The Effects of a CABAS® Conditioning Procedure To Increase Appropriate Toy Play and Decrease Stereotypy

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ABSTRACT

The following study replicated the findings of Nuzzolo-Gomez et al. (2002) on using the stimulus-stimulus pairing procedure to teach preschool children with autism how to increase appropriate toy play to replace stereotypy. The dependent variables were the number of correct responses, incorrect responses and intervals of stereotypy emitted during probe sessions and the independent variable was the stimulus-stimulus pairing procedure for toy conditioning. The design for this study was a double single subject with Participant A being treated in a CABAS® School setting and Participant B in a Learning Centre in Italy. Experimenters and procedures were the same for both Participants. The conditioning procedure demonstrated to be an effective intervention in increasing appropriate toy play and decreasing stereotypy for both students. These findings supported the choice of positive interventions to improve the behavior of preschoolers with high rates of stereotypy in the free play setting, both in USA and Italy.

Many students with disabilities, especially students diagnosed with autism, don't play with toys in an age-appropriate manner. On the contrary, they often engage in inappropriate behaviors that researchers named "stereotypy" or "passivity". Greer, Becker, Saxe and Mirabella (1985) defined stereotypy as repetitive movements without any other consequence than the movement itself. Nuzzolo-Gomez, Leonard, Ortiz, Rivera and Greer (2002) defined the behaviors of stereotypy and passivity for children from 3 to 7 years old. In their study the authors registered as stereotypy all the instances of hand clapping, finger-flicking, making nonsensical vocal noise, object mouthing, rocking and using the toy in a stereotypical manner and as passivity all the instances of non looking at, touching, searching or responding to toys.

During the years teachers and researchers tried to prevent or correct these maladaptive behaviors in many ways, typically with aversive procedures such as punishment (Lovaas, Schaeffer & Simmons, 1965 Marholin & Townsend, 1978) and overcorrection (Foxx & Azrin, 1973). Punishment procedures were found to be effective in decreasing stereotypy but just for a short period of time after the treatment (Nuzzolo-Gomez et al., 2002). Aversive procedures have been employed for years as the most effective treatment, but the doctrine of the least restrictive alternative (Cooper, Heron & Heward, 1987) suggests the ethical and scientific responsibility to try less intrusive procedures first.

Eason, White and Newsom (1982) reported that a procedure of teaching how to use toy with the teacher delivering extrinsic reinforcers for every instance of appropriate playing was successful in decreasing stereotypy. Greer et al. (1985) studied the behavior of a young student who replaced his preferred toy with stereotypy: when the toy was removed, stereotypy increased and when the toy was available stereotypy decreased.

The authors also measured the reduction of stereotypy in young adults when they could play with a ball. Both studies suggested that play and stereotypy had the same function. Greer (1981) also demonstrated with both children and adults that pairing praise or tokens with nonpreferred stimuli could result in the nonpreferred stimuli becoming preferred and functioning as a reinforcer itself. This conditioning procedure, called stimulus-stimulus pairing, is used to make toys become learned reinforcers, because "through repeated pairings, the previously neutral stimulus acquires the reinforcement capability of the reinforcers with which it has been paired" (Cooper et al. 1987). Longano and Greer (2006) measured the stimulus-stimulus pairing effects on acquisition of conditioned reinforcement for observing and manipulating stimuli and independent work on young students. The authors reported that the procedure was effective in increasing the number of intervals in which students emitted the target behaviors and decreasing stereotypy and passivity. Nuzzolo-Gomez, Leonard, Ortiz, Rivera and Greer (2002) tested the effects of conditioned reinforcers on student behavior in free- play settings. Their first experiment showed that the delivery of reinforcers paired with looking at books was an effective strategy to increase appropriately looking at books and to decrease passivity for a preschool student. In the second experiment the authors demonstrated that conditioning toys as reinforcers was effective in increasing appropriate toy play and decreasing stereotypy for the participants. The following study replicates the findings of Nuzzolo-Gomez et al. (2002) on using the stimulus-stimulus pairing procedure as a positive method to teach preschool children with autism how to play appropriately with toys to replace stereotypy

Participants

Participant A was a 3 year old male with multiple disabilities. He was able to perform activities of daily living with partial assistance and not toilet trained. He was able to follow two step directions and to imitate gestures and he was an emergent listener-emergent speaker. The student was member of an Early Intervention classroom. The classroom used a Comprehensive Application of Behavior Analysis to Schooling (CABAS®) model, in which students attend five days a week for five hours a day. The participant was selected as target student for this study because of his frequent emission of stereotypy in the free play setting.

Participant B was a 4 years old male student with multiple disabilities. He could follow one step directions and imitate some gestures. He was at an emergent listener- pre-speaker level of verbal behavior and was not toilet trained. He received 3 hours of instruction per week in a learning centre in Italy, which was implementing CABAS®-based programs. He was selected as a participant for this study because of his high rate of stereotypy emitted in the free play setting.

Setting

The study was conducted, for Participant A, in a private publicly funded school for students with and without disabilities that used the Comprehensive Application of Behavior Analysis to Schooling (CABAS®) model. The target participant was a student in the Early Intervention classroom, with six students, two teachers, and four teaching assistants, with a student- teacher ratio of 1:1. The school was located in a suburb outside a large metropolitan area in the U.S.A. The classroom consisted of five male students and one female student; all of them were from two to three years old. During the treatment, data were collected in the 1:1 setting consisting of one student and one teaching assistant or teacher throughout the day.

The conditioning sessions and the probes were both conducted in the classroom using a round table with a variety of toys on it. The table was used exclusively for probes and conditioning procedures by all the teachers. The participant sat at the table with his teacher seated next to him during the pairing procedure. During the observation probes the student was located at the same table with the teacher seated ten feet away from him.

For Participant B, the study was conducted in a private Learning Centre for students with and without disabilities that implemented CABAS®-based programs. The centre was located outside a large metropolitan area in Italy. This participant received three hours per week of 1:1 instruction, delivered by one teacher and one teaching assistant. The classroom arrangement and the intervention and probes setting were set as described for Participant A.

Definition of Behaviors

Dependent Variable

The dependent variables measured in this study were the number of correct responses, incorrect responses and stereotypy emitted during the probe sessions. For the pre and post probes a correct response was defined as independently and appropriately looking at the toy, touching the toy, or changing the toy for a preferred one. An incorrect response was defined as not touching and/or looking at the toy and stereotypy was defined as staring at the toy, touching or watching it inappropriately. Two 5 minutes-5 seconds probes were ran before the independent variable was implemented and after the child met the criteria during the pairing procedure. For appropriate activity whole interval data were recorded and for stereotypy a partial interval recording strategy was used.

Independent Variables

The independent variable in this study was the stimulus-stimulus pairing procedure for toy conditioning. This procedure consists of pairing reinforcers with toy play.

In this study vocal praise was used as the reinforcer and was delivered two or three times during every pairing interval. Before starting the pairing, five toys with different features (music, lights, open-close windows, movements and pictures) were put on the conditioning table and the student was invited to play with the teacher near him. The first procedure consisted of 20 5-seconds pairing intervals. Every pairing interval was followed by a 5-second test interval. During the pairing interval the teacher prompted the appropriate use of the toys and praised the child for appropriately playing with the toy. The praise reinforcement was delivered two or three times for every pairing interval. The pairing interval was 5 seconds long for the first phase, 10 seconds long for the second and 15 seconds long for the third. A successful pairing procedure was defined as an interval in which the child was appropriately looking at and touching the toy. If during the procedure the behavior of the participant was not appropriate the stimulus-stimulus pairing was started again from the beginning, repeating the same interval, verbally and physically prompting the student's behavior. After every successful stimulus-stimulus pairing whole-interval a 5 seconds test was recorded and an observation interval started. The observation interval was 5 second long when it followed the 5 seconds pairing procedure, ten seconds long when it followed the 10 seconds pairing procedure and 15 seconds long when it followed the 15 seconds pairing. During the observation test the teacher sat 10 feet far from the child and collected a plus for a correct response and a minus for an incorrect response. A correct response was defined as independently and appropriately looking at the toy, touching the toy, or changing the toy for a preferred one. An incorrect response was defined as not touching and looking at the toy, emitting stereotypy or passivity, or pushing the toy away. Neither correction nor reinforcement was delivered during the test and at the end of it. Criterion for the student during the pairing procedure was at least 90% correct responses for two consecutive sessions.

Data Collection

Data were collected by one or two observers during the probes sessions using a timer, a pen, a clipboard, and a data collection sheet. The timer was set for five minutes and every five seconds a plus for correct response, a minus for incorrect response or an S for stereotypy were collected. The data were then added together and graphed as the total number of correct, incorrect and stereotypy responses (Fig. 2). During the pairing procedure session data were collected using a pen and a 20-learn unit (Greer & McDonough, 1999) data collection sheet. A correct response was recorded as a plus (+) and an incorrect response was recorded as a minus (-). After the completion of 20 pairing and test intervals the correct responses were graphed (Fig.1).

In the current study, after the experimenters graphed and analyzed the students' correct responses, the experimenters used the CABAS® Decision Tree Protocol (Greer, 2001) to make decisions regarding the progression of each short-term goal for the pairing procedure. According to the protocol, a decision about the curriculum is to be made after three ascending or three descending data paths, three data paths with no trend, after five data paths have been established, and each time a student meets criterion. Furthermore, if there are three ascending data paths and five data paths with an ascending trend, a decision should be made to continue with the current curriculum and tactic. If there are three descending data paths and five data paths with descending data paths, a decision should be made to change the tactic. In this study each time the student met the criterion during the pairing procedure, a decision was made to move on a five second interval longer pairing procedure. A phase change line, in the form of a broken vertical line, was drawn whenever a change to the targeted set was made.

Interobserver Agreement

During the pairing procedure, interobserver agreement (IOA) was conducted for Participant A for the 30% of the sessions, using the Teacher Performance Rate and Accuracy (TPRA) observations. This procedure was developed by Ingham and Greer (1992) to collect data on student and teacher responding. The teacher that ran the pairing procedure had errorless TPRA with 100% of accuracy. For Participant B, IOA was recorded for the 45% of the sessions with two observers and TPRA, with a mean agreement of 98%.

Design

This study is an ABACAD experimental design for two single subjects. Two baseline five minutes probe sessions were conducted for both participants for two consecutive days prior to the start of the pairing procedure. After the conditioning procedure once the participant met criterion (90% across 2 sessions) on emitting correct responses during the test interval, two post-probe session were conducted to measure the numbers of emitted correct and incorrect responses and stereotypy across the five minutes probe session period.

Procedure

Data were collected during the morning or after lunch. Two baseline probe sessions were conducted prior to the start of the pairing procedure. The student received toy conditioning using a set of scripted procedures (Greer et al., 1985). Each session consisted of 20 5-seconds intervals for the first pairing phase. To begin each pairing interval the experimenter prompted the student to appropriately touch and play with the toy for five seconds and reinforced the correct response with vocal praise. A 5-seconds interval in which the student was observed without receiving any reinforcement or correction followed every pairing interval. A plus was scored when the student played appropriately and independently with the toy during the whole interval after the pairing procedure and a minus was collected for incorrect response.

The data collection was based on a whole interval recording procedure for the correct response and a partial interval recording for stereotypy or incorrect response. Criterion for the student was at least 90% of correct responses for two consecutive times. After meeting the criterion in each conditioning session two five minutes probes were ran. During the probes the student was presented with different age appropriate toys without teacher intervention and data were collected for every five second intervals. A plus was collected for independently playing with toys or changing toy during the whole observation interval, a minus was collected for not playing with the toy and an S was collected for stereotypy. Both incorrect response and stereotypy were partial interval recorded data. After each probe sessions, if the criterion (90% of correct responses for two consecutive observations) wasn't reach, a new pairing procedure phase was implemented. The second phase followed the same procedure described for the first, but with 10-seconds pairing and test intervals. The third phase, followed the same procedure described for the first but with 15-seconds. After the third stimulus-stimulus pairing phase Student A met the criterion and two more probes were ran, while only two pairing phases were needed for Student B to meet the criterion.

Results

Baseline data (Fig. 2) showed that Participant A had a range of 0 to 15 intervals with toy play present, with a mean of 7.5, a range of incorrect responses intervals of 6 to 10, with a mean of 8 and a range of stereotypy intervals of 33 to 54, with a mean of 43.5. During the first pairing procedure phase the student mastered the criterion in two sessions, with 19 correct responses over 20 intervals and 18 correct responses over 20 intervals. During the second pairing procedure phase the student's data showed a variable ascending trend. The student met the criterion for the 10-seconds pairing procedure phase after seven session and three sessions with 15-seconds pairing intervention were conducted to meet the following criterion.

Each post-conditioning probe showed an improvement in the number of desired behavior intervals: appropriate toy play intervals' range was from 15 to 40 after the first intervention, then it went up to 51 and finally 58. Both Participants' data showed a steady increase in appropriate play and decrease in stereotypy intervals, with Participant B needing only two intervention sessions to reach the 5-minute of appropriate play goal.

DISCUSSION

The data from this study replicated the findings of Nuzzolo-Gomez et al. (2002), showing that the toys acquired more stimulus control after every pairing procedure. The data demonstrated that the conditioning of toy play resulted in a decrease in stereotypy for the student. This finding supported the theory that toy play has stronger stimulus control than stereotypy, that stereotypy has a play function and that it can be replaced by appropriate play (Nuzzolo et al., 2002). This study also indicated that aversive treatments are not necessary for replacing stereotypy with correct behavior, and hopefully more researches will be conducted about the use of positive procedures.

A limitation of the study was the difficulty to control the temporal occurrence of the pairing procedure: Participant A had an irregular attendance of the school and the class did not have the same schedule every day, while Participant B was receiving only three hours of instruction per week. This difference in the intensity of the treatment received could also explain why Participant B needed more stimulus-stimulus pairing sessions to meet the criterion. The results of this study are encouraging and suggest that CABAS® procedures can be effectively replicated not just in a different country, but also in a different instructional context.

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Figure 1: Number of correct responses emitted during the stimulus-stimulus pairing procedure for toy conditioning sessions
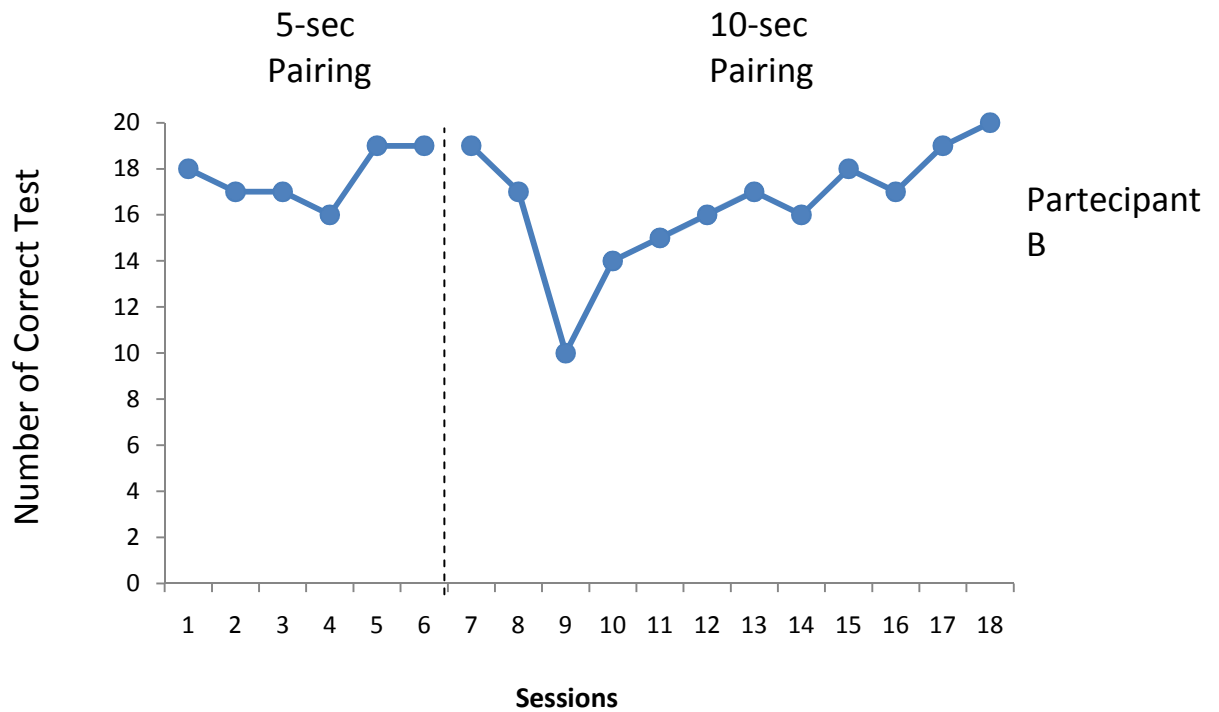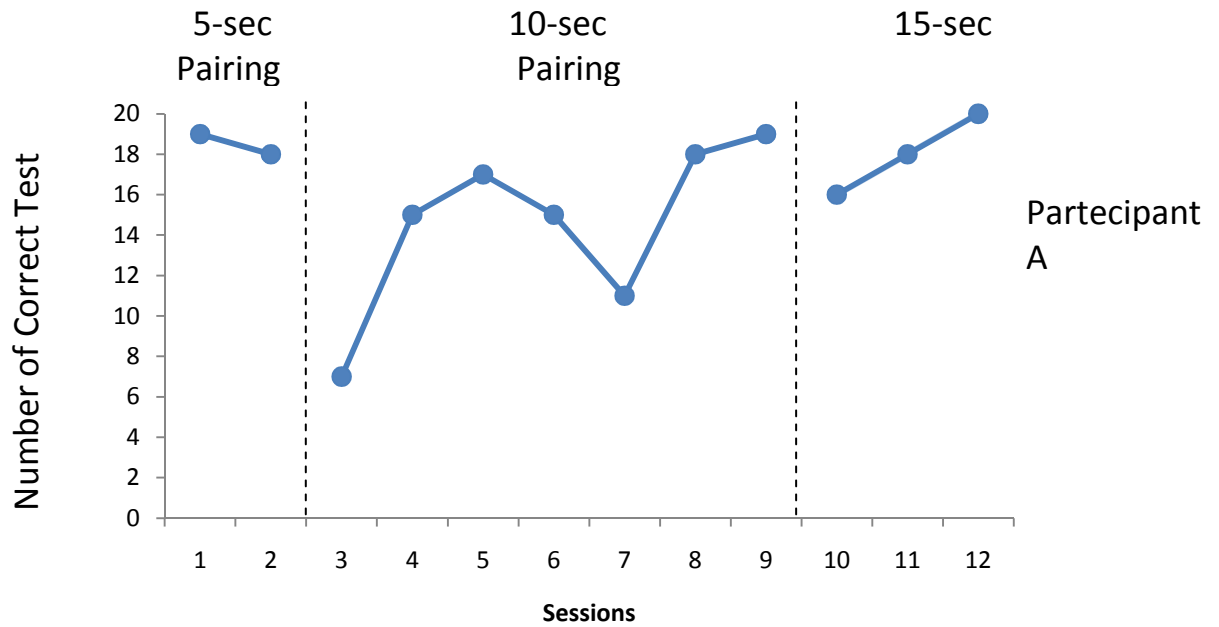
Figure 2: Number of correct and incorrect responses and number of stereotypy emitted during the free-setting play probe sessions