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ENHANCING THE EFFECTIVENESS OF A PLAY INTERVENTION BY ABOLISHING THE REINFORCING VALUE OF STEREOTYPY: A PILOT STUDY

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An alternating treatments design compared one condition in which a child with autism was allowed to engage in stereotypy freely prior to the intervention (abolishing operation component) to a second condition without the free-access period. Levels of stereotypy and problem behavior were lower and levels of functional play were higher in the condition with the abolishing operation component. These data provide preliminary support for the use of abolishing operations in interventions to increase the play skills of children with autism.

DESCRIPTORS: abolishing operation, autism, motivating operation, play, stereotypy

Many researchers and practitioners have reported that stereotypic behaviors (e.g., spinning and mouthing toys), which are prevalent among children with autism, can interfere with attempts to teach play skills (e.g., Baker, 2000; Baker, Koegel, & Koegel, 1998; Koegel, Firestone, Kramme, & Dunlap, 1974). Despite this problem, few research-based procedures exist for addressing stereotypy during interventions to teach play skills, and additional approaches are required (Rapp, Vollmer, St. Peter, Dozier, & Cotnoir, 2004). One potential novel approach involves reducing stereotypy by eliminating or abolishing the child's motivation to engage in the behavior.

An *abolishing operation* is any stimulus or series of events that reduces the value of a particular reinforcer (Laraway, Snycerski, Michael, & Poling, 2003). If an individual has unrestricted access to a particular reinforcer for an extended period of time, that stimulus may eventually lose its reinforcing value (e.g.,

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McComas, Thompson, & Johnson, 2003; Vollmer & Iwata, 1991). Based on this logic, if a child has unrestricted opportunities to engage in stereotyped movement, it is possible that the behavior may eventually lose its reinforcing value, at least for periods of time sufficient to promote the acquisition of new skills. Thus, by incorporating an abolishing operation component (AOC) into an intervention, practitioners may be able to reduce more effectively the reinforcing value of stereotypy, thereby increasing the child's responsiveness to the intervention.

In the current study the levels of stereotypy, problem behavior, and functional play were compared across two conditions. In one condition, the child was allowed to engage in stereotypy freely prior to a play-skills intervention (AOC condition). In the second condition, the same intervention was implemented without the prior free-access period (no-AOC condition).

METHOD

Participant, Setting, Therapist, and Materials

Sue was an 8-year-old Caucasian girl who had been diagnosed with autism. She scored a 47.5 on the Childhood Autism Rating Scale (Schloper, Reichler, Devellis, & Daly, 1980), placing her in the severe autism range. When given a toy, Sue would repeatedly spin it on the table. Prior functional analysis of this behavior suggested that it was maintained by automatic reinforcement (data available from the first author). When her toy spinning was interrupted, she would scream loudly and drop to the floor.

Sessions were conducted in a room at Sue's school reserved for individual instruction. Toys used in the study (i.e., a toy train, a doll with hair styling accessories, and plastic cooking utensils) were identified through a paired-choice preference assessment prior to the study (Fisher et al., 1992).

Dependent Variables, Data Collection, and Interobserver Agreement

Stereotypy was defined as placing the toy on a flat surface and spinning the toy so that it rotated in rapid circles. *Problem behavior* was defined as loud vocalizations significantly above the conversational level (i.e., screams) and falling rapidly to the floor by buckling both knees. Both topographies of problem behavior usually occurred in tandem and are therefore collapsed into a single category. *Functional play* was defined as independent (i.e., unprompted) use of play materials in a manner consistent with their intended function (e.g., moving the toy train, brushing the doll's hair, placing clips and extensions into the doll's hair, setting the table, stirring the bowl, feeding the doll).

A 10-s partial-interval data-collection procedure was used to record the occurrence of each of the three dependent variables. Interobserver agreement between the observers was calculated on an interval-by-interval basis by dividing the number of agreements (occurrence plus nonoccurrence) by the total number of intervals and converting this ratio to a percentage. Interobserver agreement was collected for all dependent variables during 33% of the sessions. Mean interobserver agreement across the three dependent variables was 92% (range, 85% to 95%).

Experimental Design and Procedure

An alternating treatments design with a baseline was used. Baseline sessions were 10 min in duration. During baseline, Sue had free access to all of the toys, no demands or instructions were given to her, and the therapist made positive verbal statements (e.g., "I'm having a good time playing with you") every 10 s.

During the alternating treatments phase, two play intervention conditions were alternated: (a) a 10-min session without the AOC and (b) a 10-min session preceded by the AOC. To reduce carryover or order effects, only one session was conducted per day, and only two to three sessions were conducted per week.

Play intervention without AOC. The play intervention consisted of three components: modeling, prompting with contingent reinforcement, and child-directed naturalistic instruction (Lang et al., in press). The therapist set up the room so that toys were spread out and easily available. Sue was free to approach any of the toys, and the therapist followed the child's lead. The therapist then modeled appropriate play with the toy Sue had approached. Multiple sets of identical toys were available so the therapist would not need to remove the toy from Sue in order to model the play skill. The therapist used a most-to-least prompting hierarchy (physical, model, verbal prompts) to prompt Sue to imitate the therapist and praised her if she engaged in functional play behaviors. The therapist often had to interrupt stereotypy during the intervention to physically prompt functional play behavior. Interrupting consisted of stopping the toy from spinning and immediately prompting Sue to engage in functional play with the toy. Only independent functional play was graphed.

Play intervention with AOC. In this condition the same play intervention described above was implemented. The only change between conditions was the presence or absence of the presession free-access period. This free-access period was hypothesized to act as the AOC of the intervention. During the presession AOC, the therapist provided an environment containing all the selected toys spread out and easily available. The therapist allowed Sue to engage in any behavior she chose and ignored all occurrences of stereotypy and problem behavior (i.e., she was not physically interrupted). The AOC continued until Sue stopped engaging in stereotypy for at least 10 s and attempted to leave the room. These criteria were based on previous research (O'Reilly et al., 2009). The mean duration of this component was approximately 15 min (range, 7 min to 25 min). Following the AOC, the therapist immediately initiated the play intervention.

RESULTS AND DISCUSSION

Figure 1 displays the results for each dependent variable in a separate panel. The top panel displays the percentage of intervals during which Sue engaged in functional play behaviors. During baseline, functional play was rare (M = 3%, range, 0% to 10%). Once the therapist began the intervention, Sue's play behaviors increased in both the AOC and no-AOC conditions. However, Sue engaged in higher levels of functional play in the AOC condition (M = 56%, range, 33% to 76%) relative to the no-AOC condition (M = 39%, range, 25% to 54%). In addition, Sue's overall levels of play increased in both conditions over time. The middle panel displays the percentage of intervals in which Sue engaged in stereotypy. During baseline, stereotypy was high (M = 79%, range, 66% to 90%). Once the intervention began, stereotypy decreased in both conditions. However, Sue engaged in lower levels of stereotypy in the AOC (M = 28%, range, 15% to 60%) than in the no-AOC (M = 44%, range, 27% to 66%) condition. Furthermore, levels of stereotypy decreased in both conditions over successive sessions. The bottom panel displays the percentage of intervals in which Sue engaged in problem behavior. During baseline, problem behavior was low (M = 4%, range, 0% to 10%) and remained low in the AOC condition (range, 0% to 9%) but increased in the no-AOC condition (M = 13%, range, 0% to 33%).

Four important implications are suggested by the results of this study. First, the play intervention appeared to increase Sue's functional play skills, which supports previous research (Lang et al., in press). However, caution should be used when interpreting these data. Although the alternating treatments design provided experimental control for the comparison of the AOC to the no-AOC condition, the effect of the play intervention itself was evaluated only in an AB design. Future research designed to evaluate this

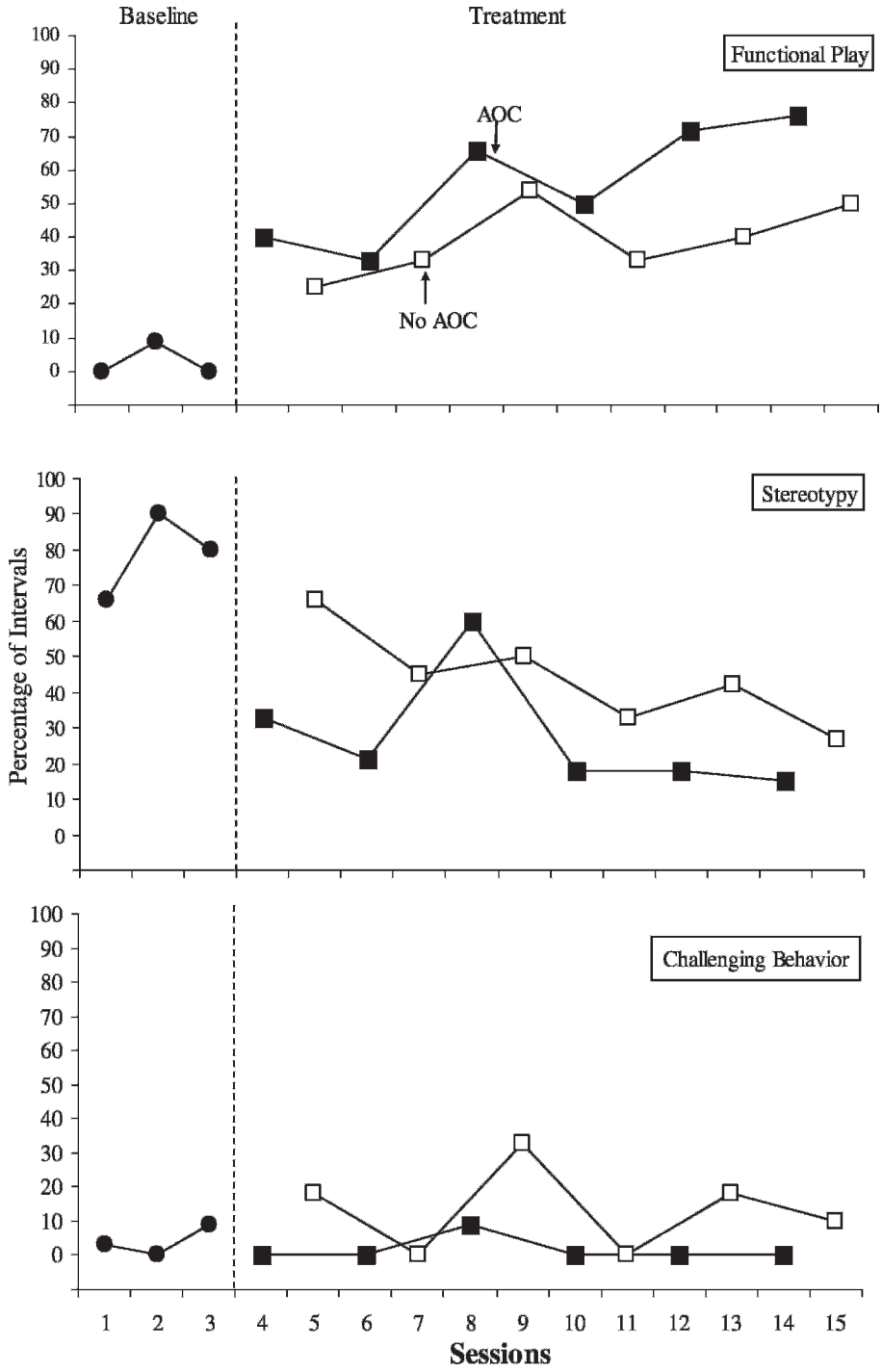

Figure 1. Percentage of intervals containing functional play behaviors, stereotypy, and problem behavior during baseline and following the abolishing operation component (AOC) and no AOC.

particular play intervention with multiple participants and using a more rigorous research design is warranted.

Second, stereotypy decreased as functional play increased, suggesting a negative correlation between stereotypy and play skills. This finding is consistent with previous research (e.g., Hume & Odom, 2007; Paterson & Arco, 2007) and suggests that one method for effectively treating stereotypy may be to replace it with functional play skills. When considering what play skills to teach, it may be beneficial to match the stereotypic play with a similar aspect of functional toy play (Rapp et al., 2004).

Third, allowing a child free access to stereotypy prior to providing instruction in play skills may decrease the level of stereotypy during subsequent play instruction. This, in turn, may make it easer to engage the child and prompt functional play during the intervention session. The concept of the motivating operation (which includes both motivating and abolishing operations) offers a potential explanation for this finding (Laraway et al., 2003). Because the AOC condition allowed the individual to engage freely in stereotypy, it is possible that the stereotypy was less reinforcing during the subsequent intervention session; thus, the child allocated less responding to stereotypy and more to functional play.

A final implication of these results is that the AOC may more effectively reduce problem behavior. Because stereotypy was no longer being interrupted as often and periods of free access to the behavior were available, less problem behavior occurred. Data were not collected, however, on the frequency with which the behavior was interrupted, so this is currently a hypothetical explanation.

The data presented in this pilot study, although promising, have several limitations. First, the intervention requires replication with other children and in other contexts. Second, this current study did not demonstrate sustained improvements in play skills in the absence of the intervention or over time. In future studies data could be collected during the AOC condition's free-access period to observe the changes in functional play and stereotypy in the absence of the intervention procedures over time. Finally, although differences between the AOC and no-AOC conditions were found, the magnitude of these differences in terms of clinical significance was small.

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