Increasing sharing in children with autism spectrum disorder using automated discriminative stimuli

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A R T I C L E   I N F O

A B S T R A C T

Appropriate sharing of a high-preference item is a common problem among children with autism spectrum disorder (Baron-Cohen et al., 1985). The purpose of the current study was to evaluate whether a multiple schedule of reinforcement could be used to promote appropriate turn-taking behavior. Participants included one dyad of siblings and one dyad of non-related peers who were identified as having poorly developed sharing skills. The first dyad included a 6-year-old diagnosed with autism and his typically developing sister. The other dyad included a 4-year-old and 5-year-old, both diagnosed with autism. During sessions, an auditory and visual stimulus in the form of a PowerPoint® presentation played in the background to signal each participant's turn with a mutually preferred item. Following baseline, we used a progressive prompt delay to teach the participants to attend and appropriately respond to the stimuli presented in the PowerPoint® presentation. Findings suggest that an auditory and visual stimulus can be used to increase appropriate sharing.

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1. Introduction

From Leo Kanner's (1943) initial description of the syndrome of autism to the current day, impairments in social interaction have been considered a core feature of the disorder. Children with autism spectrum disorder (ASD) have difficulty: (a) initiating interactions with others; (b) responding appropriately to social interactions initiated by others; (c) sharing preferred items and activities; (d) participating in turn-taking activities; and (e) expressing and interpreting interests and emotions using words, gestures, and facial expressions (Baron-Cohen, 2004; Boyd, Conroy, Asmus, McKenney, & Mancil, 2008; Hart & Whalon, 2008; Laushey & Heflin, 2000; Reichow & Volkmar, 2010). These social deficits can impede social and emotional development, beget persistent social isolation and peer rejection, and interfere with academic progress (Bellini, 2006; Bellini & Akullian, 2007; Camargo et al., 2014; Welsh, Widaman, & O'Neil, 2001). Despite the longstanding recognition of the importance of social deficits in children with ASD, research on treatments to increase prosocial behavior in children with ASD until recently has lagged behind other interventions for this population (Reichow & Volkmar, 2010).

A variety of procedures have been evaluated for teaching social responses to young children with ASD, including (a) adult-delivered prompts and reinforcement, (b) peer-mediated interventions in which typically developing peers are trained to appropriately prompt and reinforce social responses in children with ASD, (c) self-monitoring, (d) social scripts and script fading, and (e) video modeling (Goldstein, Lackey, & Schneider, 2014; MacDuff, Ledo, McClannahan, & Krantz, 2007; Reichow

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& Volkmar, 2010). In a number of cases, these intervention strategies have been combined into treatment packages (Goldstein et al., 2014; Kamps et al., 2015).

Most interventions for improving social interactions in children with ASD involve the participant interacting with a trained adult or peer (and the trained peers are almost always children showing typical development). Peers have participated more often in preschool or school settings (Goldstein et al., 2014), ostensibly to promote generalization, but also probably because peers are readily available in such settings. Adults often serve as social partners in clinic settings during social skills training for participants with ASD due to their availability, but also because they often are easier to train than peers (cf. Jones, Lerman, & Lechago, 2014). However, a common limitation of studies that have included adults as social partners for children with ASD is that the investigators did not test the extent to which treatment effects generalized to peer recipients (e.g., Charlop, Schreibman, & Thibodeau, 1985; Charlop-Christy & Kelso, 2003; Matson, Sevin, Fridley, & Love, 1990). Moreover, in studies that have tested for generalization of treatment effects across adults and peers, the participant's performances often have decreased in the generalization context (e.g., Charlop-Christy & Kelso, 2003; Jones et al., 2014; Leaf, Dotson, Oppeneheim, Sheldon, & Sherman, 2010). More generally, among adult-mediated interventions for increasing social interactions and sharing behavior in children with ASD, it often has been difficult to fade adult supports without observing decreases in treatment effectiveness (Whalon, Conroy, Martinez, & Werch, 2015).

Stimulus control manipulations can be used to facilitate the generalization and maintenance of treatment effects for children with ASD, both when prosocial behavior served as the dependent variable (e.g., Betz, Higbee, & Reagon, 2008; Jones et al., 2014) and when other responses have been targeted (e.g., Fisher, Greer, Fuhrman, & Querim, 2015). For example, Betz et al. (2008) used joint activity schedules to promote peer engagement and to increase the number of games each dyad played. The joint activity schedules directed each child in a dyad to engage in the same interactive games at the same time point on the schedule. Importantly, treatment effects maintained when the investigators introduced new games and when they altered the sequences on the activity schedules, suggesting that the activity schedules exerted stimulus control and promoted transfer of the treatment effects.

Jones et al. (2014) used prompting, prompt fading, and reinforcement to teach children to emit appropriate social responses (e.g., saying, "Let's play.") with an adult recipient. During subsequent stimulus control tests, results showed that the treatment effects generalized to novel adults but the investigators observed considerable degradation of treatment effects with peers. The investigators overcame this overly restricted stimulus control by exposing the participants to a video of a peer engaged in the targeted behavior with another peer who, in turn, delivered reinforcement for the appropriate social response.

Another stimulus-control procedure commonly used for promoting generalization across people and settings is to program common stimuli in the training and generalization contexts (Stokes & Baer, 1977). For example, Durand (1999) showed that the effects of training participants to emit a functional communication response (FCR) using a voice-output device in one setting (i.e., a classroom) readily generalized to other community settings without implementation of the programmed contingencies in those new settings. Apparently, the voice-output device served as a common stimulus and facilitated generalization from the training context to the generalization settings.

Multiple schedules of reinforcement may also promote stimulus generalization (Fisher et al., 2015). A multiple schedule consist of two or more reinforcement schedules (called components) in which a distinct stimulus signals the reinforcement schedule currently in effect. Transitions between components of a multiple schedule are based on the passage of time. For example, a therapist may wear a green bracelet when client requests will be reinforced on a fixed ratio (FR) 1 schedule but may wear a red bracelet when client requests result in extinction. Fisher et al. (2015) used the discriminative stimuli of a multiple schedule to promote rapid transfer of the treatment effects of functional communication training across settings and interventionists. Results showed that the discriminative stimuli of the multiple schedule promoted increasingly more rapid transfer of treatment effects with each application in each new setting or with each new interventionist.

The purpose of the current investigation was to replicate and extend the findings on the use of multiple schedules to promote treatment generalization and maintenance of treatment effects on prosocial behavior in young children with ASD. We evaluated whether the inclusion of discriminative stimuli in the context of a multiple schedule could be used to (a) decrease problem behavior, such as aggression and hoarding, associated with sharing a highly preferred item and (b) increase prosocial behaviors, such as appropriate mands and turn-taking.

2. Method

2.1. Participants

We recruited four young children to participate in this study – Owen (6 years old), Claire (5 years old), Walter (4 years old), and Abel (5 years old). We identified participants based on therapists' and caregivers' report of difficulties with sharing and grouped participants into two dyads (Owen and Claire, Walter and Abel). Owen was diagnosed with ASD and attended a university-based early intervention program. Claire was Owen's typically developing sister who did not attend the early intervention program, but visited the clinic on a bi-weekly basis to participate in sharing sessions. Owen was reported to engage in aggressive and disruptive behaviors when required to share highly preferred items with peers. At home, this aggression was often directed toward his sister, Claire. Parents reported that Claire would occasionally aggress toward Owen when he attempted to remove an item from her possession, but that she generally relinquished the item and relocated to