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# Development of Joint Attention Skills in Young Children with Autism Spectrum Disorder and Intervention Considerations for Early Childhood Speech Language Pathologists

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DEVELOPMENT OF JOINT ATTENTION SKILLS IN YOUNG CHILDREN WITH AUTISM  
SPECTRUM DISORDER AND INTERVENTION CONSIDERATIONS FOR EARLY  
CHILDHOOD SPEECH LANGUAGE PATHOLOGISTS

by

Katherine Daw

B.A., University of Wisconsin-Madison, 2011

A Research Paper  
Submitted in Partial Fulfillment of the Requirements for the  
Master of Science Degree.

Rehabilitation Institute  
in the Graduate School  
Southern Illinois University Carbondale  
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A Research Paper Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Master of Science

in the field of Communication Disorders and Sciences

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Young children with autism spectrum disorder (ASD) demonstrate significant deficits in early joint attention (JA) skills when compared to typically developing children and children with developmental delays (Adamson, Bakeman, Deckner, & Ronski, 2008; Carpenter, Pennington, & Rogers, 2002; Charman et al., 1997; Charman, Drew, Baird, & Baird, 2003; Dawson et al., 2004; Murray et al., 2008; Thurm, Lord, Lee, & Newschaffer, 2007). While this fact has gained much support, researchers have been unable to come to a unanimous decision as to the compilation of these deficits and as to the predictive value of joint attention skills for concurrent and later language development (Bono, Daley, & Sigman, 2004; Carpenter et al., 2002; Charman et al. 2003; Dawson et al., 2004; Luyster, Kadlec, Carter, & Tager-Fluesberg, 2008; McCarthen, Yoder & Warren, 1999; Murray et al., 2008; Sigman & Ruskin, 1999 as cited in Smith, Mirenda, & Zaidman-Zait, 2007; Toth, Munson, Meltzoff, & Dawson, 2006; Thurm et al., 2007). While some of these discrepancies may be due to differing research methodologies and definitions of terminology, children with ASD have been described as an extremely heterogeneous group—especially with regard to language development (Weismer, Lord & Esler, 2010).

Despite these discrepancies, the clinical implications of this research need to be interpreted for early childhood speech language pathologists. Multiple researchers have evaluated intervention techniques aimed at increasing these skills (Bono et al., 2004; Ferrailoi & Harris, 2011; Isaksen & Holth, 2009; Jones, Carr & Feeley, 2006; Jones & Feeley, 2009; Kaale, Smith & Sponheim, 2012; Kasari, Freeman, & Paparella, 2006; Kasari, Gulsrud, Freeman, Paparella & Hellemann, 2012; Kasari, Paparella, Freeman & Jahromi, 2008; Lawton & Kasari, 2012; Martins & Harris, 2006; Prelock, Calbourn, Morris, & Platt, 2011; Rocha, Schreibman, & Stahmer, 2007; Vismara & Lyons, 2009; Whalen & Schreibman, 2003; Whalen, Schreibman &

Ingersoll, 2006). As such, it is pertinent that early childhood speech language pathologists understand the research behind joint attention and language skills in young children with ASD; as well as available intervention techniques so that they are able to provide the most efficacious treatment to their clients.

### **Terminology**

Compared to typically developing children and children with developmental delays, children with autism spectrum disorder (ASD) have shown significant deficits in joint attention skills from a young age (Adamson et al., 2008; Carpenter et al., 2002; Charman et al., 1997; Charman et al., 2003; Dawson et al., 2004; Murray et al., 2008; Thurm et al., 2007). Joint attention skills have been studied both as a whole (Charman et al., 1997; Charman et al., 2003; Dawson et al., 2004; Kasari et al., 2006; McCarthren et al., 1999; Prelock et al., 2011; Sigman & Ruskin, 1999 as cited in Smith et al., 2007) and through the subdivisions of response to joint attention (RJA) and initiation of joint attention (IJA) (Bono et al., 2004; Carpenter et al., 2002; Charman et al., 2003; Ferraoili & Harris, 2011; Isaksen & Holth, 2009; Jones et al., 2012; Jones & Feeley, 2009; Kaale et al., 2006; Kasari et al., 2011; Kasari et al., 2008; Lawton & Kasari, 2012; Luyster et al., 2008; Martins & Harris, 2006; Murray et al., 2008; Rocha et al., 2007; Schertz & Odom, 2007; Sigman & Ruskin, 1999 as cited in Smith et al., 2007; Thurm et al., 2007; Toth et al., 2006; Vismara & Lyons, 2007; Whalen & Schreibman, 2003; Whalen et al., 2006). Response to joint attention (RJA) is the process of reacting to an individual's attempts to call a communication partner's attention to an object, event, or third entity; this can be accomplished either verbally or non-verbally through the use of gaze switching or gestures. When individuals engage in initiation of joint attention (IJA), they call their communication partner's focus to an object, event, or third entity through the use of verbal or non-verbal cues;

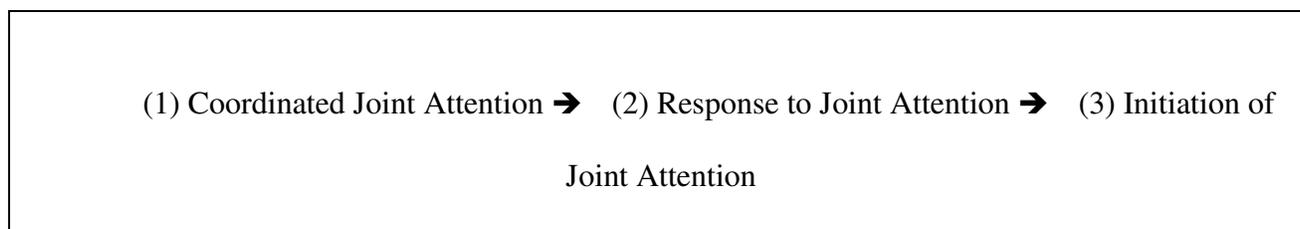
however, it needs to be stated that IJA is not considered a request for an object rather it is the act of sharing attention with a communication partner. Coordinated JA (CJA) is to be operationally defined as sharing attention to an object, event, or third entity with another individual. While these three concepts are widely discussed in research to date, the use of this terminology varies among researchers (Bruinsma, Kogegel & Koegel, 2004 as cited in Meindl & Cannella-Malone, 2011). Despite the distinction between these three JA skills, most researchers recognize RJA and IJA as core skills of joint attention (JA) and solely discuss these two skills. As such, a large majority of this literature review will focus on RJA and IJA skills in young children with ASD with minimal mention of CJA skills.

### **Development of joint attention skills in children with ASD**

Carpenter et al. (2002) conducted research aimed at understanding the development of joint attention skills in young children with ASD as compared to typically developing children. In order to complete this research, the skills of RJA and IJA were ordered according to their time, or age, of acquisition. While children with ASD showed significant deficits in the development of joint attention skills as a whole, their development of joint attention skills followed the same pattern as that of typically developing children. Both groups of children began with CJA. Following the mastery of CJA with another individual, the children with ASD and typically developing children began to respond to bids for joint attention from their communication partners. The final joint attention skill to emerge in both groups of children was that of initiation of joint attention.

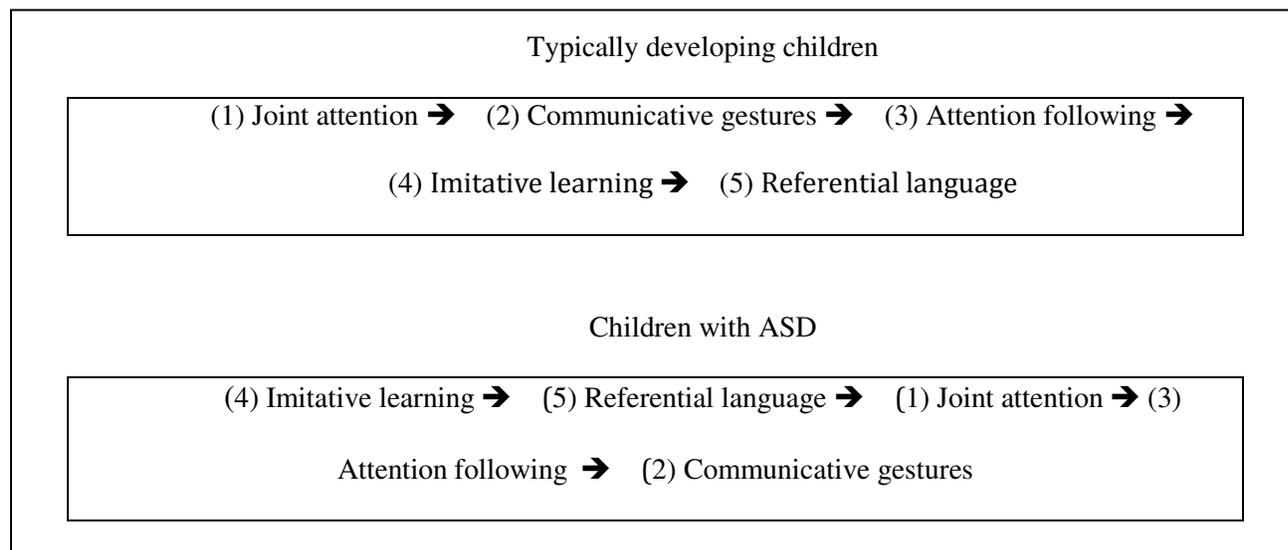
Table 1:

Development of JA skills in typically developing children and children with ASD



While the children with ASD demonstrated the same developmental pattern with regard to the acquisition of joint attention skills as typically developing children, their development of other early skills was significantly different than that of the control group of typically developing children.

Table 2:



Following the collection of this information, these authors questioned whether the atypical development of these early skills might be a cause for the deficits in language development seen in children with ASD (Carpenter et al., 2002).

## **Relationship between response to joint attention, initiation of joint attention, and language development in children with ASD**

Many researchers have aimed to understand the predictive value of joint attention skills in order to determine the concurrent and later language abilities of young children with ASD. Some researchers have studied joint attention skills as a whole (Charman et al., 1997; Charman et al., 2003; Dawson et al., 2004; McCarthen et al., 1999; Sigman & Ruskin, 1999 as cited in Smith et al., 2007), while other researchers have separated joint attention skills into RJA, IJA, and CJA to determine what particular type of joint attention determines the concurrent and later language development of young children with ASD (Bono et al., 2004; Carpenter et al., 2002; Charman et al., 2003; Luyster et al., 2008; Murray et al., 2008; Sigman & Ruskin, 1999 as cited in Smith et al., 2007; Thurm et al., 2007; Toth et al., 2006).

Researchers who have studied joint attention as a whole have concluded that joint attention skills are strongly correlated with concurrent and later language scores in young children with ASD (Charman et al., 2003; Dawson et al., 2004; McCathren et al., 1999; Sigman & Ruskin, 1999 as cited in Smith et al., 2007). Dawson et al. (2004) found that joint attention skills were the lowest in children with ASD as compared to typically developing children and children with developmental delays. These researchers also concluded that joint attention was the best predictor of concurrent language abilities in all three of the groups studied.

In support of Dawson et al.'s (2004) research, Bono et al. (2004) followed a group of 29 children with ASD with a mean chronological age of 46.68 months and a mean mental age of 26.37 months for one year. They found that those children who had better joint attention skills at the beginning of the study showed greater language development at the one-year follow-up assessment. This conclusion was further supported by research conducted by Toth et al. (2006)

who found that children with ASD who presented with better joint attention abilities between 34-52 months of age had higher overall language scores at 65 to 78 months of age than children with lower joint attention skills. In addition, Sigman and Ruskin (1999, as cited in Smith et al., 2007) found that four-year-old children with better IJA and RJA abilities showed better overall language development at the age of five than those children with lower IJA and RJA skills.

Charman et al. (2003) support these findings through their research in which children with ASD were separated into two groups: those with “high joint attention” skills and those with “low joint attention” skills (p. 271). “High joint attention” was defined as “gaze switching on 67% or more trials,” and “low joint attention” was operationally defined as “gaze switching on 50% or fewer trials” (p. 271). Children placed into the “high joint attention group” showed better receptive language scores than those children placed in the “low joint attention group” at the conclusion of the study. However, no group differences were seen with regard to the expressive language scores between the two groups.

Children with ASD who have better joint attention skills have better concurrent and later language development than those children with lower joint attention skills. While this research is pertinent to the field of speech language pathology, it is important to understand that these studies are broad representations of both language abilities and joint attention skills. In order to understand the exact effects of JA skills on expressive and receptive language abilities, researchers have studied RJA and IJA separately (Bono et al., 2004; Carpenter, et al., 2002; Charman et al., 2003; Luyster et al., 2008; Murray et al., 2008; Sigman & Ruskin, 1999 as cited in Smith et al., 2007; Thurm et al., 2007).

### **Response to joint attention**

In Dawson et al.'s (2004) research children with ASD showed a lower response to bids for joint attention from a communication partner than did children with developmental delays and typically developing children (Dawson et al., 2004). In addition, 48-month-old children with ASD have been shown to produce fewer responses to gaze switching than children with developmental delays (Carpenter et al., 2002). Many researchers have studied the RJA skills in children with ASD and have found that children with ASD present with a reduced ability to respond to bids for joint attention from a communication partner (Charman et al., 1997; Dawson et al., 2004). This reduction in the ability to respond to bids for joint attention has been found to correlate with delayed development of language abilities in children with ASD (Sigman & Ruskin, 1999 as cited in Smith et al., 2002).

**Expressive language:** Some researchers, such as Murray et al. (2008), have chosen to further study RJA skills in conjunction with expressive language development in children with ASD. Murray et al. (2008) found that those children with ASD who have better RJA skills scored better on measures of expressive language ability. These children with higher RJA abilities showed better syntactic development, as evidenced by their longer utterance lengths (higher MLU), than those children with lower RJA skills. However, these researchers did not find a correlation between RJA and the expressive language measure of semantic development (TTR). It was concluded that three to four-year-old children with ASD who have greater RJA skills show better syntactic, but not semantic, expressive language development.

**Receptive language:** In contrast to research conducted by Murray et al. (2008), researchers such as Charman et al. (2003), Luyster et al. (2008), and Thurm et al. (2007) concluded that RJA does not predict expressive language abilities; rather these researchers found

that RJA skills best predicted later receptive language abilities. Specifically, Charman et al. (2003) found that children who showed increased joint attention skills at 20 months of age had higher receptive, but not necessarily expressive, language abilities at 42 months of age. Additionally, these three research groups found no correlations between IJA skills and receptive language abilities of young children with ASD.

### **Initiation of joint attention**

Young children with ASD have shown deficits in early JA skills as a whole (Adamson et al., 2008; Carpenter et al., 2002; Charman et al., 1997; Charman et al., 2003; Dawson et al., 2004; Murray et al., 2008; Thurm et al., 2007). These significant deficits span across both RJA (Carpenter et al., 2002; Charman et al., 1997; Dawson et al., 2004) as well as IJA skills (Dawson et al., 2004; Murray et al., 2008) as these young children with ASD have been shown to attempt fewer responses to and initiations of joint attention (Dawson et al., 2004).

Researchers are continually attempting to determine what these deficits mean with regard to concurrent and later language development in children with ASD. Researchers have been unable to come to a unified decision as to the predictive value of IJA skills on language development in these young children with ASD (Bono et al., 2004; Dawson et al., 2004; Luyster et al., 2008; Murray et al., 2008; Smith et al., 2007; Toth et al., 2006; Thurm et al., 2007).

Many other researchers support the findings of Charman et al. (2003), Luyster et al. (2008), and Thurm et al. (2007) by stating that IJA skills correlate with neither expressive nor receptive language abilities in young children with ASD. Murray et al. (2008) found no significant correlations between IJA and the expressive language measures of MLU and TTR. These researchers also found no evidence that linked IJA with receptive language abilities. Additionally, researchers such as Thurm et al. (2007) and Luyster et al. (2008) found that the IJA

skills of children with ASD were not correlated with these children's overall language development.

However, other researchers have found the opposite to be true. Researchers such as Bono et al. (2004) have found that, in fact, more attempts to initiate acts of joint attention led to higher language abilities at follow-up assessments. Results showed that better IJA skills were significantly correlated with higher language abilities at the first assessment. In addition, higher language abilities at the initial assessment led to greater gains in language during the one-year follow-up assessment.

The inability of researchers to come to a decision about the predictive value of IJA on language development lends itself to questions related to the importance of IJA skills as a whole. Some researchers who have come to the conclusion that IJA is not correlated with language outcomes in young children with ASD have created hypotheses as to the value of IJA skills in young children with ASD (Murray et al., 2008; Dawson et al., 2004).

One of these hypotheses is that IJA skills may be associated with the pragmatic use of language. In other words, IJA may be considered to develop into a social domain of language, which is often deficient in children with ASD. As such, IJA may not be directly linked to the development of expressive and receptive language skills but may instead be correlated with social-communicative development (Murray et al., 2008). Without the development of pragmatics, children with ASD may be left without the social exchanges that support the development of language skills. Dawson et al. (2004) take this hypothesis one step further by stating that when typically developing children participate in IJA this behavior is reinforced with affective sharing with their adult counterpart. For these typically developing children, this experience is rewarding and will motivate the child to further initiate bids for JA. However, these

researchers hypothesized that children with ASD may not find this sharing of attention naturally reinforcing and as such may not be motivated to participate in JA interactions. In turn, this may decrease their likelihood of developing appropriate IJA skills and decrease their pragmatic development. The question remains to be answered as to whether this reduction in affective sharing (Dawson et al., 2004) and the delayed development of pragmatics (Murray et al., 2008) lead to a decrease in opportunities to communicate; in turn, reducing the amount of language that young children with ASD are attending to and producing in their communication environment.

### **Relationship between response to joint attention and initiation of joint attention skills in young children with ASD**

The important question for early childhood speech language pathologists remains to be answered. Is there any relationship between the skills of IJA and RJA? This question is pertinent to the field of speech language pathology as it determines how JA skills are targeted in intervention. If the two skills show a correlation, it is possible that by only targeting one the other skill will generalize. However, if these two main skills (RJA and IJA) show no correlation, then they must be targeted separately during intervention. While research has yet to come to a unanimous decision about the correlation between these two skills, significant evidence has been provided that there is no correlation in the development between IJA and RJA skills in young children with ASD. As such, intervention to target JA skills should target RJA and IJA as separate abilities (Ferrailoi & Harris, 2011; Isaksen & Holth, 2009; Jones et al., 2012; Jones & Feeley, 2009; Kaale et al., 2012; Kasari et al., 2012; Kasari et al., 2008; Lawton & Kasari, 2012; Martins & Harris, 2006; Murray et al., 2008; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyons, 2007; Whalen & Schreibman, 2003; Whalen et al., 2006).

### **Joint attention intervention for young children with ASD**

Researchers have used multiple intervention techniques to target RJA and IJA as separate skills in young children with ASD. These techniques vary based upon who provides intervention and the environment in which the intervention is provided. Interventionists may be family members (parents or siblings) (Ferraoli & Harris, 2011; Jones & Feeley, 2009; Jones et al., 2012; Prelock et al., 2011; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyons, 2007), teachers under the supervision of a speech language pathologist (Isaksen & Holth, 2009; Kaale et al., 2012; Lawton & Kasari, 2012; Martins & Harris, 2006), speech language pathologists (Kasari et al., 2006; Kasari et al., 2012; Kasari, et al., 2008; Whalen et al., 2006; Whalen & Schreibman, 2003), behavior analysts, or professionals of which the intervention procedures reviewed are within his or her professional scope of practice.

The interventions reviewed also vary in the methodologies with which they teach JA skills. These methods include ABA (Applied Behavior Analysis) methods of Discrete Trial Training (DTT), Pivotal Response Training (PRT), and Enhanced Milieu Teaching (EMT), and developmental methods of teaching. Some of the interventions reviewed utilized only one technique to target JA skills (Isaksen & Holth, 2009; Lawton & Kasari, 2012; Prelock et al., 2011; Schertz & Odom; Vismara & Lyons, 2007) while other experimenters utilized a combination of methods to implement intervention (Ferraioli & Harris, 2011; Jones & Feeley, 2009; Kaale et al., 2012; Kasari et al, 2006; Kasari et al., 2012; Kasari et al., 2008; Rocha et al., 2007; Whalen et al., 2006; Whalen & Schreibman, 2003).

#### **Intervention techniques:**

Discrete Trial Training (DTT) is an ABA intervention technique that utilizes “prompting, cueing, chaining, fading, and differential reinforcement” (Jones et al., 2012; Kaderavek, 2011, p.

297; Rocha et al., 2007) to target a specific behavior. Additionally DTT procedures include error correction, task interspersal, and repeated trials (Ferraioli & Harris, 2011). Researchers have employed this framework to teach JA skills to young child with ASD as it provides researchers a structured method of intervention. Using a DTT method, researchers are more readily able to regulate intervention and ensure that each experimenter or clinician is providing regimented instruction (Ferraioli & Harris, 2011; Isaksen & Holth, 2009; Jones et al., 2012; Jones & Feeley, 2009; Kaale et al., 2012; Kasari et al., 2006; Kasari et al., 2012; Kasari et al., 2008; Martins & Harris, 2006; Rocha et al., 2007; Whalen & Schreibman, 2003; Whalen et al., 2006).

Pivotal Response Training (PRT) is a based upon ABA methods of intervention. This technique uses the principles of teaching in a child's natural environment through structured operant teaching techniques (Ferraioli & Harris, 2011; Kaderavek, 2011, p. 296). Additionally, PRT utilizes the techniques of following the child's lead, following the child's interest, interspersing maintenance and acquisition tasks, varying tasks to maintain interest, reinforcement of correct responses, reinforcement of reasonable attempts made by the child, the use of direct natural reinforcers (Vismara & Lyons, 2007), parallel talk, and creating play routines (Kaale et al., 2012). Researchers who use this method aim to increase the children's abilities to generalize skills learned in therapy to their activities of daily living.

Researchers have also employed the use of Enhanced Milieu Teaching (EMT) to increase JA skills in young children with ASD (Kasari et al., 2006; Kasari et al., 2012, Kasari et al., 2008). This technique is considered a naturalistic approach to intervention that utilizes strategies of modeling, mand-modeling, time delay, and incidental teaching. According to Kaderavek (2011) this approach is to be used with children who "(a) are verbally imitative, (b) have a

vocabulary of at least 10 productive words, and (c) have an MLU between 1.0 and 3.5 words” (Hancock & Kaiser, 2006, p. 204).

While each of these intervention techniques is specific in their implementation, some of these researchers use a combination of methods to increase the participant’s likelihood of generalization of JA skills to novel situations, environments, toys, or communication partners. Despite differing research intervention techniques, all of the articles reviewed concluded that young children with ASD could be taught JA skills from family members, teachers, and/or clinicians in a variety of settings (Ferraoli & Harris, 2011; Jones et al., 2012; Isakesen & Holth, 2009; Jones & Feeley, 2009; Kaale et al., 2006; Kasari et al., 2012; Kasari et al., 2008; Kasari et al., 2008; Lawton & Kasari, 2012; Martins & Harris, 2006; Prelock et al., 2011; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyons, 2007; Whalen & Schreibman, 2003; Whalen et al. 2006). A large majority of these experiments targeted RJA and IJA separately and a majority of articles found that IJA skills required more training than RJA skills (Ferraoli & Harris, 2011; Jones et al., 2012; Isakesen & Holth, 2009; Jones & Feeley, 2009; Kaale et al., 2012; Kasari et al., 2012; Kasari et al., 2008; Lawton & Kasari, 2012; Martins & Harris, 2006; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyons, 2007; Whalen & Schreibman, 2003; Whalen et al., 2006).

### **Family-centered approaches:**

Family-centered approaches to teach JA skills to young children with ASD have been successful in implementing interventions in homes and in clinical settings. These researchers provided family members (parents and siblings) with instruction, modeling, and contingent feedback to ensure that parents understood the purpose of intervention techniques, accurate implementation, and reinforcement techniques for each intervention. In some cases, parents were

monitored directly and were provided feedback immediately (Ferraioli & Harris, 2011; Rocha et al., 2007); while in other cases, parents were provided with delayed feedback (Jones & Feeley, 2009; Prelock et al., 2011; Schertz & Odom, 2007). Despite differences in methodology, all family members were able to effectively implement JA intervention with their children with ASD. The conclusions to be drawn from these studies with family members are: (1) Intervention should be tailored to each family's lifestyle, preference, and needs; (2) the provision of modeling and feedback from speech-language pathologists is essential to ensure each family's motivation to participate and accurate implementation of intervention (Prelock et al., 2011); (3) the use of motivating stimuli increases a child with ASD's motivation to complete intervention activities (Vismara & Lyons, 2007); (4) family members are able to effectively implement intervention techniques targeted at increasing JA skills for children with ASD; (5) and the use of PRT, DTT, and developmentally-based methods are effective in training young children with ASD to respond to and initiate bids for JA. Additionally, it can be inferred from these studies that there is no specific intervention technique that is proven most effective at teaching JA skills to young children with ASD (Jones et al., 2012; Jones & Feeley, 2009; Prelock et al., 2011; Rocha et al., 2007; Schertz & Odom, 2007; Vismara & Lyons, 2007).

Schertz and Odom (2007) found that intervention for young children with ASD should be implemented based upon parent-child relationships. In doing this, these experimenters believed that children would be more likely to generalize targeted skills, as this strategy would utilize children with ASD's primary social-communicative partners as the implementers of the intervention. Schertz and Odom (2007) implemented an intervention targeting RJA and IJA skills by teaching skills based upon a developmental model. Each child was first taught to focus on a communication partner's face to increase each child's tolerance for looking at another

individual's face. The second skill taught was turn taking. The purpose of this was to promote communicative reciprocity seen in typical conversation. Following the acquisition of these skills, children with ASD were taught to respond to JA through sharing attention of an object between a parent and his/her child following a parent's bid for IJA. Once each child was independent in responding to bids for JA, parents supported their child's acquisition of IJA skills by showing excitement following their child's attempts to initiate bids for JA. Throughout training protocols, experimenters' primary roles were to support the parents in learning the new skill set, educate parents on the purpose and goals of each phase of intervention, provide parents with examples of all required activities, and track the progress of each parent-child dyad. Two of the three participants demonstrated increased JA skills following intervention; one of the three participants showed progression toward JA with increased focus on faces and turn-taking skills. Researchers concluded from these results that in order to teach JA skills, prerequisite skills (focus on a communication partner's face, turn-taking, share attention of an object, etc.) must be mastered.

While these interventions utilized a developmental model of intervention, Prelock et al. (2011), Vismara and Lyons (2007), Ferraioli and Harris (2011), Jones and Feeley (2009), and Rocha et al. (2007) utilized behavioral methods to teach JA skills to young children with ASD.

**Family-centered approaches utilizing PRT:** Prelock et al.'s (2011) research concluded that intervention is most effective if tailored to each family's lifestyle, preference, and needs. Families were able to choose between a PRT intervention and a developmentally based intervention method targeting JA skills for children with ASD between the ages of two and three year. Families who required more support from the interventionist and were less comfortable engaging in play with their children were better candidates for a PRT-based intervention; while families who were competent in play with their children and who managed difficult behaviors

with ease were better candidates for the developmental model of JA intervention. Researchers proposed that by tailoring intervention to each family, each family's motivation to participate in intervention was increased.

Results from this study noted that all participating parents believed that modeling and direct training provided by trained experimenters in their home was the most valuable component of the intervention. Researchers, on the other hand, believed that intervention would have been more effective had it been provided in shorter, more frequent, intervention sessions with a longer overall duration. These experimenters hypothesized that families' abilities to conduct the intervention was based upon each family's ability to perceive the JA skill of gaze shifting. Without a solid understanding of the targeted JA skill, researchers believed that families would not appropriately implement the JA intervention and may not fully commit to the intervention itself (Prelock et al., 2011).

Vismara and Lyons (2008) conducted another experiment in which children with ASD participated in an experiment that utilized a PRT method to determine the contribution of using preservative interest stimuli to teach JA skills. Researchers found that despite the fact that IJA skills were not directly targeted in therapy, IJA behaviors increased following the provision of intervention using highly motivating stimuli. The immediate increase in IJA skills suggests that the use of motivating stimuli is pertinent to intervention targeting JA for children with ASD. Researchers hypothesized that the increase in IJA skills was due to an increase in the participant's motivation to participate and initiate JA interactions with family members.

**Family centered approaches utilizing PRT and DTT methods:** Rocha et al. (2007), Ferrailo and Harris (2011), and Jones and Feeley (2009) used a combination of PRT and DTT methods with young children with ASD in order to teach JA skills. While all three of these

experiments resulted in an increase in JA skills, all three studies employed differing methodologies.

Rocha et al.'s (2007) research targeted RJA skills using a parent-implemented combined five-phase DTT and PRT model. Trained experimenters educated parents on how to respond appropriately to their child's actions; experimenters also modeled each phase of the intervention, described the purpose of each phase, and demonstrated how to accurately prompt for appropriate behaviors. The intervention procedures administered through Rocha et al.'s (2007) research were identical to the procedures administered by Whalen and Schreibman (2003) and Whalen et al. (2006).

The first phase of training required the child to respond to a bid for JA by following the adult's placement of the child's hand onto an object. Following mastery at this level, phase two was conducted which required the child to respond to the adult's attempts to initiate JA by tapping on a new object. Children were then required to respond to the showing of an object by the adult in the third phase. Prior to completing phases four and five, each child was taught to maintain eye contact through the use of DTT techniques. Once children consistently established eye contact, phases four (which required the child to respond appropriately to a point) and five (which required children to respond to a gaze switch toward an object without pointing) were completed (Rocha et al., 2007).

At the conclusion of the study, children in Rocha et al.'s (2007) study improved CJA, RJA, and IJA skills with generalized improvement in RJA and IJA to the home environment without the experimenter present; all participants responded to a higher percentage of JA initiations following intervention. Parent participants initiated more bids for JA following training than during baseline. However, this increase was seen less consistently in phases four

and five than in the first three phases. At a follow-up assessment within the home, no parent maintained an increase in initiations of JA. From this conclusion, researchers hypothesized that it is important that parents understand the purpose of intervention and consider the intervention to be worthwhile in order to maintain consistent implementation.

Unlike Rocha et al.'s (2007) research that was implemented in a clinical setting, Jones and Feeley (2009) supported parents in implementing an intervention targeting both RJA and IJA skills within each family's home. Jones and Feeley (2009) taught RJA and IJA skills separately with IJA skills taught immediately following mastery of RJA skills. Parents were able to adequately implement the intervention resulting in mastery of both JA skills for all children with generalization of JA skills to novel toys; however IJA required more intervention to mastery than RJA skills in two of the three participants. Researchers hypothesized that the increase in time required to master IJA skills was because RJA skills require only mastery of gaze alternation while IJA skills included gaze alternation and pointing.

Utilizing sibling-mediated JA intervention, Ferraoili and Harris (2011) demonstrated that IJA must be directly targeted, as increases in RJA skills do not lead to direct improvements in IJA Skills. Changes in RJA were seen for all participating children with pre-treatment variables impacting outcome of IJA skills for all children. Children with increased pre-treatment IJA skills showed better IJA post-treatment. Despite differences in IJA skill acquisition, all siblings were able to administer the intervention and found treatment to be adequate and motivating.

Parent and sibling participants in the previously reviewed articles were able to adequately implement all interventions despite differing methodologies. Although differences in outcome of children with ASD were appreciated, at least some of all children with ASD in each study increased either RJA and/or IJA skills following the implementation of intervention with

generalization of JA skills in some studies (Ferraioli & Harris, 2011; Jones & Feeley, 2009; Prelock et al., 2011; Rocha et al., 2007; Schertz & Odom, 2004; Vismara & Lyons, 2007).

### **Teacher-implemented JA intervention**

As with family members, teachers have been able to adequately implement intervention resulting in increases in JA skills for children with ASD. These children have participated in JA interventions that included intervention utilizing behavioral methods of DTT and PRT in both preschool and kindergarten classes with positive results in both settings.

Lawton and Kasari (2012) demonstrated an increase in IJA skills with preschool children with ASD following a two-group comparison study utilizing a developmental behavioral model names Joint Attention and Symbolic Play/Engagement and Regulation (JASP/ER). JASP/ER included the strategies of: Setting up the environment, following the child's toy choice, imitating the child's play actions, prompting for play actions, establishing play routines, violations, waiting for communication, contingent language, prompting for joint attention, modeling joint attention, and encouraging eye contact. One group of children received the experimental intervention as well as typical classroom instruction while the other group received typical classroom instruction with pullout speech therapy services. All children participating in the study showed increases in IJA skills with no difference seen in the mean total nor the overall total frequency of IJA bids between the two groups. Additionally, all teachers participating in this experiment were able to successfully implement the intervention to all participating preschool children.

**Teacher-implemented JA intervention utilizing ABA techniques:** Three research experiments utilized only ABA methods of intervention presented via teachers; two of these experiments included preschool children participants (Martins & Harris, 2006; Jones et al.,

2012), one of which included kindergarten children participants within a classroom setting (Isaksen & Holth, 2009). All three of these studies found increases in both RJA and IJA skills following intervention.

Both studies with preschool children with ASD in the classroom setting concluded that RJA and IJA skills are distinct abilities that require individual intervention techniques per skill. Martins and Harris (2006) utilized a specific prompting hierarchy to establish response to JA skills. Teachers were instructed to implement a four-phase intervention: (1) the use of an attention getting phrase with a head turn, a point touching the object, and a verbalization of, “look;” (2) the use of an attention getting phrase with a head turn, a point that does not touch the object, and the verbalization, “look;” (3) the use of an attention getting phrase with a head turn and the verbalization of, “look at that;” and (4) the use of an attention getting phrase and a head turn. Results from this study supported researchers’ conclusion that JA intervention was successful in increasing participant’s motivation to participate in RJA and IJA turns with a communication partner. Following intervention increases in RJA and IJA skills were noted for all participating children.

These results carried over to Isaksen and Holth’s (2009) research on a teacher-implemented intervention with kindergarten-aged children with ASD. This intervention utilized a three-phase intensive ABA model: (1) teach the child to respond to bids for JA; (2) establish a normal conditioned reinforcer (smiling and/or nodding); and (3) teach the child to use JA skills in turn-taking activities. Following treatment, all three kindergarten-aged children made significant progress in mastering RJA and IJA skills with maintenance and improvement of JA skills at a one-month follow up assessment.

An increase in RJA and IJA skills was also found following a teacher-implemented intervention with preschool aged participants conducted by Jones et al. (2012). These researchers utilized a combined DTT and PRT model to elicit JA behaviors. All participants were able to increase both RJA and IJA skills following treatment. When the researchers analyzed the results, they found that children required additional sessions to master the IJA skills as compared to mastery of RJA skills.

### **Clinician-implemented intervention**

The final form of intervention for JA skills reviewed for the purposes of this literature review included intervention administered by clinicians in a clinical setting. Children in these studies ranged in chronological ages from three to four years of age. Following administration of all of these experimental interventions, children were noted to show improvements in RJA and IJA skills. Three of the five studies reviewed provide information on increases in language skills as a direct result of increases in JA skills following clinician-implemented intervention, and two of the five studies reported increases in RJA and IJA skills following intervention.

**Clinician-implemented techniques utilizing DTT and PRT methods:** Whalen et al. (2006) and Whalen and Schreibman (2003)'s research utilized combined DTT and PRT methods to increase RJA and IJA skills with four year-old children with ASD. Both interventions taught RJA and IJA as separate skills with RJA skills taught prior to IJA skills. Both studies implemented RJA training utilizing the same strategies as those implemented in Rocha et al. (2007). IJA training for both studies was administered by teaching coordinated gaze shifting and protodeclarative pointing (Whalen & Schreibman, 2003).

Whalen and Schreibman (2003) reported that increases in RJA and IJA skills were noted for all participants with maintenance of RJA skills at a three-month follow up assessment.

Despite significant increases, and maintenance, of RJA skills, these researchers noted that IJA skills increased immediately following treatment with no evidence of maintenance of IJA skills as a whole at three-month follow-up assessment. Maintenance of protodeclarative pointing was noted at the follow up assessment without increases in coordinated gaze shifting. Overall, these IJA skills were increased as compared to baseline behaviors.

While Whalen et al. (2006) administered the same procedure of JA intervention, these researchers reported, “positive collateral changes were observed in social initiations, positive affect, imitation, play, and spontaneous speech” (Whalen et al., 2006, p. 655). Increases in spontaneous speech were noted directly following treatment with a slight decrease in skills at a follow-up assessment; however the percentage of spontaneous speech at follow-up was increased as compared to baseline expressive language scores.

**Increases in expressive language following JA intervention:** As with Whalen et al.’s (2006) researcher, Kasari et al. (2008) found that increases in JA skills impacted growth in expressive language abilities for three to four year old children with ASD. Children in this study were placed into a JA, a symbolic play (SP), or a control group. The JA and SP interventions utilized a combination of DTT and milieu-teaching techniques while the control group was administered a typical adult-directed ABA method of therapy. Children in the JA intervention showed increases in RJA skills and IJA skills of giving and showing (Kasari et al., 2006). Additionally, children in the JA group showed significantly greater growth in expressive language following intervention than the SP and control groups. Specifically, the more IJA episodes produced by a child, the greater growth was noted in expressive language abilities. Researchers also found that children with higher receptive language abilities at the onset of the

study showed a significantly greater growth in expressive language abilities than those children with lower receptive language scores at the onset of the study (Kasari et al., 2006).

Kasari et al. (2008) found that specific pre-treatment variables predicted language outcomes for all participating children. Those children with higher receptive and expressive language abilities, mental ages, and developmental skills showed greater progress toward age appropriate language skills following intervention than those children with lower abilities. Additionally, those children who demonstrated greater IJA episodes with their mothers prior to treatment showed more rapid increases in language abilities following intervention. Interestingly, those children with expressive language abilities of 20 months of age or below made greater gains in language development when they were randomized to the JA or SP group than if they were randomized to the control group.

Five-years post-intervention Kasari et al. (2012) reassessed 40 of the original 58 participants. At this re-assessment the average age of all children with ASD was eight years and eight months. Researchers found that those children who showed better IJA skills following the original intervention had better expressive language abilities during the five-year follow-up reassessment than those children with lower IJA abilities. Those children randomized to the JA group showed a greater increase in expressive language scores by 12.5 standard deviations than those children randomized to the SP group who showed a 10.5 standard deviation increase. Overall, Kasari et al. (2012) concluded that an increase in lexicon for children with ASD was best predicted by a younger age at the onset of intervention, better IJA abilities at the onset of intervention, and higher levels of play skills.

### **Future directions**

While the significant deficits in JA skills as a whole in young children with ASD is well documented (Adamson et al., 2008; Carpenter et al., 2002; Charman et al., 1997; Charman et al., 2003; Dawson et al., 2004; Murray et al., 2008; Thurm et al., 2007), the specific compilation of these deficits, the impact that these deficits have on language abilities, and the best practices for intervention have yet to be concluded. Much research remains to be completed with children with ASD regarding JA skills.

Foremost, a distinct definition of JA skills needs to be formulated. Research on this topic utilizes multiple terms to discuss the same skills. However, with differing terminology it is difficult for researchers to ensure that they are studying the same skills.

Additionally, research needs to be conducted with differing severity levels of ASD. While some research articles reviewed specified specific subtypes of ASD, most articles did not make a distinction based upon the severity level of ASD. These distinctions may have implications for differing JA abilities and different responses to treatment. .

Researchers should aim to study the efficacy of intervention techniques on children of differing ages. This is not only true for children with ASD but typically developing children as well. Few of the studies reviewed utilized a control group with typically developing children as a comparison group. Rather, they utilized a comparison group from previous research. This method of research may decrease the validity of their results. By providing a comparison group at the same time as the experimental group, researchers ensure that intervention was provided consistently between groups and interventionists.

While the interventions reviewed concluded positive results for JA and language skills, more research needs to be conducted on a younger population. Specifically, the field of speech

language pathology is in need of evidence-based interventions for early intervention targeting JA skills for children with ASD. As the age of identification of ASD becomes younger, early intervention speech language pathologists must be prepared to provide intervention to these children. With the research provided, it has been concluded that targeting JA is pertinent to the development of many other skills. As such, it would be beneficial for research to be conducted for children eligible for early intervention services.

Much research remains to be conducted as to the relationship between JA skills and language development. This area of research may help speech language pathologists better understand the development of language skills for children with ASD and may aid in providing adequate intervention to children with ASD. While some research has been conducted in this area, it is non-conclusive and requires a larger sample size with additional follow-up assessments to truly determine the efficacy of intervention provided.

### **Summary**

Despite differences in terminology and research methodology, many conclusions may be drawn from the studies reviewed. Most importantly, it can be concluded that children with ASD show significant deficits in JA skills as a whole. These deficits have been shown to persist through both RJA and IJA skills.

While deficits in language development have been noted for young children with ASD, the impact of JA skills on concurrent and later language development remains to be found. A majority of the articles reviewed found that RJA skills best predict later receptive language abilities. However, the impact of IJA skills in language development remains to be a tumultuous debate. While some researchers claim that IJA skills have no impact on either expressive or

receptive language abilities, increases in IJA skills following intervention have been shown to correlate with increases in expressive language abilities.

Through the experimental interventions provided, a large majority of children were able to increase their RJA and IJA abilities with concomitant increases in CJA and expressive language abilities for some. While these experiments did not utilize the same research methodologies, a large majority of experiments were successful. They provide early childhood speech language pathologists with guidelines of evidenced-based interventions targeting JA skills and potential outcomes.

This research review found that children with ASD are able to successfully increase their JA skills following intervention provided by multiple interventionists, through different environments, and utilizing multiple techniques. These skills not only maintained in some instances but also generalized to novel stimuli, environments, and individuals. This research validates the importance of targeting JA skills when working with young children with ASD.

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