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THE EFFECTS OF PROGRAMMING COMMON STIMULI FOR ENHANCING STIMULUS GENERALIZATION OF ACADEMIC BEHAVIOR

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Programming common stimuli is a strategy for generalizing behavior across settings (Stokes & Baer, 1977). The present study programmed common stimuli (i.e., goal statement and use of a pictorial icon) to generalize the effects of a reinforcement-based intervention for students identified as either developmentally delayed or emotionally disturbed. Results supported the effectiveness of the strategy in producing generalized responding from training to the generalization setting. The importance of methodological rigor in future research exploring generalization and the need to compare generalization strategies are discussed.

DESCRIPTORS: generalization, programming common stimuli, academic behavior, emotionally disturbed

Stokes and Baer (1977) noted a number of strategies for facilitating generalization. One strategy, programming common stimuli, involves presenting salient stimuli in both the training and generalization settings. Although this approach has been effective for facilitating generalization (Walker & Buckley, 1972), only one study to date has evaluated the utility of this approach for enhancing generalization among individuals diagnosed as emotionally disturbed. Ayllon, Kuhlman, and Warzak (1983) assessed whether inclusion of salient stimuli facilitated correct academic behavior across settings. Results showed that appropriate behavior generalized across environments as a result of the procedure. However, the authors noted that appropriate behavior in the generalization setting may have been due to increased teacher attention associated with the delivery of the salient stimuli.

Given the paucity of research examining the strategy of programming common stimuli, additional research is needed to determine its utility. Furthermore, given that the level of support and schedule of reinforcement provided to students with emotional or behavioral disorders in training or special education environments can vary greatly from that provided in generalization or general education environments (Meadows, Neel, Scott, & Parker, 1994; Schneider & Leroux, 1994), it is important to identify procedures for enhancing stimulus generalization within this population. Therefore, the purpose of the current study was to investigate the effectiveness of programming common stimuli for facilitating stimulus generalization of appropriate academic behavior for individuals diagnosed as emotionally disturbed or behaviorally disordered.

METHOD

Participants and Setting

Three students, referred by their teachers for exhibiting low rates of work completion in both the special education classroom (training setting) and the general education classroom (generalization setting), participated. Mike was a 9-year-old boy in third grade who had been diagnosed with serious emotional disturbance.

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John was a 10-year-old boy in fourth grade who had also been diagnosed with serious emotional disturbance. Peter was a 5-year-old boy in kindergarten who had been diagnosed as developmentally delayed due to social and emotional concerns.

Response Measurement and Interobserver Agreement

Dependent variables included academic responses that participants were reported to have in their repertoire but that were emitted at a low rate. Brief curriculum-based assessment indicated that participants had the skills in their repertoire (Shinn, 1989). For John and Mike, the number of digits completed correctly on math worksheets containing 99 single-digit multiplication problems was measured during 10-min sessions. For Peter, the number of shapes, numbers, and letters traced or written on worksheets (including 50 to 55 randomly chosen traceable letters, numbers, and shapes and lines) was measured during 5-min sessions.

Interobserver agreement was measured by having trained observers (i.e., the primary researcher or trained graduate students) record the total number of correct responses on students' worksheets. These totals were then compared to the teachers' totals, and the smaller number of recorded responses was divided by the larger number of recorded responses. Interobserver agreement data were collected during all sessions and averaged 100%. Treatment integrity data were also collected during 25% of the treatment and common stimuli sessions and averaged 94%.

Experimental Design and Procedure

A multiple baseline across participants design was used to evaluate the effects of the treatment and common stimulus components. During each phase, sessions were alternated across training and generalization settings in a multielement fashion to demonstrate generalization effects within phases (Koegel & Rincover, 1977).

Baseline. During baseline, teachers presented the appropriate worksheets to the students twice per day, once in the training setting and once in the generalization setting. Participants were informed that they would have 10 min (John and Mike) or 5 min (Peter) to complete the worksheet.

Treatment. During treatment, three procedures were implemented to increase appropriate academic behavior in the training setting (special education classroom). First, a goal statement, indicating the number of correct responses required for the day, was printed on the top of each worksheet. The daily goal was determined using goal-shaping procedures that require students to continuously improve their performance (Freeland & Noell, 1999, 2002). Second, a computer-generated thumbs-up icon was placed at the top of the worksheet (Mike and Peter) or a small digital timer was used (John). Third, after each session, teachers collected worksheets and scored the number of academic responses emitted. Participants were then informed whether they exceeded their goals. If they did, they were immediately allowed to choose an item from a prize box.

Common stimuli. During this phase, treatment continued in the special education setting. The salient visual stimuli provided during treatment were also presented in the generalization setting (general education classroom). That is, a goal statement and a thumbs-up sign were presented for Peter and Mike and a goal statement and a timer were used for John. However, no programmed consequences were delivered for participants' performances in the general education setting.

RESULTS AND DISCUSSION

Data for the 3 participants are presented in Figure 1. During baseline, the target response occurred at moderate levels across training and generalization settings. During treatment, when salient stimuli were provided and reinforcement

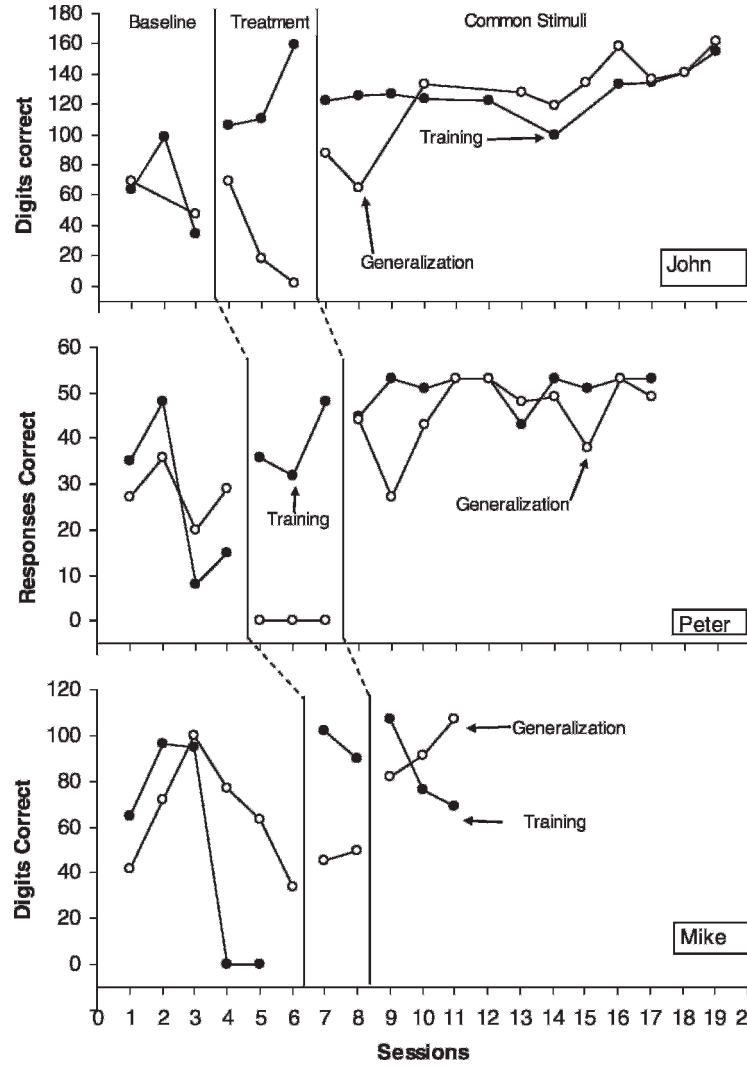

Figure 1. Correct academic responses per session for training and generalization settings across experimental phases.

was delivered in the training setting only, the target response increased to high levels in the training setting and decreased to lower levels (John and Peter) or remained at low levels (Mike) in the generalization setting. John met his goal in the training setting for all three sessions during the treatment phase. Peter met his goal on 2 of 3 days, and Mike met his goal on 1 of 2 days during treatment in the training setting.

During the common stimuli phase, when salient stimuli were presented but no reinforcement was delivered in the generalization setting, the target response increased to high levels in this setting and was maintained at high levels in the training setting. Specifically, John meet his goal 90% of the time during the common stimulus phase in the generalization setting. In the training setting, John met his goal 40% of the time. However, it should be noted that his last data point during the treatment phase was unusually high, and this made it difficult for him to initially meet his goal using the goal-setting procedure. Moreover, despite meeting

the goal only 40% of the time, John's behavior was steadily maintained at a high rate of responding. Peter met his goal during 70% of the sessions in both the generalization and training settings during the common stimulus phase. Finally, Mike met his goal on all three occasions in the generalization setting during the common stimulus phase and on one of three occasions in the training setting.

The present findings add to the existing literature that has examined stimulus generalization as a dependent variable. First, these results provide further support for the use of programming common stimuli as a strategy for enhancing stimulus generalization. Because the target response did not increase in the generalization setting during treatment, spontaneous stimulus generalization did not occur. When common stimuli were added to the generalization setting, the target response increased in that setting, demonstrating the utility of this approach. Second, this design illustrated a method for examining stimulus generalization effects independent of treatment effects. Generalized effects of the intervention were not expected and did not occur until these stimuli were present. Although spontaneous generalization is often hoped for in practice, the scientific community's understanding of generalization will not be advanced unless methods are used that demonstrate adequate internal control.

Results of this study should be considered relative to a number of limitations. First, Mike did not respond completely as expected. The length of the data-collection process and the need for multiple data points per day resulted in a study that was susceptible to attrition. Although Mike did not drop out of the study, his high absenteeism may have had a negative impact on the effects of the intervention and generalization procedures. Moreover, for both Mike and John, absences resulted in a number of missing data points throughout the study. A second limitation is that no baseline data were collected using the common stimuli prior to the treatment phase. Thus, it is possible that these stimuli may have occasioned improvement in responding independent of their pairing with reinforcement. If this was the case, then these stimuli would have served as direct treatment components rather than generalized common stimuli. Future research could clarify this limitation by evaluating the impact of the stimuli prior to intervention. In addition, the length of baseline phases differed by only one data point across participants, limiting the integrity of the multiple baseline design.

The current study evaluated the effects of one type of generalization strategy, programming common stimuli. However, there are a number of other generalization strategies, such as training multiple stimulus exemplars, that may also effectively facilitate stimulus generalization. Future research could compare these different methods to determine whether other procedures may be more or less effective. In addition, the current study was interested in promoting stimulus generalization (treatment effects across settings); however, it is also important to evaluate procedures for facilitating response generalization (treatment effects across responses) and maintenance (persistence of behavior across time). Future research could evaluate procedures for enhancing response generalization and maintenance.

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