Adapted Shared Storybook Reading: A Study of its Application For Children With Autism Spectrum Disorders and In Home Settings

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Abstract

This study investigated the use of an adapted shared reading protocol with three children with autism spectrum disorders (ASD) in home settings. Employing a multiple baseline across participants design, this investigation replicated and extended a previous investigation by Browder et al. (2008) to children with ASD and home settings. Additionally, this study was to investigate whether individual components of the intervention package contributed to its overall effectiveness. Finally, the extent to which the participating children generalized their ability to engage in adapted shared reading with the researcher to shared reading with their parents was explored. The results of the investigation indicate that the children with ASD demonstrated improvements in engagement in shared reading and these improvements generalized to shared reading with the children’s parents.
Adapted Shared Reading:

A Study of Its Application for Children with Autism Spectrum Disorders in Home Settings

Recent analyses of the literature have illustrated a lack of emphasis on beginning reading instruction for individuals with severe intellectual disabilities, including autism spectrum disorders (ASD) (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Hudson & Test, 2011). One obstacle to developing appropriate literacy instruction for individuals with severe disabilities has been the lack of consensus on a definition of literacy appropriate for this population (Browder et al., 2009). In 2009, Browder and her colleagues offered a framework for literacy that included two outcomes: (a) increased access to literature; and (b) increased independence as a reader. According to this framework, throughout the student’s educational experience there should be an emphasis on providing access to literature that is adequately adapted to allow the student to participate meaningfully with the text. Providing increased access to literature requires both opportunities for students to access literature and instruction for skills that increase access.

Building upon the literacy framework offered by Browder et al. (2009), Hudson and Test (2011) argued that “reading is … a social and cultural practice every child participates in as a reader” (p. 34). They defined literacy “as skills that increased access to age appropriate literature (e.g., listening comprehension) and reading independence (e.g., vocabulary and comprehension), including emergent literacy skills” (p. 36, emphasis in original). According to this framework, reading instruction for students who are in the beginning stages of symbol understanding and use (that is who inconsistently use spoken language, sign, or augmentative or alternative communication [AAC]) would focus on increasing access to literature and developing text awareness, vocabulary, and listening comprehension with the goal of constructing meaning.
through interactions with the text and reading facilitator. Universal Design for Learning (UDL; CAST, 2011) has emerged as a framework for increasing access to instructional activities.

In the UDL framework, barriers are reduced or removed through the inclusion of multiple means of engagement, representation, and action and expression within the lesson (CAST, 2011). This framework is not intended to result in the development of a “one size fits all” approach to instruction and adaptation. Rather, alternatives are presented based on the needs of the students (CAST, 2011). When working in one-on-one instructional settings, therefore, it is not necessary to provide each student with the entire range of possible alternative means of engagement, representation, and action and expression. Instead, the options best suited to meet the needs of the student are provided as the teacher develops a lesson that considers how students will be engaged, how the material will be represented, and how the student will participate. As will be described below, the UDL guidelines have been used to evaluate and modify shared reading contexts so that individuals with exceptional needs have increased access to and instruction during literacy lessons (Browder, Lee, & Mims, 2011; Browder, Mims, Spooner, Ahlgrim-Delzell, & Lee, 2008; Mims, Browder, Baker, Lee, & Spooner, 2009).

**Review of Research to Support Engagement in Shared Reading**

In 2011, Hudson and Test conducted a review of the literature to determine the existence of evidence-based practice for the use of shared reading as a literacy instructional method for students with severe intellectual disabilities using the criteria for establishing an evidence base developed by Horner et al. (2005). In this review, shared story reading was defined as an interaction in which a story was read aloud while the student was “provid[ed] support to interact with the reader about the story” (p. 34). Six studies undertaken by two research teams were included in this review. The results indicated a moderate level of evidence for the use of shared
reading interventions to increase literacy skills in students with severe disabilities. The authors noted that the combination of strong effect sizes in the existing research and the limited number of studies would suggest that this is a promising practice for future research in literacy instruction. Amongst recommendations for future research, the authors noted a need for component analyses as the existing research had examined the use of intervention packages.

In 2008, Browder and her colleagues first described an adapted shared reading program used to increase engagement in literacy activities for students with multiple disabilities who were at the beginning stages of learning that symbols have meaning. The intervention package included multiple components. Each book was presented along with an anticipatory set of objects chosen to highlight critical vocabulary from the text. The books were adapted to include simplified line drawings (icons) highlighting critical vocabulary words as they were used in the text, and the student’s name was used throughout the text to maintain the student’s attention. In addition to these supports, the least-to-most prompting procedure was used to elicit correct responses from the students. Finally, a contingent surprise element was introduced as reinforcement for participating in the reading interaction. Given the heterogeneity of support needs for this population of students, a critical component of the intervention included collaborative teaming using the UDL framework to adapt shared reading strategies for each participant in the study. The results demonstrated an increase in engagement in shared reading, suggesting that the combination of adaptations and systematic instruction supported the students’ learning.

Mims et al. (2009) implemented an adapted shared reading program for two students with intellectual disabilities and visual impairments extending the results of the 2008 study. This study differed from the 2008 study most notably in that there was increased emphasis on
listening comprehension through the use of comprehension questions throughout the text in addition to the prediction and general comprehension questions used in the 2008 study. The researchers were able to demonstrate increases in comprehension as measured by the students’ correct responses to specific questions. Browder et al. (2011) further extended the results of the two previous studies to include students who had both significant intellectual disability and either a physical or sensory impairment, which allowed an examination of the use of different response modes, such as eye gaze, point response, and object response. Additionally, this study employed teachers rather than members of the research team to implement the intervention. Measures of both engagement and comprehension indicated improvement for all three participants.

The evidence suggests that effective shared reading provides a rich context in which to target important language and communication goals for all children (e.g., National Early Literacy Panel (NELP), 2008; Westerlund & Lagerberg, 2008; Whitehurst et al., 1988). However, despite the promise of the shared reading intervention developed by Browder and her colleagues (2008, 2009, 2011) in increasing engagement in shared reading interactions, there is a need not only for continued replication of the effects, but also to extend the intervention into the students’ homes. Parental involvement and support in early literacy has long been identified as a critically influential factor in predicting literacy outcomes (Evans & Shaw, 2008; Morrow & Young, 1997; NELP, 2008). Two studies in the Hudson and Test (2011) review examined the impact of a parent-mediated adapted shared reading intervention with four girls with Rett syndrome with promising results (Koppenhaver, Erickson, & Skotko, 2001; Skotko, Koppenhaver, & Erickson, 2004). These studies examined the impact of resting hand splints, augmentative communication systems, and parent training on scaffolding techniques, such as interpreting all communicative
bids to be meaningful, within shared reading interactions between parents and the girls, ages 3 to 7 years. While the adaptations introduced in these studies reflect the guidelines for UDL, this intervention package differed significantly from the package developed by Browder’s team (2008, 2010, 2011) in that systematic instruction (such as prompting procedures or task analyses) was not included. In the initial study, the impact to support the development of labeling and commenting was examined. The results of their analysis suggest that the girls increased their use of these skills as the different strategies were introduced within the shared reading context. Using the videotaped sessions from their earlier study, Skotko et al. (2004) coded videotaped sessions for child behaviors (such as using augmentative communication devices, maintaining attention, and using vocalizations) and parent behaviors (such as pointing to the book and asking predictive questions). The study results indicated that girls with Rett syndrome developed the ability to communicate meaningfully while the parents successfully engaged in what the authors described as a “mutually respected and synchronous dialogue” (p. 161).

The purpose of this investigation was to replicate and extend the Browder et al. (2008) study to children with ASD in home settings. While there is a significant amount of heterogeneity in the disorder, global delays in the area of communication development are central to the diagnosis of ASD (American Psychiatric Association, 2013). These impairments can negatively influence an individual’s literacy development, particularly in areas related to comprehension (Whalon & Hart, 2011). While a significant amount of work has focused on the development of interventions to support the development of speech and/or alternative means of communication (for a description of these practices, see Wong et al., 2014), there has been less of a focus on the needs of individuals with ASD in mastering literacy skills (Browder et al.,
The UDL guidelines offer a clear framework for considering the needs of the individual with ASD when developing literacy instruction.

In the current study, the researcher collaborated with the participating children’s parents to individualize instruction using a UDL approach. Because the studies by Koppenhaver et al. (2001) and Skotko et al. (2004) demonstrated increased participation in shared reading when adaptations were introduced without the use of systematic instruction, a second purpose of this study was to investigate whether the individual components of the intervention package (adaptations based on the UDL framework, contingent surprise, and least-to-most prompting) contributed to its overall effectiveness. The final purpose was to explore the extent to which the participating children generalized their ability to engage in adapted shared reading with the researcher to adapted shared reading with their parents.

**Methods**

**Participants**

Parents of children with ASD were notified of the study via service providers and internet message boards serving families of children with ASD. Interested parents contacted the researcher and a screening was completed to determine eligibility based on the following inclusion criteria: the child (a) was receiving special education services with autism as the primary eligibility category, confirmed by review of the child’s IEP documents; (b) demonstrated fewer than 25% of spontaneous independent initiations on the task analysis (TA) for adapted shared reading (see Table 1) when reading non-adapted storybooks with the researcher; (c) did not consistently use spoken language, sign, or AAC and attempted to communicate in ways that were ambiguous or difficult to interpret as evidenced through parent report and observation by the researcher; and (d) demonstrated an emerging understanding that
pictures have meaning, either through emerging use of AAC, the ability to match pictures to objects, or the ability to follow a picture schedule, as confirmed through a review of the child’s IEP and conversations with the child’s parents. Diagnosis of an intellectual disability was not required for participation in this study. In total, the parents of five children with ASD contacted the researcher. Four children were deemed eligible for the study and began baseline. During baseline, the family of one of the children moved out of the area.

Descriptions of the participants can be found in Table 2. Nick’s mother reported that he enjoyed playing with books but resisted her attempts to read with him. She also reported that his school and therapy settings did not emphasize literacy instruction to her knowledge and he had no literacy goals on his IEP. Nick remained disengaged in the reading sessions throughout baseline, and would frequently attempt to take control of the book and/or play with other toys. Idelle’s mother reported that she had enjoyed reading books prior to experiencing a developmental regression at two years of age. At the beginning of the study she would consistently engage with three books, all of which she had engaged with prior to this regression. Her mother and teacher reported that her school did not emphasize literacy instruction and she had no literacy goals on her IEP. Throughout baseline, Idelle remained unengaged in the reading interaction. When seated at the table, she would play with her hands or hair; frequently, she would attempt to leave the table. Seth’s parents reported they had never attempted to engage him in shared reading. While his school placement was in flux, his therapy did not emphasize literacy and he had no literacy goals on his IEP. Throughout baseline, he remained unengaged in the reading interactions. He attempted to mouth objects, activate the voice output device, or turn the pages of the book. Seth did not have a functional communication system in place. Over the
course of the study, his therapy providers targeted the use of a voice output device, the Picture Exchange Communication System (PECS; Bondy & Frost, 1994), and word approximations.

Setting

The intervention took place in the children’s homes in a location identified by the parents. The participant sat facing the researcher with the study materials between them. Nick’s sessions took place on the floor of his playroom. Idelle’s sessions were conducted at the kitchen table. Seth’s sessions were completed at a large desk in the living room where he also received therapy, with one session held in a study room at the library.

Sessions occurred twice a week and lasted about 30 minutes. The shared reading interaction took about 20 minutes. The remaining 10 minutes were spent setting up, engaging with the participant, and talking to the parents. Parents were present but not always actively watching the sessions during the initial phases of the study. During the final phase, parents were encouraged to watch the session either in person or from the video recording.

Materials

Four books were used in this study (see Table 3). As the focus of this study was the use of adapted shared reading in the home, parent feedback regarding the book selection was given primary importance over estimations of grade equivalencies. Before the commencement of the study, parents were consulted about possible book selections to ensure that the books were similar to the type they would choose for their own children and whether the subject matter and illustrations would maintain their children’s attention. Three of the books were used in the 2008 study by Browder and her team. *We’re Going on a Bear Hunt* (Rosen & Oxenbury, 1989) was selected for use in this study as it shared similar features to these books, including the use of repetitive language and interesting words and concepts. Scholastic, Inc., (2014) lists the grade
level equivalents for these books between 1.5 and 3.9 and the interest level between kindergarten
and second grade (Dirty Bertie, Roberts, 2002, is not included in their database).

A description of the books and general adaptations made to each can be found in Table 3. In addition to the adaptations made in the Browder et al. (2008) study, each book was further altered by using removable double-sided tape to affix laminated pictures of the participant’s face over the face of the main character during the intervention phases. Additionally, while Browder et al. (2008) included one contingent surprise element, this study embedded four contingent surprises to encourage the participants’ independent participation in the adapted shared reading activity (Table 3). These surprise elements were individualized for each participant. For example, while Nick and Seth enjoyed seeing objects fall, Idelle became distressed when objects were disorganized. Therefore, for Nick and Seth one of the surprise elements was dumping a bucket of “bugs and worms” out. Meanwhile, Idelle got to play with the bucket of rubber bugs and worms, a sensory experience she appeared to enjoy.

**Procedures**

**Design.** This study employed a multiple baseline across participants with embedded changing conditions design. The baseline sessions were followed by the introduction of adapted materials. Next, contingent surprises were added to sessions. Finally, a least-to-most prompting hierarchy was introduced. During the final phase of the study, parents were trained to implement the adapted shared reading intervention. During all phases, participants were asked to choose between two books at the beginning of the session.

There were six possible pairs of books. In order to ensure all books were offered equally, the presentation of books was standardized such that each pair of books was offered with equal frequency. The order in which the pairs were presented was repeated for each participant (so Pair
1 was the same as Pair 7, Pair 2 was the same as Pair 8, etc.), but the first pair for each participant differed across participants.

**Dependent variable and measure.** The dependent variable was the level of engagement in shared reading demonstrated by the participant. This was measured using the TA adapted from Browder et al. (2008; see Table 1). Independent responses for each step were scored as correct. Visual inspection was used to determine when to change conditions. Condition changes occurred when it was determined that level was flat or descending.

**Baseline.** During the baseline condition, a standard shared reading lesson was implemented. In order to maintain continuity of the TA across phases of the study, the books were adapted to include (a) using short phrases, (b) shortening the book (skipping pages), and (c) using the participant’s name for the main character; the UDL adaptations, however, were not introduced. Additionally, materials related to the text were presented to allow the participant to respond to comprehension questions and to make predictions about the story. The researcher read in an animated fashion and allowed time for the participant to make each response on the TA (Table 1). No prompting, praise for correct responding, or attempts to gain the participants’ attention beyond introducing the materials was used in this phase. If the participant did not make an independent response within two seconds, the implementer moved on to the next step.

**Universal Design for Learning (UDL).** After the commencement of the baseline condition, a meeting to address barriers to participation was held for each participant. Using the UDL framework (CAST, 2011), adaptations to allow for multiple means of engagement, representation, and action and expression were considered. Recognizing that each participant brought his or her own unique strengths to the shared reading interaction, there were three goals for the meetings. First, the manner in which the book and materials were presented was modified
in order to address issues related to representation. Second, what would constitute a correct response was clarified to address action and expression. Finally, the team developed the hierarchy for the least-to-most prompting procedure and the contingent surprise elements and reinforcement strategies were discussed to address engagement.

Nick and Seth’s UDL meetings included their mothers and the researcher. Idelle’s meeting included her mother, her head school teacher, and the researcher. The outcomes determined by the UDL meetings are described in Table 4. It should be noted that each participant was asked to demonstrate knowledge by choosing between two physical objects (in Idelle’s case, this only applied to answering prediction and comprehension questions). While this increased the potential for the participants to produce a correct response by chance, each team determined this to be justifiable based on the needs of the child. This was consistent with the practices used in school and during therapy.

**Intervention condition: Adapted materials phase.** In the first phase of the intervention condition, books and materials adapted based on the results of the UDL meeting were introduced. Effort was made in this phase to increase participant attention to the materials, as outlined in Table 4. Otherwise, all other baseline procedures were followed. There was no prompting or praise for correct responding in this phase.

**Intervention: Contingent surprises phase.** In the second phase of the intervention condition, contingent surprise and reinforcement were introduced in addition to the use of adapted materials. Four surprises (outlined in Table 3) were interspersed throughout the book contingent on correct manipulation of materials. Additionally, praise and/or a pleasant touch (e.g., a pat on the back) were given for all independent responses.
**Intervention: Full intervention phase.** The final phase included all components of the intervention: adapted materials, contingent surprise and reinforcement, and the least-to-most prompting procedure. The least-to-most prompting hierarchy was individualized based on each participant’s learning history. These can be found in Table 4.

**Parent implementation.** Following the final intervention phase, Nick’s mother, Idelle’s mother, and Seth’s mother and father were trained on the implementation of the intervention, allowing for an analysis of how the participants generalized their ability to participate in shared reading to reading adapted stories with their parents. Following parent training, the parents implemented the intervention. During the sessions implemented by Idelle and Seth’s parents, the researcher stayed in the room and provided support to the parents as needed. Because Nick became distracted by the presence of the researcher during sessions with his mother, the researcher stepped out of the room during these sessions. After each session, the researcher reviewed the video of the session and provided a one-page report to each of the parents that described his or her strengths and areas to focus on in future reading interactions.

**Procedural Fidelity and Inter-Observer Agreement (IOA)**

An independent observer scored procedural fidelity on 40.4% of sessions. Fidelity to implementation of the TA and adaptations based on the UDL meetings was tracked. The number of steps implemented correctly was divided by the total number of steps and multiplied by 100 to obtain a fidelity score.

When the study commenced, IOA for steps on the TA completed independently was calculated for each participant’s first four sessions to ensure the criterion of 90% agreement was achieved. The level of agreement between the researcher and the independent observer was calculated by dividing the number of agreements by the total number of steps and multiplying by
During the study, if IOA dropped below 90%, the two observers discussed discrepancies and clarified the definition of the codes.

Social Validity

Upon completion of the parent implemented sessions, each parent was asked to complete a questionnaire to assess the social validity of the study (available from author upon request). To assess the goals of the intervention, questions were asked about the importance of literacy for their child. To evaluate the procedures, parents were asked to rate specific steps of the intervention, such as the types of prompting used and the introduction of the contingent surprise elements. Finally, to determine how valuable the outcomes of the intervention were to the parents and their child, parents were asked to rate their child’s performance in the shared reading interaction. The purpose of this analysis was to develop an understanding of parents’ perceptions of the adapted shared reading program, including its appropriateness for their children and whether or not they planned to continue to use the procedures with their child. Parents were also asked to provide feedback for future development of adapted shared reading programs. The questionnaire included 10 statements to which parents responded using a five point Likert scale (1 = “strongly agree”; 5 = “strongly disagree”) and three open-ended questions regarding what the parents liked most about their child’s participation in the study, what they liked least, and whether there was any additional feedback.

Results

Procedural Fidelity

An independent observer scored procedural fidelity on an average of 40.4% of sessions (40.0% of Nick’s sessions, 39.0% of Idelle’s, and 50.0% of Nick’s sessions). The number of steps implemented correctly was divided by the total number of steps and multiplied by 100 to
obtain a fidelity score. Fidelity ranged from 81.8% to 100% \((M = 96.8)\) of steps of the TA implemented correctly. The overwhelming majority of errors involved skipping a step on the TA (34.8% of sessions). These errors were not spread evenly across conditions. Fidelity scores during baseline ranged from 81.8% to 100% of steps presented correctly \((M = 95.5)\). During the adapted materials sessions, fidelity scores ranged from 90.9% to 100% \((M = 96.2)\); during the contingent surprise sessions, fidelity scores ranged from 91.7% to 100% \((M = 97.9)\); and during the full intervention condition, fidelity ranged from 88.2 % to 100% \((M = 98.9)\) of steps presented correctly.

**Parent sessions.** Procedural fidelity was scored for 100% of parent training sessions. During these sessions, an average of 72% of the steps of the TA were presented correctly (range, 53% to 94%). Deviations from the intervention script included prompting too quickly (80% of sessions); skipping a step (70% of the sessions); under prompting, which occurred when the parent began the prompting hierarchy but did not require a correct response before moving on (60% of sessions); and not giving the child an opportunity to manipulate the anticipatory set items (30% of sessions). Finally, in an interesting and positive deviation from the script, all of the parents introduced new targets into the shared storybook interactions based on their child’s abilities. For example, parents asked their children to identify known words in the book or verbally label the object or picture symbols they used to demonstrate listening comprehension. These targets were introduced spontaneously and inconsistently during the reading sessions which precluded an analysis of the participants’ responses to these new targets.

**Inter-Observer Agreement**

IOA on the steps of the TA completed independently was scored for an average of 42.1% of sessions (42% of Nick’s sessions, 44% of Idelle’s sessions, and 41% of Seth’s sessions). Inter-
observer agreement averaged 92.1%, with a range of 66.7% to 100%. This level of agreement was maintained across participants. Inter-observer agreement for Nick averaged 93% (range, 80% to 100%). For Idelle, IOA averaged 93% (range, 84% to 100%). For Seth, IOA averaged 90% (range, 67% to 100%). In the one session with IOA below 80%, it was found that Seth had engaged in repetitious activation of the voice output device and attempts to turn the book pages. The definition was clarified such that a response was considered correct only if it had not been emitted within two seconds prior to the opportunity to respond.

**Student Outcomes**

Visual inspection was used to analyze the results of this study. Results of the intervention with least squares regression lines fitted to the data can be found in Figure 1. Nick’s performance during baseline was relatively low and stable, with a range of 4.8% to 14.3% of the steps of the TA completed independently and no trend ($M = 7.8\%$, $b = 0.32$). When the adapted materials were introduced, his rate of responding continued to be low and stable, with a range of 10.0% to 11.8% of steps completed independently ($M = 11.0\%$, $b = -0.56$). There was a slight increase in level when contingent surprises and reinforcement were introduced, with a range of 9.5% to 28.6% of steps completed independently ($M = 19.6$), with a slight descending trend ($b = -0.78$). When the least-to-most prompting procedures was introduced, there was a change in both level and trend, with a range of 19.1% to 66.7% of steps being completed independently ($M = 45.61\%; b = 1.42$). This higher rate of responding continued when his mother read the books with him using the adapted materials and prompting procedures, with a range of 55.6% to 77.78% of steps completed independently ($M = 64.44\%$).

Idelle’s performance during baseline was low and variable, with a range of 4.8% to 19.1% of steps on the TA completed independently ($M = 14.2\%$) and no trend ($b = -0.04$).
When adapted materials were introduced, there was an increase in level, with a range of 25.0% to 57.1% of steps completed independently ($M = 41.0\%$), although her rate of responding remained variable and the trend remained flat ($b = 0.39$). When contingent surprises and reinforcement were introduced, Idelle’s rate of responding remained variable, with a range of 28.6% to 59.1% of steps completed independently ($M = 44.9\%$), and an ascending trend ($b = 1.89$). When the least-to-most prompting procedure was introduced, there was a decrease in variability from session to session with a range of 52.1% to 79.2% of steps completed independently ($M = 66.2\%$), and an ascending trend ($b = 1.55$). Idelle’s response rate when her mother read books with her ranged from 52.6% to 85.7% of steps completed independently ($M = 71.5\%$).

Seth’s performance during baseline was low and variable, with a range of 9.5% to 33.3% of steps of the TA completed independently ($M = 21.0\%$) and no noticeable trend ($b = 0.24$). There was an immediate increase in correct responses and a sustained level change in the adapted book phase, although his response rate remained variable with a range of 21.8% to 61.9% of steps completed independently ($M = 41.7\%$), and a descending trend ($b = -0.41$). Despite a change in level when contingent surprises and reinforcement were introduced, Seth’s independent performance remained similarly variable, with a range of 39.1% to 73.7% of steps completed independently ($M = 55.1\%$), and no trend ($b = -0.11$). Although there was a small increase in level, variability remained with a range of 52.2% to 79.2% of steps completed independently ($M = 67.4\%$) when the full intervention was introduced. During this phase, there was an ascending trend ($b = 1.62$). When Seth’s mother and father implemented the shared reading program, his response rate remained high. The two sessions completed with his mother had a response rate of 70.0% of steps completed independently ($M = 70.0\%$). The first session
with his father had a response rate of 94.12% while the second had a response rate of 80.0% ($M = 87.1\%$).

**Social Validity**

Upon completion of the study, Seth’s mother and father, Idelle’s mother, and Nick’s mother completed the social validity questionnaire, which asked parents to evaluate statements about the goals, procedures, and outcomes of the study. There was a high level of agreement with the statements on the questionnaire. The parents agreed or strongly agreed with statements regarding the value of early reading skills and literacy development. They also agreed that their children benefited from participating in the study. There was agreement with statements about the procedures used. There was less support for the following statement: “Introducing ‘surprises’ increased my child’s interest and engagement in shared reading,” which reflects the lack of significant improvement following the introduction of contingent surprises.

The responses to the open ended questions were generally positive. When asked what they liked most about the reading program, a common theme among the parents was an appreciation of the way in which adapted shared reading increased their child’s attention and engagement. For example, Idelle’s mom commented that she appreciated “seeing her attend to objects in the books a little more.” Another common theme among the parents was pleasure in their child’s enjoyment of the reading sessions. For example, Seth’s father commented “… plus, [Seth] enjoyed it,” while Nick’s mother commented that the learning environment was “warm and loving.” Finally, each parent expressed an appreciation of the opportunity to learn new ways of reading books with their children. Idelle’s mother commented, “I absolutely love the information given to make adaptation to other books that interest our daughter!”
Three of the four parents responded that there was “nothing” they did not like about the reading program. Nick’s mother offered a suggestion to include parents in the process of choosing vocabulary to be targeted in each book. Idelle’s mother suggested that the books “may be busy – too abstract.” These concerns highlight the value of consulting with a child’s parents when choosing the targeted vocabulary to increase the social validity of the procedures used.

Discussion

This investigation sought to replicate and extend the findings from Browder et al. (2008), examine the influence of individual components of the intervention package, and determine whether or not children would generalize the skills gained during intervention to reading adapted books with their parents. The results of the study suggest that adapted shared reading promotes engagement in literacy activities for children with significant communication impairments and ASD. When the total intervention package, including adaptations based on the UDL framework, contingent surprise, and least-to-most prompting, was introduced each participant demonstrated an increased participation in the shared reading interaction (Figure 1).

Meanwhile, the individual components did not yield as strong of a response from each participant. During baseline sessions, when the implementer simply read the non-adapted books and gave each child the designated opportunity to respond in a manner consistent with typical shared reading interactions, there was limited engagement in shared reading. When individualized adaptations developed through researcher and parent collaboration using the UDL framework were introduced in a manner similar to the way in which adaptations were introduced by Koppenhaver and his colleagues (2001, 2004), two of the three participants demonstrated noticeable gains in participation although the trend in the data suggested there would be no further improvement over time. Meanwhile, the introduction of contingent surprise and
reinforcement did not appear to benefit either Nick or Seth, but Idelle demonstrated increased participation during this phase. Although each participant demonstrated growing independence upon the introduction of adapted materials or contingent surprise and reinforcement, visual analysis indicates the greatest change occurred when these were accompanied by the least-to-most prompting procedure. Only when the full intervention package developed by Browder and her team (2008, 2009, 2011) was introduced did all three participants demonstrate favorable level changes and ascending trends in their data, indicating that the least-to-most prompting procedure is a critical component of the intervention package. This finding corroborates findings from the Autism Evidence-Based Practice Review Group’s conclusions regarding the importance of systematic prompting in the education of students with ASD (Wong et al., 2014). Removing barriers to access allowed the participants to demonstrate existing competences in shared reading exchanges but did not support the development of new competences without further instruction in the form of systematic prompting.

Results from these parent-implemented sessions were positive. After the necessary components of the intervention package were established and the participants required less prompting to engage in the interaction, it was possible for them to generalize their new abilities to reading interactions with their parents. Even though the parents did not adhere strictly to the treatment protocol, they were able to implement an adapted shared reading program that increased their child’s engagement in the interaction. As noted above, each parent introduced additional targets during the shared reading interaction, implying an understanding that shared reading provides a natural context for teaching new skills. The parents’ enthusiasm and success suggests that teachers using this intervention should offer parents training and resources (e.g. adapted books) to encourage generalization of new shared reading skills outside of school. At the
same time, the effort needed to refine the intervention techniques and develop the materials may preclude parents from serving as the primary interventionists from the onset. Instead, practitioners may need to develop the methodology in consultation with parents and guardians and then transfer the intervention to the parents when their child has demonstrated success.

**Future Directions and Limitations**

Although this study demonstrated that the adapted shared reading program showed promise in increasing the engagement in shared reading for children with ASD, it was not without its limitations. The first concern is the issue of generalization and maintenance. While the students successfully generalized their new abilities to shared reading sessions with their parents, future research must examine whether or not students generalize these skills to novel adapted books along with how well the children maintain the skills learned during intervention over time. Follow up studies should also explore the extent to which parents are able to adapt books for their children and set aside time to consistently engage with them in shared reading after support from educators has ended.

This study was initially intended to investigate the effects of the individual components on the adapted shared reading protocol. However, it was not possible to counterbalance the introduction of the components across participants. Parents and teachers adopting this protocol should consider the characteristics of their children to determine which components are likely necessary for success. The process of considering engagement, representation, and action and expression through UDL will help guide the development of a program that will increase a child’s engagement in the shared reading interaction.

Two issues related to book selection should also be considered in future implementations of this protocol. The first relates to the selection of material. While parents were consulted to
confirm that the books used in this study were similar to the types of books they would select for their children, it remains unclear if these were appropriate selections for the participants given their ages. The field offers little guidance in choosing books for shared reading, a task that is distinct from that of choosing books for guided or independent reading (for which a variety of leveling tools, such as the Lexile® score [Stenner, Burdick, Sanford, & Burdick, 2007], are available). Another issue relates to the presentation of the pairs of books. Because the pairs were repeated in the same order, it is possible that the results reflect an order effect. Future studies should endeavor to randomize the presentation of the book pairs to avoid such effects.

Another consideration for future research is developing an understanding of the particular features of adapted shared reading that support the development of symbolic understanding and communication in children with ASD. While a substantial amount of research has illustrated the relationship between shared reading and the development of oral language and vocabulary for children without ASD (see NELP, 2008, for a discussion of this connection), there has been little research on the connection between the two for children with diagnoses impacting the development of communicative abilities. There is evidence that the features of shared reading support symbolic development and communication for children without disabilities including the physical space, repetitious language, and routinized interactions (Moerk, 1985; Moody, Justice, & Campbell, 2010; NELP, 2008). While it appears reasonable to assume that these features also support the development of symbolic understanding and communication in children with ASD, it is possible that the relative beneficial contributions of each feature may differ for this population. It is also possible that other features of shared reading are beneficial for children with ASD but have little impact for children without ASD. Understanding the ways in which the physical space, repetitious language, and routinized interactions associated with shared reading contribute
to the development of symbolic understanding and communication for children with significant impairments and ASD will facilitate the design of reading programs that support beginning communication and language development.
References


Table 1

Task analysis used to score participating in the shared stories, adapted from Browder et al. (2008) and Lee, Mims, & Browder (2011)

<table>
<thead>
<tr>
<th>Step</th>
<th>Definition for independent correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Choose book to read</td>
</tr>
<tr>
<td></td>
<td>Touches, looks at, reaches toward, or says book name</td>
</tr>
<tr>
<td>2-3.</td>
<td>Identifies title and author (reader asks, “What is the name of the book?” and “Who wrote it?”)</td>
</tr>
<tr>
<td>4.</td>
<td>Attends to anticipatory set</td>
</tr>
<tr>
<td></td>
<td>Looks toward material for at least 2 seconds</td>
</tr>
<tr>
<td>5.</td>
<td>Makes a prediction (“What do you think this story is about?” and shown two objects*)</td>
</tr>
<tr>
<td></td>
<td>Touches, looks at, reaches toward, or says the name of the object</td>
</tr>
<tr>
<td>6.</td>
<td>Opens the book when given opportunity by reader (“Let’s begin!”)</td>
</tr>
<tr>
<td></td>
<td>Grasps edge of front cover, opens. (Considered correct if several pages are opened at the same time.)</td>
</tr>
<tr>
<td>7-9.</td>
<td>Reacts to name embedded within the story within 2 seconds of hearing it read (scored first three times occurs in story)*</td>
</tr>
<tr>
<td></td>
<td>Vocalizes, laughs, smiles, turns head toward reader, opens eyes, or lifts head</td>
</tr>
<tr>
<td>10-13.</td>
<td>Identifies key vocabulary words</td>
</tr>
<tr>
<td></td>
<td>Touches, looks at, or reaches toward one object</td>
</tr>
</tbody>
</table>
14-16. Turns pages when reader pauses in reading (scored first three times in the story)

17-19. Participates in reading by completing repeated story line; for example, finishing the line “The coat was” with “old and worn” (repeated story line introduced one time and scored the next three times it occurred in the story)*

20-23. Reacts to surprise element (scored only when surprise element present)

24. Answers general story comprehension question (“What was the story about?”) and shown pictures or objects*

25. Responds when asked, “Do you want me to read it again?” and teacher presents cards with enlarged yes/no symbols that are color cued (green – yes; no – red)

*These steps were considered indicators of early comprehension of the text that had just been read aloud.

Note: Steps in italics indicate a deviation from the TA in Browder et al. (2008)
Table 2

*Participant Characteristics*

<table>
<thead>
<tr>
<th></th>
<th>Nick</th>
<th>Idelle</th>
<th>Seth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>4 years, 1 month</td>
<td>10 years, 6 months</td>
<td>9 years, 0 months</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Caucasian and Japanese-American</td>
<td>Korean, raised by Caucasian adoptive parents</td>
<td>Caucasian and Korean</td>
</tr>
<tr>
<td>Home Language</td>
<td>English, with exposure to Japanese</td>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Autism</td>
<td>Autism</td>
<td>Autism</td>
</tr>
<tr>
<td>Communication development</td>
<td>1-2 word phrases, often to himself</td>
<td>1-2 word approximations, usually to get needs met</td>
<td>No functional communication system in place</td>
</tr>
<tr>
<td>Percentage of TA steps completed during screening</td>
<td>5%</td>
<td>5%</td>
<td>23%</td>
</tr>
</tbody>
</table>
Table 3

*General Adaptations Made to Books and Contingent Surprise Elements*

<table>
<thead>
<tr>
<th>Adaptations</th>
<th>Joseph had a Little Overcoat</th>
<th>Alexander and the Terrible... by David Roberts</th>
<th>Dirty Bertie by Judith Viorst</th>
<th>We’re Going on a Bear Hunt by Michael Rosen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book</td>
<td>Book shortened, pages laminated, picture symbols Velcroed into the text, book was spiral bound, child’s name and picture used for main character</td>
<td>Book shortened, pages laminated, picture symbols Velcroed into the text, book was spiral bound, child’s name and picture used for main character</td>
<td>Book shortened, pages laminated, picture symbols Velcroed into the text, book was spiral bound, child’s name and picture used for speaking characters</td>
<td>Book shortened, pages laminated, picture symbols Velcroed into the text, book was spiral bound, child’s name and picture used for pronoun “we”</td>
</tr>
<tr>
<td>Repeated story line</td>
<td>“It got old and worn”</td>
<td>“Terrible, horrible, no good, very bad day”</td>
<td>“No Bertie, that’s dirty, Bertie!”</td>
<td>“Got to go through it”</td>
</tr>
<tr>
<td>Objects for symbolic understanding</td>
<td>Overcoat, jacket, scarf, string</td>
<td>Gum (pink silly putty), cupcake, cereal box, shoes</td>
<td>Dog, piece of candy, dirt (bin of soil), rubber</td>
<td>Bear, snow covers, mud worms and bugs (homemade brown goop)</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------------</td>
<td>-------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Contingent surprise element 1*</td>
<td>Bin of beans</td>
<td>Toy pulled from cereal box if</td>
<td>Small toy found in dirt if dirt ID’ed turned</td>
<td>Nature sounds played if page was turned</td>
</tr>
<tr>
<td></td>
<td>Presented if page was cereal box ID’ed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingent surprise element 2*</td>
<td>Music played if scarf ID’ed</td>
<td>Bin of coconut sprinkles was</td>
<td>Sound of dog barking played if dog ID’ed</td>
<td>Small toy found in mud if mud ID’ed</td>
</tr>
<tr>
<td></td>
<td>presented if cupcake ID’ed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingent surprise element 3*</td>
<td>Flowers were presented if</td>
<td>Audio of someone saying “ouch”</td>
<td>Bucket of rubber bugs was dumped</td>
<td>Water added to Instasnow® if</td>
</tr>
<tr>
<td></td>
<td>page was played if page was turned</td>
<td></td>
<td>in front of student snow ID’ed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>turned</td>
<td>if page was turned</td>
<td></td>
</tr>
<tr>
<td>Contingent surprise element 4*</td>
<td>Balloon attached to the string released</td>
<td>Small flashlight turned on if page was turned</td>
<td>Bubbles were blown if page was turned</td>
<td>Hide under blanket if page was turned</td>
</tr>
<tr>
<td></td>
<td>turned</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Surprise elements could be modified to address the engagement needs of the participant.

Note: Deviations from Browder et al. (2008) materials and procedures in italics
**Table 4**

*Universal Design for Learning Adaptations*

<table>
<thead>
<tr>
<th>Child</th>
<th>Modifications for action and expression</th>
<th>Modifications in representation</th>
<th>Strategies to increase engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nick</td>
<td>Reading repeated storyline could include:</td>
<td>Reading environment</td>
<td>First/then visual schedule introduced</td>
</tr>
<tr>
<td></td>
<td>• Spoken language</td>
<td>modified to reduce distractions:</td>
<td>Least-to-most prompting hierarchy established with the following levels:</td>
</tr>
<tr>
<td></td>
<td>• Pointing to a 4”x6” card with repeated storyline written on it</td>
<td>• Bulletin board blocked access to toys</td>
<td>1) Gestural prompt</td>
</tr>
<tr>
<td></td>
<td>Choice of two objects given to answer all questions</td>
<td>• Bulletin board used to present materials at eye level</td>
<td>2) Model desired response</td>
</tr>
<tr>
<td></td>
<td>5-sec response delay</td>
<td></td>
<td>3) Hand-over-hand physical support</td>
</tr>
<tr>
<td>Idelle</td>
<td>Reading repeated storyline required producing one of the two final words</td>
<td>Reading environment modified to reduce distractions:</td>
<td>First/then visual schedule introduced</td>
</tr>
<tr>
<td></td>
<td>Choice of three pictures given to answer literal comprehension questions</td>
<td>• Extraneous materials removed from table</td>
<td>• During contingent surprise phase, token system based on the one used in school was introduced; 15 stars obtained desired activity</td>
</tr>
</tbody>
</table>
Choice of two objects given to answer prediction and comprehension questions

- Materials necessary to engage in steps of TA presented as needed

Cue “fold your hands” given when time to attend

Least-to-most prompting hierarchy established with the following levels:

1) Gestural prompt
2) Gestural + verbal prompts
3a) For responses requiring a choice: hand-over-hand support
3b) For vocal responses, idiosyncratic gestural prompt: Hold out thumb to indicate it was time to say the first word; hold out index finger for second word

Seth Reading repeated storyline could include:

- Pressing homemade, single button voice output device (under clear dish after baseline)
- Any verbal approximation

Two objects were presented for each response requiring a choice

Least-to-most prompting hierarchy established with the following levels:

1) Gestural
2) Gestural + verbal cue
3a) Remove materials and re-establish attention; gestural + verbal cue again
3b) Hand-over-hand physical support
Figure 1. Percentage of steps in the shared storybook reading task analysis completed independently.