*OBSERVATIONAL EFFECTS ON THE PREFERENCES OF CHILDREN
WITH AUTISM*

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Children with an autism spectrum disorder (ASD) may play with limited objects or toys, making it difficult for teachers to identify reinforcers to use in teaching new skills. The goal of this study was to alter children's preferences from highly preferred toys to toys that were originally less preferred using an observational pairing procedure. Child participants observed a preferred adult playing with toys that were initially less preferred by the child. This intervention resulted in a shift in preference toward the item manipulated by the adult. Maintenance of the changed preference was idiosyncratic across participants. Results suggest a procedure for expanding the range of items that students with ASD will select.

Key words: autism, conditioned reinforcement, observational learning, preference, reinforcement

One of the defining characteristics of an autism spectrum disorder (ASD) is restricted, repetitive, and stereotyped patterns of behavior, interests, and activities (American Psychiatric Association, 2000). Circumscribed interests have been reported in 31% to 86% of individuals with high-functioning autism and 37% to 95% of individuals diagnosed with Asperger syndrome (Kerbashian, Burd, & Fisher, 1990; Szatmari, Bartolucci, & Bremner, 1989; Szatmari, Bartolucci, Bremner, Bond, & Rich, 1989;

Szatmari, Bremner, & Nagy, 1989; Tantam, 1991). Limited interests in activities may create difficulties in finding effective reinforcers and may limit educational and social opportunities. Therefore, there is a need for procedures to enhance the preference of previously neutral stimuli to expand the interests of individuals with an ASD. Such procedures have been attempted with people with and without disabilities (e.g., Bruzek & Thompson, 2007; Greer & Singer-Dudek, 2008; Hanley, Iwata, Lindberg, & Connors, 2003; Hanley, Iwata, Roscoe, Thompson, & Lindberg, 2003).

Several studies have shown that children's preferences shift toward an originally neutral or nonpreferred item when they observe others work for or choose to engage with that item

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(Greer, Singer-Dudek, & Gautreaux, 2006; Singer-Dudek, Oblak, & Greer, 2011). The effects of such procedures have been examined with typically developing preschool children (Bruzek & Thompson; 2007; Duncker, 1938) and preschool children with mild to moderate language delays (Greer & Singer-Dudek, 2008). The results of these studies suggest that children who initially do not work for or play with items do so more readily after they have observed other children do so.

Three groups of children participated in a study by Arenson (1976). Children in one group were exposed to a simple discrimination task (putting a pointer into one of two holes) in which they received a neutral stimulus (a green light) contingent on picking the correct hole. Participants in the second group observed other children receive the neutral stimulus as well as an established reinforcer (candy) for completing the same task, rather than completing the task themselves. Children in a third group were not provided with any exposure to the neutral stimulus. All children were then exposed to a test condition in which they were asked to complete the task and were provided with the neutral stimulus when the task was performed correctly. The participants who observed other children receive the neutral stimulus plus reinforcement for completing the task performed better in the test condition than children in either of the other groups.

Singer-Dudek *et al.* (2011) studied the behavior of three preschool children with mild to moderate delays as they responded on maintenance and acquisition tasks. In one condition, children received food for correct responses, and in another condition, the children received access to books for correct responses. The participants responded less during the maintenance tasks and did not demonstrate learning during the acquisition tasks when books were provided contingent on correct responses. During the observational conditioning intervention, the participants observed a peer receive access to books

contingent on correct responding while the participants received no consequences for responding. Following approximately 1 week of intervention, the participants displayed high levels of responding during the maintenance tasks and increased learning during the acquisition tasks when books were provided contingent on correct responding. These results suggested that the observational conditioning procedure resulted in the books functioning as conditioned reinforcers for all three children.

Bruzek and Thompson (2007) examined the effects of observation of peer play on preferences of four typically developing preschool children. Initial preference assessments for each child identified high-, medium-, and low-preference toys. Subsequent preference assessments were preceded by 2-min observations of a peer playing with either a high- or a low-preference toy. During the subsequent preference assessments, three of the four children consistently preferred the toy played with by the peer in the immediately preceding observation.

The purpose of the current study was to determine if the effects of Bruzek and Thompson (2007) could be replicated with children on the autism spectrum. We examined whether observation of a known and preferred adult playing with low-preference toys in presumably novel and exciting ways could increase the rate of choosing those items by three children on the autism spectrum.

EXPERIMENT 1

METHOD

Participants

Three children who had been diagnosed with an ASD participated in Experiment 1. Hank was a 5-year-old boy who had been diagnosed with pervasive developmental disorder not otherwise specified. He had an IQ of 117 and a standard score of 67 on the Social Skills Rating Scale Parent (SSRS-P). Hank had good conversational skills but had some deficits in social and play skills and sometimes displayed

aggression and noncompliance. He was enrolled in a preschool classroom with typically developing peers. Buddy was a 6-year-old boy who had been diagnosed with autism. He had an IQ of 87 and a standard score of 63 on the SSRS-P. Buddy had good conversational skills, displayed no aggression or noncompliance, but had some deficits in play and social skills. He was enrolled in a typical kindergarten classroom. Larry was a 5-year-old boy who had been diagnosed with Asperger's syndrome. He had an IQ of 89 and a score of 106 on the SSRS-P. Larry could speak and understand full sentences but had limited play and social skills and engaged in scripted and ritualistic play. He was enrolled in a typical kindergarten classroom.

Setting

The study was conducted at a large mid-western university. Sessions for Hank were conducted in an empty preschool classroom that contained play mats, a sink, a table with chairs, an indoor slide, and a one-way observational mirror. Sessions for Hank were conducted twice per day, at least 90 min apart, 5 days per week. Sessions for Buddy and Larry were conducted in an empty therapy room with a one-way mirror for observation. Sessions for both Buddy and Larry were conducted twice per day, at least 1 hr apart, 2 days per week.

Preassessments

Paired preference assessment. Prior to baseline, a paired-choice preference assessment (Fisher et al., 1992) was conducted to identify an initial high-preference item (IHP) and an initial low-preference item (ILP) to be used in the reinforcement assessment. Ten items were included in the paired preference assessment. Items were selected based on direct observations of the participants' play (e.g., items frequently chosen to play with) and included some presumed neutral items. Prior to starting the assessment, the participants were given the opportunity to play with each toy for approximately 10 s. The entire paired preference assessment was repeated on a subsequent day to determine consistency of preferences across

time. The stimulus that was selected most frequently across the two assessments was used as the IHP item, and the stimulus selected least often across the two assessments was selected as the ILP.

Stimuli. Hank, Buddy, and Larry had the same IHP stimulus, which was a noise-making putty. Hank and Buddy shared the same ILP stimulus, a dinosaur figurine. Larry's ILP stimulus was a light globe.

Person preference. Prior to baseline, we assessed participants' preference for two known adults (adults who previously had spent an equivalent amount of time with each boy). Each adult sat on either end of a small table, with the participant sitting in a chair 2 m away from the table and equidistant from each adult. In front of each adult was a cup and five small counting bears. The assessment began with the experimenter providing a general instruction to the participant: "If you put all the counting bears in the cup in front of Adult A, then you can play with Adult A, and if you put all the counting bears in the cup in front of Adult B, then you can play with Adult B." Next, the experimenter stated, "Go put the bears in the cup." The participant then walked over and placed the bears in the cup in front of Adult A or Adult B. If the participant did not complete the task within 30 s, the experimenter guided the participant back to the chair. After the participant had placed all five bears in the cup, the corresponding adult provided social reinforcement (e.g., hugs, piggy back rides, tickles) to the participant for 30 s. Each adult was told to act as fun as possible if chosen. This procedure was continued for 10 trials. The adult selected more frequently was deemed preferred and was used as part of the reinforcement assessment.

Reinforcement Assessment

A reinforcement assessment was conducted to determine participants' rate of choosing among the IHP, ILP, and a control stimulus (blank index card) when asked to complete a

simple task, which consisted of the participant placing 10 small counting bears into a paper cup.

Baseline. Baseline was used to assess which stimulus was most preferred prior to intervention. Sessions started with the experimenter showing the participant a bin that contained three stimuli: the IHP, the ILP, and a control stimulus (a blank index card). Next, the experimenter stated the contingency to the participant (“If you place all the bears in the cup, then you can pick the toy you want to play with.”). The experimenter placed a paper cup and 10 counting bears in front of the participant and instructed him to place the bears in the cup. If the participant did not place all the bears in the cup within 30 s, the next trial began immediately. After the participant had placed all the bears in the cup, the experimenter asked him to choose the toy he wanted to play with. The participant had access to the selected stimulus for 10 s. After the 10 s, the experimenter said “my turn” and had the participant place the item back in the bin. This procedure continued for a total of 10 trials.

While the participant played with either the IHP or the ILP toy, the experimenter did not provide any social interaction or verbal communication, did not play with the toy, and did not make eye contact with the participant. If the participant attempted to interact with the experimenter, minimal attention or responding was provided. If the participant selected the control stimulus, the experimenter took the card and provided no interaction with the participant for 10 s.

Adult select ILP. The purpose of this condition was to change the participants’ preferences from the IHP to the ILP. This phase was similar to the baseline condition with three major exceptions. First, the preferred adult was in the room with the participant. Second, the preferred adult completed the task before the participant completed the task. Third, the preferred adult selected the ILP after engaging in the task.

Each session during the adult select ILP phase started with the participant, preferred adult, and experimenter entering the research room. The experimenter then stated the contingency (described above) to both the preferred adult and to the participant and said that the adult would go first. Next, the adult placed the 10 counting bears in the cup as quickly as possible while stating how much he wanted to play with the ILP (e.g., “Cool, I want the —”) and on occasion stating how he did not want to play with or did not like the IHP (e.g., “I do not want to play with the putty.”). After the adult placed all 10 bears in the cup, he selected the ILP and played with the ILP in novel and exciting ways (described below).

The way that the preferred adult played with the ILP was individualized for each participant. On some occasions, the adult attempted to play with the ILP in ways that the participant typically played with other toys (e.g., if the participant liked to run around with his toys, the adult would run around with the ILP). On other occasions, the adult pretended to make the ILP into another toy or activity that the participant preferred (e.g., pretending that the ILP was a train if the participant liked trains). A third strategy was playing with the ILP in novel ways. From time to time, the adult commented on exciting ways to play with the ILP and how much fun he was having with it. As the intervention progressed, the adult changed the way he played with the stimulus from session to session based on observations of the participant playing in different ways with other toys in the natural environment.

For example, for Hank’s ILP (the dinosaur), the preferred adult typically ran around the room with it, had it fly around the room, and placed it in the sink so that it could have a bath. For Buddy’s ILP (also the dinosaur), the adult typically roared loudly (pretending that the dinosaur was roaring) and had the dinosaur engage in silly but appropriate behaviors (e.g., turning the lights on and off in the room). For Larry’s ILP (the light globe), the adult typically

turned off the lights and had the toy spin, pretended the toy was a microphone and sang into it, and pretended the toy was a train and had it travel through a hole in the room that was made into a make-believe tunnel.

During each session, the preferred adult engaged in these behaviors for five trials, during which time there was no interaction between the adult and the participant. If the participant attempted to interact with the adult, the experimenter stopped the participant and told him that it was the adult's turn to play and he would have a chance later. After the adult's five trials, the participant had the opportunity to complete the task. The rest of the session was identical to baseline, with the exception that the adult remained in the room while the participant completed the 10 trials of the task. The adult had no interaction with the participant during these trials.

Adult select IHP (Buddy only). Because Buddy continued to choose the ILP during the second baseline after intervention, the preferred adult selected the IHP (noise-making putty) during Buddy's second intervention. Otherwise, adult select IHP was identical to the adult select ILP condition.

Dependent Variable

Trained graduate and undergraduate students served as experimenters, preferred adults, and data collectors. In vivo recording of behavior was conducted throughout the study, with observers using pen and paper to score responses. The main dependent variable was participant selection of either the IHP, ILP, or control stimulus following the simple task. The purpose of the control stimulus was to determine if stimuli selection was indiscriminate; the control stimulus did not contribute to a demonstration of the variables that controlled task completion. The item that the participant removed from the bin was scored as the preferred item for that trial. At the conclusion of each session, the researchers calculated and recorded the percentage of selections for the three stimuli.

Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and converting this number to a percentage. Agreement was defined as both observers scoring the same selection for the trial. Agreement data were collected during 50% of all paired preference assessments and was 100%. During the person preference assessment, reliability data were collected in 100% of sessions; agreement was 100%. Reliability data were collected during 70% of all reinforcement sessions; agreement averaged 99.8% (range, 90% to 100%).

Design

An ABABA design (Hank and Larry) and an ABACA design (Buddy) were used to evaluate the effects of the intervention. In addition, a nonconcurrent multiple baseline design was implemented for the initial intervention condition. The initial adult select ILP phase was not introduced for a new participant until the previous participant had demonstrated a change in preference, leading to a staggered baseline. In the reversal design, demonstration of functional control is weakened when behavior does not return to baseline levels, as was the case for Buddy. Thus, the additional nonconcurrent multiple baseline design added to the demonstration of the functional relation between the intervention and behavior change. Each participant demonstrated an initial change in preference when, and only when, the intervention was implemented.

RESULTS AND DISCUSSION

In this experiment, the observation procedure altered the preferences of each participant from an IHP stimulus to an ILP; however, maintenance of effects was idiosyncratic across participants (Figure 1). The control stimulus was rarely selected ($M = 2.7\%$ across all sessions) throughout all conditions; therefore, these data are not shown. During the first baseline, Hank selected the IHP stimulus on a mean of 85% of trials, the control stimulus on a mean of 15% of trials (not shown), and the ILP

Figure 1. Percentage of trials on which the ILP and IHP stimuli were selected during baseline, adult select ILP, and adult select IHP (Buddy only) conditions during Experiment 1. ILP = initial low preference, IHP = initial high preference.

stimulus on 0% of trials. In the first adult select ILP condition, Hank selected the ILP stimulus more frequently than the IHP stimulus after only two sessions. During a second baseline, his selections varied for 11 sessions before selections for the IHP stimulus returned to baseline levels. During the second adult select ILP condition, he again switched his preference to the ILP stimulus within two sessions. During the last five sessions of this condition, he selected the ILP stimulus on at least 90% of trials. During the final baseline condition, he maintained preference for the ILP stimulus.

During the first baseline, Buddy selected the IHP stimulus more frequently than the ILP and control stimuli in five of six sessions. During the adult select ILP condition, Buddy selected the ILP stimulus 100% of trials after only two sessions and did so for the remainder of the condition. In the return to baseline, he maintained preference for the ILP stimulus and was, therefore, exposed to an adult select IHP condition. Within the first session of this condition, Buddy immediately began selecting the IHP stimulus and continued to select the IHP stimulus on 100% of trials. In the final baseline, he continued to select the IHP stimulus on at least 90% of trials.

During the first baseline, Larry selected the IHP stimulus more frequently than the ILP stimulus in all nine sessions. During the first four sessions of the adult select ILP phase, Larry showed variability in his preference for the IHP and ILP; however, by the fifth session he consistently selected the ILP more frequently than the IHP. When he entered the second baseline, he immediately demonstrated a preference for the IHP again. During the second adult select ILP condition, it took five sessions for Larry to start selecting the ILP more frequently than the IHP. During the final baseline, he initially showed some variability in his preference for the stimuli before selecting the IHP stimulus on 100% of trials in the last three sessions.

Children with autism typically have interest in a limited number of activities and toys, making it difficult for clinicians to find a variety of reinforcers to use when they implement behavioral interventions. To date, however, little empirical evidence has shown ways to increase reinforcement value for nonpreferred stimuli for these children. Thus, Experiment 1 is one of the first studies to demonstrate empirically that, through observation, an initially low-preference stimulus can become a highly preferred stimulus for children with autism. These results have implications both for clinicians and experimenters who work with this population, because they suggest that reinforcement values may be changed.

Although the results of the first experiment look promising, several questions remain unanswered. First, it is unknown if the results can be replicated across different stimulus sets using the same participants. Second, the maintenance effects varied across all three participants in the first experiment. Thus, it is unknown what the maintenance effects would be with a new stimulus set. Finally, the first experiment utilized an observation procedure in which the preferred adult played with the ILP in novel ways, commented on how fun the ILP was, and made occasional negative comments about the IHP. The impact of these negative comments is currently unknown. If conditioning is possible without the negative comments, that may be a preferred method for clinical use of this procedure. The second experiment assessed this procedure with a second set of stimuli and assessed the role of negative comments in the conditioning process.

EXPERIMENT 2

The purposes of the second experiment were (a) to replicate the findings of Experiment 1 using different IHP and ILP stimuli, (b) to replicate the maintenance effects of the observation procedure, and (c) to assess the effects of

the observation procedure without using the occasional negative comments about the IHP.

METHOD

Participants and Setting

Two of the boys (Hank and Buddy) who participated in Experiment 1 also served as participants in Experiment 2. Sessions for both boys were conducted in the same therapy room used in Experiment 1.

Preassessments

Paired preference assessment. Prior to baseline, a paired-choice preference assessment (Fisher *et al.*, 1992) was conducted as in Experiment 1. Ten items were paired with each other exactly once across two paired-choice preference assessments. The 10 items used in this paired preference assessment were all different from the items used in Experiment 1.

Stimuli. The paired preference assessment yielded an IHP and an ILP stimulus for both participants. Buddy's IHP stimulus was a Whoopee cushion, and his ILP was an Etch-a-Sketch. Hank's IHP was a Slinky, and his ILP was a small football.

Adult preference. No adult preference was conducted in Experiment 2. Both Hank's and Buddy's preferred adult was the same as in Experiment 1.

Reinforcement Assessment

A reinforcement assessment was conducted to determine what percentage of trials participants would choose the IHP, ILP, and control stimuli after completing a simple task identical to the one used in Experiment 1.

Baseline. Baseline sessions were identical to those in Experiment 1.

Adult select ILP. The adult select ILP phase was identical to that in Experiment 1 with one major exception. At no time did the preferred adult make any negative comments about the IHP. The adult still engaged with the ILP as in Experiment 1. For Buddy's ILP (the Etch-a-Sketch), the adult typically created drawings, shook it hard to erase the drawings, and held it

in front of his stomach while he pretended he was a robot. For Hank's ILP (the football), the adult typically tossed the football in the air in an attempt to hit the ceiling, ran out in the hall and threw the football down the hall, pretended to be Peyton Manning, and tried to hit targets across the room.

Dependent Variable and Interobserver Agreement

The main dependent variable in Experiment 2 was the same as in Experiment 1. Interobserver agreement data were collected during 75% of all paired preference assessments and during 49% of all reinforcement assessments, and were calculated as in Experiment 1. Mean agreement was 100%.

Design

An ABA reversal design and nonconcurrent multiple baseline design across participants was implemented during Experiment 2.

RESULTS

Results of the second experiment indicated that, as in the first experiment, both participants switched their preference from the IHP stimulus to the ILP stimulus during the adult select ILP condition; however, the maintenance effects were once again idiosyncratic across participants (Figure 2). The control stimulus was never selected throughout all sessions and conditions; therefore, the data are not shown.

In the second experiment, Buddy's preference for stimuli again switched following exposure to the adult select ILP condition. During the first baseline, Buddy selected the IHP stimulus on 100% of trials. During intervention, he selected the ILP stimulus on 100% of the trials. In his final baseline, he selected the ILP stimulus on 100% of the trials.

Hank's preference for stimuli also switched following exposure to the adult select ILP condition. During the first baseline, Hank selected the IHP stimulus more frequently than the ILP stimulus in every session. In the intervention condition, he selected the ILP stimulus on at least 90% of trials. When Hank

Figure 2. Percentage of trials on which the ILP and IHP stimuli were selected during the baseline and adult select ILP conditions during Experiment 2. ILP = initial low preference, IHP = initial high preference.

returned to a final baseline, he showed variability in his preference for 10 sessions before preference for the IHP stimulus returned to baseline levels.

GENERAL DISCUSSION

One of the defining features of autism is rigid and limited interest in toys and activities (American Psychiatric Association, 2000). This narrow range of interest makes it difficult for clinicians, parents, and teachers to identify potential reinforcers for these children. Without adequate reinforcement, maintenance of performance and acquisition of new skills may be

hindered. Therefore, research is needed on ways to broaden the range of reinforcers for children with autism. Previous research has shown that observation procedures can be effective in changing preferences of typically developing children. Bruzek and Thompson (2007), for example, found that observing a peer playing with a stimulus affected the participant's preference for that stimulus. The present study indicates that similar antecedent observation of an adult playing with an item also can affect the preferences of children with an ASD.

In Experiment 1, three children switched their preference from an IHP stimulus to an ILP stimulus following an observation proce-

ture in which the participant observed a preferred adult engaging with the ILP stimulus, making comments about how much he enjoyed the stimulus, and making occasional negative comments about the IHP stimulus. In Experiment 2, these results were replicated with the same participants but with a different set of IHP and ILP stimuli. Similar effects were obtained without the use of negative comments directed towards the IHP. Thus, the results of the study indicate that for children with autism, preference for stimuli can be altered through an observational procedure. These findings may have implications for therapists, clinicians, and teachers who work with this population.

This procedure may provide clinicians with a way to widen the interests of children with autism, which could lead to more diversity in play, more interest in age-appropriate play, and, ultimately, more social opportunities with peers. Although this study did show that the observation procedure affected the stimulus selections of the children with autism, it did not evaluate the effects of the IHP and ILP stimuli on the rate of a more effortful operant response. Future research should examine whether this procedure is effective not only in changing preferences for other children with autism but in producing reinforcers for this population that can be used to teach new skills.

Several explanations for the results are plausible. One possible explanation is that the preferred adult choosing and playing with the ILP may have served as a motivating operation, changing the reinforcing value of the ILP. The ways in which the adult engaged with the ILP (i.e., enthusiastic, novel actions) may have changed the consequences associated with choosing the ILP. The children vicariously came into contact with the new consequences by observing the adult engaging with the ILP, which can account for the quick change in behavior. The participants frequently were observed to engage with the toys in the same manner as the adult; thus, continued choice of the ILP could be accounted for by the child

then coming into contact with the consequences himself (e.g., choice of the ILP led to engagement in fun and preferred activities with the ILP).

A second plausible explanation is that a history of reinforcement for imitation and direction following may have led the children to imitate the behaviors of the preferred adult (i.e., choosing the ILP toy, imitating play behaviors with the ILP toy). As noted previously, the children frequently imitated the actions displayed by the preferred adult, which may indicate that history of reinforcement for imitation was a factor in behavior change. Future research may test this possibility by having the adults leave the room while the child plays with the selected toy.

A third possible explanation is that the ILP became more reinforcing through conditioning. The ILP was paired throughout the intervention with an already established reinforcer, the preferred adult. In addition, the adult played with the ILP in ways that paired the ILP with already preferred play behaviors (e.g., turning the ILP into a train for a child obsessed with trains, essentially pairing the ILP with trains). This explanation could be tested by exploring the parameters of the intervention that are necessary for the desired effects. Some possible changes could include the preferred adult not incorporating preferred play behaviors, the adult simply choosing the ILP but not playing with it, and use of a nonpreferred or unknown adult or peer.

One limitation of this study is that the intervention involved several components, including a preferred adult who completed the task, selected the ILP, and interacted with the ILP in a variety of ways. Conducting a component analysis could shed light on the processes responsible for behavior change, as previously discussed. Future research also could examine ways to maintain the effects of the observational procedure after it is discontinued or programmed more intermittently. Another possible area of future research is to examine

whether results could be replicated with a wider variety of children with autism. All three participants in this study would be classified as high functioning. Therefore, it is unknown if similar effects would be obtained for children who have more severe cognitive and social delays or for children who may have dual diagnoses.

This study provides the first empirical evidence that preferences of children with an ASD can be altered using an observation procedure. These results are similar to the findings of Bruzek and Thompson (2007) and may have implications for the treatment of children and adolescents with autism. Clearly, more research is needed in this area to address the significant challenges of expanding interests and identifying reinforcers for children with autism.

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