OBSERVATIONAL EFFECTS ON PREFERENCE SELECTION FOR FOUR CHILDREN ON THE AUTISM SPECTRUM: A REPLICATION

Justin B. Leaf[1]*, Alyne Kassardjian[1], Misty L. Oppenheim-Leaf[2], Kathleen H. Tsuji[1], Stephanie Dale[1], Aditt Alcalay[1], Jeremy A. Leaf[1], Daniel Ravid[1], Christine Miline[1], Ronald Leaf[1], Mitchell Taubman[1] and John McEachin[1]

[1]Autism Partnership Foundation, Seal Beach, CA, USA
[2]Behavior Therapy and Learning Center, Seal Beach, CA, USA

Individuals with autism have been noted to have restricted interests and repetitive behavior such as non-functional manipulation of objects. In this study, we used an observational conditioning procedure to switch the preference of items for four individuals diagnosed with autism who are considered lower functioning. The procedure consisted of the participant observing an adult playing with toys that were initially non-preferred by the participant in a functional and engaging manner. For two participants, results were similar to the findings by Leaf; one participant required additional conditioning procedures, and we were unable to switch the preference for the other participant. Copyright © 2015 John Wiley & Sons, Ltd.

Limited interests and stereotypic behavior are one of the central deficits of autism spectrum disorders (American Psychiatric Association, 2000). These limited interests in toys and activities may make it difficult for teachers and clinicians to identify stimuli that can be used as reinforcers. Without having a wide variety of reinforcers, teachers may have difficulty teaching children with autism spectrum disorder (ASD) new skills or participating in activities with typical peers, thus limiting their educational and social opportunities. To increase interest in new stimuli, potentially broaden learning opportunities, and possibly widen social opportunities, teachers and clinicians may need to condition neutral stimuli to become more preferred.

Conditioning stimuli to be potential reinforcers has been well investigated for humans with and without disabilities other than ASD (e.g., Bruzek & Thompson, 2007; Greer & Singer-Dudek, 2008; Hanley, Iwata, Lindberg, & Conners, 2003;

Hanley, Iwata, Roscoe, Thompson, & Lindberg, 2003; Singer-Dudek, Oblak, & Douglas, 2011). For example, in Greer and Singer-Dudek (2008), an observational conditioning procedure for typically developing children aged 3–5 years old was studied. The conditioning procedure involved participants observing confederate peers receiving neutral items (disks or string) for working on previously taught skills. Prior to intervention, participants showed low levels of responding with mastered tasks when the neutral items were provided for correct responding. Following intervention, participants showed high levels of responding to the mastered tasks when the neutral items were provided for correct responses. Thus, the conditioning procedure appeared to have increased the reinforcing value of the neutral items.

Bruzek and Thompson (2007) examined the effects of an observational conditioning procedure on the preferences of four typically developing preschool children. The conditioning procedure in this study involved participants observing peers play with either a low or high preference stimulus for 2 min. After the observational period, the researchers implemented a preference assessment with each participant. The study found that three out of four participants consistently displayed preferences for the toy that they just observed the peer play with regardless of their initial preference for that item. Thus, the observational conditioning procedure was effective in switching the preference for these participants.

Despite these studies evaluating conditioning procedures for children without ASD (e.g., Bruzek & Thompson, 2007; Greer & Singer-Dudek, 2008; Hanley et al., 2003; Hanley et al., 2003), the research on conditioning procedures for children with ASD has remained somewhat limited. In a recent study, Leaf et al. (2012) expanded the work of Bruzek and Thompson by evaluating an observational conditioning procedure for three young, high-functioning children diagnosed with an ASD. This study showed that participants switched preference from a highly preferred stimulus to a neutral or least preferred stimulus. Participants did this following an intervention in which they observed a familiar adult complete a simple compliance task and then choose the least preferred stimulus as a reinforcer, playing with the stimulus in an engaging manner.

Although Leaf et al. (2012) showed that an observational conditioning procedure can be effective in changing the preference for young children diagnosed with ASD, they identified several areas for future research. One area suggested for future research was to evaluate the observational procedure with children with ASD who have a different demographic than the children evaluated in the original study. In the original study, all participants would be considered high-functioning as they had IQ scores above 80, had high levels of language, and displayed moderate to high social skills. Thus, a study for children who are more deeply impacted with ASD (e.g., lower IQ, less language, and/or fewer social skills) is warranted. The purpose of this study was to expand the results found by Leaf et al. (2012) by evaluating a similar observational conditioning procedure for four children diagnosed with ASD who are more impacted with ASD (i.e., an IQ score of 60 or below).

METHOD

Participants

To be included in this study, participants had to have a formal independent diagnosis of an ASD and a full-scale IQ score of less than 60. Four children met these criteria, all of whom had received a diagnosis of autistic disorder from a licensed psychologist not affiliated with the researchers. All four participants had IQ scores that would classify them as having a mild to moderate intellectual disability.

Dante was a 5-year-old boy and had a Mullen's full-scale IQ score of 49 (moderate intellectual disability), a Vineland Adaptive Behavior Score of 59, and a Gilliam Autism Rating Score (GARS) of 72. Dante was not placed in an education setting but was receiving 35 h of behavioral intervention per week in his home and a clinic center. Ivan was a 7-year-old boy and had a Wechsler Intelligence Scale for Children (WISC-IV) full-scale IQ score of 46 (moderate intellectual disability), a Vineland Adaptive Behavior Score of 78, and a GARS Score of 72. Ivan was placed in a special education classroom and was receiving 10 h of behavioral intervention per week in his home and a clinic center. Jeremy was a 9-year-old boy and had a WISC-IV full-scale IQ score of 48, a Vineland Adaptive Behavior Score of 65, and a GARS Score of 95. Jeremy was placed in a special education classroom and was receiving 32 h of behavioral intervention per week in his home and a clinic center. Hailey was a 7-year-old girl and had a WISC-IV full-scale IQ score of 54 (mild intellectual disability), a Vineland Adaptive Behavior Score of 83, and a GARS Score of 70. Hailey was placed in a special education classroom and was receiving 12.5 h of behavioral intervention per week in her home and a clinic center.

Setting

Sessions were conducted in a room at the office of a private behavioral intervention service agency in Southern California or in the participants' homes. Rooms both in the agency's office and in the participants' homes contained furniture and other educational materials. Participants participated in research sessions from 1 to 5 days per week; each session lasted approximately 30 min.

Pre-assessments

Paired Preference Assessment

Prior to baseline (BL), the researchers conducted two paired-choice preference assessments (Fisher et al., 1992) to identify an initial high preference (IHP) and an initial low preference (ILP) stimulus to be used in the conditioning procedure. Ten

items were included in the paired stimulus preference assessment. The researchers selected items based on direct observations of the participants' play and interviews with the participants' teachers and parents. Prior to starting the assessment, the researcher provided the participant with approximately 10 s access to each item. During the paired stimulus preference assessment, the researcher presented each stimulus with every other stimulus until all possible pairs had been presented once. For each pairing, the researcher held out two stimuli, one stimulus in each hand, and whichever stimulus the participant touched first was delivered to the participant for 30 s. The researchers implemented the paired preference assessment twice in order to identify stable preferences. In order to calculate the preference of each item, the researchers divided the number of participant selections of an item by the number of presentations of it and multiplied by 100%.

Stimuli

The paired preference assessment revealed the IHP and ILP for each of the participants. Dante's IHP was a mechanical claw toy and his ILP was a spinning toy with colored lights inside a globe. Ivan's IHP was a drumstick that played music and his ILP was a *Don't eat the babysitter*© popup book. Jeremy's IHP was moon sand© and his ILP was a figurine of a dragon. Hailey's IHP was a *Hello Kitty*© DVD and her ILP was a figurine of the Little Mermaid©.

Dependent Variable

The main dependent variable was participant selection of the IHP, ILP, or control stimulus following the compliance task. 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.

Experimental Design

Because of the variability across participants for switching their preferences from the IHP to the ILP, the researchers utilized a variety of multiple treatments reversal designs across all four participants. Dante's reversal design was an ABACDAB; Ivan's reversal design was an ABACAB; Jeremy's reversal design was an ABCDAD. Hailey's design was an ABCD design without a reversal, because she did not switch her preference during any of the intervention conditions.

Conditions

Baseline

Participants were exposed to a BL condition prior to intervention and following each intervention condition (described in the succeeding text). The initial BL assessed whether the participants would demonstrate item engagement in correspondence with the preference assessment when asked to choose between the IHP and the ILP following completion of a simple compliance task. The BL conditions that followed intervention assessed if the participant would maintain the preference previously demonstrated during intervention or if the preference would revert back to BL once intervention was removed.

Baseline sessions started with the researcher showing the participant a bin in which three stimuli were placed: the IHP, the ILP, and a control stimulus (a blank index card). The purpose of the control stimulus was to ensure that the participants were not making random selections. The researcher then placed 10 counting cubes and a cup in front of the participant. Next, the researcher stated the contingency to the participant, 'If you place all the cubes in the cup, then you can pick the toy you want to play with'. If the participant did not place all the cubes in the cup within 60 s, then the researcher prompted the participant to put the cubes in the cup. Once the participant placed all the cubes in the cup, prompted or unprompted, the researcher asked the participant to choose the toy he or she wanted to play with. The participant had 30-s access to the stimulus that he or she selected. After the 30 s, the researcher said 'my turn' and had the participant place the item back in the bin. The researcher continued this procedure for a total of 10 trials.

The researcher did not provide any social interaction or verbal communication, did not play with the toy, and did not make eye contact with the participant while the participant played with either the IHP or the ILP. If the participant selected the control stimulus, the researcher took the card and provided no interaction with the participant for 30 s. If the participant verbally initiated with the researcher, the researcher stated 'I am busy right now' and continued to avoid interaction.

Intervention

The researchers implemented an intervention condition with all participants. The purpose of the intervention condition was to attempt to change the participants' preferences from the IHP to the ILP. The intervention phase was similar to the BL condition with three major exceptions. First, a second adult different from the researcher (referred to as the 'conditioner' from this point forward) was also in the room during research sessions. Second, the conditioner completed the compliance

task prior to the participant completing the compliance task. Third, the conditioner selected the ILP after engaging in the compliance task and played with it.

The intervention phase started with the participant, the conditioner, and researcher entering the research room. The researcher then stated the contingency (as described in the preceding text) to both the conditioner and to the participant. Then, the researcher stated that the conditioner would go first. Next, the conditioner placed the 10 counting cubes in the cup as quickly as possible while stating how much he wanted to play with the ILP (e.g., 'Cool, I want the …'). After the conditioner placed all 10 cubes in the cup, he selected the ILP and played with the ILP in novel and exciting ways as described in the succeeding text.

The way that the conditioner played with the ILP was individualized for each participant, incorporating aspects of play frequently exhibited by that participant as well as novel aspects. On some occasions, the conditioner 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 conditioner would run around with the ILP). On other occasions, the conditioner pretended to make the ILP into another toy that the participant frequently played with (e.g., pretending that the ILP was a train if the participant liked trains). A third strategy was playing with the ILP in novel and different ways than the participant would typically play with toys. From time to time, the conditioner commented on exciting ways to play with the ILP and how much fun he or she was having with the ILP. As the intervention phase progressed, the conditioner changed the way he or she 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 as well as observations of the participants' interest levels during previous research sessions.

The conditioner engaged in these behaviors for five trials, during which there was no interaction between the conditioner and the participant. After the five trials, the participant had the opportunity to complete the compliance task. The rest of the session was identical to the BL condition, with the exception that the conditioner remained in the room. While the participant completed the 10 trials of the compliance task, the conditioner was in the same room but had no interaction with the participant.

Intervention Alpha

The experimenters implemented an intervention alpha condition for Dante and Ivan. This condition was implemented because both Dante and Ivan switched their preference during the initial intervention condition (i.e., selected the ILP stimulus more frequently than the IHP stimulus) but then maintained preference for the ILP once the researchers returned to the BL condition. During the intervention alpha

condition, the conditioner selected the IHP stimulus rather than selecting the ILP stimulus after completing the compliance task. Other than this change, the intervention alpha condition was identical to the intervention phase. This condition was also implemented in the Leaf et al. (2012) study.

Intervention Beta

After the intervention alpha condition was implemented for 12 sessions, Dante continued to select the ILP more frequently than the IHP; therefore, the experimenters implemented an intervention beta condition for Dante. Dante was the only participant to receive the intervention beta condition. The purpose of this condition was to get Dante to switch preference back to the IHP. During the intervention beta condition, when it was the conditioner's turn to engage in the task and select the reinforcer, the conditioner did the following: (i) selected the IHP and (ii) paired the IHP with one of three toys that he or she brought from outside of the research setting (toys were selected based on the researchers asking parents and teachers the participant's preference for toys that were not part of the original preference assessment). In addition, when it was the participant's turn to make a choice following the compliance task, the experimenter allowed the participant access to the paired toy contingent upon him or her selecting the IHP. The experimenter, however, did not have any interaction with Dante when it was his turn to engage in the task and select the reinforcer.

Intervention Delta

The researchers implemented an intervention delta condition for both Jeremy and Hailey because after 15 sessions in the original intervention condition, Jeremy and Hailey continued to select the IHP rather than the ILP stimulus; thus, the original intervention condition was not effective at switching preference for these two participants. The intervention delta condition was similar to the intervention condition with two additions. First, when it was the conditioner's turn to engage in the task and select the reinforcer, the conditioner paired the ILP with one of three toys that he or she brought from outside of the research setting. The conditioner selected toys that were identified as preferred by the participant's teachers and parents and played with both that toy and the ILP in exciting ways. The second addition was that the conditioner allowed the participant access to the paired toy contingent upon him or her selecting the ILP. The conditioner, however, did not have any interaction with the participants when it was the participants' turn to engage in the task and select the reinforcer.

Intervention Gamma

After more than 15 sessions in the intervention delta condition, Jeremy and Hailey continued to select the IHP rather than the ILP; therefore, the researchers implemented an intervention gamma condition. This condition was the same as the intervention delta condition with one major exception; the conditioner interacted with the participant when he or she had a turn to choose and engage with one of the stimuli.

Data Collection and Interobserver Agreement

Using a pen and paper, the researchers recorded the participants' selection of the three stimuli (i.e., IHP, ILP, and control stimulus) during every session of this study. An independent observer also recorded the participants' selection of stimuli (i.e., IHP, ILP, and control stimulus), via videotape, during 31% of sessions across all conditions. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Agreements were defined as both observers scoring the same selection for the trial. Interobserver agreement was 100%.

RESULTS

Figure 1 displays Dante's responding across the various conditions. During the initial BL condition, Dante selected the IHP above 80% across all three BL probes. Once placed in the first intervention (INT) condition, Dante showed variability in his selections of the IHP and ILP for the first four sessions before selecting the ILP more frequently in the last three consecutive sessions. Next, the researchers placed Dante back into the BL condition, during which he continued to select the ILP at high levels (above 80% across all sessions); therefore, Dante was placed in the intervention alpha condition. During the intervention alpha condition, there was no change in Dante's behavior as he continued selecting the ILP at consistently high levels. The researchers then placed Dante in the intervention beta condition, where within two sessions he started selecting the IHP more frequently than the ILP. After three sessions of selecting the IHP more frequently than the ILP in the intervention beta condition, the researchers placed Dante back into the BL condition where he continued to consistently select the IHP more frequently than the ILP. Finally, the researchers placed Dante in another intervention condition and he started selecting the ILP more frequently than the IHP.
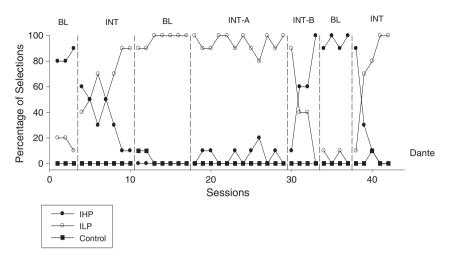
Figure 1. Dante's selection of items. BL, baseline; INT, intervention; INT-A, intervention alpha; INT-B, intervention beta; IHP, initial high preference; ILP, initial low preference.
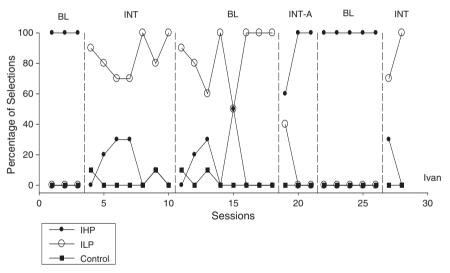

Figure 2. Ivan's selection of items. BL, baseline; INT, intervention; INT-A, intervention alpha; IHP, initial high preference; ILP, initial low preference.

Figure 2 displays Ivan's responding across the various conditions. During the initial BL condition, Ivan selected the IHP during every opportunity, and therefore, the researchers placed Ivan in the INT condition. During the first session of the intervention condition, Ivan immediately switched his preference as he started

selecting the ILP more frequently then the IHP. After seven sessions of selecting the ILP more frequently than the IHP, Ivan was placed in a second BL condition. During the second BL condition, Ivan continued to select the ILP more frequently than the IHP, and thus, the researchers placed him into the intervention alpha condition (similar to a condition described by Leaf et al., 2012). Within the first session of the intervention alpha condition, Ivan began selecting the IHP more frequently than the ILP and continued to do so throughout the remaining intervention alpha condition. Therefore, the researchers placed Ivan back into the BL condition where he continued to select the IHP during every opportunity. Next, the researchers placed Ivan back into the intervention condition where he immediately switched his preference to the ILP.

Figure 3 displays Jeremy's responding across the various conditions. During the initial BL condition, Jeremy consistently selected the IHP more frequently then the ILP and was placed in the INT condition. After 15 sessions in the intervention condition, there was no change in Jeremy's behavior and the researchers placed him into the intervention delta condition. Still, after 18 sessions in the intervention delta condition, Jeremy continued selecting the IHP more frequently then the ILP, and therefore, the researchers placed Jeremy in the intervention gamma condition. During the first session of the intervention gamma condition, Jeremy switched his preference to the ILP and did so for three consecutive sessions and, therefore, was placed back into a BL condition. During this second BL condition, Jeremy reverted back to selecting the IHP more frequently within three sessions and, therefore, was placed
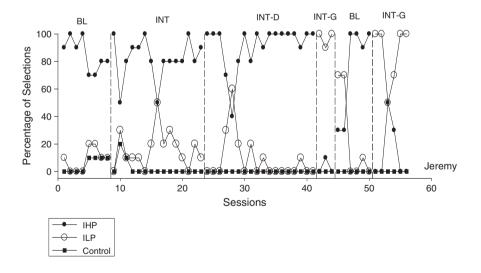

Figure 3. Jeremy's selection of items. BL, baseline; INT, intervention; INT-D, intervention delta; INT-G, intervention gamma; IHP, initial high preference; ILP, initial low preference.

back into the intervention gamma condition where he once again switched his preference to the ILP.

Figure 4 displays Hailey's responding across the various conditions. During the initial BL condition, Hailey selected the IHP during every opportunity to make a selection and was placed in the INT condition. Hailey did not switch her preference after 15 sessions of the intervention condition, 19 sessions of the intervention delta condition, and three sessions of the intervention gamma condition.

DISCUSSION

The purpose of this study was to attempt to replicate the findings of an observational conditioning procedure utilized by Leaf et al. (2012). In the original Leaf et al. (2012) study, the participants were all considered higher functioning, and in this study, participants would be considered lower functioning as they had lower IQ scores, lower language capabilities, and lower social capabilities. Therefore, this study attempted to address the conditioning of preferences and possible reinforcers for a different demographic of individuals who are found along the autism spectrum. The results of this study found only partial replication across the four participants.

Overall, the researchers were able to condition the preference of three of the four participants; however, for two of the participants, additional conditioning procedures were required. For Dante, the results showed that during some phases, the original
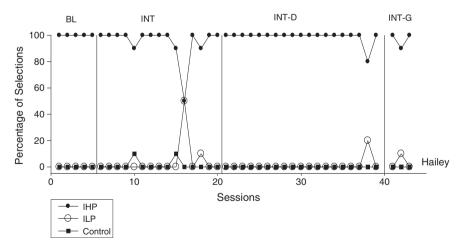

Figure 4. Hailey's selection of items. BL, baseline; INT, intervention; INT-D, intervention delta; INT-G, intervention gamma; IHP, initial high preference; ILP, initial low preference.

observational conditioning procedure was effective in changing preference, while in other phases, Dante did not switch his preference until other conditioning procedures were implemented. Thus, for Dante, the researchers were only able to partially replicate the findings from the Leaf et al. (2012) study. The results for Ivan indicated that the original observational conditioning procedure was responsible for a switch in preference, thus replicating the findings from the Leaf et al. (2012) study.

For one participant, Jeremy, preference did not switch following implementation of the procedure utilized by Leaf and colleagues and did not switch to the ILP until the researcher(s) interacted with him. Thus, it cannot be determined if the switch in behavior was due to the observational conditioning procedure, due to more social attention, or due to the addition of toys. Therefore, the researchers were not able to replicate the Leaf et al. (2012) finding for Jeremy. For the final participant, Hailey, preference never switched from the IHP to the ILP, even after multiple variations of the original procedure. Therefore, no conditioning procedure implemented in this study was able to affect her preference for the two items.

Although the results for Jeremy and Hailey greatly differ from Leaf et al. (2012) and slightly weaken the generality of the findings, they offer clinicians, teachers, and parents valuable information about what it may take to condition preference for a wider range of participants. These data also allow future researchers to evaluate why some participants' preferences change, while some do not, and what procedures it may take to condition preference dependent upon learner characteristics.

One explanation of why some participants' preferences switched using the Leaf et al. (2012) procedure, while other participants switched their preference only after additional steps, could be that the observational conditioning procedure may serve as a motivating operation changing the reinforcing value of the ILP and, thus, resulting in the participants selecting the ILP more frequently, as hypothesized by Leaf et al. (2012). For Dante and Ivan, the researchers may have effectively changed the reinforcing value of the ILP, which resulted in a switch in preference; for Jeremy and Hailey, however, the researchers may have been unable to increase the reinforcing value of the ILP, thus resulting in no switch of preference.

The researchers may have been unable to increase the value of the ILP at the same level as in the original study because of several factors. First, in this study, the participants were functioning at a lower level of independence than the participants in the original Leaf et al. (2012) study. Therefore, the participants in this study displayed behavior or higher levels of behavior (i.e., self-stimulatory behaviors) that were not present or occurred infrequently by the participants in the first study. Anecdotally, Jeremy and Hailey engaged in higher levels of automatically reinforced stereotypy than Dante and Ivan, which could have competed with our ability to affect the reinforcing value of the ILP. Additionally, both Jeremy and Hailey's IHPs were heavily

related to their stereotypy, which may have further competed with our ability to increase the reinforcing value of the ILP. Furthermore, participants in this study lacked some prerequisite skills (e.g., imitation and observational learning), which may be necessary for conditioning preference with these procedures. Finally, adults and their social approval appear to have lower reinforcement value for Jeremy and Hailey than for the other two participants. This may have decreased the reinforcing effect of the observational procedure and, thus, decreased the reinforcing value of the ILP.

Second, in the original study, the experimenters conducted a person preference assessment to ensure that the person implementing the observational conditioning procedure was preferred by the participant; therefore, the participant may have valued the adult's preference and verbal statements about the stimuli and been more willing to change his selection. In this study, however, no adult preference was conducted, so it may be that the adult who was implementing the observational conditioning procedure had little to no reinforcing value for the participant and, therefore, was unable to affect the child's selection.

A third possible explanation of why the procedure may have not been effective for some of the participants is that the IHP was too highly preferred for Jeremy and Hailey and that although the researcher may have been able to switch the reinforcing value of the ILP, it was not raised to a level greater than the highly preferred IHP. Future researchers may wish to evaluate this procedure by using a more moderately preferred IHP and seeing if a change in preference can occur.

Along with addressing these limitations, there are several areas that future researchers may wish to explore. First, the experimental design utilized in this study was idiosyncratic for each participant, which may make it difficult for clinicians and researchers to replicate. Thus, a potential area of future research would be to evaluate the procedures utilizing different experimental designs. Second, it is not known if this observational procedure would be effective across the entire spectrum of children and adolescents diagnosed with ASD. For example, future researchers could examine this procedure for adolescents or even adults diagnosed with ASD. Third, both this study and the previous work have only evaluated switching preference for various tangible items. Future researchers should examine whether they can increase preference for social praise or social reinforcement using similar procedures. Finally, both this and the previous study have only evaluated the observational procedure on changing preference; thus, it is not known how effective it would be in turning these preferences into functional reinforcers.

Despite the limitations of this study, we were able to partially replicate the findings of Leaf et al. (2012); thus, this study provides further empirical support to a simple observational procedure that can be used in changing the preference of stimuli for certain children diagnosed with ASD. The procedure, although containing multiple components, is fairly simple to implement and can provide a method that teachers,

parents, and clinicians can apply to their children. Given the limited research in conditioning preference for children with autism, this study can be of great importance for those working in the field of autism.

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