

Which Way Are You Looking? Establishing Eye-Direction Detection in Children with Autism Spectrum Disorders

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Abstract. Children with autism spectrum disorders (ASD) lack the ability to share attention with others. This is a key symptom for diagnosing an ASD. The inability to reference the joint attention of another negatively impacts a child's language and social skill development. This study investigated whether three preschool boys, diagnosed with ASD, could be taught to detect an adult's eye gaze direction, to obtain a motivational item. Treatment improved all of the participants' ability to reference the trainer's eye gaze and use the trainer's eye direction to locate a concealed reinforcer. If children with ASD can improve their ability to share attention, this may positively affect their language and social skill development.

1. Introduction

Children with autism have difficulties sharing attention with others. This deficit is recognized as a core feature of autism spectrum disorders (ASD). The lack of joint attention behaviors such as showing, pointing, and gaze-following is a key factor in early identification and diagnosis (Baron-Cohen, 1995).

Typically, the ability to follow another person's head and eye direction is established by the time a child is 10-12 months of age (Butterworth & Jarrett, 1991). A basic understanding of persons as intentional beings is demonstrated by 18-24 months. This is observed when a child is able to actively transfer their attention to match that of an adult's. Often, this requires the child to shift his/her own attention so that it aligns with the adult's; thus, demonstrating recognition of differing points of view (Tomasello, 1995). The development of joint attention skills appears, then, to mark the development of the child's awareness that other people can see objects or events they can see (Mundy, Sigman, & Kasari, 1990).

Children with autistic disorders demonstrate noticeable difficulties with these skills by approximately 10 months of age. Because these deficits manifest early in a child with ASD, it has been proposed, the subsequent development of both language and social skills is negatively affected. Evidence that impairments of joint attention behaviors

lead to impaired social information processing has been provided by Mundy and Neal (2001).

Joint attention skills have also been closely associated to a child's ability to develop language. For a child to correctly learn labels, they must be able to respond to the joint attention of the speaker to ensure both parties are focusing on the same thing. When a child is unable to coordinate their attention with both the speaker and a target object, appropriate word mapping fails (Dawson, 2004).

It has been suggested, that because children with autism have marked joint attention deficits which affects their ability to develop language skills and social relationships, that intervention strategies targeting the development of these skills would be appropriate. The purpose of this study was to determine if children with autism could be taught to reference a trainer's eye gaze and use the trainer's eye direction to locate a concealed reinforcer.

2. Experiment, Results, Discussion, and Significance

Three boys, diagnosed with autism were selected for this multiple base-line study. Two of the boys were 5 years old, one was 3 years old. They were enrolled in a university-based clinic. It was observed, these boys had difficulties initiating and responding to joint attention activities (e.g., directional eye gaze, pointing and showing). They struggled to establish social interactions with their peers and their language skills were significantly delayed for their age.

To begin, a reinforcement inventory assessment was administered to identify highly preferred items that would be reinforcing for each child. It was determined that each child responded best to food (e.g., M&Ms, chips). These preferred items were used to establish a baseline measure (Phase 1) for each child to verify if the participants were able to locate the food after: the trainer indicated they were hiding it under one of three cups, asked the child to hide their eyes, hid the item under a cup, established visual attention with the child, and directed them to look for the item under the cup

while shifting their eye gaze in the direction of the appropriate cup.

During this activity, the child was placed 2 feet in front of the three cups on a child-size carpet square. The trainer was positioned 2 feet behind the cups, and lowered to the ground so that her head was at the approximated level of the cups. The trainer did not move the direction of her head toward the cup, but rather kept it straight forward and shifted only the direction of her eye-gaze. The cups were spaced approximately one foot apart on all sides so that it would be obvious to the child where the trainer's gaze was being directed.

During baseline, for a response to be considered correct, the child had to establish visual attention with the trainer's gaze prior to selecting a cup and retrieving their desired item. If the child moved to a cup, without referencing the direction of the trainer's eye gaze, the response was considered incorrect, even if the child happened to "guess" the correct cup.

During the initial baseline series, the children did not reference the trainer's eye gaze nor detect the trainer's eye gaze direction. Even when the children did not immediately receive their preferred item, they did not appear to use a different strategy, other than guess, to assist them in locating the reinforcer.

Once baseline had been completed, verbal and visual prompts were provided by the trainer during Phase 2 (treatment), to help the child learn to use the trainer's eye gaze to locate their preferred item. As each child began to respond appropriately, prompts were eliminated and the training continued until the child was able to consistently reference the trainer's eye gaze direction to locate their motivators.

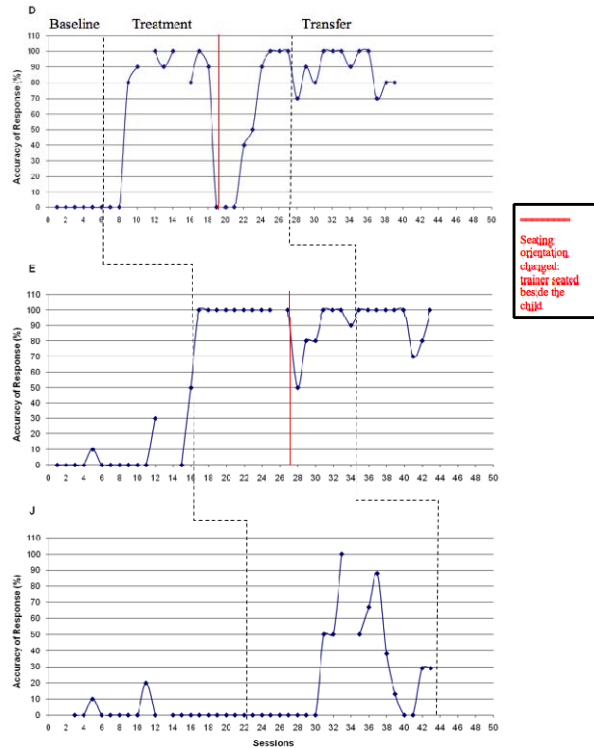
Treatment improved all of the participants' ability to reference the trainer's eye gaze and use the trainer's eye gaze direction to locate the reinforcer (see Figure 1). During treatment, the orientation of the trainer relative to participants D & E was shifted so that the trainer was seated next to the child. D & E learned to shift their physical orientation to the trainer to detect the necessary visual information to locate the reinforcer.

Four weeks after the completion of the treatment phase, new trainers began Phase 3 (transfer). New eye direction detection tasks were presented to D & E in new environments, using new concealers, while alternating seating orientations.

3. Conclusions

Treatment improved all of the participants' ability to reference the trainer's eye gaze and use the trainer's eye

gaze direction to access information. Two of three participants maintained and generalized eye-direction detection in new environments, using new concealers, with new trainers (see Figure 1). Additional research is needed with a greater number of participants to determine if these skills will transfer into social learning situations.



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