

Practice of an Alternative Behavior as Intervention for Object Stereotypy: Comparison of Contingent and Noncontingent Implementation Across Evoking Stimuli

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We evaluated contingent and noncontingent practice of an alternative behavior (appropriate play) as intervention for stereotypy that occurred with two play objects in a 5-year old boy with autism. Contingent practice was implemented as a consequence for stereotypy, and the rate of noncontingent practice was matched (yoked) to that schedule. On average, stereotypy with one object (blocks) was less frequent during implementation of both contingent and noncontingent practice, but neither procedure had a sustained positive effect with the second play object (figures). Appropriate play did not improve consistently with intervention. Issues related to treating object stereotypy are discussed.

Key Words: stereotypy, alternative response training, noncontingent intervention, autism

Stereotypy in the form of repetitive, invariant motor responses is a defining characteristic of children with autistic disorder (American Psychiatric Association, 1994). Common stereotypic behaviors include hand flapping, body rocking, and head shaking. Stereotypy is a concern because it interferes with learning, competes with acquisition of adaptive skills, and is socially stigmatizing.

Behavior analysis research suggests that stereotypy frequently is automatically reinforced by the sensory consequences it produces (Lovaas, Newsome, & Hickman, 1987). Providing noncontingent access to preferred leisure and play materials can be effective in reducing stereotypic behaviors maintained by automatic reinforcement (LeBlanc, Patel, & Carr, 2000). However, most studies have targeted stereotypy that does not include contact with objects, for example, hand mouthing and saliva play (Piazza et al., 2000; Vollmer, Marcus, & LeBlanc, 1994) and head rocking, face rubbing, and repetitive hand movements (Britton, Carr, Landaburu, & Romick, 2002; Wilder, Kellum, & Carr, 2000). Many children with autism display stereotypy by manipulating objects, and this situation may make it difficult to provide noncontingent access to alternative (and more preferred) stimuli. To illustrate, Carr, Dozier, Patel, Adams, & Martin (2002) reported the case of a 7-year old girl diagnosed with autistic disorder who displayed object mouthing, "which involved placing a small inedible object (e.g., a pen cap) between her lips and flipping the object up and down, with either hand, in a repetitive motion" (p. 38). Access to vibratory toys was made available noncontingently but did not reduce object mouthing until the procedure was combined with a response blocking intervention.

Stereotypy that includes object manipulating is particularly challenging when the objects are integral to instruction or are used during leisure activities. In the present study, we focused on object stereotypy displayed by a young child with autism during play. Using alternative response training, the goal of intervention was to reduce stereotypy by increasing the child's appropriate physical contact with toys. Applied contingently, this training consisted of practicing play behaviors when object stereotypy was performed. We also evaluated whether noncontingent practice could have a decelerative effect. Compared to contingent implementation of an intervention procedure, noncontingent application may be easier and less time consuming for practitioners (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993).

Additional contributions of the study were assessing whether play behavior improved concurrently (covaried) with the treatment of stereotypy, and determining whether these results were influenced by different play objects (evoking stimuli).

METHOD

Participant and Setting. Bill was a 5-year old boy diagnosed with autistic disorder. He communicated through spoken words, gestures, and simple sign language. Bill was able to identify colors, shapes, letters, and most functional objects in his surroundings. With modeling and direction from an adult, he could perform several gross-motor play activities. He was toilet trained and had rudimentary self-care skills (washing, dressing, eating). Bill enjoyed playing with a variety of toys, looking at books, and using the computer.

The study was conducted at a private school for children with developmental disabilities. Bill attended school 6 hours each weekday, and was enrolled in a classroom with 5 other students, a primary teacher, and two assistants.

Materials During assessment sessions (described below), Bill had access to two play objects. Blocks were multicolored shapes, made of wood, and approximately 1-3 inches in size. The second object, figures, were plastic "Winnie-the-Pooh" characters that measured approximately 2 inches in height. Blocks and figures were considered object preferences for Bill, and he was accustomed to playing with them preceding the study.

Measurement Two behaviors were measured. Object stereotypy was defined as Bill lining up the blocks and figures, tensing his body, and "inspecting" the objects visually by holding them 1-2 inches in front of his eyes. The second behavior, appropriate play, was defined as Bill using the play objects for their intended purposes, for example, stacking blocks, building a structure, or moving figures to simulate actions. Appropriate play was recorded when it occurred spontaneously and when it was practiced.

Sessions were conducted in a partitioned area of Bill's classroom that contained a table and two chairs. The classroom teacher or an assistant sat beside Bill and intervened according to experimental conditions. An observer recorded object stereotypy and appropriate play during four, 5-min sessions each day using a 30-s, partial interval method. The observer timed recording intervals on a hand-held stopwatch and scored each interval as occurrence/nonoccurrence of the behaviors on a precoded form.

Interobserver Agreement A second person recorded data with the primary observer in a simultaneous but independent manner during 20% of sessions. An agreement was tallied if both individuals recorded the occurrence of object stereotypy and appropriate play in the same interval. Average agreement (agreements/agreements + disagreements x 100) was 95.7% (range: 90-100%) for object stereotypy and 89.8% (range: 89.8-100%) for appropriate play.

Procedures. Contingent and noncontingent practice of alternative behavior were compared in an ABAB yoked control design. Yoking was achieved by matching the rate of noncontingent practice to the rate of contingent practice implementation. Contingent practice was always scheduled during the first two sessions of the day. The first session occurred between 9:15-9:30AM each day, and the second session occurred approximately 15 minutes later. Noncontingent practice was scheduled during the third session of the day, between 1:15-1:30PM, and the fourth session, which occurred approximately 15 minutes later. During the two morning (contingent practice) and two afternoon (noncontingent practice) sessions, Bill played separately with either the blocks or figures. The order of play objects was randomized each day.

Baseline. The instructor arranged the play objects on the desk in front of Bill and told him, "Time to play." Otherwise, there was no interaction with him for the duration of the session. That is, the instructor did not implement a consequence for object stereotypy or appropriate play.

Contingent Practice. Each time Bill displayed object stereotypy, the instructor stopped the response, demonstrated an alternative play behavior, and had him perform that behavior 5 times. The instructor initiated practice by telling Bill what to do and if he did not comply with the verbal direction, guiding his hands physically for the 5 practice behaviors. To illustrate, the alternative behavior that was practiced contingent on object stereotypy with blocks might be arranging them in the shape of a "tower." For object stereotypy with figures, the alternative behavior might be moving them to mimic walking, jumping, or similar actions. The total time required to complete practice of the alternative behavior was approximately 20-30 s. If Bill engaged in non-practiced appropriate play independently, the instructor did not respond.

Noncontingent Practice. The practice of an alternative play behavior was implemented with Bill as described previously, but not contingent on object stereotypy. The instructor prompted practice at evenly spaced intervals based on the rate of implementation that was calculated from the preceding contingent practice session that day. The practice trials occurred according to this schedule, regardless of the preceding behavior. That is, the instructor prompted Bill whether he was inactive, displaying object stereotypy, or playing appropriately with the blocks and figures. Similar to baseline, the instructor did not implement a consequence for object stereotypy, and identical to baseline and contingent practice conditions, did not respond to non-practiced appropriate play.

RESULTS

Figure 1 and Figure 2 show the percent of intervals Bill demonstrated object stereotypy and appropriate play with blocks during contingent and noncontingent practice respectively. The object stereotypy and appropriate play data for figures are depicted in Figure 3 and Figure 4 respectively.

As seen in Figure 1, when Bill played with blocks, object stereotypy occurred at a high percent during the Baseline I phase. Stereotypy decreased with contingent practice during the Practice I phase. Although a reduction in stereotypy also was recorded during the first intervention session with noncontingent practice, responding increased steadily during the remainder of the Practice I phase. During Baseline II, object stereotypy increased when contingent practice was discontinued, and it remained at a high but variable percent with the removal of noncontingent practice. When practice of an alternative behavior was reintroduced (Practice II), object stereotypy decreased during implementation of both contingent and noncontingent practice.

Figure 2 reveals a moderate percent of appropriate play with blocks in Baseline I sessions. There was an increase in appropriate play with contingent practice during the Practice I phase, but no change with noncontingent practice. During Baseline II, appropriate toy play decreased when contingent practice was removed, and also occurred less frequently in the absence of noncontingent practice. There was an increase in appropriate play during Practice II for both contingent practice and noncontingent practice.

Object stereotypy with figures (Figure 3) occurred during 100% of intervals in all but one session during Baseline I. In the Practice I phase, there was a reduction in stereotypy for both contingent and noncontingent practice. However, percent occurrence did not change appreciably for either condition when intervention was withdrawn during Baseline II. Practice II was associated with decreased object stereotypy with contingent practice and noncontingent practice.

Displayed in Figure 4, appropriate play with figures was infrequent during the Baseline I phase for contingent practice, but there was an increasing trend for noncontingent practice. In the Practice I phase, appropriate play increased with contingent practice, while average occurrence during

noncontingent practice, although highly variable, was similar to the preceding baseline phase. During Baseline II for contingent practice, appropriate play continued to increase. Appropriate play decreased with the elimination of noncontingent practice. Appropriate play with contingent practice during Practice II occurred at a percent similar to the Practice I phase, but decreased from Baseline II. The percent of appropriate play during the second implementation of noncontingent practice remained consistent with the preceding phase.

Average percent object stereotypy with blocks and figures, during baseline and practice phases, is presented in Figure 5. Relative to baseline, average occurrence of stereotypy with blocks was less in both contingent and noncontingent practice phases. With figures, the same effect was documented for noncontingent practice but not contingent practice. The data shown in Figure 6 are the average percent appropriate play with blocks and figures during baseline and practice phases. Both contingent and noncontingent practice were associated with increased appropriate play with blocks. Average percent appropriate play with figures did not improve with either practice condition.

DISCUSSION

Contingent and noncontingent practice of an alternative behavior had different effects on object stereotypy and appropriate play. The clearest results were found when Bill played with blocks and practice was implemented contingent on stereotypy. In this situation, contingent practice was associated with a decrease in stereotypy. Initially, appropriate play increased with contingent practice and decreased when it was removed, but remained at a reduced frequency when the practice procedure was reintroduced. Stereotypy with blocks also decreased relative to baseline phases when Bill received noncontingent practice, with *average* occurrence comparable to the contingent practice condition. Appropriate play with blocks did not improve with noncontingent practice.

With regard to Bill's play with figures, there was a decrease in object stereotypy when he was first exposed to contingent and noncontingent practice. However, stereotypy remained at these reduced percentages during the reversal to baseline phase. The second implementation of practice had a reductive effect on stereotypy, with both contingent and noncontingent implementation. Although appropriate play with figures increased from Baseline I with contingent practice, an accelerating trend continued when practice was withdrawn, and then decreased when it was reintroduced. Similar to the data for blocks, appropriate play with figures did not improve with noncontingent practice.

As explained earlier, our rationale for intervention was that stereotypy with play objects might be reduced through alternative response training that increased Bill's appropriate manipulation of these objects. In summarizing our findings, the strongest conclusion is that contingent practice was effective in reducing stereotypy with blocks. With noncontingent practice, *average* occurrence of object stereotypy with blocks decreased, but variability was noteworthy, particularly the increasing trend in stereotypy recorded during the first noncontingent practice phase (Figure 1). A second conclusion is that contingent practice of an alternative behavior was more effective in reducing object stereotypy with blocks than with figures. This outcome suggests a complex model of stereotypy in which response strength is a function of features of evoking stimuli (Carr, Yarbrough, & Langdon, 1997). One limitation to the present study was that we did not assess object preferences empirically or identify other play materials that occasioned stereotypy less frequently.

It is not possible to interpret clearly the changes in appropriate toy play recorded with contingent and noncontingent practice. As related to contingent practice with blocks, it appeared that the procedure promoted play (Practice I phase in Figure 2), but this effect was not sustained a second time. Appropriate play with figures also increased when contingent practice was introduced, but this trend continued when

the intervention was discontinued, and decreased when it was implemented again. With noncontingent practice, Bill's appropriate play with blocks and figures essentially was unaffected. The finding that appropriate play did not increase unequivocally with alternative response training may indicate that the reduction in object stereotypy with blocks was a function of punishment. A punishment effect may have been the result of response interruption (Luiselli, 1998) or perhaps increased response effort (Friman & Poling, 1995). The influence of punishment in this case is likely because if the contingent practice intervention was reinforcing, more object stereotypy would result. Note however that reduce object stereotypy through contingent practice also would decrease opportunities to prompt appropriate toy play. One suggestion is to combine positive reinforcement for spontaneous appropriate play with stereotypy-contingent practice (Wells, Forehand, Hickey, & Green, 1977).

Despite the equivocal findings of this study, we propose that future research continue to evaluate noncontingent intervention for object stereotypy and related challenging behaviors. To reiterate, one advantage of noncontingent procedures is that they may be easier to implement than those requiring application of a consequence following every response (Carr, Coriaty, Wilder et al., 2000). Furthermore, because implementation of noncontingent practice in our study was yoked to the rate of contingent practice, it is possible that there might be different results from other, and perhaps more frequent, fixed-time schedules. Also, the 30-s interval recording method in the study may have been insensitive to small trend changes that possibly would be revealed by a shorter interval duration (e.g., 10s or 15s). Finally, we selected an intervention on the hypothesis that Bill's object stereotypy was maintained by automatic reinforcement. We did not conduct a functional behavioral assessment, which may have identified more conclusively the source of control over stereotypy and suggested a different treatment approach. These and related refinements to practitioner focused applied research will strengthen our understanding about the most efficacious interventions for stereotypy and the mechanisms responsible for behavior change.

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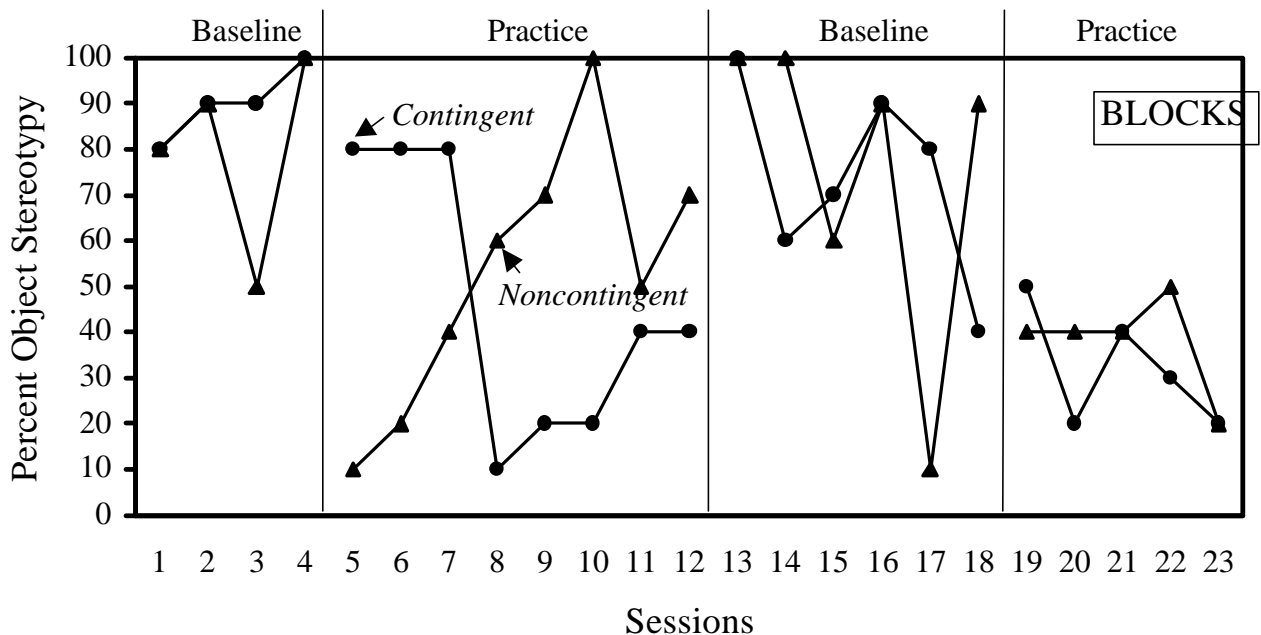


Figure 1. Percent object stereotypy with blocks during baseline and practice phases.

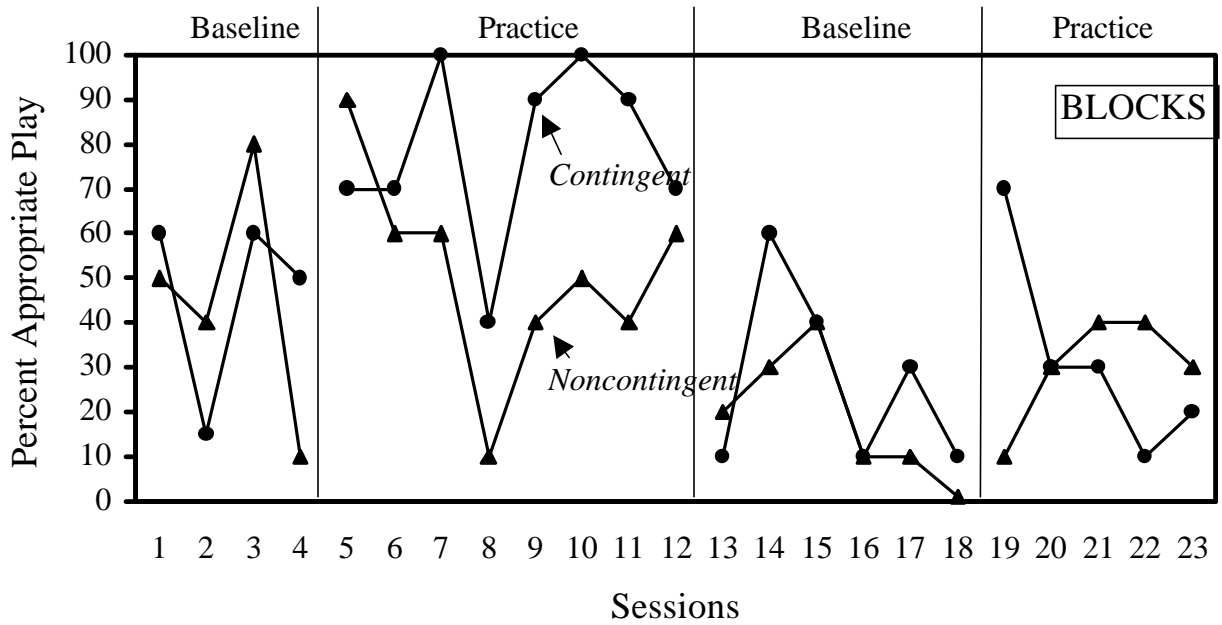


Figure 2. Percent appropriate play with blocks during baseline and practice phases.

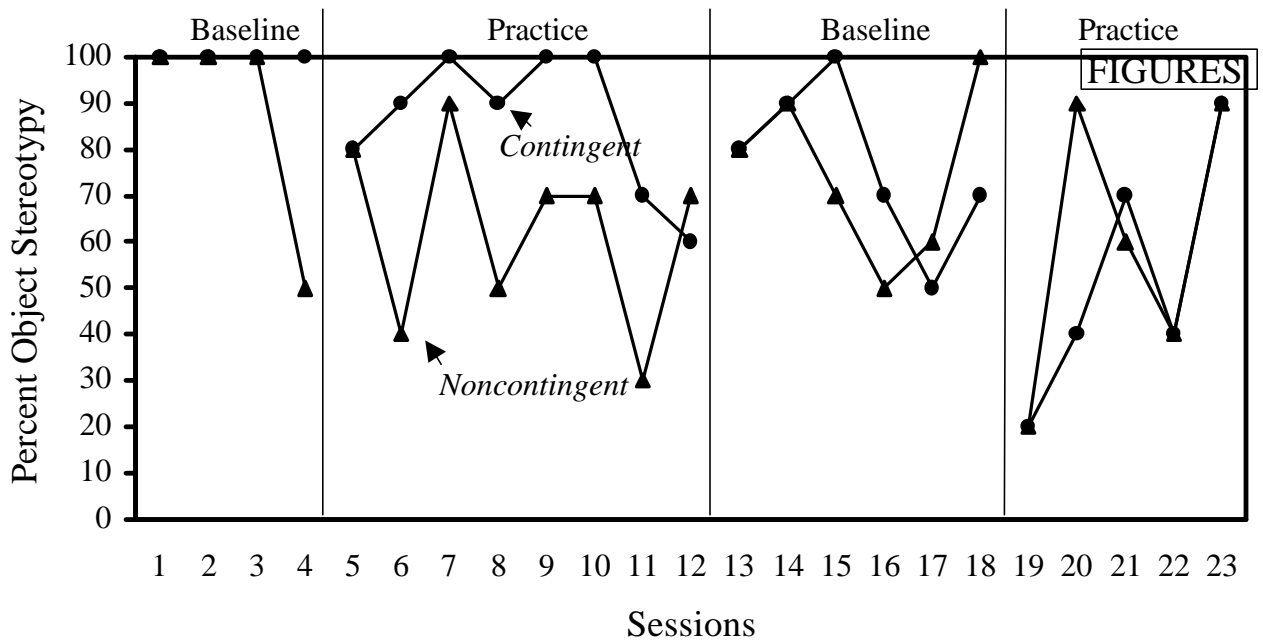


Figure 3. Percent object stereotypy with figures during baseline and practice phases.

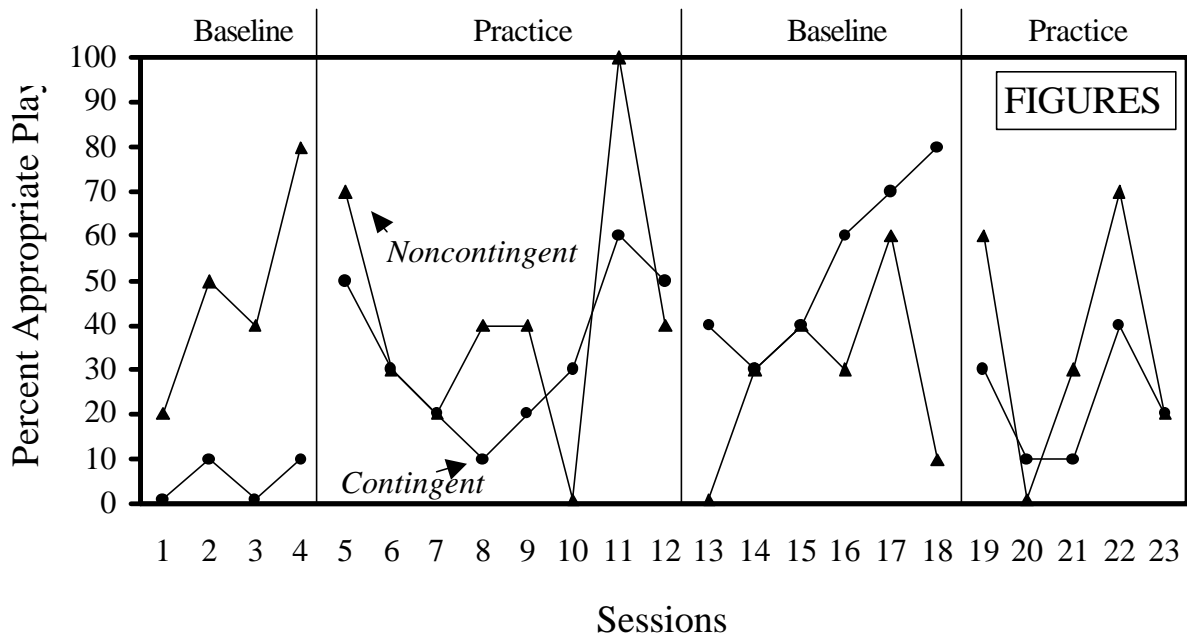


Figure 4. Percent appropriate play with figures during baseline and practice phases.

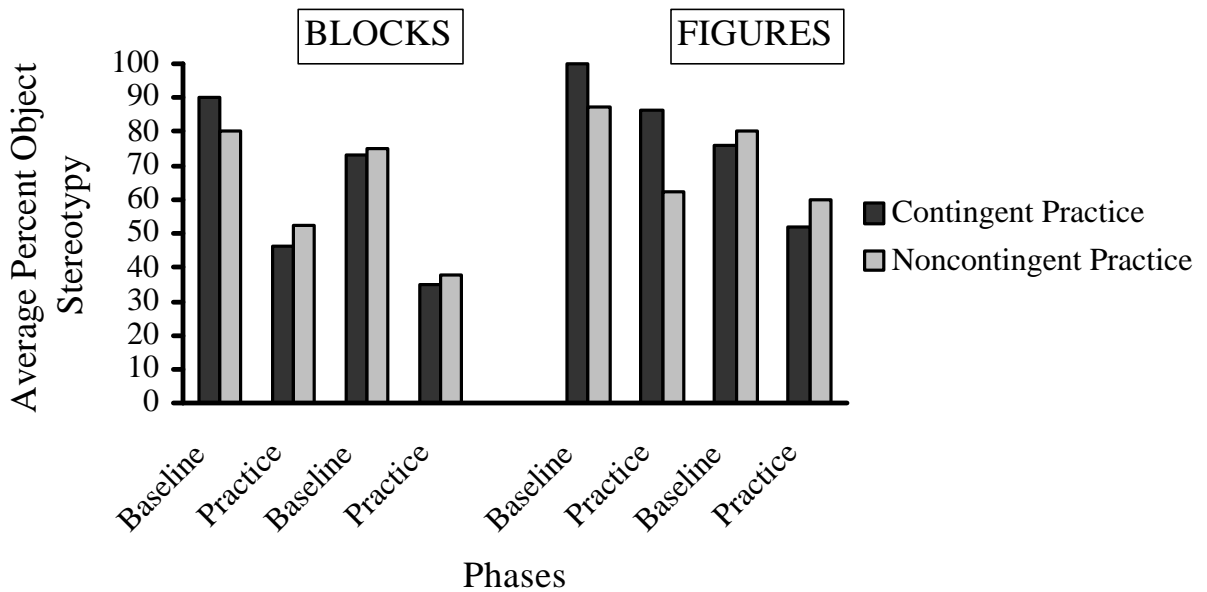


Figure 5. Average percent object stereotypy with blocks and figures during baseline and practice phases.

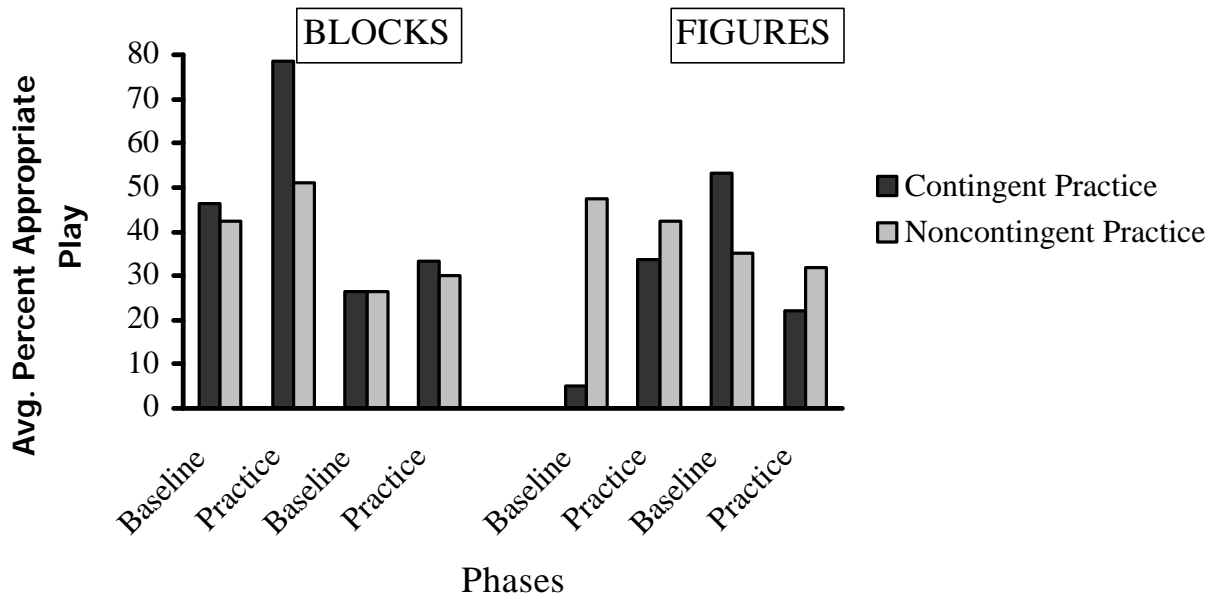


Figure 6. Average percent appropriate play with blocks and figures during baseline and practice phases.

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