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EMBEDDED PROMPTING MAY FUNCTION AS EMBEDDED PUNISHMENT: DETECTION OF UNEXPECTED BEHAVIORAL PROCESSES WITHIN A TYPICAL PRESCHOOL TEACHING STRATEGY

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This study describes an unexpected behavioral process that influenced behavior during the teaching of concepts to a 4-year-old girl. The efficacy of and preference for three strategies that varied in teacher directedness were assessed in a multielement design and concurrent-chains arrangement, respectively. The strategy that involved the most teacher direction was most efficacious and preferred. In addition, embedded teacher prompts, common in child-led teaching procedures, functioned as a punisher for the child's toy play. Implications for designing effective and preferred teaching conditions are discussed.

Key words: concurrent-chains arrangement, embedded teaching, punishment, teacher directedness

Heal, Hanley, and Layer (2009) described results from assessments of the relative efficacy of and child preference for three teaching strategies that differed in the level of teacher directedness with six preschoolers. The teacher taught the children color- and animal-name relations. In Strategy 1, the teacher provided praise for correct responses during an exclusively child-led play period (based on discovery-oriented teaching strategies). Procedures in Strategy 2, derived from embedded teaching strategies, were similar to those in Strategy 1 except that the teacher prompted the child to vocalize name relations contingent on child-initiated interactions with toys and modeled correct responses contingent on errors. Strategy 3 was similar to Strategy 2 except that the teacher also arranged a brief period of teacher-initiated instructional trials. Results showed that Strategy 3 was the most efficacious for teaching the name relations and was preferred by most children.

A somewhat surprising result was that the children showed the least preference for Strategy 2, in which the teacher prompted responses when the child touched particular toys. Moreover, one participant interacted with target toys less over time during Strategy 2. In contrast, his interactions with target toys persisted in Strategy 1, which was devoid of embedded prompts. The exclusive decrease in toy play during Strategy 2 suggests that embedded teacher prompts may have punished toy play. The analysis of the specific influence of embedded prompts on play initiations as well as on children's preferences for the teaching strategies involving embedded prompts was not possible in Heal et al. (2009) because embedded prompts were programmed in two of the three teaching strategies (both Strategies 2 and 3). Therefore, the purpose of the current study was to replicate the general procedures of Heal et al. with a new participant while isolating the influence of the embedded prompts. To this

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end, we embedded prompts exclusively in Strategy 2.

METHOD

Participant, Setting, and Materials

Ali, a 4-year-old girl of typical development who attended a full-day inclusive preschool, participated. Sessions were conducted in a session room that contained a child-sized table and chairs. Twelve color and then 12 animal Spanish name relations were taught in the first and second assessments, respectively (Heal et al., 2009, Table 1). Relations were randomly assigned to the three teaching strategies. Three unique sets of toys were associated with each teaching strategy and rotated across sessions. Each toy set included three toys to evoke each target response and at least two nontarget toys.

Response Measurement and Interobserver Agreement

Play and correct responses were recorded during 15-s intervals and are reported as percentages. Play was defined as Ali touching a new target toy during each 15-s interval. If she touched a second target toy during an interval, play was not recorded. If she touched a target toy across successive intervals, play was recorded only in the interval in which she first touched the target toy. These scoring rules were somewhat unique because playing with a new toy was used as an opportunity to prompt target responses within embedded teaching. Correct responses were defined as Ali independently and correctly saying the target Spanish color or animal name within 5 s of touching the toy or within 5 s of a teacher-delivered question. Card selection in the initial link of a concurrent-chains arrangement served as our preference measure. A second observer simultaneously but independently recorded responses during 36% of sessions, and observers' records were compared on a trial-by-trial basis. Agreement was 100%, 95%, and 97% for card selection, play, and correct responses, respectively.

Preassessments

Prior to the efficacy and preference assessments, three preassessments were conducted (see Heal et al., 2009, for detailed procedures). Three moderately preferred colors were identified via a paired-item color preference assessment, and each was then associated (via poster boards) with one of the three teaching strategies. Results of an echoic assessment demonstrated that Ali had the necessary skills to echo a model prompt. Results of a pretest showed that she was unable to name any of the target relations in Spanish.

Efficacy and Preference Assessments

The efficacy and preference assessments were conducted simultaneously through the use of a multielement design and a concurrent-chains arrangement (Heal et al., 2009). One session block was conducted per day and consisted of three sessions such that Ali experienced each teaching strategy once per day. Session blocks alternated between forced and free choice every other day. In the first session of each block, three colored cards, each associated with one of the teaching strategies, were located on the session room door. The teacher said "Hand me the [color] card" while pointing to one or "Hand me the card that you want to do first [next]" during the forced- or free-choice session blocks, respectively. No other instructions were delivered. Following a card selection, the teacher and child both entered the session room to experience the associated teaching strategy. The forced- or free-choice procedure was then repeated with the two remaining cards, and with the final card after the second teaching session. The same teacher conducted all sessions and provided some form of attention during each 15-s interval. The teacher assessed each target relation four times during a posttest that followed the completion of each preference assessment (one assessment for color names and one assessment for animal names). No differential consequences were delivered for correct responses in these posttests.

Teaching Strategies

During Strategy 1, the teacher held up and labeled a target toy such that each relation was modeled once prior to the start of the session. Once the session started, all interactions were child initiated, and the teacher provided no prompts to engage in the target responses. If Ali correctly named a target relation at any time, the teacher delivered praise; however, she never provided corrective feedback. During Strategy 2, all interactions were child initiated. When Ali touched a target toy (only the first or different toy in each interval), the teacher delivered a prompt to engage in a target response (e.g., the teacher asked ''What color is the car?'' when Ali touched a toy car) but did not physically interrupt her play. Praise was delivered following correct responses, and a model prompt was delivered following incorrect responses. Strategy 3 began with the teacher initiating four to eight instructional trials lasting for a total of 30 to 60 s. She used a progressive prompt-delay procedure with a terminal delay of 5 s between the initial vocal prompt and model prompt, along with conditioned (tokens) and back-up (toys that could occasion the target responses) reinforcers for correct responses. The second component of Strategy 3 was conducted identically to Strategy 1 and lasted for 4 min. Session times for Strategies 1 and 2 were yoked to the previous Strategy 3 session time (combined time of both components); all sessions ranged between 4.5 to 5 min. For additional details, see Heal et al. (2009).

RESULTS AND DISCUSSION

Results from the efficacy and preference assessments and the pre- and posttests are shown in Figure 1. Strategy 3 resulted in the highest percentage of correct responses during teaching sessions (top) and during the posttests (bottom). Ali reached the mastery criterion for both target relations only in Strategy 3. These results are consistent with the results of Heal et al. (2009), suggesting that the combination of teacher-initiated trials, prompt-delay procedures, and conditioned and back-up reinforcers facilitated acquisition of concept classes.

The second panels depict the percentage of intervals with play during each teaching strategy. Play was variable across and within all conditions during the color-name assessment. However, a downward trend was clearly evident in Strategy 2 sessions, ending with 0% for the final three sessions. Play persisted at variable but relatively higher levels during the animal-name assessment in the strategies devoid of embedded prompts (Strategies 1 and 3). By contrast, play occurred at near-zero levels during the condition that included embedded prompts (Strategy 2). In other words, Ali stopped touching the toys only during Strategy 2 sessions in which the teacher delivered embedded prompts. It appears that embedded teacher prompts functioned as a punisher; that is, contingent delivery of teacher prompts decreased child-initiated play.

Results of the preference assessments are shown in the third panels. Ali's selections were variable during the initial assessment. In the second assessment, she selected Strategy 3 first during five of the seven free-choice session blocks. She never refused to make a selection (the consequence of which would have been session-block termination and a return to the classroom), so the aversive nature of Strategy 2 was not necessarily demonstrated. However, it was apparent that Strategy 2 was the least preferred teaching method in the second assessment because she selected Strategy 2 last during three of the last four free-choice session blocks.

Embedded teaching methods have varied across and within studies with respect to the timing of the delivery of embedded prompts and the consequences provided for correct responding (e.g., Schepis, Reid, Ownbey, & Parsons, 2001; Tate, Thompson, & McKerchar, 2005). In the context of teaching language skills, the procedural variability can be directly related to

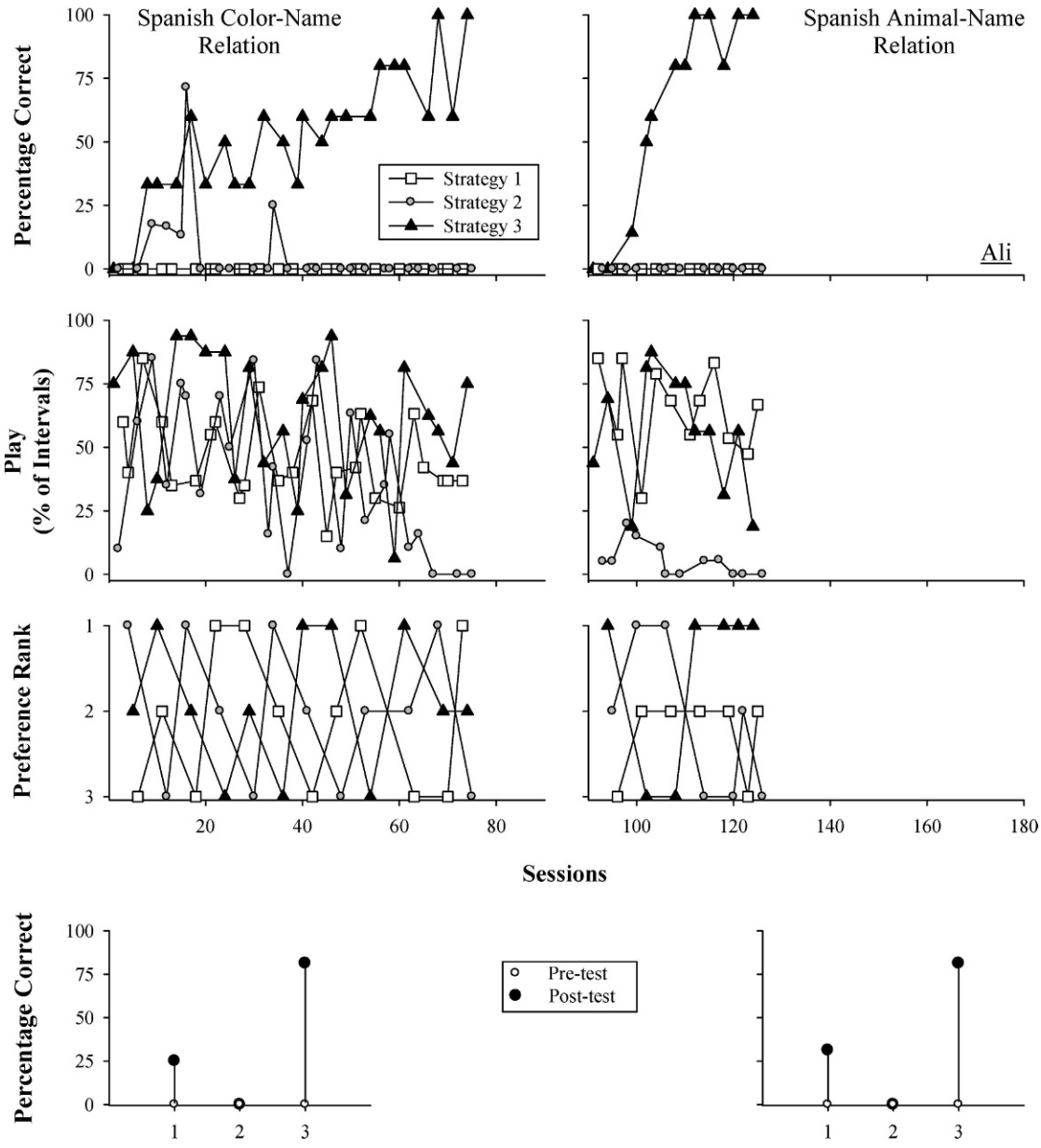

Figure 1. Percentage of correct responses (top); percentage of intervals with play (second panels); and preference rank, in which 1 represents the first strategy selected and 3 represents the last strategy selected (third panels), during the efficacy and preference evaluations for Ali. Pre- and posttest measures for target relations are depicted in the bottom panels.

the specific learning objective. The verbal behavior conceptual system (Skinner, 1957) may be useful for understanding the important differences in the manner in which embedded teaching is implemented. When teaching a mand (e.g., requesting; i.e., verbal behavior largely under the control of a specific establishing operation and reinforced by a related and specific consequence), embedded prompts are delivered prior to item access and the consequence for

correct responding is access to the requested item. In contrast, when teaching a tact (e.g., color identification; i.e., verbal behavior under the control of a discriminative stimulus and reinforced with a nonspecific and generalized reinforcer) embedded prompts are often delivered following access to items and the consequence for correct responding is praise (Fox & Hanline, 1993; Tate et al., 2005). In the current study, the learning objective was tacting colors and animals, and the procedures arranged in our Strategy 2 were consistent with recommended embedded teaching procedures (Grisham-Brown, Pretti-Frontczak, Hemmeter, & Ridgley, 2000). Therefore, the type of verbal operant taught may be a moderator of the observed effects. In other words, the ineffectiveness of Strategy 2 and the avoidance of this strategy by Ali and the children in Heal et al. (2009) may occur only when tacts are taught with these procedures. Thus, researchers should evaluate whether similar relations are found when mands are taught with embedded procedures. Meanwhile, it seems important to conduct embedded teaching of tacts under mand-like conditions (see Hart & Risley, 1975, for these language elaboration procedures).

In the current investigation, the counterintuitive punishment effect of embedded teacher prompts on play initiations was demonstrated in a multielement design. However, as with all single-subject research that has not yet been replicated, the extent to which this relation may operate during embedded teaching with other preschoolers is unknown. Nevertheless, given the widespread implementation of embedded teaching strategies (Pretti-Frontczak & Bricker, 2001), research should be dedicated to identifying variables that make them effective in promoting skill acquisition and preferred by those children who experience them. For instance, it seems plausible that providing more models prior to prompting target responses and providing fewer (i.e., more intermittent) embedded prompts during play may increase correct responding and decrease the aversive nature of embedded prompts. Alternatively, signaling the conditions under which embedded teaching will occur or embedding prompts within less or moderately preferred activities (such that praise is relatively more valuable than the reinforcers associated with play) may also increase the value of child-led teaching to those children who experience it.

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