseline, pre- and post-test data from each book read illustrates Jayden’s ability to respond to comprehension questions over time. Jayden’s correct responses across books were used to establish a functional relationship between the independent (i.e., RECALL) and dependent variable (i.e., responses to comprehension questions). Although only one child participated in this study, SCRD quality indicators were considered by ensuring at least 5 demonstrations of an effect (See Horner et al., 2005; Kratochill et al., 2010).

**Data Collection**

All data collection sessions were videotaped and coded. The dependent variable was the percentage of unprompted correct responses on comprehension monitoring probes. The third author administered the probes. Probes consisted of open-ended, fact-, and inference-based questions. Fact-based questions included those focused on vocabulary (e.g., “What animal is this?”) and immediate recall (e.g., What do dragons love?). Inference-based questions targeted motivations (e.g., Why is the boy throwing away all of the salsa?), distancing (e.g., Dragons love tacos. What is something you love?), or emotion (e.g., How do you think the dragons are feeling?). The number of fact-based questions asked (n = 6-8) depended on the number of opportunities to respond to questions per book (range 15-17). The number of open-ended (n = 3) and inference-based questions (n = 6) remained constant. The first and third authors wrote the probes and reached consensus on question types (e.g., fact, inference, open-ended) prior to administering each probe.

When administering the probes, the third author read the book aloud and, prior to turning the page, asked a scripted comprehension question. When Jayden responded correctly, the researcher confirmed his response and provided praise. If Jayden responded incorrectly, the researcher stated the correct response.

Unprompted, correct responses were coded when the child spontaneously (i.e., without an adult prompt) responded to a question within a 5-second interval, and the response was related to the book. Administration of comprehension monitoring probes was the same across conditions. During baseline, the probe occurred during an initial reading with the third author. During intervention, the pre-test probe was administered prior to the implementation of RECALL, and the post-test probe following three parent-implemented RECALL sessions. That is, Jayden’s responses to questions during an initial reading with the researcher were compared with his responses after receiving RECALL for three days.
Procedure

Baseline. A baseline phase consisted of three readings from three different books to determine Jayden’s current level of correct responding to comprehension questions. Baseline consisted of the comprehension monitoring probe procedures described under data collection.

Materials. Books in each phase were of similar length in pages (15-17 pages) and number of words per page, included pictures that illustrated content, and provided an opportunity to ask questions about character emotions (A list is available from the first author upon request.). Jessica was given a large Ziploc bag containing the book and question cards with a typed scripted question for each page and three visual options created with Boardmaker®. For each book, three separate sets of question cards were provided for use over three days. Day 1, Day 2, and Day 3 cards were separated, laminated, and bound with a metal ring (see Figure 1). All visual options were possible given the context of the question, but only one answer was correct. Questions were created by the first and third authors to ensure all prompt types were represented.

Intervention. Following baseline and prior to the intervention, Jessica participated in two 30-minute RECALL training sessions. Jessica was shown videos of the researchers modeling the procedures and role-playing occurred until she achieved 100% accuracy on a RECALL treatment fidelity checklist.

The scripted questions asked during RECALL sessions (i.e., intervention) differed from pre- and post-test probes, but included the same number of fact, inference, and open-ended questions, and included all question prompt types (see Table 1). RECALL embeds an adapted DR instructional sequence, PEEP: prompt, evaluate, expand, and praise. That is, if Jayden responded incorrectly following an initial prompt, Jessica initiated a 4-level prompting hierarchy (See Whalon et al., 2015.). First, three visual response options were provided. If Jayden failed to respond or responded incorrectly, Jessica covered one option and a binary choice was presented. Next, if Jayden failed to respond or responded incorrectly, Jessica directly modeled the correct response, and asked Jayden to repeat it. If Jayden did
not repeat the direct model or point to the correct visual option, Jessica placed his hand on the correct visual. Jessica also elaborated and praised unprompted and prompted correct responses.

To facilitate interaction and participation, Jessica used secure attention prompts and intentional pauses. The secure attention prompt was used to establish joint attention (e.g., “Look!” pointing to the book). A blue sticker dot with the letter “J” written in the middle was placed on the scripted question cards corresponding with pages that show action/emotion in the illustration. Jessica was not limited to 3 secure attention prompts, and was told that she could use them to gain attention when she felt Jayden was beginning to lose interest. To encourage an initiation, Jessica provided an intentional pause. At three different points just before/after turning a page, Jessica looked expectantly at Jayden for 3–5s. A red sticker dot with an “I” written in the middle was placed on three scripted question cards corresponding to pages with climatic parts to remind Jessica to intentionally pause.

Jessica received a short manual with examples of the RECALL prompting hierarchy and elaborations (e.g., “That’s right, Pete is riding a skateboard. Pete has a red skateboard.”). Throughout intervention, researchers watched the videos and provided Jessica with feedback through weekly emails and pre-post-testing visits. Feedback was specific to consistencies/inconsistencies with RECALL procedures.

Maintenance. Following intervention, the third author re-read one of the books taught during intervention and administered the same pre/post comprehension monitoring probe to determine if Jayden’s gains maintained. Books from week 2, 4 and 6 were read one, two, and three weeks following intervention, respectively.

Social validity. Following the intervention, Jessica was interviewed regarding her perceptions of the intervention. Specifically, interview questions asked for Jessica’s perceptions related to the impact of RECALL on literacy and language skills, the strategies she employs while reading, and how her reading aloud has changed since participating in RECALL. Jessica’s responses were audio-recorded and transcribed. These responses were summarized to capture her perceptions related to each question.

Treatment fidelity. Treatment integrity data were collected on 80% of the sessions. Jessica averaged 93% on a treatment integrity checklist (75-100%). Interobserver agreement was calculated for a randomly selected 53% of the videotaped sessions and agreement averaged 97% (89-100%). Checklist items included the consistency with which Jessica asked scripted questions, provided expansions, initiated the prompting hierarchy, and offered praise. Con-
Consistency was defined as 80% of opportunities. Additional checklist items documented whether Jessica gave at least 4 joint attention prompts, intentionally paused 3 times, made the visual supports available, and ensured Jayden could see the book/illustrations throughout the reading. Jessica demonstrated the greatest variability in her application of expansions. Jessica provided expansions at an acceptable level (80% of opportunities) in 67% of the sessions. Jessica consistently asked scripted questions, and implemented instructional procedures (e.g., prompting hierarchy, praise, secure attention prompts, intentional pauses; 80% of sessions), and reliably ensured the visuals and the book were visible to Jayden (100% of sessions).

In weekly self-evaluations, Jessica rated how consistently and to what extent she was comfortable administering RECALL on a scale of 1 (inconsistently; uncomfortable) to 10 (consistently; comfortable). Jessica indicated that she consistently asked scripted questions, presented the visuals, and kept the book in view of the child. On average, Jessica reported implementing the intervention procedures consistently (average 7.5-8.5) and comfortably (average 7.2-8.3). Jessica noted becoming increasingly more comfortable with expansions over time, which is consistent with treatment integrity data showing greater consistency in later sessions. Although Jessica routinely implemented the prompting hierarchy and intentional pauses with integrity, her ratings increased over time (from 6 in early sessions to 8/9 in later sessions).

**Interobserver Agreement (IOA)**

Two coders (i.e., the first author and a graduate assistant) used the dependent variable coding scheme to code videotapes of a prior RECALL study. Coders viewed the videos until they reached a minimum of 80% agreement on 3 out of 5 consecutive videos. Once reliable, a randomly selected 75% of sessions from each phase were coded for IOA. Reliability was calculated by dividing the number of agreements by the number of agreements plus the number of disagreements and multiplying by 100. IOA for responses averaged 95% (81-100%).

**Data Analysis**

The number of correct, unprompted responses at pre- and post-test for each book are displayed in Figure 2. Data were analyzed visually, and the nonoverlap of all pairs (NAP) was calculated. NAP is one of few complete non-overlap indices as it uses all available data points. NAP is a pairwise comparison of all data points that show improvement (Pos), decline (Neg), or no change (Tie): (Pos+.5XTie)/#Pairs (See Parker, Vannest, & Davis, 2011).

**Results**

Figure 2 illustrates the data collected across phases. In baseline, Jayden’s percentage of unprompted correct responses on comprehension probes ranged from 19-25% with an average of 21% unprompted, correct responses. Figure 1 shows immediate gains in the percentage of unprompted correct responses from pre- to post-test. The average percentage of unprompted correct responses rose from 30% (19-41%) on pre-tests to 54% (44-73%) on post-tests. In the maintenance phase, data suggest Jayden maintained or exceeded intervention levels with a percentage of unprompted correct responding of 66% (59-71%). NAP was 1.0 suggesting no overlap between pre- and post-test scores. Although Jayden’s post-test scores were consistently higher than pre-test, Jayden began to improve on his pre-tests over time.

Table 2 provides the average percentage of Jayden’s unprompted correct responses to fact, inference, and open-ended questions across phases. Jayden’s percentage of unprompted correct responses improved from pre-test averages of 33% of fact, 17% of inference, and 39% of open-ended responses to 72% of fact, 33% of inference, and 67% of open-ended. Jayden maintained his gains on fact and open-ended responses (74% and 67% respectively), and showed greater improvement when responding to inference-based questions (average 56% unprompted correct responses) in the maintenance phase.

**Social validity.** When asked about the impact of RECALL on Jayden’s language and literacy skills, Jessica noted that RECALL “…sparked something in him to want to learn
more about reading and words.” She perceived a difference in Jayden’s vocabulary following RECALL noting, “…his vocabulary has expanded a great deal since starting RECALL.” She stated that she still reads with Jayden at least twice a day, and that her reading habits changed after participating in RECALL: “Before when we read to him we just read to him. We didn’t really realize how much those questions lay the foundation for so much more.” Jessica now asks “…more questions about what is going on in the story.” In addition, she consistently asks about emotions because this continues to be a “weakness” for Jayden. Jessica also noted changes in Jayden’s behavior when she reads. She has noticed he is asking more questions and is “reading with you and pointing to the words.” In general, she saw that Jayden wants to be “more involved” when she reads aloud. Jessica said that she and Jayden “really enjoyed” RECALL.

### Discussion

This preliminary, systematic case study sought to determine the impact of RECALL on the correct, spontaneous responding of a young child with autism when implemented by a parent at home. The data indicate that RECALL impacted Jayden’s correct responding to fact, inference, and open-ended questions. Gains were maintained at follow-up, and pre-test scores began escalating in the 4th week suggesting that Jayden increased his ability to answer questions over time. This study is consistent with previous shared reading studies that have shown increased participation/

### Table 2

<table>
<thead>
<tr>
<th>Phase</th>
<th>Fact</th>
<th>Inference</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-baseline</td>
<td>24%</td>
<td>17%</td>
<td>22%</td>
</tr>
<tr>
<td>Pre-tests</td>
<td>33%</td>
<td>17%</td>
<td>39%</td>
</tr>
<tr>
<td>Post-tests</td>
<td>72%</td>
<td>33%</td>
<td>67%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>74%</td>
<td>56%</td>
<td>67%</td>
</tr>
</tbody>
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engagement in shared reading (Bellon, Ogletree, & Harn, 2000; Fleury, Herriott Miramontez, Hudson, & Schwartz, 2014; Whalon et al., 2015). Jayden achieved greater gains when responding to fact-based and open-ended questions than when responding to inference-based questions. This study also adds to the initial study documenting the benefits of RECALL when implemented in preschool settings (Whalon et al., 2015).

Many learners with ASD have trouble understanding the mental states of others, which can limit their ability to identify the thoughts, feelings, and motivations of others in text (Bauminger-Zviely, 2014). To have a greater impact on the inference-making skills of young children with ASD, it may be that more time/opportunities to make inferences, and/or explicit instruction on inference making is required. However, in maintenance, Jayden increased his ability to correctly answer fact-based and inference-based questions and maintained his ability to correctly answer open-ended questions. In an interview following intervention, Jessica admitted continued to read with Jayden emphasizing emotion questions.

Data also suggest that after minimal training and ongoing feedback, a caregiver was able to implement RECALL as intended. In fact, the participating parent indicated comfort with her implementation of RECALL and enjoyment of the intervention in general. Social validity data also were positive as Jessica acknowledged changes in her reading behavior as well as Jayden’s spontaneous language use. In addition, Jessica reported that both she and Jayden enjoyed RECALL.

This is a preliminary study and, without any replications across participants, the findings must be interpreted with caution as it is impossible to determine whether or not a similar effect would occur with other caregivers and their children with ASD. Future research is needed to determine to what extent caregivers can effectively implement shared reading interventions with their children with ASD at home. Moreover, because the impact of shared reading on the language and emergent literacy skills of young children with ASD remains an understudied topic, additional studies are needed to determine the extent to which children with ASD can benefit from such interventions and what adaptations are needed for children with ASD and varying levels of skill development. Future research should investigate the impact of RECALL when delivered by teachers or paraprofessionals in preschool settings.

Because children with ASD are at-risk for future reading problems, early intensive literacy instruction, with an emphasis on language and comprehension, is necessary (Kaiser et al., 2011). Shared reading is one intervention that targets the oral language skills linked to future reading comprehension (NELP, 2009). This preliminary case study suggests that RECALL may be a user-friendly way to support parent implementation of a shared reading intervention.

References


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