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RECALL READING INTERVENTION FOR CHILDREN IN PRESCHOOL AND KINDERGARTEN WITH MODERATE TO SEVERE LANGUAGE DELAYS

A Thesis
presented in partial fulfillment of requirements
for the degree of Master of Science
in the Department of Communication Sciences and Disorders
The University of Mississippi

by

REBEKAH C. BOSLEY

May 2019

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ABSTRACT

Dialogic reading is a reading intervention method in which the adult prompts the child with questions and expansions. Previous research has documented that it has been effective in promoting engagement, increasing response rates, developing vocabulary knowledge, and increasing overall answer accuracy in children with Autism Spectrum Disorder (ASD) (Fleury, Miramontez, Hudson, & Schwartz, 2014; Fleury & Schwartz, 2016; Whalon, Martinez, Shannon, Butcher, & Hanline, 2015). The current study investigates whether children with moderate to severe language delays with or without Autism could increase their verbal and nonverbal responses and joint attention through the RECALL (Reading to Engage Children with Autism in Language and Literacy) dialogic reading method (Whalon, Delano, & Hanline, 2013). Children ages 3-7 years (*n* = 8) with moderate to severe language delays participated in the study for six weeks. We utilized a multiple-baseline design in multiple baseline Study (n=6) and an alternating baseline design in Alternating Treatments Study (n=2). During the intervention, the researchers read a book with the child and asked the child a completion, open-ended, wh-, wh-inference, or emotion identification question after each page. Results suggest that when children are provided more opportunities to respond (prompts), they increase number of responses. However, improvement in joint attention was not tied to the intervention method. These results indicate that dialogic reading strategies can increase responses from children with moderate to severe speech and language delays.

Keywords: Dialogic reading, moderate to severe language delays, RECALL, responses, joint attention, literacy

LIST OF ABBREVIATIONS

ASD	Autism Spectrum Disorder
ASHA	American Speech-Language-Hearing Association
DD	Developmental Delays
DR	Dialogic Reading
DV	Dependent Variable
JA	Joint Attention
LD	Language Delay
RECALL	Reading to Engage Children with Autism in Language and Literacy
SES	Socio-economic Status
TD	Typically Developing

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I. INTRODUCTION

The development of pragmatics begins during the prelinguistic phase of development and continues throughout early development into adolescence (Parsons, Cordier, Munro, Joosten, & Speyere, 2017). Children with Autism Spectrum Disorder (ASD) and children with moderate to severe language delays (LD) often can have pragmatic difficulties (ASHA, 2019). These include decreased drive for social reciprocity in communication, decreased frequency of spontaneous communication, deficits in nonverbal joint attention (JA), and in initiating joint attention.

Autism Spectrum Disorder (ASD) is defined according to the American Psychiatric Association Desk Reference to the DSM-5 as "persistent deficits in social communication and social interaction across multiple contexts . . . [and] restrictive, repetitive patterns of behavior, interests, or activities" (p. 27-28). According to the CDC, the prevalence of ASD in eight-year-old children in the United States is 1 in every 59 (Baio et al., 2014). The degree of severity can be varied in children with ASD. ASD can occur comorbidly with several other deficits including intellectual impairment, language impairment, medical or genetic conditions, environmental factors, an additional neurodevelopmental, mental, of behavioral disorder, or with catatonia (APA, 2013). Research concerning long-term outcomes for children with ASD later in adulthood are inconsistent due to the spectrum of impairments and abilities of children with ASD (Howlin, Goode, Hutton, & Rutter, 2004). However, previous research has documented that higher IQs and communication abilities in childhood are linked to more positive outcomes for those with ASD later in adulthood (Gillberg & Steffenburg, 1987; Howlin, Goode, Hutton, & Rutter, 2004).

Moderate to severe language delay (also known as specific language impairment, spoken language disorder, developmental language delay/disorder, or language impairment/delay/disorder) is a "significant impairment in the acquisition and use of language across modalities (e.g., speech, sign language or both) due to deficits in comprehension and/or production across any of the five language domains (i.e., phonology, morphology, syntax, semantics, pragmatics)" (ASHA, 2019). In order for the child to be considered for a diagnosis of language delay there needs to be a significant impairment in one or more of the language domains as determined by the results from a comprehensive assessment provided by a speech-language pathologist (ASHA, 2019). If language delays (LD) persist beyond preschool, it can have a significant impact on literacy including learning to read (Snowling, Duff, Nash, & Hulme, 2016). Children with moderate to severe language delay (LD) differ from children with ASD in that they do not present the same restrictive and repetitive behaviors (ASHA n.d.). Children with LD have some similarities to children with ASD including frequency of spontaneous communication (Paul, Chawarska, & Volkmar, 2008).

I. A. Responding

I.A.1. Typical development of responding skills. After birth, infants begin producing coos and murmurs which elicit communicative responses from their social partner (Gratier et al., 2015). Social partners interpret the coos and murmurs as intentional communication and respond accordingly (Bruinsma, Koegel, & Koegel, 2004; Capone & McGregor, 2004; Yoder & Warren, 2001). Although the infant's early vocalizations may be reflexive, rather than intentional communication, the language input that the infants receive from their social partners aids in the development of communication.

Intentional communication, defined by Yoder and Warren (2001) as "the use of (a) coordinated attention to adult and object combined with either unconventional gestures or vocalizations or (b) conventional gestures or symbols directed to adult" (p. 224) emerges early in development during the first year of life (Bruinsma, 2004). For example, an infant might vocalize while the mother is changing his or her clothes; the mother could respond to the child's vocalization by talking about the outfit. The mother-infant interaction might continue with the infant vocalizing again to the mother's communication, resulting in the start of turn-taking in conversation which is an essential pragmatic skill.

Research has shown a mother's responsiveness to intentional communication attempts from their children results in improved later language development in typically developing (TD) children and children with developmental disabilities or Down syndrome (Yoder & Warren, 1999). Dunham and Dunham (1990) found that the vocal turn-taking between the mother-infant dyad is the most important contributor to the dyad as compared to only verbal stimulus from the mother. However, when infants are less responsive to maternal communication, the turn-taking interaction between the mother-infant dyad is broken, resulting in a missed communication moment (Van Egeren, Barratt, & Roach, 2001). Therefore, infant responsiveness is critical for further language development.

Responding can also include non-verbal responses such as pointing and gestures. As the infant continues to develop, so does their language with the use of gestures, words, phrases, and eventually sentences. As communication develops, each component of language, gestures, and speech can be used compensate for another while other communication skills, such as articulation or phonological systems, develop (Capone & McGregor, 2004). The ability to compensate for communicative deficits allows the child to continue to be responsive with their

communication partners. If they are unable to compensate with alternative communicative modals, it will further limit the social-communicative opportunities the child will have at an older age with adults and peers (Capone & McGregor, 2004; Craig, 1993).

I.A.2. Autism Spectrum Disorder. Research has documented that children with Autism Spectrum Disorder (ASD) have impaired intentional communication; they lack the drive to participate in social reciprocity that is needed for communication (Yoder & Stone, 2006). Dennis, Lazenby, and Lockyer (2001) found that even children with ASD who are considered high-functioning have difficultly with social communication. In particular, they have deficits in using inferences in social communication contexts (Dennis, Lazenby, & Lockyer, 2001). The communicative acts that are produced by children with ASD have been found to be different in communicative function and fewer in number than peers with Down Syndrome, language-age matched peers, and mental-age matched peers (Capone & McGregor, 2004; Tager-Flusberg & Anderson, 1991). For example, children with ASD use language to communicate requests and protests and nonverbal naming as opposed to using language to communicate socially (Bruinsma, 2004; Capone & McGregor, 2004). Children with ASD have deficits in using language to respond to comments or questions, express affirmations, provide expansions, using verbal turn-taking, or producing contingent utterances (Casenhiser, Binns, McGill, Morderer, & Shanker, 2015). In addition, Loveland, Landry, Hughes, Hall, and McEvoy (1988) found that children with ASD did not produce turn-taking responses (responses to maintain the interaction), but did produce more instrumental acts (completing a task in response to a communication partner's requests) than typically developing children or children with developmental language delay. Responding skills in children with ASD are often characterized and demonstrated to be a weakness.

I.A.3. Language delay. Both children with ASD and children with LD have decreased frequency of spontaneous communication and expressive language (Paul, Chawarska, & Volkmar, 2008). Like children with ASD, children with LD will also have fewer instances of social interactive communication acts, as some may have atypical pragmatic conversation abilities which limit the social interaction opportunities children with LD could have with typically developing (TD) peers or adults (Craig, 1993; Paul, Chawarska, & Volkmar, 2008). For example, Paul, Chawarska, and Volkmar (2008) investigated the communication profiles of children with ASD and children with a diagnosis of delay in language development (DLD) ages 16 to 34 months old. A battery of standardized assessments was given during the study including the Communication and Symbolic Behavior Scales, Mullen Scales of Early Learning, Autism Diagnostic Observation Scale – Module 1, McArthur CDI, Vineland Adaptive Behaviors Scales, and the Autism Diagnostic Interview-Revised. The study found that children with LD will have difficulty engaging in the turn-taking communication skill that is frequently demonstrated by TD peers (Paul, Chawarska, & Volkmar, 2008). Additionally, children with LD lack the ability to initiate communication which would elicit the turn-taking skill in TD peers, which in turn would help reinforce and develop turn-taking in children with LD (Paul, Chawarska, & Volkmar, 2008). Children with LD may depend upon on gestures, more than TD peers, to compensate for communication deficits due to expressive and receptive scores that are well below normal on standardized assessments; their articulatory and phonological systems may still be developing (Capone & McGregor, 2004; Paul, Chawarska, & Volkmar, 2008). Children with LD do demonstrate usage of conventional gestures, compensatory gestures, and responding to language in natural settings (Capone & McGregor, 2004; Paul, Chawarska, & Volkmar, 2008). Therefore,

children with LD demonstrate a weakness in using turn-taking skills to respond in social-communicative interactions as compared to typically developing peers.

I.B. Joint Attention

I.B.1. Typical joint attention development. Joint attention (JA) is a coordinated social interaction between two people and an object, event, or action through sharing attention, following attention of another, or directing their attention (Beuker, Lambregts-Rommelse, Donders, & Buitelaar, 2013; Bruinsma, 2004; Meindl & Cannella-Malone, 2011). JA is accomplished through a cluster of social and communicative behaviors, such as eye gaze, gaze alternation, gesturing, and verbal or non-verbal communication (Beuker et al., 2013; Bruinsma, 2004; Meindl et al., 2011). These skills emerge in typically developing children around 8 to 15 months of age and are a milestone in early communication development (Mundy, Sigman, & Kasari, 1990; Meindl et al., 2011; Beuker et al., 2013). The use of JA skills during the first three years of life foster further development in social, cognitive, and vocabulary (Beuker et al., 2013; Cochet & Byrne, 2016; Mundy, Sigman, & Kasari, 1990). JA skills during early development correspond to later higher order social skills (Cochet & Byrne, 2016). Further time spent in JA during early development leads to lexicon development which contributes to intentional communication and functional language (Bruinsma, 2004). JA research has documented that individual JA skills vary substantially, making it difficult to determine typical versus atypical development during the prelinguistic stage of communication (Beuker et al., 2013). However, children with developmental disabilities, Down Syndrome, or Autism Spectrum Disorder (ASD) have particular deficits with JA (Beuker et al., 2013).

I.B.2. Joint attention in ASD. Children with ASD typically have delayed or no JA skills or deficits in their JA skills as compared TD peers or peers with developmental delays (DD) (Bottema-Beautel 2016; Bruinsma, 2004; Hurwitz & Watson, 2016; Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1990). They use JA less often, not at all, or in varied contexts (Bottema-Beautel 2016; Bruinsma, 2004; Hurwitz & Watson, 2016; Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1990). Children with ASD have deficits in nonverbal JA skills, impaired initiating JA, correct responses to JA, and referential eye contact (Bottema-Beutel, 2016; Bruinsma, 2004; Hurwitz & Watson, 2016; Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1990). Research specific to ASD has demonstrated that deficits in JA impact language acquisition as the child has limited opportunities for social-communicative interactions with peers or adults (Hurwitz & Watson, 2016). Like children with TD, JA also influences language acquisitions in children with ASD; however, JA might develop at different rates and result in differing competency levels for each individual with ASD (Hurwitz & Watson, 2016).

Gestural non-verbal joint attention, responding to joint attention, and initiating joint attention are predictive aspects of downstream language ability in children with ASD (Bottema-Beautel, 2016; Hurwitz & Watson, 2016; Mundy, Sigman, & Kasari, 1990; Parsons et al., 2017). Naber et al. (2008)'s study established that children with ASD had significantly lower JA skills at 24 months as compared to developmentally delayed (DD) peers. However, by the time the children with ASD were 42 months old they demonstrate the same JA skills as DD peers. As compared to TD and DD peers, children with ASD were initially delayed in eye contact and gestures (Mundy, Sigman, & Kasari, 1994). By the time those same children were over 20 months, mental age, they significantly differed from DD peers in gestures and did not demonstrate significant eye contact deficits (Mundy, Sigman, & Kasari, 1994).

I.B.3 Joint attention in LD. Children with moderate to severe language delays demonstrate deficits in expressive language well below typically developing peers, but evidence is mixed as to whether children with LD have difficulties with JA. In comparison to children with ASD results demonstrated that children with LD have a higher number of correct JA response, more JA initiations, and more distal gesture use when communicating (Loveland & Landry, 1986). Children with LD respond at near ceiling level to adult initiated JA as compared to ASD (McArthur & Adamson, 1996). JA skills of children with LD may be impacted by expressive language skills but does not demonstrate the same delays or deficits as compared to children with ASD.

On one hand, children with LD's JA skills could be affected in the same way as other aspects of expressive language (Loveland & Landry, 1986; Landry & Loveland, 1988; McArthur & Adamson, 1996). JA abilities in children with LD may be considered delayed relative to language-matched younger TD children (Landry & Loveland, 1988). Directing or expressive JA skills in children with LD appear to be delayed, similar to the delay they demonstrate with expressive language. In addition, McArthur and Adamson (1996) stated that it appeared that children with LD sought out JA with peers and adults to learn more about "what their partners know about the world" (p. 494).

I.C. Reading-Based Language Interventions

Adult-to-child reading creates a foundation of early literacy and language skills that are critical for developing later literacy and language skills (Bus, Ijzendoorn, & Pellegrini, 1995). Several different types of adult-to-child reading are discussed in the literature, including traditional book reading, shared storybook reading, dialogic reading, modified dialogic reading, and RECALL storybook reading. Previous literature has indicated that reading-based

interventions may be useful for increasing receptive and expressive vocabulary and joint attention in a wide range of children, including those with ASD, hearing impairments, and low socio-economic backgrounds, to help them overcome their language and literacy difficulties (e.g. Ergül, Akoğlu, Sarıca, Karaman, Tufan, Bahap-Kudret, & Deniz, 2016; Fleury & Schwartz, 2016; Fung, Chow, & McBride-Chang, 2005; Whalon, Martinez, Shannon, Butcher, & Hanline, 2015).

I.C.1. Traditional and shared storybook reading. Traditional storybook reading involves an adult reading to a child with little to no expansions on the story. Previous research has demonstrated mixed results on the benefit of traditional storybook reading on improving vocabulary in preschool children (Hargrave & Sénéchal, 2000; Kotaman, 2013). Scarborough and Dobrich (1994) believed that perhaps it is the quality of storybook reading over the quantity or number of readings that plays the most significant role in a child's early pragmatic development.

Shared storybook reading is an enriched type of read-aloud story time in which the adult reads to the child and occasionally points or asks questions as the child listens to the story. Pillinger and Wood (2014) found that shared storybook reading resulted in significant increases in phonological awareness, word reading, and parental reading attitudes, which resulted in continuation of reading at home.

I.C.2. Dialogic reading. Dialogic reading (DR) is a type of shared storybook reading intervention in which the adult is working to actively engage the child in the storybook. This engagement involves the adult interacting with the child through questions, prompts, and expansions, adding onto what the child says with additional vocabulary. DR differs from

traditional storybook reading and shared storybook reading due to the active and intentional engagement of the child during the reading for the purpose of improving language and literacy skills.

Research has shown DR to be effective with a variety of populations, including TD children (Kotaman, 2013), children from low socio-economic status (SES) households (Ergül et al., 2016; Vally, Murray, Tomilson, & Cooper, 2015), dual language learners (Huenneken & Xu, 2016), deaf and hard of hearing children (Fung, Chow, & McBride-Chang, 2005), and children with severe developmental delays (Towson, Gallagher, & Bingham, 2016). DR has been demonstrated to increase lexical comprehension, attention, overall comprehension, print awareness, reading attitudes, phonological awareness skills, alphabet knowledge, and receptive vocabulary (Fung, Chow, & McBride, 2005; Hargrave & Sénéchal, 2000; Huenneken & Xu, 2016; Kotaman, 2013; Towson at al., 2016; Vally et al., 2015).

Research into the effectiveness of various adapted DR interventions for pragmatic skills has reported gains in story comprehension and engagement, correct responses to comprehension questions, and spontaneous language for children with ASD (Bellon, Ogletree, & Harn, 2000; Fleury, Miramontez, Hudson, & Schwartz, 2014; Fleury & Schwartz, 2016; Mucchetti, 2013).

I.C.3. Modified dialogic reading intervention to improve pragmatic skills in ASD. Two recent studies by Fleury and Schwartz (2016) and Whalon, Martinez, Shannon, Butcher, and Hanline (2015) implemented a modified DR intervention for children with ASD with the goal of determining the impact of modified DR on children's with ASD's oral language, spontaneous responding, and initiations. Fleury and Schwartz (2016) included DR-like questions and expansions and added a prompting hierarchy. The prompting hierarchy included binary visual choice, yes/no response, repeating the target word, and pointing to the correct response.

Their study involved nine children (seven males and two females), age 3;0 to 5;11, and all with an ASD diagnosis. Participants increased in both pragmatic and non-pragmatic skills, such as maintaining engagement, response rate, and book vocabulary knowledge.

Another adapted version of DR, Reading to Engage Children with Autism in Language and Learning (RECALL), was developed by Whalon et al., (2015). RECALL was designed to include strategies that have been previously demonstrated, in separate interventions, to be effective in targeting the specific language and literacy needs of children with ASD, including strategies designed to help the children identify emotions (Whalon, Delano, & Hanline, 2013). RECALL, similar to Fleury and Schwartz (2016), contains the questions and expansions of DR, as well as additional question types: wh-inference and emotion identification. Wh-inference questions (e.g., "Have you ever gone to the beach before?") help the child apply the situations in the books to everyday occurrences, while emotion identification questions (e.g., "How does the little boy feel?") help the child identify emotions expressed by characters in the story. Like Fleury and Schwartz (2016), RECALL also includes a prompting hierarchy; however, the prompting hierarchy in RECALL is visual throughout (e.g., the final level of prompting involves hand-over-hand pointing to an image), whereas the prompts used by Fleury and Schwartz (2016) were visual for the first level of prompting only. Whalon and colleagues tested the effectiveness of the RECALL method with five 4-5-year-old males with an ASD diagnosis. They found a decrease in the frequency of incorrect responses, a decrease in the level of prompting, and an increase in spontaneous correct responses.

The results of Whalon et al. (2015) and Fleury and Schwartz (2016), are encouraging for the effectiveness of RECALL and modified DR for increasing responses in children with ASD; however, the research is limited to these two research teams. Furthermore, the Whalon et al.

(2015) study was designed to improve joint attention (JA) skills, however these particular results were not presented. Finally, both RECALL and modified DR have only been investigated in children with ASD; further studies on these techniques should be expanded to include children with other disorders.

I.D. Research Questions

The current study aims to investigate the impact of RECALL on responses and joint attention by replicating Whalon et al.'s (2015) study with a larger sample size, larger age range, and children with and without an ASD diagnosis. The research questions for this current study, for children aged 3;4-6;11 with moderate to severe LD with and without ASD, are as follows:

a) Is RECALL effective at increasing responses and meaningful responses?
b) Is RECALL effective for changing non-verbal responses to verbal responses?
c) Is RECALL effective at decreasing the level of prompting over time?
d) Does RECALL improve responsiveness to the adult's JA bids?

II. METHODS

II.A. Participants

Participants were recruited from the HILL Program at the University of Mississippi. This program serves children with moderate to severe language impairments. Participants included eight children who ranged from 3;4 to 6;11 years old at the end of the study. Three of the participants had a diagnosis of LD only, and five of the participants had an ASD diagnosis, along with associated LD. One of the three LD only participants, Matt, was suspected to have an ASD diagnosis, but did not have a formal diagnosis. This study was approved by the University of Mississippi's Institutional Research Board; consent and assent were provided by the parents and participants, respectively. Participant details are provided in Table 1.

Table 1: Participant Information

Name	Age	Design	PLS-5			KBIT-2	PPVT-4	Diagnosis	Researcher	Expected Responses
			AC	EC	TLS	SS	SS			
Oliver	3;4	MB	55*	50*	50*	**	**	ASD & LD	2	Non-Verbal with gestures, crying & fussing
Wally	3;5	MB	50*	50*	50*	**	**	ASD & LD	1	Non-Verbal with gestures, crying & fussing
Ben	3;9	MB	53*	72*	60*	54*	51*	Moderate LD	2	1-4-word utterances
Matt	4;7	AT	69*	56*	60*	42*	58*	Moderate to Severe LD (ASD suspected)	1	1- word utterances; pointing; gestures
Tucker	5;0	MB	51*	54*	50*	57	56	Severe LD	1	1-2-word utterances; gestures
Dillan	5;2	MB	50*	50*	50*	47	56	ASD & LD	2	Non-Verbal with gestures
Zack	5;6	AT	74*	81*	76*	103	89	ASD & LD	2	Full sentences
Hayley	6;11	MB	67*	50*	55*	92	75	ASD & LD	1	2+ word utterances; echolalic

Note: Participants were tested in two different designs **MB**: Multiple Baseline design and **AT**: Alternating Treatment design. Age at the end of the study. **PLS-5**: Preschool Language Scales Fifth edition; **KBIT-2**: Kaufman Brief Intelligence Test Second Edition; **PPVT-4**: Peabody Picture Vocabulary Test, Fourth Edition; **SS**: Standardized Score; **AC**: Auditory Comprehension Standardized Score; **EC**: Expressive Communication Standardized Score; **TLS**: Total Language Score Standardized Score. "Expected Responses" indicates what the child's regular clinician reported for the child's typical responses. Scores marked with * were obtained 7-8 months after the study; all other scores were obtained 0-4 months before the study. Oliver and Wally did not meet the age-criteria for the KBIT-2 and took the Mullen as a replacement assessment. Scores marked with ** could not be scored due to being well below standardized scores.

II.B. Procedures

Procedures were adapted from Whalon et al., (2015) who read with the child 3 days a week over 2.5 months. The current study involved 17-22 sessions over the course of six weeks, with participants attending the sessions four days a week for 30 minutes. Each session was video and audio recorded for later analysis.

Participants were randomly divided between two researchers (see Table 1). The same two researchers provided reading intervention in the same therapy room with the same children throughout all sessions. While it is possible that having the same researcher throughout could have led to the child improving due to familiarity, a multiple baseline design controls for familiarity, as well as other changes that could be due to outside influences. The purpose of having the same researcher throughout the sessions was to provide consistency.

Additionally, some participants attended the sessions with their clinicians present in the room to help control behavior. Clinicians were instructed not to prompt or answer for the participant during baseline or intervention sessions. Clinicians intervened with the participant only when the participant required behavioral assistance.

Every week, each child chose a book, which was read for the remainder of the week. All participants started with several days in the baseline condition; this varied in length from a few days to several weeks. Baseline condition was used to determine the child's percentage of initial and meaningful responses, pre-intervention response type, prompting level, and percentage of responses to JA bids[1] in order to measure against intervention conditions. During both baseline and intervention, the researcher read to the child using RECALL method, asking a question after

[1] Whalon et al. (2015) study included JA bids and initiation bids, which were bids in which the researcher would look expectantly at the book, then the child, and at the book again within 5 seconds. However, JA is a prerequisite for initiations and we did not find an effect of RECALL on JA (see Section III.E.1 and .2 for study 1 and study 2), we have chosen not to report on initiation bids in this study.

each page (Section II.B.1 and Table 2). Both baseline and intervention involved the Prompt, Evaluate, Expand, and Praise (PEEP) sequence (Section II.B.2 and Table 3) and JA bids (Section II.B.4). Intervention added a prompting hierarchy (Section II.B.3 and Figure 1).

II.B.1. Questions. During baseline and intervention, the researcher asked a question after reading each page. Question types (Table 2) were adapted from Whalon et al., (2015) and included CROWD questions and RECALL-specific questions (Table 2). The CROWD questions, Completion, Recall, Open-Ended, Wh-Questions, and Distancing, are an integral part of the DR method (Whitehurst et al., 1988). Whalon, Delano, & Hanline (2013) adapted the DR method to include question types for which children with ASD need additional support: Wh-Inference and Emotion Identification. The number of question types was controlled for across days, baseline and intervention. Additionally, different questions were asked for each day for each week of a book to prevent memorization of the question and answers.

Table 2. Question types. (Whalon et al., 2015).

Question Type	Description	Example
Completion	A pause left the end of a sentence in place of a predictable word	*Finish what I say, "Now dog has ten…"*
Recall	Asking the child what happened in the story	*Where did dog run to?*
Open-Ended	Asking the child what is happening in the story	*What do you think dog will do next?*
Wh-Questions	Focusing on the vocabulary in the book	*What is dog holding?*
Distancing	Asking the child to relate their personal experience back to the book	*Have you ever played in the mud before, like dog?*
Wh-Inference	Asking Wh-questions that require prediction and understanding motivation	*Have you ever colored with a purple marker before?*
Emotion Identification	Asking the child how a character is feeling or how he/she would feel in a similar situation	*How do you think dog feels?*

Note: See Appendix A for a complete list of questions used on Day 1 with the book, *Dog's Colorful Day*.

II.B.2. PEEP sequence. During baseline, if the child answered the question correctly, the researcher proceeded through the PEEP sequence (Table 3). For example, the researcher would Prompt[2] for a response by asking a question like "What did the dog do in the yard?" The child's answer ("Run") would be Evaluated as correct or incorrect based on the question asked. The researcher would then Expand upon the child's response by adding additional vocabulary like "Yes, the dog did run through the yard and knock over all the flowers." The researcher would then Praise the child for his/her response and continue through the book. If incorrect or if there was no response, the researcher would only Evaluate the response and Expand upon the answer the researcher expected from the child.

Table 3. PEEP Sequence. (Whalon et al., 2015).

	PEEP Sequence
Prompt	Prompt/Ask the child a question
Evaluate	Evaluate the child's response
Expand	Expand upon the child's response
Praise	Praise the child for their response

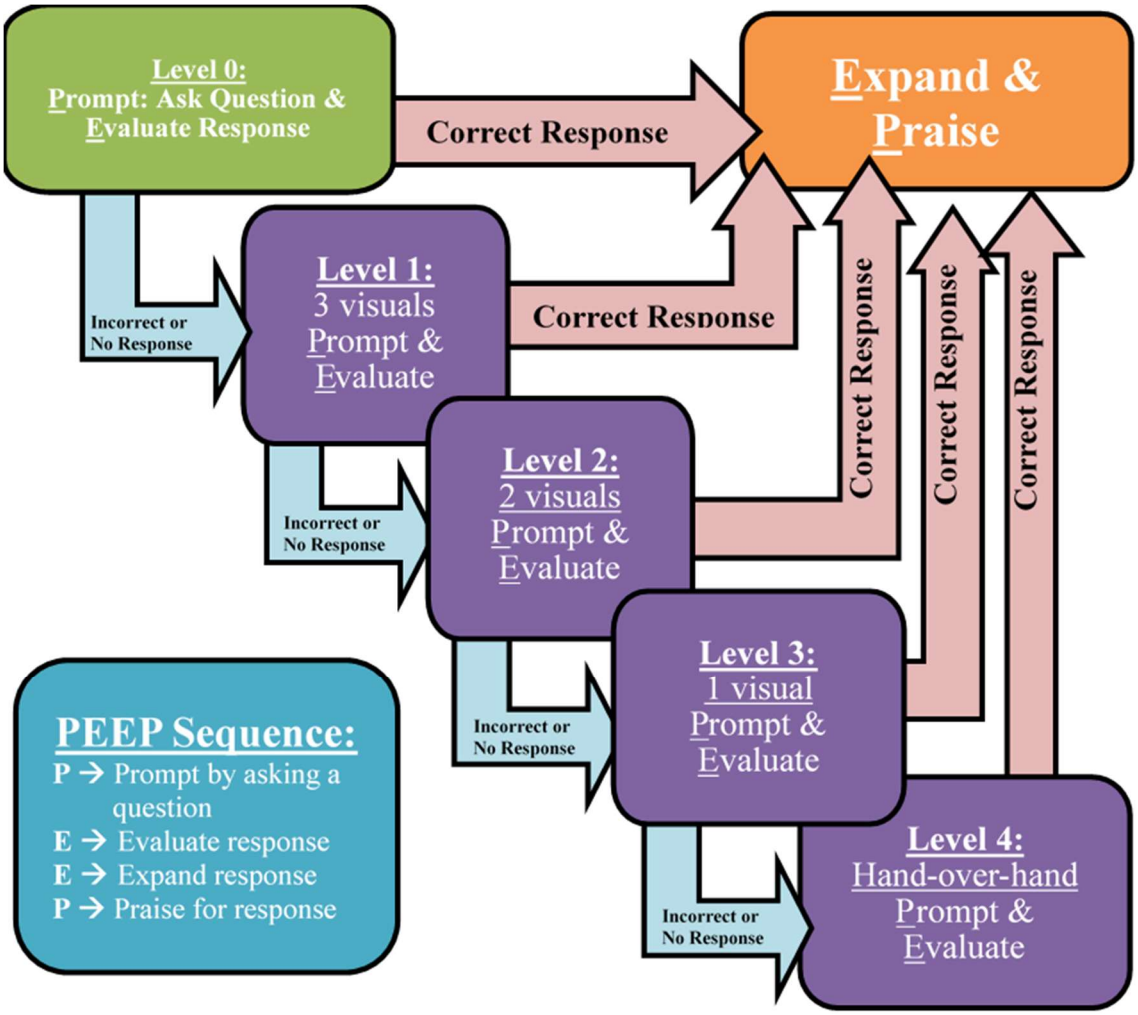
During intervention, the PEEP sequence was used during each level of the prompting hierarchy (see Section II.B.3 and Figure 1). For example, during Level 0 of the prompting hierarchy, the child would be Prompted with a question, the researcher would Evaluate the response to determine if it correct, incorrect, or if the child gave no response. If the response was correct the researcher would procedure through the typical PEEP sequence with Expand and Praise. However, if the answer was incorrect or they gave no response, the researcher would end the PEEP sequence at Evaluate and move on to Level 1 of the prompting hierarchy where the

[2] Prompt from the PEEP sequence refers to asking the child a question, not the prompting hierarchy.

child would be Prompted with a question again and the researcher would Evaluate the second response.

II.B.3. Prompting hierarchy for intervention. Intervention began in the same way as baseline, with the researcher reading a page, asking a question, and proceeding through the PEEP sequence (level 0 in intervention). The key difference between baseline and intervention was the use of the RECALL prompting hierarchy during intervention (Figure 1).

Figure 1. RECALL Prompting Hierarchy and PEEP Sequence. (Whalon et al., 2015)



If the child responded incorrectly or did not respond, after ten seconds, to the level 0 question (Prompt), the researcher moved to the next level of the prompting hierarchy, level 1. For example, the researcher would ask the child a question like "What did the dog do in the yard?" (Answer: *run*). If the child did not respond after a ten second interval, the researcher then continued to level 1 of the prompting hierarchy. In **level 1**, the researcher repeated the question ("What did the dog do in the yard?") and then laid out three visual prompt cards as responses (e.g. a photo of a dog running, swimming, or jumping), while verbally listing the visual options (e.g. "Did the dog run, jump, or swim?") (see Appendix B). If the child did not respond or responded incorrectly, the researcher moved to level 2. During **level 2**, one of the incorrect prompt cards was removed; for example, if the child chose the picture of the dog swimming, that card was removed while the researcher said "No, the dog did not swim in the yard". The researcher asked the question again ("What did the dog do in the yard?"), and then point to the two remaining prompt cards while verbally naming them ("Run or jump?"). If the child did not respond or responded incorrectly, the researcher moved to level 3.

At **level 3**, the researcher removed the final incorrect prompt card while saying "No, the dog did not jump in the yard" and repeated the question ("What did the dog do in the yard?"), produced the correct answer ("The dog runs in the yard"), and repeated the question a second time ("What did the dog do in the yard?"). If the child did not respond or responded incorrectly, the researcher moved to level 4. **Level 4** required the researcher to provide hand-over-hand response for the child while repeating the correct response and asking the question a final time ("The dog runs in the yard, what did the dog do in the yard?"). The final point of the prompting hierarchy was **level 5**. In order to be considered a level 5 (non-) response, the child had to refuse

to answer after the researcher did hand-over-hand and then asked the prompt question for the final time.

Once the child responded correctly at any point in the RECALL prompting hierarchy, the researcher continued through the PEEP sequence. Some participants responded to the prompts by handing the prompt card to the clinician who was present in the room to provide behavioral support. This was coded as a response.

II.B.4. JA bids. Joint Attention (JA) bids were implemented during both baseline and intervention. JA bids consisted of the researcher pointing to a character or action occurring on a particular page while saying "Look!" The researcher would then look to the child to engage their attention then back to the picture in the book and wait for ten seconds to determine if the child would respond to the JA bid by looking at the character or action the researcher pointed to. The bid could occur at the beginning or at the end of a page. JA bids were designed to occur three times per session. However, the number of JA bids varied by session (0-4 times) according to various external factors, such as researcher error and participant manipulation of the materials.

II.C. Materials

Materials for the study included age-appropriate storybooks (see Appendix C), daily question sheets, and prompt cards. The storybooks were suggested by the *Read Together, Talk Together Kit* A from Pearson Education, Inc. We were unable to order the Kit in time for the study, so the two author and another researcher gathered the storybooks suggested by Kit A.

The two researchers developed original questions and prompt cards and used the RECALL question types (Table 2) based from Whalon, Delano, & Handline (2013). The number of questions ranged from 12-14 per session, depending on the number of pages in the book (see

Appendix A for an example). Prompt cards consisted of three images, e.g. three photos of a dog sleeping, eating, and playing, which were presented to the child during the intervention prompting hierarchy (see Appendix B for an example). To ensure that the participants were not memorizing the questions or answers, questions were different for each day that a particular storybook was used. Data tracking sheets were used to keep a record of responses, responses to JA bids, and the number of prompts used to elicit a response.

Validity of the materials was established by the two researchers and two supervisors examining the books and questions to determine that they were age-appropriate.

II.D. Testing Location

The study took place in the University of Mississippi Communication Sciences and Disorders Labs. The testing rooms consisted of tables and chairs for the researchers and participants. Additionally, one of the rooms had a blue light cover for one of the participants with light sensitivity.

II.E. Design

The participants were divided into two separate studies, Multiple Baseline Study and Alternative Treatments Study (see Table 1). In multiple baseline Study (n= 6), we implemented a multiple baseline design. The goal behind the multiple baseline design was to account for the changes in responses that may have been due to extraneous variables rather than the independent variable and to control for threats to internal validity without requiring withdrawal of intervention (Backman, Harris, Chisholm, & Montte, 1997). The baseline was determined to be stable once the child's response rate stabilized for at least 4 days. In multiple baseline Study, once a stable baseline was established, the intervention condition began on different days for

each participant. In the multiple baseline condition, we had three pairs that entered intervention at the same time. Dillan and Hayley began intervention on day 4 and day 5, respectively. Ben and Tucker did not begin intervention until Dillan and Hayley demonstrated stabilization in responses while in intervention and their own baseline responses were stable, which occurred on day 8 and day 9 respectively. Oliver and Wally followed the same progression as the other pairs. They did not begin intervention until day 14 when their own baseline response demonstrated stabilization and Ben's and Tucker's responses in intervention were stable.

In the Alternating Treatments Study (n= 2), an alternating treatment design was implemented with intervention occurring on random days, after 1 to 2 days in the baseline condition. The alternating treatments design allowed for the relatively quick examination of results received from the participants when time is limited for the study. Disadvantages to an alternating treatments design include carryover of threats to internal validity in such a way that the researcher may have difficultly determining if the intervention or outside variables are affecting the results, unlike multiple baseline which controls for extraneous variables (Barlow and Hayes, 1979).

Both researchers were trained on the same procedures and used the same materials, processes, and techniques. Inter-rater reliability was recorded for each dependent variable and is reported in the results section.

II.E.1. Variables. The independent variable was the method of reading: DR (baseline) and RECALL (DR plus the prompting hierarchy). The impact of the method of reading was measured by several dependent variables (DVs).

a) *Percentage of initial responses*. A response was considered an initial response if the child responded to a level 0 question without any additional prompting. All responses

during baseline were considered initial responses. Each trial was coded as a *yes* – the child responded, *no* – the child did not respond, or *na* – no question was asked on this page. The percentage of initial responses was calculated based on the total number of trials per book (12-14).

b) *Percentage of meaningful responses*. A meaningful response was defined as a response that demonstrated the characteristics of basic comprehension of the book and the question. Responses were coded as *meaningful* – a correct response during levels 0-2 (no visual cards, three visual cards, and two visual cards) and *non-meaningful* – a response during levels 3-5 (one visual card, hand-over-hand, or no response). Level 3-5 were not considered meaningful because the child had been given the correct answer by the time they reached level 3-5 (i.e., only one prompt card option remained). The percentage of meaningful responses was calculated based on the total number of level 0-2 responses per trial (12-14 trials per book).

c) *Response type*. Several response options were possible:

- *Verbal*
  - *Words* – the child made an intentional vocal bid by vocalizing/approximating a 1-word utterance.
  - *Phrases* – the child made an intentional vocal bid by producing a 2+ word utterance. Fillers were not included in the word count as they do not carry meaning.
- *Non-verbal*
  - *Sign Language* – the child made an intentional ASL sign/approximation.

- *Gestures* – the child made an intentional gesture to the researcher and/or clinician, up to and including head nods (yes) and head shakes (no).
- *Pointing*– the child made an intentional bid by gesturing with either a single finger, multiple fingers, the whole hand/fist, and/or by picking up and handing the visual prompt card to the researcher or the clinician.

- *Combinations*
  - *Pointing and Words* – the child made an intentional bid by combining a physical gesture (pointing) with a vocal bid of 1 word.
  - *Pointing and Phrases* – the child made an intentional bid by combining a physical gesture (pointing) with a vocal bid of 2+ words.

d) *Average prompting level*. The prompt level (0-5) the researcher had to reach in order to get a correct response from the child was recorded for each question. The mean prompting level was calculated for each session.

e) *Percentage response to joint attention (JA) bids*. Responses to JA bids were coded as *yes* – the child responded to the researcher's JA bid through a shared JA interaction that was not less than three seconds, *no* – the child did not respond to the researchers JA bid through a shared JA interaction that was not less than three seconds, or *na* – the researcher failed to provide a JA initiation bid due to experimental error. Percentage of responses to JA bids was calculated out of the total number of JA bid trials conducted each day.

III. RESULTS

III.A. Dependent Variable 1: Initial Response

Initial responses were coded as the percentage of responses to level 0 questions with 12-13 trials per book. The kappa co-efficient for percentage of initial responses was 86.1%.

III.A.1. Multiple baseline. Analysis of means and ranges for each participant in baseline versus intervention demonstrate a small decrease in average percentage of initial responses for three of the six participants (see Table 4). Hayley, Ben, and Tucker demonstrated a 6%, 18%, and a 10% decrease, respectively, in initial responses from baseline to intervention. Dillan demonstrated a small increase in the average number of initial responses: mean baseline scored was 10% compared to 14% during intervention. Two participants, Oliver and Wally, had stable percentage of initial responses from baseline to intervention.

Table 4: Initial Responses for Multiple Baseline Study

Participant	Condition	Mean	Range
Dillan	Baseline (Days 0-4)	10%	0-17%
	Intervention (Days 6-22)	14%	0-31%
Hayley	Baseline (Days 0-5)	17%	7-43%
	Intervention (Days 6-22)	11%	0-23%
Ben	Baseline (Days 0-8)	27%	15-50%
	Intervention (Days 9-22)	9%	0-23%
Tucker	Baseline (Days 0-9)	33%	8-73%
	Intervention (Days 10-22)	23%	14-31%
Oliver	Baseline (Days 5-14)	9%	0-25%
	Intervention (Days 15-22)	9%	0-15%
Wally	Baseline (Days 0-14)	7%	0-21%
	Intervention (Days 15-22)	7%	0-14%

As suspected based on the small change (or no change) in the percentage of initial responses in baseline or intervention, the visual analysis did not demonstrate an increase in initial responses (see Figure 2).

Figure 2: Visual Analysis of Initial Responses for Multiple Baseline Study

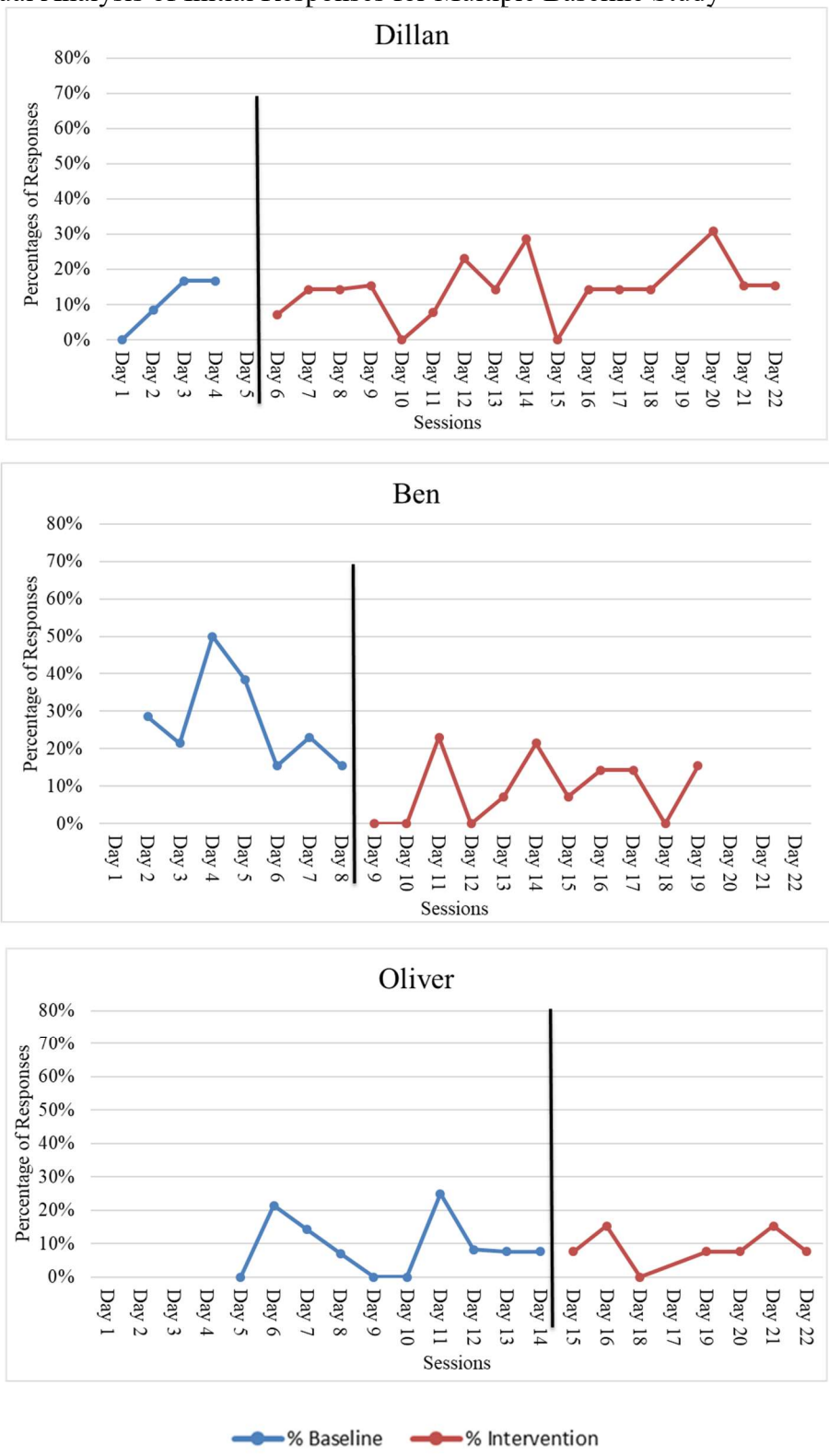
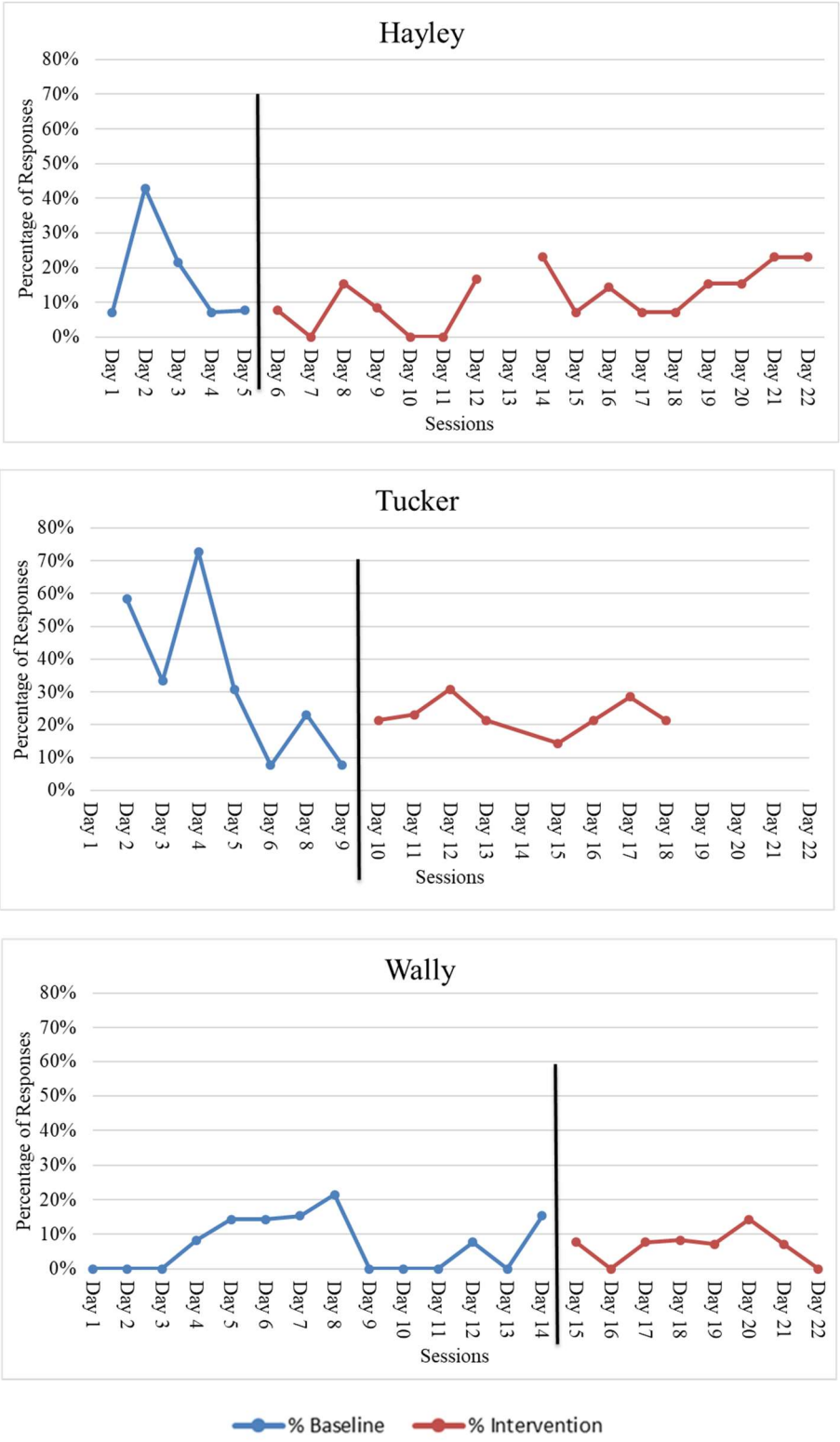


Figure 2: Visual Analysis of Initial Responses for Multiple Baseline Study (continued)



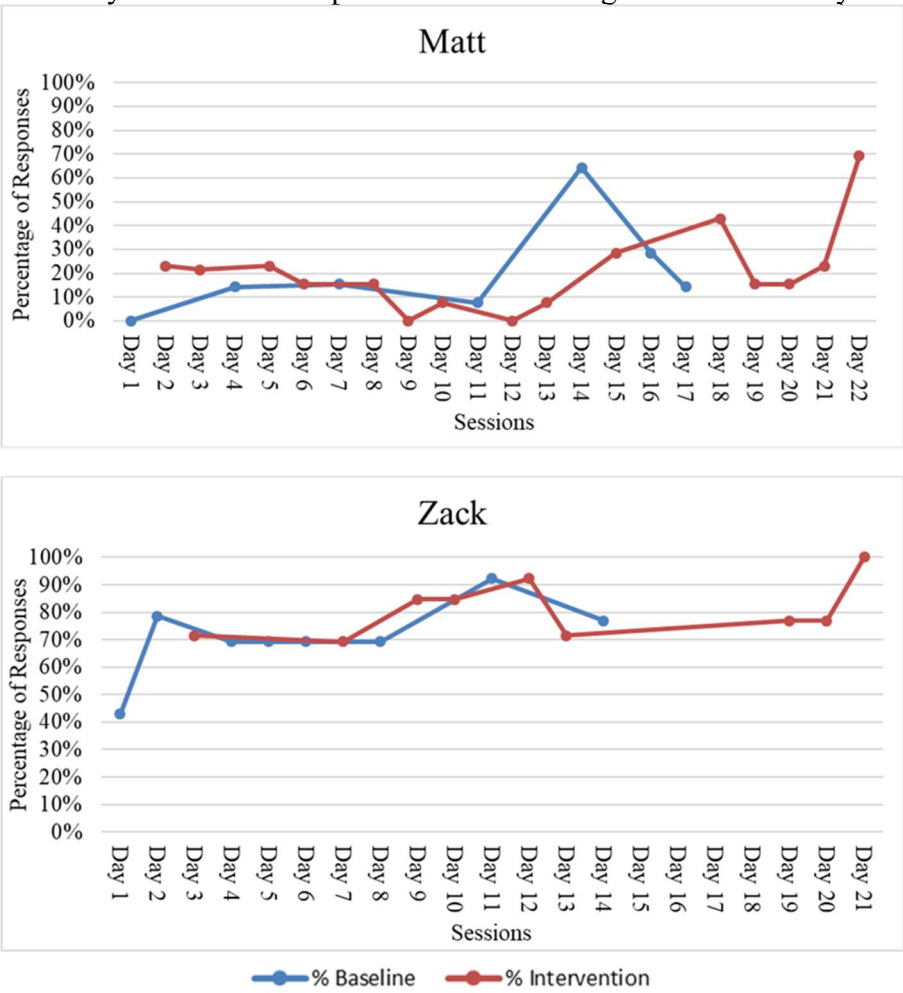
III.A.2. Alternating treatments design. Analysis of the means and ranges demonstrated a small increase in initial responses for one participant, Zack. He increased his mean initial response from baseline to intervention by a mean of 10% with variability noted in the range (see Table 5). However, Matt did not demonstrate an increase in initial responses from baseline to intervention. His initial mean responses remained stable at 21% for both baseline and intervention.

Table 5: Initial Responses for Alternating Treatments Study

Participant	Condition	Mean	Range
Matt	Baseline (7 Days)	21%	0-64%
	Intervention (15 Days)	21%	0-69%
Zack	Baseline (8 Days)	71%	43-92%
	Intervention (9 Days	81%	69-100%

Similarly, the visual analysis for Matt did not demonstrate an increase in initial correct responses from baseline to intervention (see Figure 3). Zack, on the other hand, had a slightly higher mean percentage of initial responses during intervention, while visual analysis suggests that this was largely due to a low response percentage on Day 1, and that his percentage of initial responses otherwise remained relatively stable from baseline to intervention.

Figure 3: Visual Analysis of Initial Responses for Alternating Treatments Study



III.B. Dependent Variable 2: Meaningful Responses

Meaningful responses measured the percentage of trials (out of 12-14 trials) the participant responded correctly to the question with visual supports up to level 2 (levels 0-2). Level 2 was the last level for which the child made a choice that demonstrated comprehension of the question and story. The kappa co-efficient for percentage of meaningful responses was 69.7%.

III.B.1. Multiple baseline. All six participants demonstrated an increase in the percentage of meaningful correct responses (see Table 6). The largest average increase for

meaningful responses was Hayley, who increased by 73%, and the smallest increase was Wally, who increased by 37%.

Table 6: Meaningful Responses for Multiple Baseline Study

Participant	Condition	Mean	Range
Dillan	Baseline (Days 0-4)	10%	0-17%
	Intervention (Days 6-22)	75%	31-100%
Hayley	Baseline (Days 0-5)	17%	7-43%
	Intervention (Days 6-22)	90%	77-100%
Ben	Baseline (Days 0-8)	27%	15-50%
	Intervention (Days 9-22)	73%	38-92%
Tucker	Baseline (Days 0-9)	38%	8-73%
	Intervention (Days 10-22)	83%	64-93%
Oliver	Baseline (Days 5-14)	9%	0-25%
	Intervention (Days 15-22)	75%	69-85%
Wally	Baseline (Days 0-14)	7%	0-21%
	Intervention (Days 15-22)	44%	17-57%

Likewise, the visual analysis of meaningful responses demonstrated a substantial increase in the number of meaningful correct responses for all six participants (see Figure 4).

Figure 4: Visual Analysis of Meaningful Responses for Multiple Baseline Study

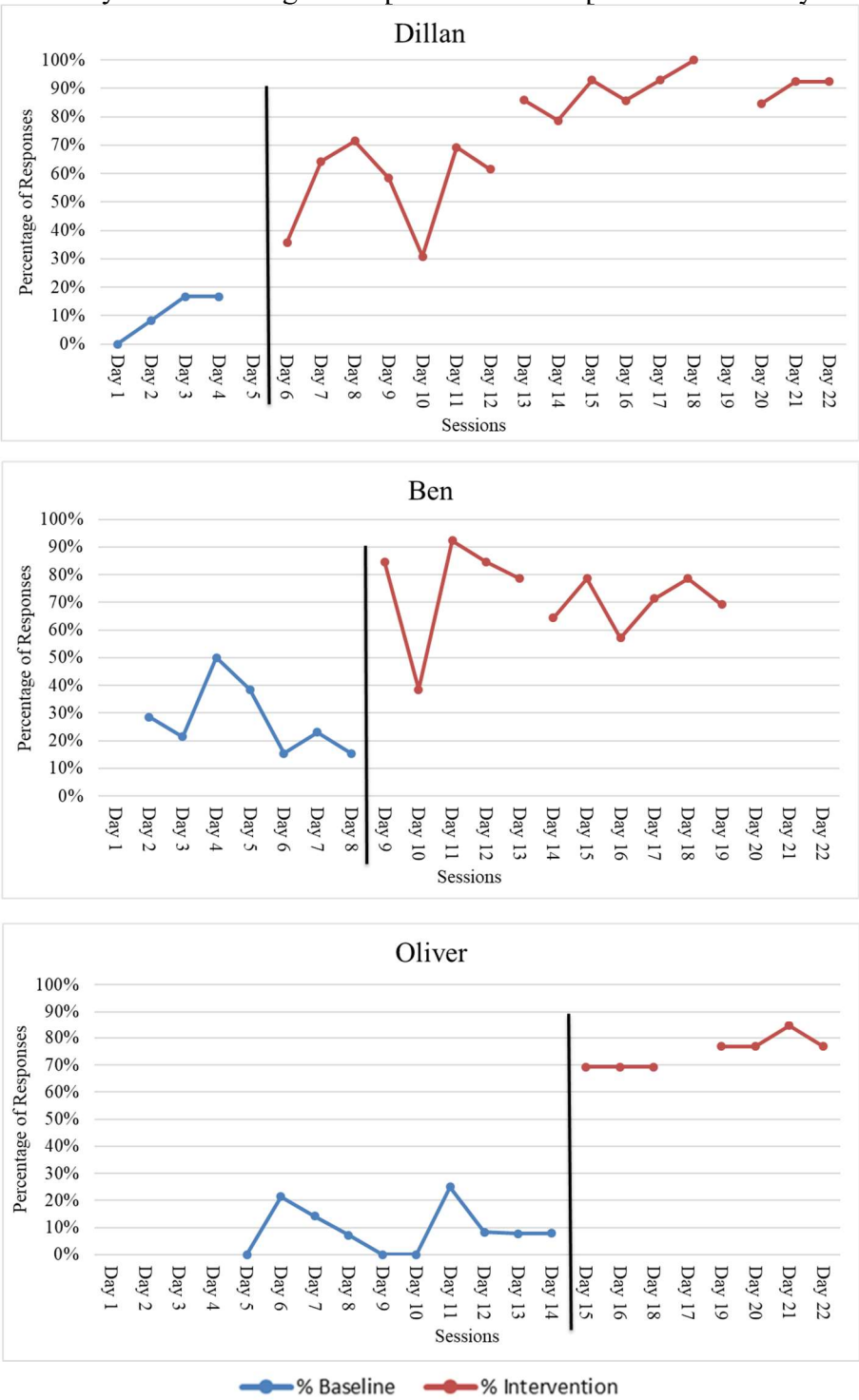
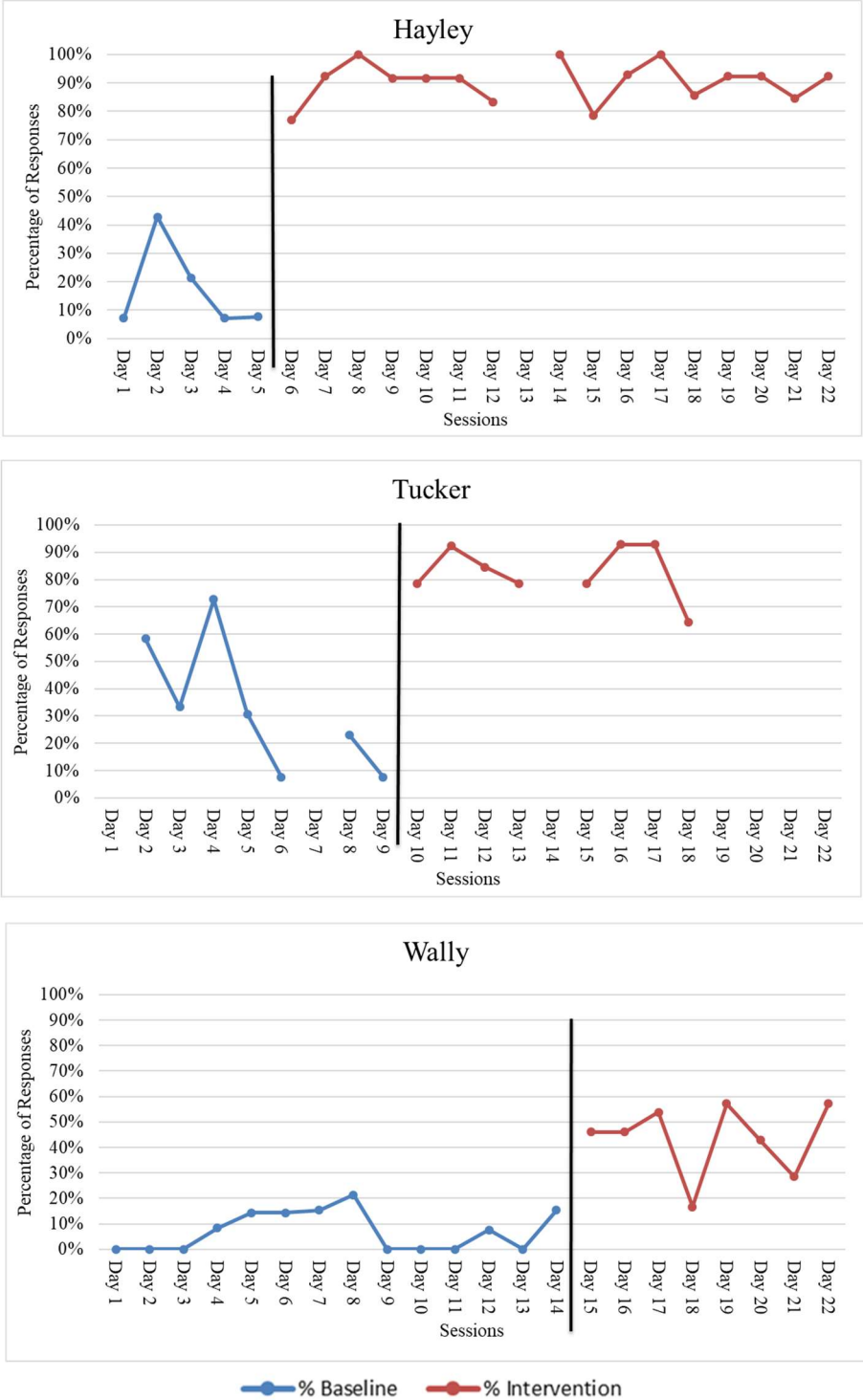


Figure 4: Visual Analysis of Meaningful Responses for Multiple Baseline Study (continued)



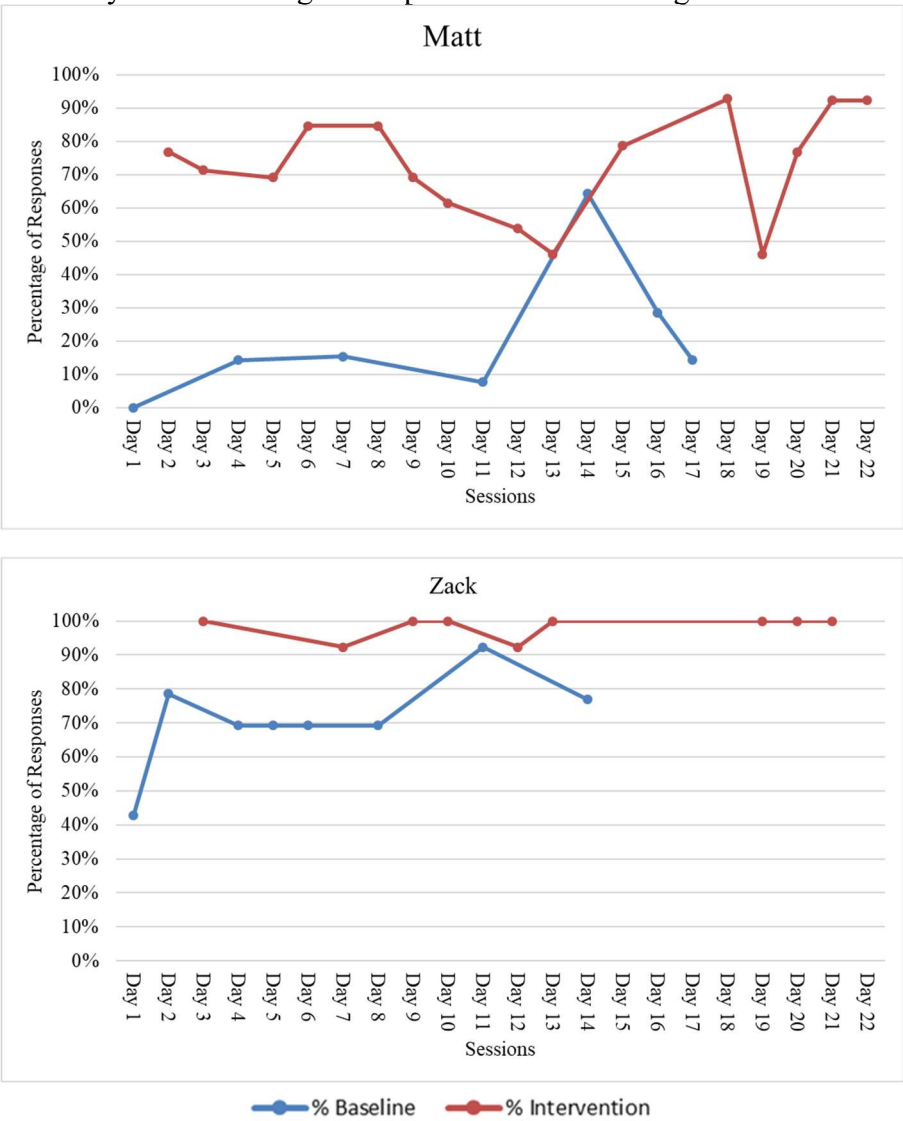
III.B.2. Alternating treatments design. Both Matt and Zack demonstrated an increase in the percentage of meaningful responses from baseline to intervention (see Table 7). Zack demonstrated an increase during intervention, however his percentages were closer to ceiling in the baseline condition leaving less room for improvement.

Table 7: Meaningful Responses for Alternating Treatments Study

Participant	Condition	Mean	Range
Matt	Baseline (7 Days)	21%	0-64%
	Intervention (15 Days)	73%	46-93%
Zack	Baseline (8 Days)	71%	43-92%
	Intervention (9 Days	88%	69-93%

Similarly, visual analysis of Matt and Zack's percent of meaningful responses per day demonstrates an increase from baseline to interventions (see Figure 5).

Figure 5: Visual Analysis of Meaningful Responses for Alternating Treatments Study



III.C. Dependent Variable 3: Response Type

Response type recorded how the participants responded to questions. The responses that were recorded included non-verbal (pointing, signs, and gestures), verbal (words and phrases), a combination of non-verbal and verbal (point and word, point and word, gesture and word, etc.), and no response. The kappa co-efficient for type of response was 76.6%.

III.C.1. Multiple baseline. Each of the six participants demonstrated a significant decrease in the number of no responses from baseline to intervention. Oliver demonstrated the

largest decrease in no responses (80%) and Ben demonstrated the smallest decrease in no responses (18%). Four of the six participants (Dillan, Ben, Oliver, and Wally) demonstrated a large increase in nonverbal response during intervention. The percentages of verbal responses were stable for Dillan, Oliver, and Wally in comparison to Hayley (10%) and Tucker (7%), who increased their verbal response in intervention (see Table 8), and Ben, who demonstrated a 47% decrease in verbal responses from baseline to intervention. Combination responses – non-verbal plus verbal responses – increased for two of the six participants, Hayley (39%) and Tucker (47%), with no significant change for the remaining four participants.

Table 8: Response Type for Multiple Baseline Study

	Non-Verbal Mean (Range)	**Verbal Mean (Range)**	**NV+V Mean (Range)**	**NR Mean (Range)**
Dillan				
Baseline	19% (8-33%)	2% (0-8%)	0% (0-0%)	79% (67-92%)
Intervention	90% (50-100%)	0% (0-0%)	0% (0-0%)	10% (0-50%)
Hayley				
Baseline	4% (0-8%)	27% (7-57%)	1% (0-50%)	67% (36-86%)
Intervention	20% (0-50%)	37% (0-92%)	40% (0-85%)	2% (0-14%)
Ben				
Baseline	5% (0-14%)	62% (36-92%)	9% (0-21%)	23% (8-38%)
Intervention	66% (54-79%)	15% (7-23%)	14% (0-31%)	5% (0-15%)
Tucker				
Baseline	37% (15-58%)	5% (0-15%)	5% (0-17%)	54% (25-85%)
Intervention	34% (14-54%)	12% (0-31%)	52% (36-79%)	3% (0-8%)
Oliver				
Baseline	18% (0-50%)	1% (0-8%)	0% (0-0%)	81% (50-100%)
Intervention	99% (92-100%)	0% (0-0%)	0% (0-0%)	1% (0-8%)
Wally				
Baseline	10% (0-33%)	1% (0-7%)	1% (0-7%)	89% (67-100%)
Intervention	88% (71-100%)	0% (0-0%)	0% (0-0%)	12% (0-29%)

Likewise, the visual analysis of the type of responses demonstrated a significant decrease in no response from baseline to intervention for all participants (see Figure 6). For Dillan and Oliver, the no responses were eventually extinguished. The visual analysis also demonstrated an increase in non-verbal responses from baseline to intervention for all participants except Hayley and Tucker, who demonstrated an increase in verbal responses. Hayley and Tucker also demonstrated significant increases in combination responses from baseline to intervention.

Figure 6: Visual Analysis of Response Type for Multiple Baseline Study

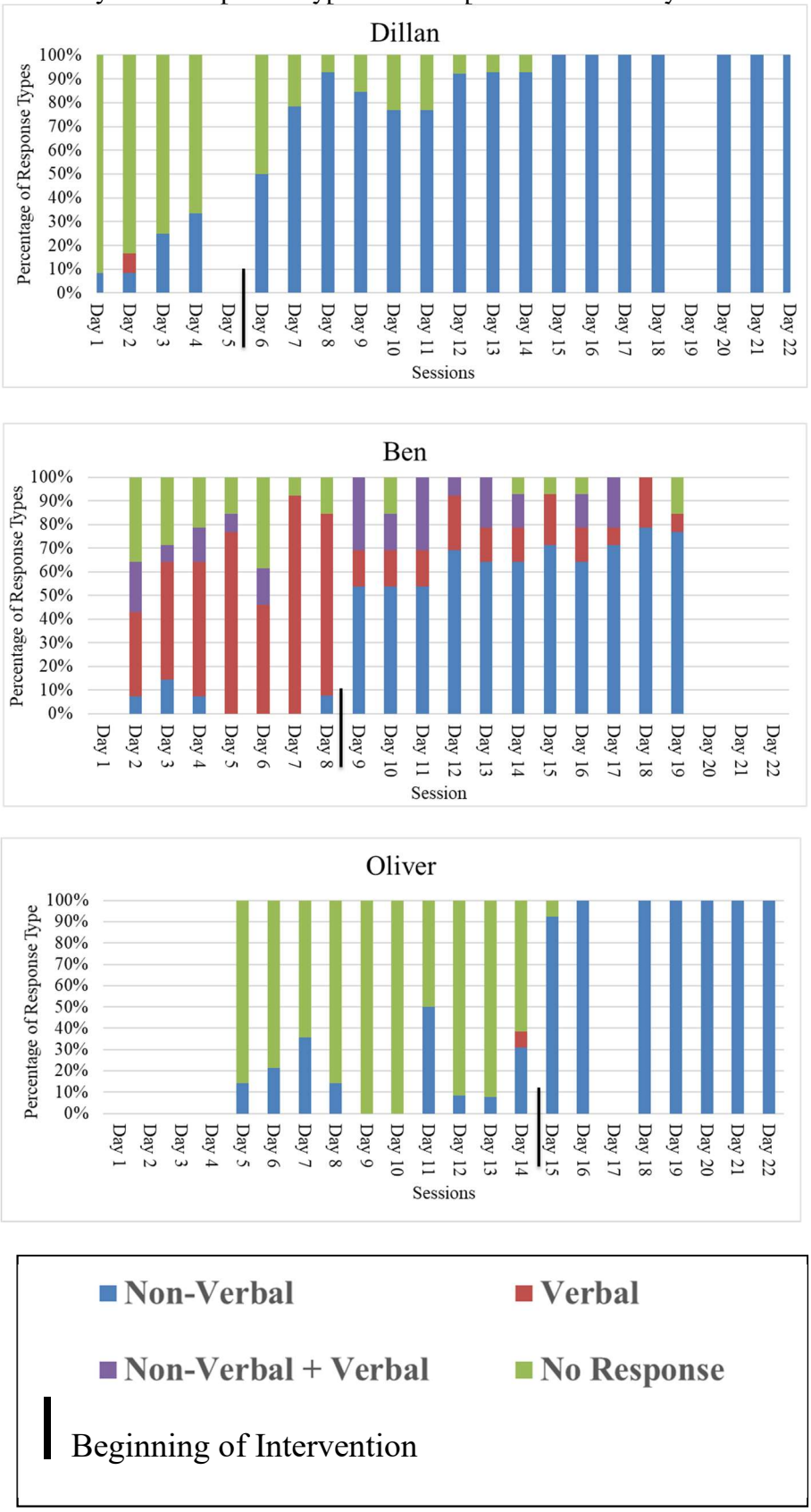
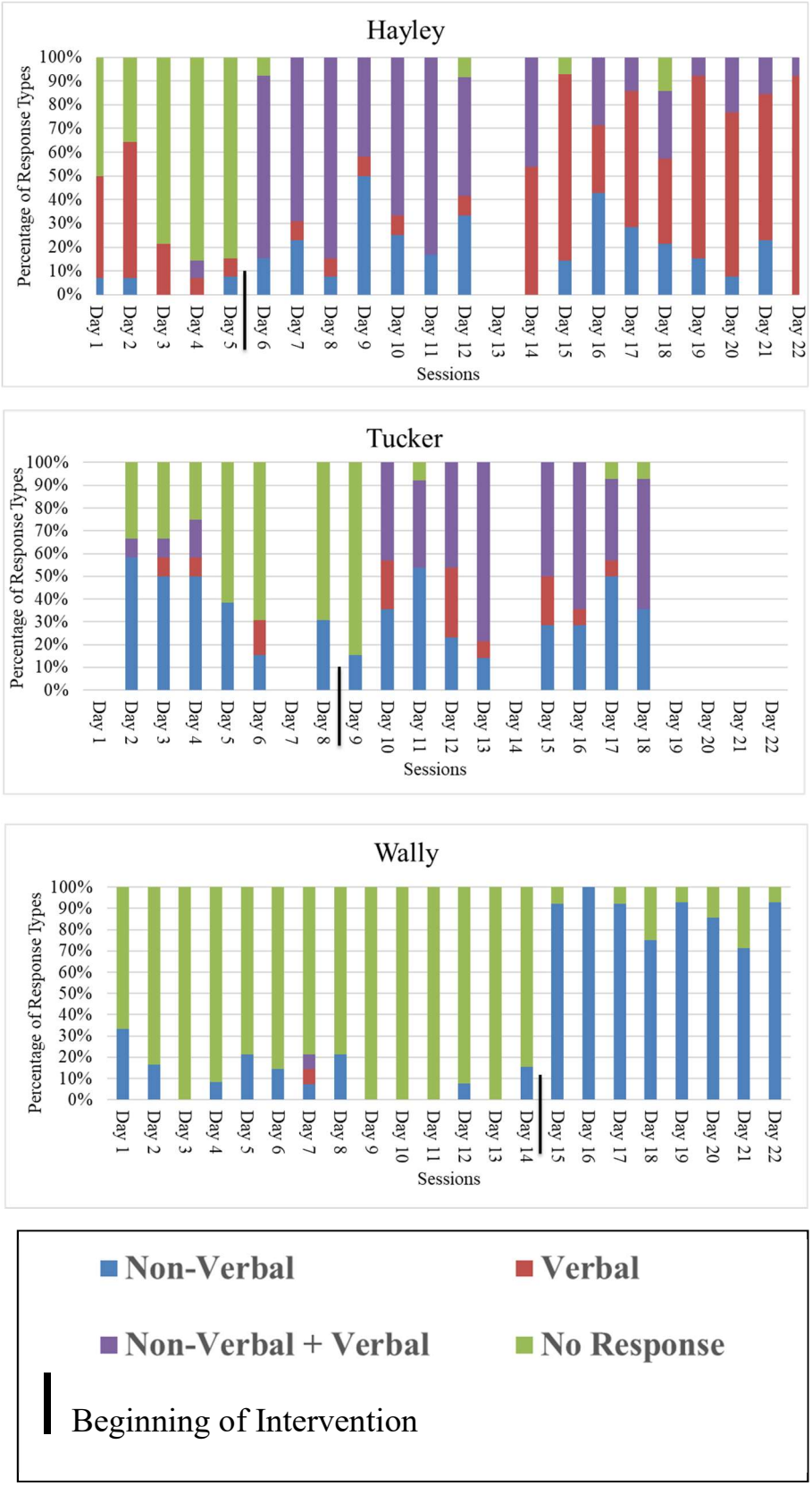


Figure 6: Visual Analysis of Response Type for Multiple Baseline Study (continued)



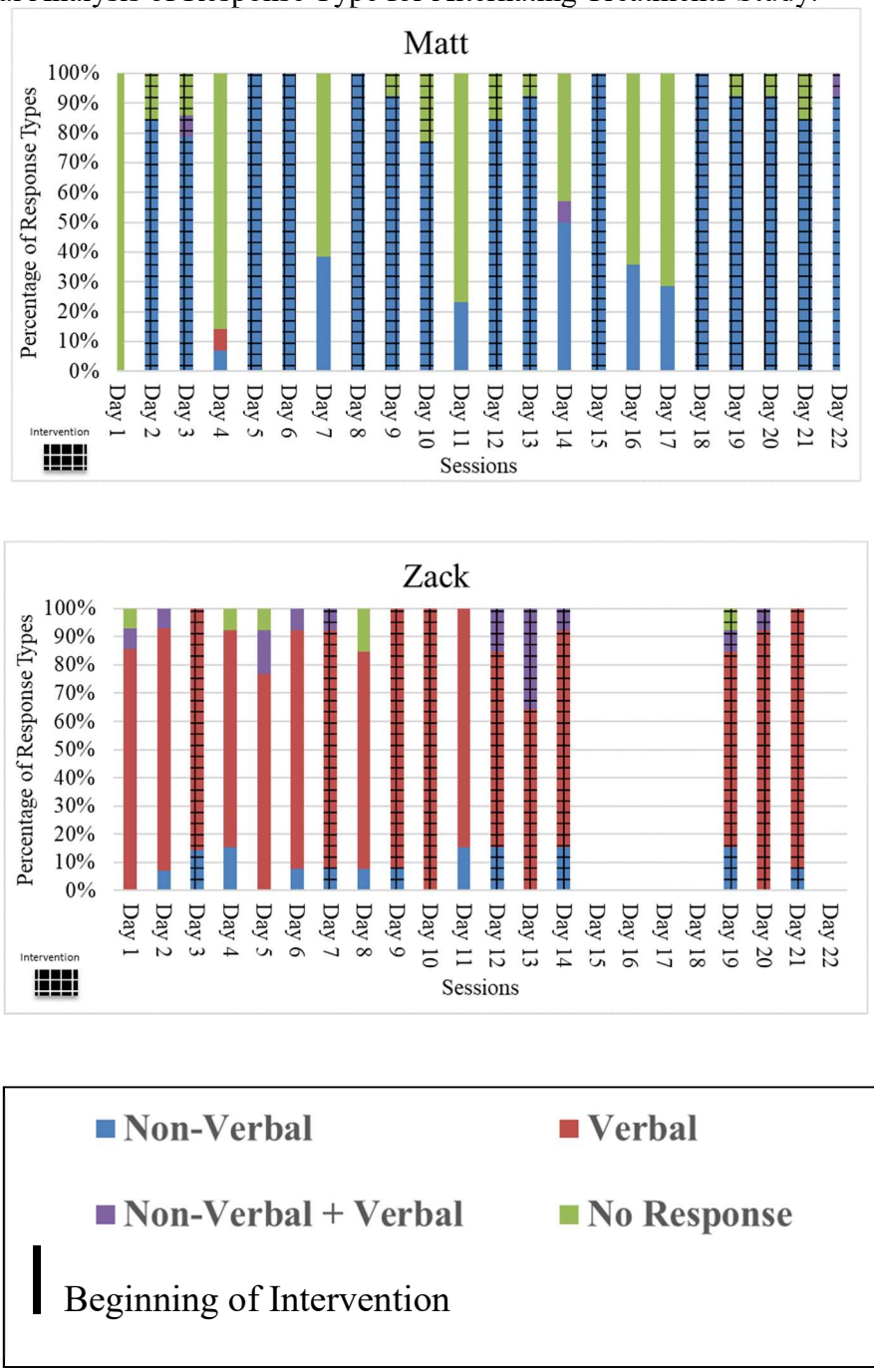
III.C.2. Alternating treatments design. The percentage of no responses decreased for both participants from baseline to intervention, though Zack's percentage of decrease was less, perhaps due to his near-ceiling response rate in baseline (see Table 9). Matt demonstrated an increase in non-verbal responses from baseline to intervention, while Zack remained stable from baseline to intervention.

Table 9: Response Type for Alternating Treatments Study

	Non-Verbal Mean (Range)	**Verbal Mean (Range)**	**NV+V Mean (Range)**	**NR Mean (Range)**
Matt				
Baseline	25% (0-43%)	1% (0-7%)	1% (0-7%)	72% (43-100%)
Intervention	90% (69-100%)	0% (0-0%)	1% (0-8%)	8% (0-23%)
Zack				
Baseline	8% (0-15%)	82% (7-86%)	5% (0-15%)	5% (0-15%)
Intervention	8% (0-15%)	83% (64-100%)	8% (0-36%)	1% (0-8%)

Visual analysis confirms that Matt decreased his number of no responses from baseline to intervention (see Figure 7). Additionally, his number of non-verbal responses increased during intervention as compared to baseline. Zack's type of responses remained stable throughout baseline to intervention.

Figure 7: Visual Analysis of Response Type for Alternating Treatments Study.



III.D. Dependent Variable 4: Average Prompting Level

Prompting level was calculated according to the average level of prompting the participant reached in order to respond correctly each day (12-14 trials). Since there were no prompts in the baseline condition, data is reported for the intervention period only. The kappa co-efficient for average prompting level was 84.8%.

III.D.1. Multiple baseline. Prompting levels remained relatively stable for the first vs. second half of intervention for five of the six participants (see Table 10). Dillan, however, required approximately one level less of prompting during the second half of intervention.

Table 10: Average Prompting Level for Multiple Baseline Study

Participant	Intervention Days	Mean (Range)
Dillan	Intervention (Days 6-22)	1.76 (1.00-3.43)
	Days 6-12	2.43 (1.86-3.43)
	Days 13-22	1.24 (1.00-1.58)
Hayley	Intervention (Days 6-22)	1.22 (0.77-1.69)
	Days 6-12	1.24 (0.77-1.69)
	Days 14-22	1.21 (0.77-1.64)
Ben	Intervention (Days 9-22)	1.79 (1.15-2.69)
	Days 9-12	1.83 (1.15-2.69)
	Days 13-19	1.77 (1.53-2.00)
Tucker	Intervention (Days 15-22)	1.21 (0.00-2.00)
	Days 10-12	1.27 (1.23-1.31)
	Days 13-28	1.40 (1.14-2.00)
Oliver	Intervention (Days 15-22)	1.63 (1.46-2.00)
	Days 15-17	1.74 (1.46-2.00)
	Days 19-22	1.54 (1.46-1.62)
Wally	Intervention (Days 15-22)	2.66 (2.08-3.58)
	Days 15-18	2.70 (2.08-3.58)
	Days 19-22	2.63 (2.21-3.36)

Note: Level 0 = initial response, level 1 – three option cards, level 2 – two option cards, level 3 – one option card, and level 4 – hand-over-hand.

Correspondingly, the visual analysis of the data demonstrated that only Dillan decreased his average level of prompting required from the start of intervention to the end (see Figure 8). The remaining five participants were either stable or variable in their average levels of prompting from the start to the end of intervention.

Figure 8: Visual Analysis of Prompting Level for Multiple Baseline Study

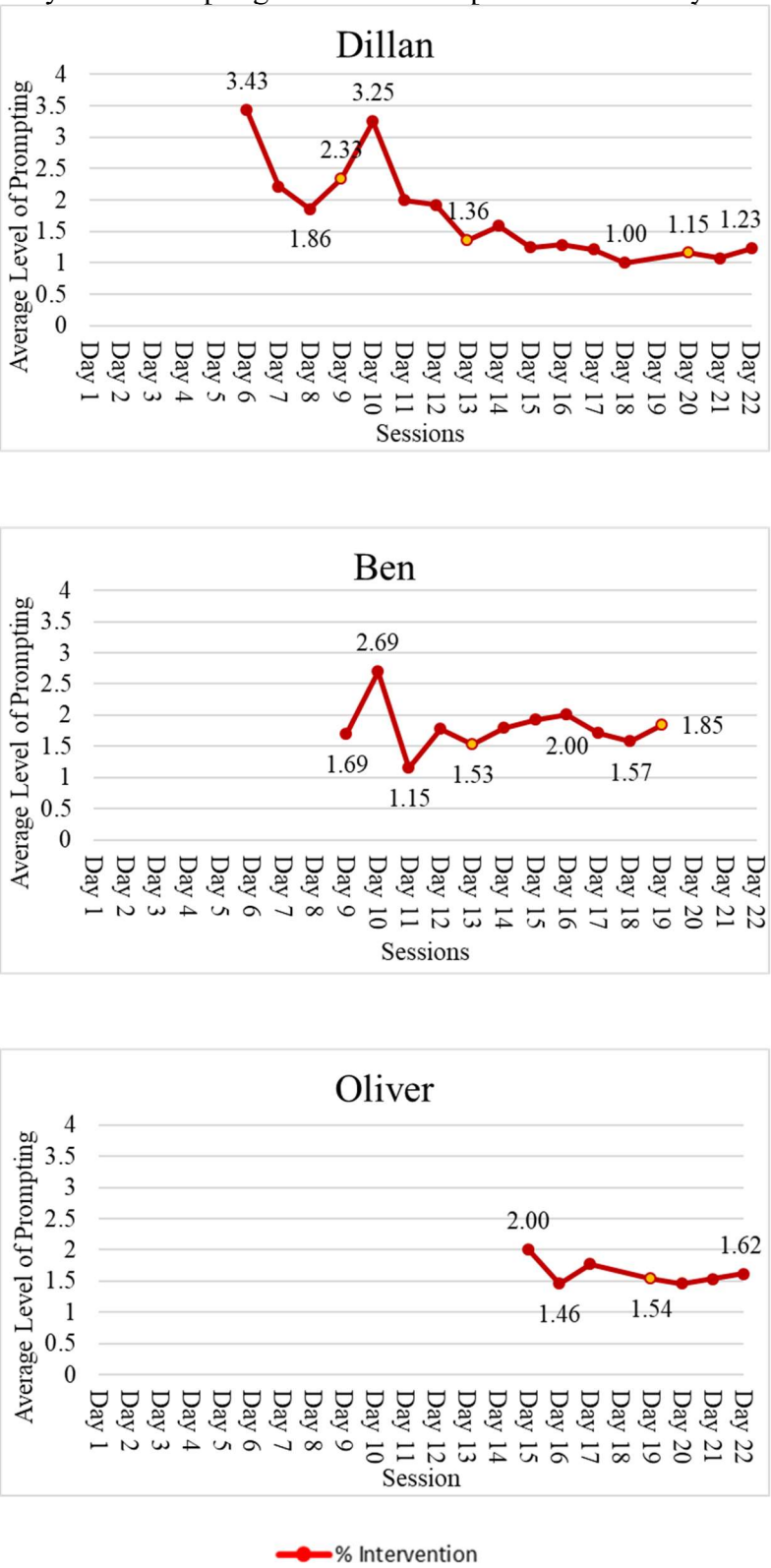
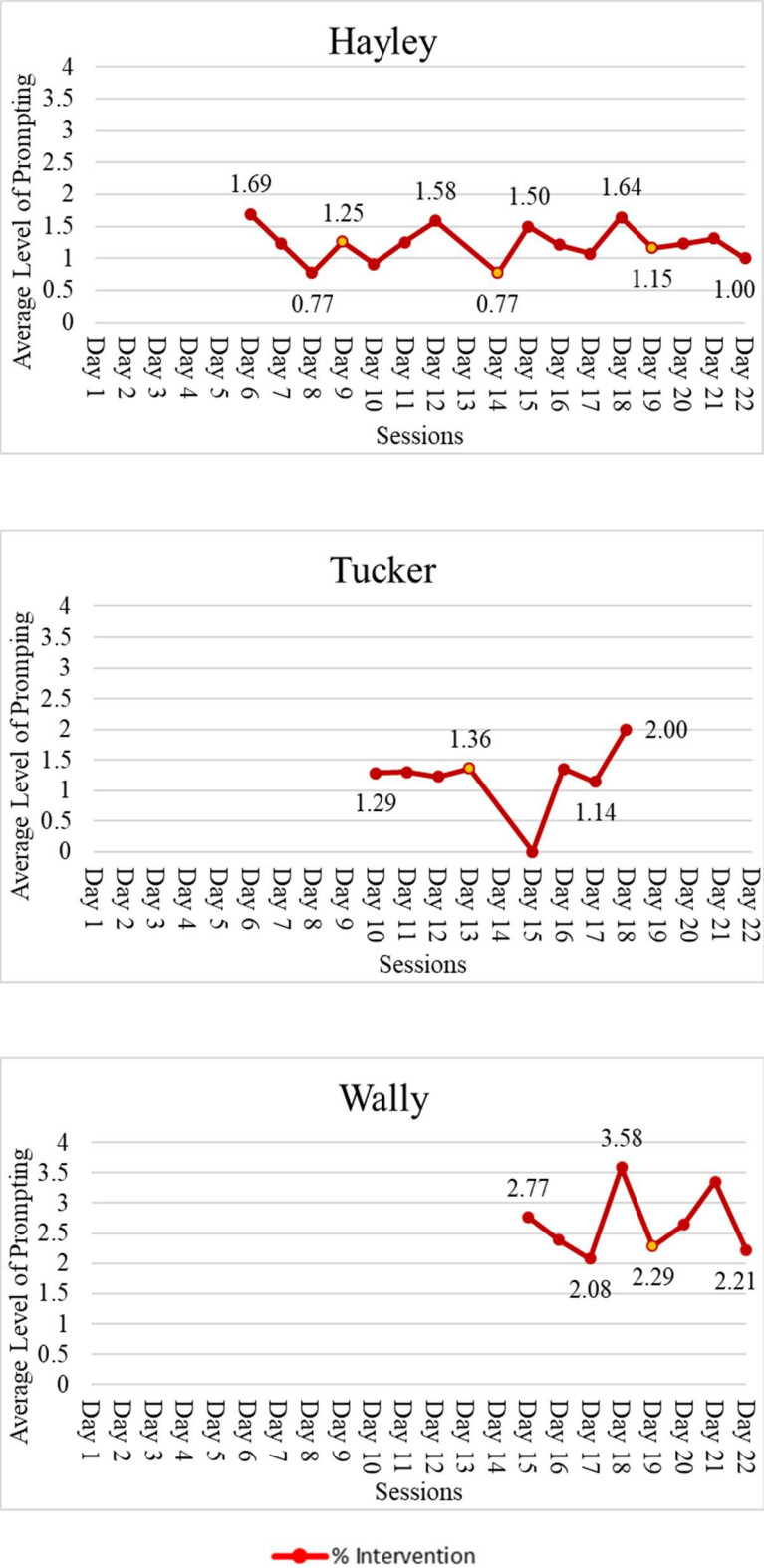


Figure 8: Visual Analysis of Prompting Level for Multiple Baseline Study (continued)



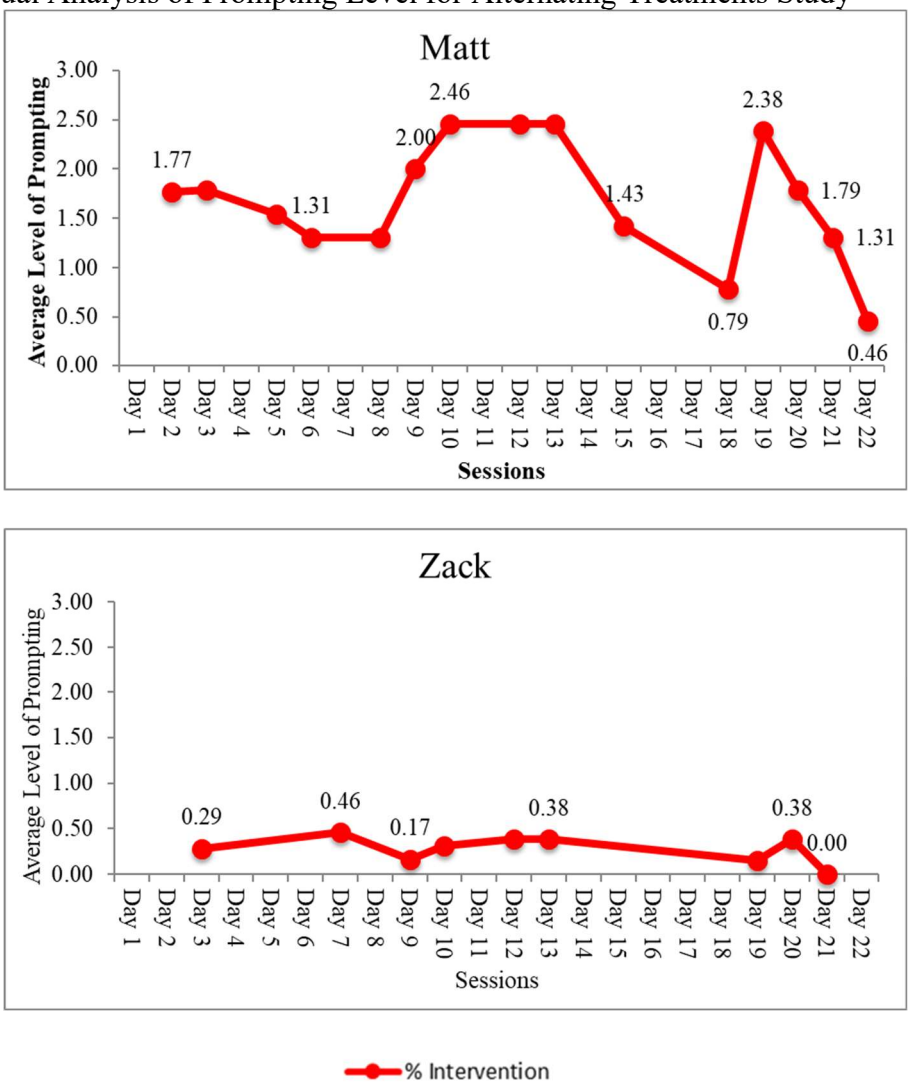
III.D.2. Alternating treatments design. Matt and Zack demonstrated rather stable mean prompting levels from the first half of the intervention days to the last half of intervention days (see Table 11), though Matt showed notable variability throughout the intervention period. Zack overall demonstrated a low average prompting level throughout intervention (0.23).

Table 11: Average Prompting Level for Alternating Treatments Study

Participant	Condition	Mean (Range)
Matt	Intervention (15 Days)	1.68 (0.46-2.46)
	Days 2-12 (8 Days)	1.83 (1.31-2.46)
	Days 13-22 (7 Days)	1.52 (0.46-2.46)
Zack	Intervention (9 Days)	0.28 (0.00-0.46)
	Days 3-12 (5 Days)	0.32 (0.17-0.46)
	Days 13-21 (4 Days)	0.23 (0.00-0.38)

Likewise, the visual analysis demonstrated that Zack was relativity stable, requiring a low level of prompting throughout the start and end of intervention (see Figure 9). Visual analysis of Matt's data demonstrated variability in the average level of prompting during intervention.

Figure 9: Visual Analysis of Prompting Level for Alternating Treatments Study



III.E. Dependent Variable 5: Joint Attention Bids

Joint Attention (JA) bids measured the percentage of trials (approximately three per day) the participant responded to researcher's joint attention bid over the course of the intervention session. The kappa co-efficient for type of response was 70.5%.

III.E.1. Multiple baseline. Analysis of the percentage response to JA bids revealed a small increase from baseline to intervention for three of the six participants (Dillan, Oliver, and Wally) with varied ranges (see Table 12). One participant, Tucker, demonstrated a slight decrease in response to JA bids; however, his ranges were inconsistent too. Hayley and Ben demonstrated no change in their response to JA bids from baseline to intervention.

Table 12: JA Bids for Multiple Baseline Study

Participant	Condition	Mean	Range
Dillan	Baseline (Days 0-4)	43%	33-67%
	Intervention (Days 6-22)	69%	0-100%
Hayley	Baseline (Days 0-5)	63%	33-100%
	Intervention (Days 6-22)	58%	0-100%
Ben	Baseline (Days 0-8)	95%	67-100%
	Intervention (Days 9-22)	85%	67-100%
Tucker	Baseline (Days 0-9)	71%	67-100%
	Intervention (Days 10-22)	50%	0-100%
Oliver	Baseline (Days 5-14)	27%	0-67%
	Intervention (Days 15-22)	74%	33-100%
Wally	Baseline (Days 0-14)	33%	0-67%
	Intervention (Days 15-22)	50%	0-100%

Despite the slight changes to the mean percentages of responses to JA bids, the visual analysis suggests that all participants demonstrated varied and inconsistent response to JA bids across both baseline and intervention (see Figure 10). No consistent trends are notable in the

visual analysis, except perhaps for Oliver, whose performance was inconsistent but higher during intervention.

Figure 10: Visual Analysis of Responses to JA Bids for Multiple Baseline Study

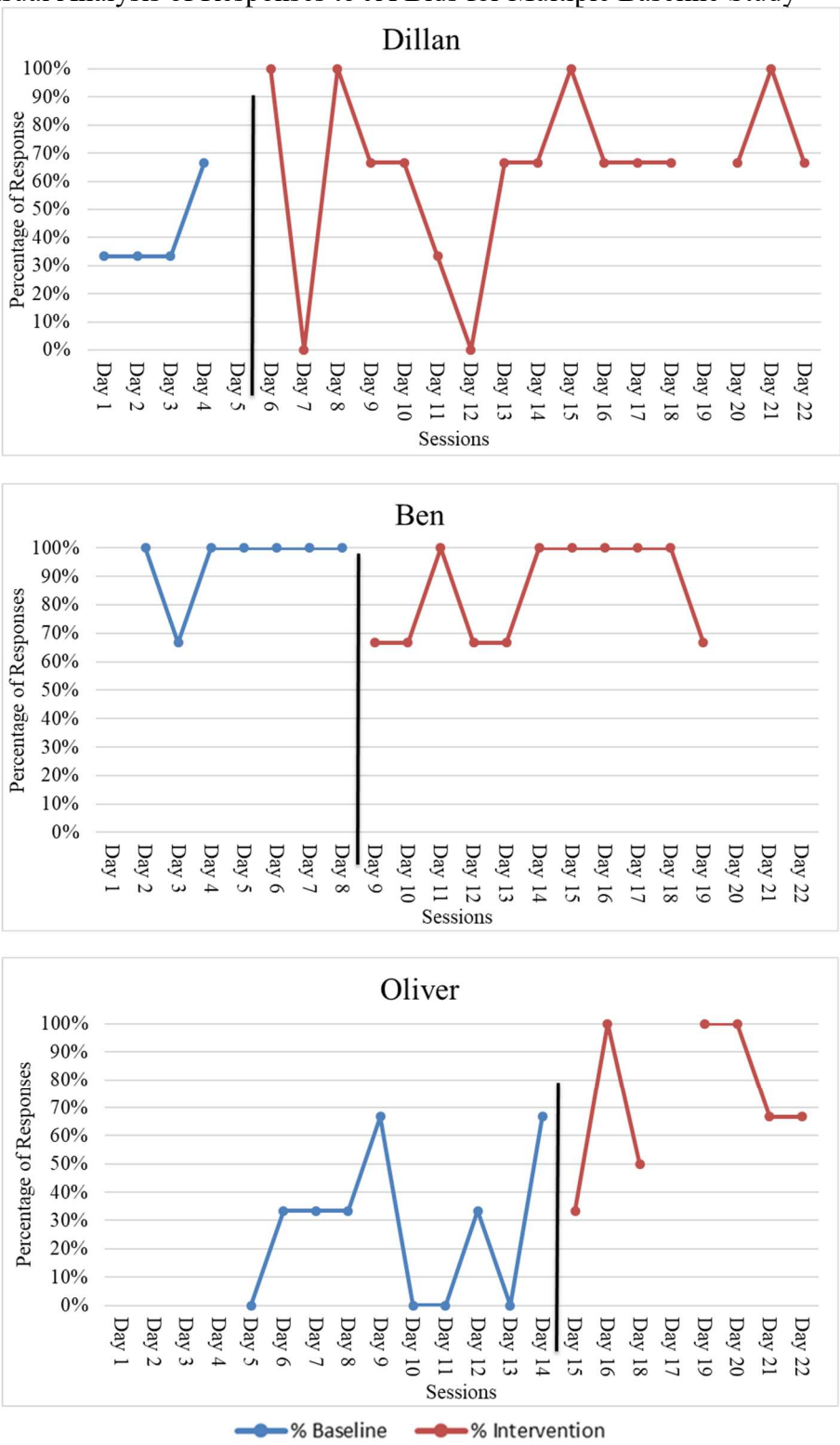
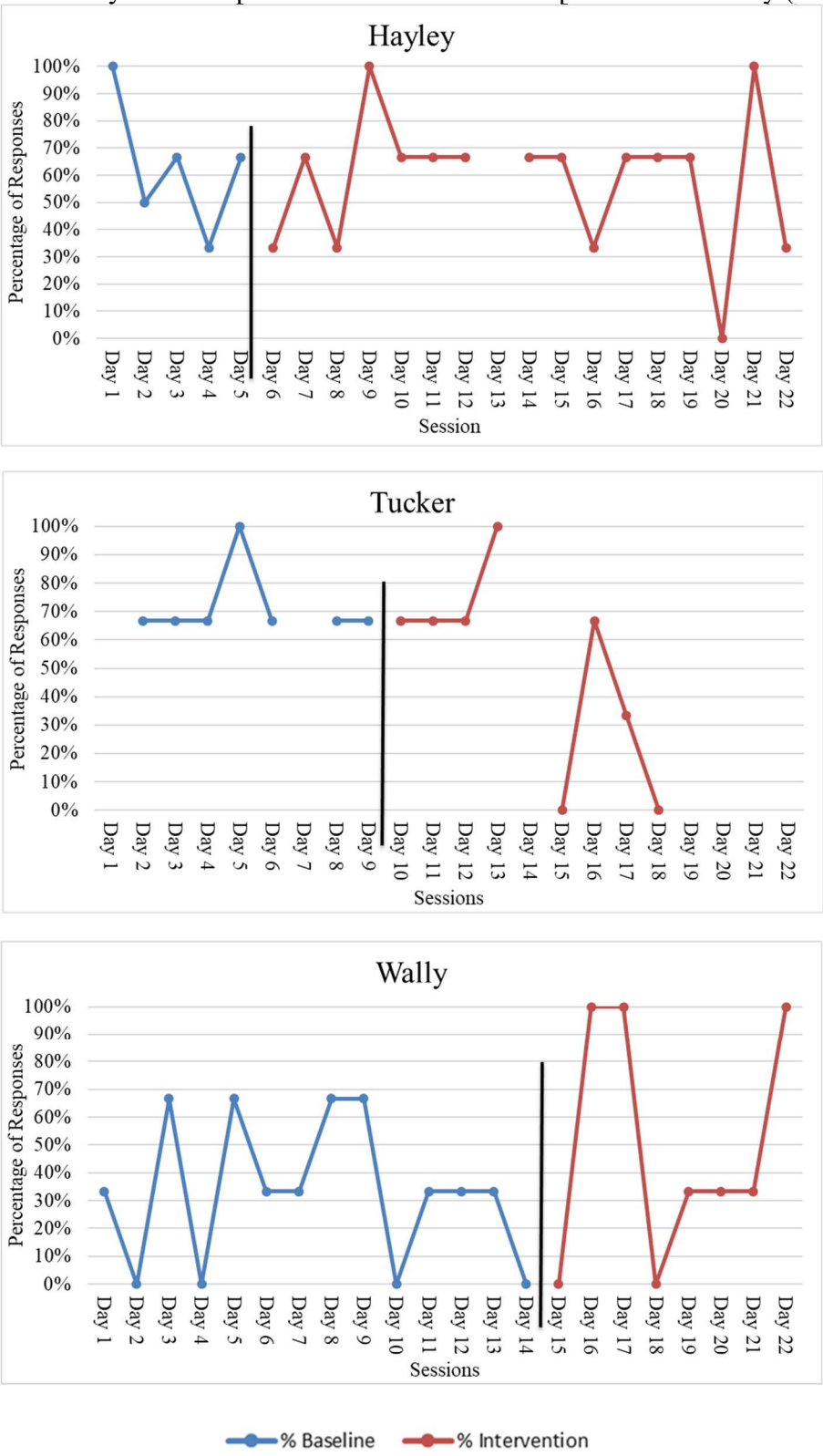


Figure 10: Visual Analysis of Responses to JA Bids for Multiple Baseline Study (continued)



III.E.2. Alternating treatments design. Both Matt and Zack demonstrated no percentage change for responses to JA bids (see Table 13). Matt demonstrated more variability within intervention as compared to Zack, who demonstrated similar ranges from baseline to intervention.

Table 13: JA Bids for Alternating Treatments Study

Participant	Condition	Mean	Range
Matt	Baseline (7 Days)	57%	33-100%
	Intervention (15 Days)	57%	0-100%
Zack	Baseline (8 Days)	92%	67-100%
	Intervention (9 Days	96%	67-100%

Correspondingly, the visual analysis of JA bids demonstrated that Zack was stable – and near ceiling – between baseline and intervention (see Figure 11). Zack's average response to JA bids went below 100% twice in baseline and once during intervention. Matt's response to JA bids demonstrated high variability in both baseline and intervention.

Figure 11: Visual Analysis of Responses to JA Bids for Alternating Treatments Study

IV. DISCUSSION

The purpose of the study was to investigate the impact RECALL has on responses and on responding to joint attention bids by replicating Whalon et al.'s 2015 study with a larger sample size, larger age range, and for children with LD both with and without an ASD diagnosis. The first research question was if RECALL is effective at increasing initial responses and meaningful responses. Results suggest that participants did not demonstrate an increase from baseline to intervention in their initial, level 0, responses. Six of the eight demonstrated either a decrease or no change in initial responses, while two participants increased initial responses slightly (by 4% and 10%) from baseline to intervention. On the other hand, results suggest that meaningful responses, which demonstrate basic comprehension of the book, increased for all eight participants in intervention, compared to baseline. All participants also demonstrated a decrease in no responses from baseline to intervention.

This current study differed from Whalon et al. (2015), who demonstrated an increase in initial responses with RECALL. The lack of increase in initial responses in the current study might be due to dependence on the prompting cue cards. If the participants did have a dependence on prompting cards, then it would follow that the participants would decrease their initial responses during intervention as they would rather wait on the prompting cards. Additional research may be necessary to determine if fading of prompting cards could assist in decreasing the dependence on the prompting cards. On the other hand, perhaps participant-specific reinforcers, e.g. edible reinforcements, instead of only verbal praise could have motivated them to respond to the initial question, level 0. A third possibility is that length of time

could account for the differences in results. Whalon et al.'s (2015) study lasted for approximately 67 sessions as compared to the 22 sessions of the current study. Finally, the differences in results of initial responses could be due to the participants included in the study. Whalon et al. 2015's study had four participants who were four to five years-old and typically responded verbally (i.e., sentences, echolalia, one-to-two-word utterances, and verbal but difficult to understand). In comparison, this study included eight participants, ages 3;4 to 6;11 years-old, who demonstrated variety of different responses types ranging from non-verbal to full sentences (see Table 1).

The increase in meaningful responses and decrease in no responses suggest that if children with moderate to severe LD with or without ASD are given an assisted opportunity to respond, like a prompting cue card, they will increase their responses. This corresponds with Whalon et al. (2015), who demonstrated that overall responses increased, and no responses decreased with RECALL. By increasing the average number of responses during a communicative interaction, even if initial responses are not increasing, RECALL allows for more social-communicative opportunities for the child.

Second, we asked if RECALL is effective for changing non-verbal responses to verbal responses. All participants in the current study exhibited a change in response type. However, this was not in favor of verbal responses. While initial (level 0) responses did not increase, participants typically did respond with additional prompting and the addition of the prompting cards. This significantly decreased the percentage of failing to respond (no response) for all participants. In turn, other response types became more frequent.

Oliver, Wally, Dillan, Ben, and Matt (n = 6) increased their non-verbal responses from baseline to intervention. Oliver, Wally, and Dillan demonstrated the largest increase (71-82%) from baseline to intervention in non-verbal responses. Prior to the start of the study, these three

children were described by their clinicians as typically responding minimally through occasional gestures, crying, or fussing. The results suggest that the addition of prompting cards provided Dillan, Oliver, and Wally with an avenue to respond non-verbally. However, Ben and Matt were described by their clinicians as typically responding in 1 to 4-word utterances and 1-word utterances, pointing, and gestures, respectively. The increase in non-verbal responses for Ben and Matt could suggest that participants who are more verbal may choose the easier, non-verbal (pointing) route of communicating when provided with the option.

Two participants – Hayley and Tucker – demonstrated an increase in the number of non-verbal plus verbal combination responses with RECALL. These results suggest that the prompting cards provided the opportunity to combine two-modes of communication (verbal and non-verbal). Whalon et al. (2015) reported the participant's method of communication, verbal or non-verbal, for spontaneous initiations but did not include type of response for the questions during the storybook reading.

Third, we investigated if RECALL was effective at decreasing the level of prompting required during intervention. A decrease in prompting level percentage was demonstrated for only one participant, Dillan. Six of the eight participants (multiple baseline Study: n = 5; alternating treatments Study: n = 1) demonstrated inconsistent prompting levels throughout the intervention period. Zack's average prompting level was relatively stable throughout intervention, with little prompting required, regardless of condition. Whalon et al. 2015's study coded for level 1 and level 2 of prompting but did not report detailed results of their findings. Perhaps with additional time in intervention the prompting levels would have decreased or stabilized.

The final research question was concerned with whether RECALL improved the participants' responsiveness to the adult's JA bids. Analysis of the mean percentage response to JA bids demonstrated a slight increase for three participants from baseline to intervention, albeit with considerable variability. Hayley, Ben, Matt and Zack demonstrated no change in the responsiveness to JA bids from baseline to intervention, and Tucker's responses to JA bids decreased. Dillan, Hayley, Tucker, Wally, and Matt demonstrated the same significant variability in ranges for intervention response to JA bids (0-100%).

Since JA bids were not explicitly taught during the baseline or intervention method, the lack of a substantial increase of responsiveness to JA bids during intervention suggests that RECALL alone may not be sufficient for increasing JA. Rather, children with moderate to severe LD with or without ASD may require explicit teaching of JA, more time working on JA, and/or more trials per session. On the other hand, for children with moderate to severe LD with or without ASD using additional language to teach JA skills may be ineffective or inappropriate for this population. JA skills could perhaps be presented as a within-stimulus prompt (i.e., moving stimulus or exaggeration) which has been demonstrated to be an effective learning tool for children with ASD (Schreibman, 1975).

According to Whalon et al. (2015) and Whalon, Delano, & Hanline (2013), RECALL was designed to elicit and improve JA skills in children with ASD. However, Whalon et al. (2015) did not provide data supporting the improvement of JA skills while using RECALL in the study. Further research should investigate how teaching JA skills could be included incorporate into the RECALL reading intervention method because JA skills are important for continued language growth and development.

IV.A. Limitations

There are several limitations of this study. First, the study lasted six weeks (twenty-two days) with a one week break in the middle of the study. As a result, there was not a significant amount of time for some of the participants in the multiple baseline design (Oliver and Wally) to be in the intervention condition. Second, as with any single subject design study, the limited number of participants (n = 8) makes it difficult to generalize results to the larger population of children with ASD and LD. However, the sample size compares favorably with other studies including Whalon's et al. (2015) study, which included four participants with ASD, and Fleury and Schwartz's (2016) study, which included nine participants with ASD.

Third, the participants were divided among the two testers. The two testers were trained and had access to the same materials. However, each person is intrinsically different from the other in terms of personality and responses to unanticipated situations. Despite careful training and preparation each of the testers would have performed slightly differently from the other during baseline and intervention. A fourth limitation could be the method of reinforcement implemented during baseline and intervention. Both testers provided verbal praise ("Good job!") during the praise portion of the PEEP sequence, which could have not been an adequate reinforcer for children with poor language skills or lack intrinsic social motivation (ASD). Future work could incorporate personalized reinforcements, such as edible reinforces or work-then-break prompts, instead of relying solely on verbal praise. Finally, there was little to no motivation provided to respond to the initial question, level 0, once intervention started. The participants had learned that option cards would soon follow the first question if they did not respond. If participant-specific reinforcements had been provided, perhaps this could have motivated the participants to respond during level 0.

IV.B. Summary

Overall, results suggest that RECALL was ineffective at increasing joint attention and initial, unprompted responses. On the other hand, RECALL was effective at increasing meaningful response for children with moderate and severe language delays with or without autism spectrum disorder. The implications are that RECALL could be beneficial to increase non-verbal responses in children, ages three to seven years, particularly those with limited non-verbal and verbal communication.

LIST OF REFERENCES

List of References

American Psychiatric Association: Desk Reference to the Diagnostic Criteria from DSM-5. (2013). Arlington, VA: American Psychiatric Association.

American Speech-Language-Hearing Association (2019). *Autism (Practice Portal)*. Retrieved April 10, 2019, from https://www.asha.org/practice-portal/clinical-topics/autism/.

American Speech-Language-Hearing Association (2019). *Spoken Language Disorders (Practice Portal)*. Retrieved April 29, 2019, from https://www.asha.org/Practice-Portal/Clinical-Topics/Spoken-Language-Disorders/.

Baio J, Wiggins L, Christensen DL, et al. (2014). Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. *MMWR. Morbidity and Mortality Weekly Report, Surveillance Summaries 2018;67*(6):1–23. DOI: http://dx.doi.org/10.15585/mmwr.ss6706a1.

Bellon, M. L., Ogletree, B. T., & Harn, W. E. (2000). Repeated storybook reading as a language intervention for children with autism: A case study on the application of scaffolding. *Focus on Autism and Other Developmental Disabilities, 15*(1), 52-58.

Beuker, K. T., Lambregts-Rommelse, N. N. J., Donders, R., & Buitelaar, J. K. (2013). Development of early communication skills in the first two years of life. *Infant Behavior and Development, 36*, 71-83.

Bottema-Beutel, K. (2016). Associations between joint attention and language in autism spectrum disorder and typical development: A systematic review and meta-regression

analysis. *Autism Research: Official Journal of the International Society for Autism Research, 9*(10), 1021.

Bruinsma, Y., Koegel, R., & Koegel, L. (2004). Joint Attention and Children with Autism: A Review of the Literature. *Mental Retardation and Developmental Disabilities Research Reviews,10*, 169-175.

Bus, A. G., Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint Book Reading Makes for Success in Learning to Read: A Meta-Analysis on Intergenerational Transmission of Literacy. *Review of Educational Research, 65*(1), 1. doi:10.2307/1170476.

Capone, N. C., & McGregor, K. K. (2004). Gesture development: A review for clinical and research practices. *Journal of Speech, Language, and Hearing Research, 47*(1), 173-186.

Casenhiser, D. M., Binns, A., McGill, F., Morderer, O., & Shanker, S. G. (2015). Measuring and supporting language function for children with autism: Evidence from a randomized control trial of a social-interaction-based therapy. Journal of Autism and Developmental Disorders, 45(3), 846-857.

Christensen, D. L., Baio, J., Van Naarden Braun, K., Bilder, D., Charles, J., Constantino, J. N. Centers for Disease Control and Prevention (CDC). (2016). Prevalence and characteristics of autism spectrum disorder among children aged 8 years--autism and developmental disabilities monitoring network, 11 sites, United States, 2012. *Morbidity and Mortality Weekly Report. Surveillance Summaries* (Washington, D.C.: 2002), *65*(3), 1.

Cochet, H., & Byrne, R. W. (2016). Communication in the second and third year of life: Relationships between nonverbal social skills and language. *Infant Behavior and Development, 44*, 189-198.

Craig, H. K. (1993). Social skills of children with specific language impairment: Peer relationships. *Language, Speech, and Hearing Services in Schools, 24*(4), 206-215.

Dennis, M., Lazenby, A. L., & Lockyer, L. (2001). Inferential language in high-function children with autism. *Journal of Autism and Developmental Disorders, 31*(1), 47-54.

Dunham, P., & Dunham, F. (1990). Effects of mother-infant social interactions on infants' subsequent contingency task performance. *Child Development, 61*(3), 785-793.

Ergül, C., Akoğlu, G., Sarıca, A. D., Karaman, G., Tufan, M., Bahap-Kudret, Z., & Deniz, Z. (2016). An adapted dialogic reading program for turkish kindergarteners from low socio-economic backgrounds. *Journal of Education and Training Studies, 4*(7), 169-184.

Fleury, V. P., Miramontez, S. H., Hudson, R. F., & Schwartz, I. S. (2014). Promoting active participation in book reading for preschoolers with autism spectrum disorder: A preliminary study. *Child Language Teaching and Therapy, 30*(3), 273-288. doi:10.1177/0265659013514069.

Fleury, V. P., & Schwartz, I. S. (2016). A modified dialogic reading intervention for preschool children with autism spectrum disorder. *Topics in Early Childhood Special Education, 37*(1), 16-28. doi:10.1177/0271121416637597.

Fung, P., Chow, B. W., & McBride-Chang, C. (2005). The impact of a dialogic reading program on deaf and hard-of-hearing kindergarten and early primary school-aged students in Hong Kong. *Journal of Deaf Studies and Deaf Education, 10*(1), 82-95. doi:10.1093/deafed /eni005.

Gratier, M., Devouche, E., Guellai, B., Infanti, R., Yilmaz, E., & Parlato-Oliveira, E. (2015). Early development of turn-taking in vocal interaction between mothers and infants. *Frontiers in Psychology, 6*, 1167 1-10.

Gillberg, C., & Steffenburg, S. (1987). Outcome and prognostic factors in infantile autism and similar conditions: A population-based study of 46 cases followed through puberty. *Journal of Autism and Developmental Disorders, 17*(2), 273.

Hargrave, A. C., & Sénéchal, M. (2000). A book reading intervention with preschool children who have limited vocabularies: The benefits of regular reading and dialogic reading. *Early Childhood Research Quarterly*, *15*(1), 75-90. doi:10.1016/S0885-2006(99)00038-1.

Hart, B., & Risley, T. R. (2003). The Early Catastrophe: The 30 Million Word Gap by Age 3. *American Educator,* 4-9.

Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry, 45*(2), 212-229. doi:10.1111/j.1469-7610.2004.00215.x

Hurwitz, S., & Watson, L. R. (2016). Joint attention revisited: Finding strengths among children with autism. *Autism: The International Journal of Research and Practice, 20*(5), 538.

Kotaman, H. (2013). Impacts of dialogical storybook reading on young children's reading attitudes and vocabulary development. *Reading Improvement*, *50*(4), 199-204. Retrieved from http://www.projectinnovation.com/reading-improvement.html.

Landry, S. H., & Loveland, K. A. (1988). Communication behaviors in autism and developmental language delay. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 29*(5), 621-634.

Loveland, K. A., & Landry, S. H. (1986). Joint attention and language in autism and developmental language delay. *Journal of Autism and Developmental Disorders, 16*(3), 335.

Loveland, K. A., Landry, S. H., Hughes, S. O., Hall, S. K., & McEvoy, R. E. (1988). Speech acts and the pragmatic deficits of autism. *Journal of Speech, Language, and Hearing Research, 31*(4), 593-604.

McArthur, D., & Adamson, L. B. (1996). Joint attention in preverbal children: Autism and developmental language disorder. *Journal of Autism and Developmental Disorders, 26*(5), 481-496.

Meindl, J. N., & Cannella-Malone, H. I. (2011). Initiating and responding to joint attention bids in children with autism: A review of the literature. *Research in Developmental Disabilities, 32*(5), 1441-1454.

Mucchetti, C. A. (2013). Adapted shared reading at school for minimally verbal students with autism. Autism: The International Journal of Research and Practice, 17(3), 358.

Mundy, P., Sigman, M., & Kasari, C. (1990). A longitudinal study of joint attention and language development in autistic children. *Journal of Autism and Developmental Disorders, 20*(1), 115.

Mundy, P., Sigman, M., & Kasari, C. (1994). Joint attention, developmental level, and symptom presentation in autism. *Development and Psychopathology,6*, 389-401.

Naber, F., Bakermans-Kranenburg, M. J., van Ijzendoorn, M., Dietz, C., van Daalen, E., Swinkels, S. H. N., Buitelaar, J.K., van Engeland, H. (2008). Joint attention development in toddlers with autism. *European Child & Adolescent Psychiatry, 17*(3), 143-152.

Parsons, L., Cordier, R., Munro, N., Joosten, A., & Speyere, R. (2017). A systematic review of pragmatic language interventions for children with autism spectrum disorder. *PLoS One, 12*(4), 1-37.

Paul, R., Chawarska, K., & Volkmar, F. (2008). Differentiating ASD From DLD in Toddlers. *Perspectives on Language Learning and Education,15*(3), 101-111. doi:https://doi.org/10.1044/lle15.3.101

Pillinger, C., & Wood, C. (2014). Pilot study evaluating the impact of dialogic reading and shared reading at transition to primary school: Early literacy skills and parental attitudes. *Literacy*, *48*(3), 155-163. doi:10.1111/lit.12018.

Scarborough, H. S., & Dobrich, W. (1994). On the efficacy of reading to preschoolers. *Developmental Review*, *14*(3), 245-302. doi:10.1006/drev.1994.1010.

Snowling, M. J., Duff, F. J., Nash, H. M., & Hulme, C. (2016). Language profiles and literacy outcomes of children with resolving, emerging, or persisting language impairments. *Journal of Child Psychology and Psychiatry, 57*(12), 1360-1369. doi:10.1111/jcpp.12497

Tager-Flusberg, H., & Anderson, M. (1991). The development of contingent discourse ability in autistic children. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 32*(7), 1123-1134.

Towson, J. A., Gallagher, P. A., & Bingham, G. E. (2016). Dialogic reading: Language and preliteracy outcomes for young children with disabilities. *Journal of Early Intervention*, *38*(4), 230-246. doi:10.1177/1053815116668643.

Vally, Z., Murray, L., Tomlinson, M., & Cooper, P. J. (2015). The impact of dialogic book-sharing training on infant language and attention: A randomized controlled trial in a deprived South African community. *Journal of Child Psychology and Psychiatry*, *56*(8), 865-873. doi:10.1111/jcpp.12352.

Van Egeren, L. A., Barratt, M. S., & Roach, M. A. (2001). Mother-infant responsiveness: Timing, mutual regulation, and interactional context. *Developmental Psychology, 37*(5), 684-697.

Weiss, J. A., Baker, J. K., & Butter, E. M. (2016, September). Mental health treatment for people with autism spectrum disorder (ASD). Retrieved September 28, 2017, from http://www.apa.org/pi/disability/resources/publications/newsletter/2016/09/autism-spectrum-disorder.aspx.

Whalon, K., Delano, M., & Hanline, M. F. (2013). A rationale and strategy for adapting dialogic reading for children with autism spectrum disorder: RECALL. *Preventing School Failure*, *57*(2), 93-101. doi:10.1080/1045988X.2012.672347.

Whalon, K., Martinez, J. R., Shannon, D., Butcher, C., & Hanline, M. F. (2015). The impact of reading to engage children with autism in language and learning (RECALL). *Topics in Early Childhood Special Education*, *35*(2), 102-115. doi:10.1177/0271121414565515.

Yoder, P., & Stone, W. L. (2006). Randomized comparison of two communication interventions for preschoolers with autism spectrum disorders. *Journal of Consulting and Clinical Psychology, 74*(3), 426-435.

Yoder, P. J., & Warren, S. F. (1999). Maternal responsivity mediates the relationship between prelinguistic intentional communication and later language. *Journal of Early Intervention, 22*(2), 126-136.

Yoder, P. J., & Warren, S. F. (2001). Relative treatment effects of two prelinguistic communication interventions on language development in toddlers with developmental delays vary by maternal characteristics. *Journal of Speech, Language, and Hearing Research, 44*(1), 224-237.

APPENDIX

Appendix A: Question Samples for *Dog's Colorful Day* for Day 1

Completion "Finish what I say…."

- Dog has a spot on his _____ (Ear/Tail/Nose).
- Now dog has six _____ (Spots/Bees/Clouds).

Recall

- What color is Dog's new spot? (Red, Blue, Purple)
- How did Dog get his purple spot? (Marker/Rain/Mud)

Open-ended

- What is happening in this picture? (Running, Sleeping, Swimming)
- What is he doing? (Getting in bed/Eating dinner/ Going for a walk)

Wh-Questions

- Why did Dog take a bath? (He was Dirty, Hungry, Tired)
- Point to the chocolate (Chocolate, Beach Ball, Grass)
- How many spots does Dog have now? (8/5/1)
- Why did Dog take a bath? (Dirty/Hungry/Tired)

Wh-Inference

- What do you think will happen next? (Eat, Walk, Sleep)

Distancing

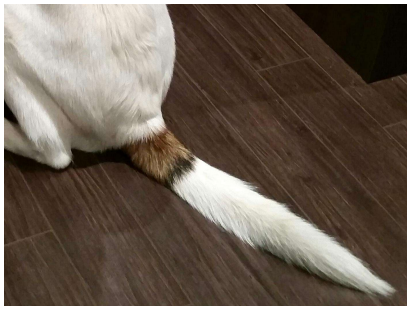
- What type of ice cream do you like the best? (Chocolate, Vanilla, Strawberry)
- What type of juice do you like the best? (Orange/Apple/Grape)

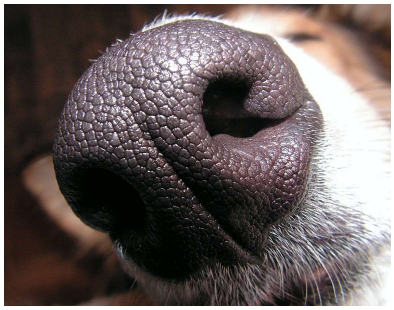
- Which color do you like the best? (Pink/Blue/Green)

Emotion Identification

- How does Dog feel? (Tired, Sad, Happy)

Appendix B: Prompting Visual Cards for *Dog's Colorful Day*





Appendix C: **List of Storybooks for Baseline and Intervention**

Dog's Colorful Day by Emma Dodd

The Day the Goose Got Loose by Reeve Lindbergh

Pigs Aplenty, Pigs Galore! by David McPhail

The Snowy Day by Ezra Jack Keats

The Summery Saturday Morning by Margaret Mahy

The Wolf's Chicken Stew by Keiko Kasza

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2018 Bosley, R., Hawthorne, K., and Loveall, S., and Kellum, K., *RECALL Reading Intervention for Preschool and Kindergarten Age Children with Moderate to Severe Language Delays*. Poster session: 2018 American Speech and Hearing Association Convention.

2018 Bosley, R., Fischer, S., Hawthorne, K., Kellum, K., and Loveall, S., *RECALL Reading Intervention for Preschool and Kindergarten Age Children with Moderate to Severe Language Delays*. Poster session: 2018 Mississippi Speech and Hearing Association Annual Continuing Education Conference.

2018 Bosley, R., Fischer, S., Hawthorne, K., Kellum, K., and Loveall, S., *RECALL Reading Intervention for Preschool and Kindergarten Age Children with Moderate to Severe Language Delays*. University of Mississippi: CSD Colloquium, February 2018.

2017 Bosley, R., Williams, Q., Loveall, S., & Hawthorne, H., *Adults with Intellectual Disabilities have a Subject Bias for Ambiguous Pronouns.* Poster session: 2017 Mississippi Speech and Hearing Association Annual Continuing Education Conference.

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