JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1988, 21, 45–55 NUMBER 1 (SPRING 1988)

THE FUNCTIONAL ROLE OF PRESCHOOLERS' VERBALIZATIONS IN THE GENERALIZATION OF SELF-INSTRUCTIONAL TRAINING

DAVID C. GUEVREMONT
UNIVERSITY OF MASSACHUSETTS MEDICAL CENTER

PAMELA G. OSNES AND TREVOR F. STOKES
CAROUSEL SERVICES FOR CHILDREN AND FAMILIES AND
FLORIDA MENTAL HEALTH INSTITUTE,
UNIVERSITY OF SOUTH FLORIDA

We examined the functional role of verbalizations in the generalization of self-instructional training with preschoolers. Children learned to overtly self-instruct during classroom work periods prior to covert training. Data were collected on children's acquisition of verbal regulation during training and on overt use of self-instructions in the classroom generalization setting. Results of a multiple baseline design across subjects indicated that treatment effects were evident in the training setting but did not generalize to the classroom until children were emitting overt self-instructions in the classroom itself. The production of self-verbalizations in the generalization setting was related to changes in correct responding, on-task behavior, and efficiency in completing academic work.

DESCRIPTORS: verbal regulation, self-instruction, generalization, self-control, preschool children

Self-instructional training is based on the premise that children's self-verbalizations may acquire a regulatory function in mediating behavior change (e.g., Meichenbaum & Goodman, 1971; O'Leary & Dubey, 1979). Although early studies were concerned primarily with documenting the controlling effects of self-statements on analogue tasks and in laboratory settings (e.g., Bem, 1967; Palkes, Stewart, & Kahana, 1968), closer examination of the clinical utility of verbal regulation training procedures is currently underway (e.g., Guevremont, Tishelman, & Hull, 1985; Hobbs, Moguin, Tyroler, & Lahey, 1980; Kendall & Wilcox, 1980).

The practical value of self-instructional training requires the generalization of behavior change to children's natural environments (e.g., Cole & Kazdin, 1980). When generalization to extratraining settings is not observed, it is frequently unclear whether a child's verbalizations have not functioned as effective mediators or if the child simply has failed to produce the self-instructions in the relevant settings. In addition, when generalized effects are documented, it is unclear to what extent covert self-instructions are responsible for these positive changes. With a few notable exceptions (e.g., Bryant & Budd, 1982; Burgio, Whitman, & Johnston, 1980), researchers have rarely attempted to ascertain that verbalizations have actually acquired the desired self-regulatory functions as a result of training, or examined systematically children's use of self-instructions in the generalization environment (e.g., Eastman & Rasbury, 1981; Robin, Armel, & O'Leary, 1975).

Evaluation of the role of self-instructions offers several methodological and applied advantages. First, if self-verbalizations are identified as critical parameters of successful treatment, greater effort could be applied toward programming self-instructions in the relevant environment (e.g., Stokes & Osnes, 1986). Second, characteristics of effective and ineffective self-instruction (e.g., content, rate, continued use) could be more readily identified. Finally, research focusing on children's actual use of self-verbalizations could provide more objective appraisal of self-regulatory mechanisms that are

Reprints may be obtained from David Guevremont, Department of Psychiatry, University of Massachusetts Medical Center, Worcester, Massachusetts 01605, or Pamela Osnes and Trevor Stokes, Florida Mental Health Institute, University of South Florida, 13301 Bruce B. Downs Blvd., Tampa, Florida 33612. P. Osnes and T. Stokes thank the Department of Psychology, University of Western Australia, Perth, for support during the writing of this paper.

often elusive or confounded by external intervention tactics (e.g., Blount & Stokes, 1984; Gross & Wojinlower, 1984).

Only one study (Burgio et al., 1980) has provided systematic assessment of children's acquisition of self-instructional skills following training and reported relatively high rates of self-instructions in the classroom. The intervention resulted in positive increases in on-task behavior of two mentally retarded 9 and 11 year olds, although the effects on academic performance were minimal. In other studies, equivocal outcomes of self-instructional training have been most evident with very young children. Although Bornstein and Quevillon (1976) reported dramatic increases in on-task behavior of preschoolers following a single training session, for example, these results were not replicated by Billings and Wasik (1985) nor by Friedling and O'Leary (1979) using slightly older children (i.e., second and third graders). Both of these studies controlled for teacher attention and feedback in the classroom, suggesting that variables other than self-instructions may have been responsible for the changes obtained by Bornstein and Quevillon (1976). When classroom use of self-instructions was obtained, Bryant and Budd (1982) found minimal changes in on-task behavior of preschoolers but significant improvements in accuracy on academic worksheets. Because children's use of overt self-instructions occurred so infrequently in the classroom, the role of self-verbalizations in treatment generalization was unknown.

Inconclusive findings with preschoolers suggest that further research is warranted to examine the clinical utility of self-instructional training and factors related to positive treatment outcome. In the present study, we examined the functional role of self-verbalizations on the classroom performance of preschoolers receiving self-instructional training. In contrast to Bryant and Budd (1982), who used covert self-instructional training procedures, we taught children to use overt self-instructions prior to the typically used covert fading procedures to achieve a more direct analysis of the relationship between children's use of self-instructions and performance change. This study is also an extension of that of Burgio et al. (1980), who examined rates of self-instructional use with older children. In that study, self-instructional training focused primarily on the modification of off-task behavior. In this study, we used self-instructional training to alter the performance accuracy of preschoolers on academic tasks on which poor performance was displayed, and analyzed on-task behavior as one of several supplementary measures.

METHOD

Subjects and Setting

Four children, 4 and 5 years old, who attended a private preschool, participated in the study. Children were selected for the study because of low rates of on-task behavior in the classroom, a lack of efficient or independent work skills, and performance deficits on prereading decoding skills that were part of their regular educational curriculum. These skills were part of a programmed sequence of prereading exercises taught at the preschool. The children had mastered all prerequisite letter recognition and decoding skills prior to this study, allowing them to proceed to the more advanced exercises investigated here. Children performed at age-appropriate levels on the standardized *Circus Sequential Tests of Education Progress* (1974). Data collection occurred during self-instructional training sessions in a room adjacent to the classroom and in the generalization setting (the children's regular classroom).

Materials

Classroom work tasks were worksheets from a commercially available *Basic Decoding Skills Workbook* (Rosner, 1982) designed to teach children to identify the 40 letter sequences that occur most frequently in written language. The workbook contained sections focusing on basic and advanced skill levels, according to difficulty level. As a result of assessments conducted prior to the study, difficulty level was matched to the individual child's prerequisite skills. Sue and Paul received worksheets selected from the advanced skill level, and Ann and Josh performed on worksheets selected from the

basic level. Each worksheet contained 11 lines with a series of letter sequences that represent phonics units. On the far left of each line was a sample phonics unit (e.g., ock) followed by five response alternatives (e.g., mick, dock, luck, clock, sick), some of which contained the sample units within a larger sequence of letters. Children were required to identify and circle the units that contained the same sequence of letters presented in the sample. The number of possible correct units on each line varied from one to four. Worksheets contained between 11 and 27 possible correct responses and were presented randomly across all conditions.

Experimental Conditions

Self-instructional training. The experimenters served as trainers. Training was similar to procedures described by Meichenbaum and Goodman (1971) and included four self-instructional steps: (a) problem orientation (e.g., "What do I have to do first?"), (b) task statement (e.g., "I have to circle the words that have the same letters"), (c) guiding self-verbalizations (e.g., "Not this one so I won't circle it" or "This one so I will circle it"), and (d) self-acknowledgment (e.g., "Good job"). Training included modeling of self-instructions by therapists, rehearsal by the child of overt verbalizations, and practice on training worksheets while emitting self-instructions. During overt training children learned to verbalize aloud. When covert training was introduced, overt self-instructions were briefly reviewed, after which children were taught to first whisper the instructions and then to say them to themselves using lip movements but not sound.

Training sessions lasted about 20 min and involved two phases. During the first phase, children sat at a table with the trainer and received specific praise for correct self-instruction use (e.g., saying the instructions appropriately) when the self-verbalizations were congruent with correct performance. When an initial error was made, consisting of incorrect self-verbalizations (e.g., content, sequence, or volume) or nonverbal behaviors (e.g., off-task behavior, circling the wrong items), children were provided with specific verbal feedback (e.g., "You said the instruction right but you didn't circle a right answer"). If the same error was made following feedback, the child's pencil was removed for 5 s and the trainer turned away from the child. Worksheets used during this phase were similar to the classroom generalization worksheets, although the actual items were different (e.g., different letter sequences).

A second phase of training was conducted in the last 10 min of each session that was designed to enhance the generalization of skills to the classroom and to provide a probe of the child's acquisition and mastery of self-instructional skills in the training setting. During this phase, children were given a second worksheet taken from the same workbook used in classroom work periods. These were not the worksheets presented in the classroom. Trainers no longer sat at the table with subjects but stood behind them, to more closely resemble classroom generalization conditions. Children were praised only for on-task behavior. Worksheet performance was scored after children completed the worksheet or when 10 min had elapsed.

Children were required to demonstrate correct use of self-instructions with appropriate corresponding nonverbal behavior and 75% accuracy or greater on worksheets for 3 consecutive days before training was terminated. Thus, training was terminated only after children demonstrated acquisition of the verbal regulatory skills. At the end of every training session, children were instructed to "use the instructions you learned today to help you on your worksheets during work time." The instruction to the children specified saying the self-instructions "out loud" during the work period following overt training and "to yourself" following covert training sessions.

Classroom generalization conditions. Baseline conditions always operated in the classroom. Each child was given one worksheet and told to circle the words on each line that contained the sequence of letters in the sample. Following a 10-min work period, the child was told by the teacher to stop and the worksheet was collected. The child was instructed to raise his or her hand when the worksheet was completed, which was consistent with the

preschool's regular procedures. If the worksheet was completed (i.e., at least one letter sequence was circled on each line) before 10 min elapsed, the teacher collected it. If the child raised his or her hand before completing the worksheet, he or she was told by the teacher to continue working. Children never received feedback on the accuracy of their work during or after the generalization classroom work period. Teachers were instructed to praise on-task behavior without attending to the actual quality of worksheet performance.

During overt instruction, the teacher gave the child a worksheet and an extra instruction, saying, "Today I want you to say the instructions you learned out loud while you do your work." During covert instruction, the teacher gave the child a worksheet and an extra instruction, saying, "Today I want you to say the instructions you learned to yourself while you do your work."

On 1 day for Ann and 3 days for Josh a special procedure was introduced. Ann was off-task during the covert instruction condition toward the end of the school year, completing very few lines on worksheets. Similarly, Josh was using self-instructions infrequently and often in an exaggerated manner in the classroom. An unobtrusive procedure was introduced. If the child performed with an accuracy of below 75%, he or she was given an additional worksheet and told, "You'll have to do another worksheet because you're not using your instructions enough."

Data Collection and Reliability

Observations and data collection were made in the settings and from audio and videotapes. Observers were students trained to an 80% agreement criterion on all behavior codes. Observers were not informed as to which days reliability would be checked. Reliability scoring was done independently by comparing in-setting recordings with audio and videotapes scored by a second observer.

Accuracy on worksheets. The percentage of correct answers on each child's generalization worksheet was calculated daily. At least 35% of each child's worksheets, sampled across conditions, were corrected by an independent scorer. Percentage agreement was calculated by counting the number of agreements divided by the number of agreements plus disagreements and multiplying by 100. Mean interscorer agreement was 98.7% (range, 71% to 100%).

Worksheet completion. The number of lines with at least one item marked, divided by 11 (i.e., the number of lines on each worksheet), and multiplied by 100 was used to calculate the percentage of a worksheet completed. At least 25% of each child's worksheets, sampled across conditions, were scored by two independent scorers. An agreement was counted when both scored a line as complete. Reliability was calculated using the formula described above. Mean agreement was 100%.

Time to complete worksheets. The amount of time taken to complete worksheets was recorded daily. Reliability was calculated using the formula described above. An agreement was counted when both observers recorded the same amount of time within 10 s. Mean interobserver reliability was 96.4% (range, 92% to 100%).

Classroom verbalizations. Self-verbalizations were audiotaped daily. A portable tape recorder was placed beside the children's desks and a microphone was attached to a wall approximately 0.5 m away. The tape recorder was present each day and across all experimental conditions. Verbalizations were recorded on a 10-s interval system and were defined as the audible use of one of the four instuctions trained or the verbalization of a portion of the instruction. Daily percentage of intervals in which self-verbalizations occurred was calculated by dividing the number of intervals in which a verbalization was recorded by the total number of intervals the child performed on the worksheet, multiplied by 100. Only one occurrence was scored per interval. Interobserver reliability was calculated on an interval-by-interval basis on at least 50% of the days for each subject using the formula described above. An agreement was counted when both observers recorded the occurrence of a self-verbalization in the same interval. Mean interobserver reliability was 92.4% (range, 71% to 100%).

On-task behavior. On-task behavior was recorded when the child's eyes were directed toward

the worksheet and his or her pencil was being manipulated toward task completion for an entire 10-s interval. Interobserver reliability was calculated on at least 22% of the days on an interval-by-interval basis using the formula described above. Mean interobserver agreement was 89.4% (range, 74% to 100%).

Training performance. An 11-item checklist of critical child and trainer behaviors was completed for each training session to ascertain that children correctly used all of the self-instructions and that trainers followed prescribed procedures. Checklist items (e.g., "Did the trainer model each self-instruction?", "Was the child on-task while emitting a self-instruction?", "Did the child say 'good job' after each line?") were scored as "yes" or "no" based on occurrence. An agreement was counted when both observers scored the occurrence or nonoccurrence of the same item. Reliability was calculated on an item-by-item basis using the formula described above, yielding 100% agreement. Prescribed training procedures were followed in each session.

The self-regulatory function of self-instructions was also assessed in the training setting at each session by examining the accuracy of performance on a worksheet while children used self-instructions (described above). Interscorer agreement on training worksheet accuracy was calculated using the same procedures as those for generalization classroom worksheets. Mean interscorer agreement was 100%.

Teacher attention. Several teacher behaviors were recorded daily, including praise of on-task (any positive evaluative statement directed toward a child regarding on-task behavior, such as looking at the worksheet); praise of accuracy (any positive evaluative performance, such as circling the right letters); and corrective feedback (any statement directed toward a child specifying inappropriate performance, such as circling the wrong letters).

Interscorer agreement was calculated on an interval-by-interval basis on 23% of the days, dispersed across all experimental conditions, using the formula described above. Mean interscorer agreement on praise of on-task was 95.3% (range, 84% to 100%). No occurrences of praise of accuracy or corrective feedback were recorded by any observer, indicating that teachers followed prescribed instructions to attend only to on-task behavior.

The mean number of praise on-task statements by condition for Sue was 6.4, 7.3, and 6.8 in baselines (BL), 5.9 in overt training (OT), 10.2 in overt instruction (OI), 6.9 in covert training (CT), and 5.4 in covert instruction (CI). The mean number for Paul was 11.1, 9.4, and 10.7 in BL, 10.2 in OT, 9.4 in OI, 11.3 in CT, and 9.8 and 10.6 in CI. For Ann, it was 8.7 and 7.5 in BL, 7.1 in OT, 8.9 in OI, 8.3 in CT, and 9.2 in CI. For Josh, it was 12.4 in BL, 11.6 and 18.4 in OT, and 13.1 and 10.7 in OI.

For each child, the mean number of praise on-task statements within a condition never varied by more than one standard deviation from the overall mean across conditions for that child with two exceptions: Sue received slightly more during the initial days of the overt instruction condition and Josh similarly received more during the second overt instruction condition than in other conditions.

Experimental Design

A multiple baseline design across children was used to evaluate the effects of self-instructional training and each experimental condition on classroom performance. Overt self-instructional training was introduced sequentially across subjects followed by overt instruction and return to baseline. Covert self-instructional training was then introduced sequentially followed by covert instruction. Only overt self-instructional training and overt instruction conditions were examined on Josh's classroom performance.

RESULTS

Presented in Figure 1 are the percentage of items correct on worksheets in the training setting and in the generalization classroom setting and the percentage of intervals in which overt self-verbalizations were recorded in the classroom. Although overt training produced demonstrable changes on worksheet performance in the training setting for

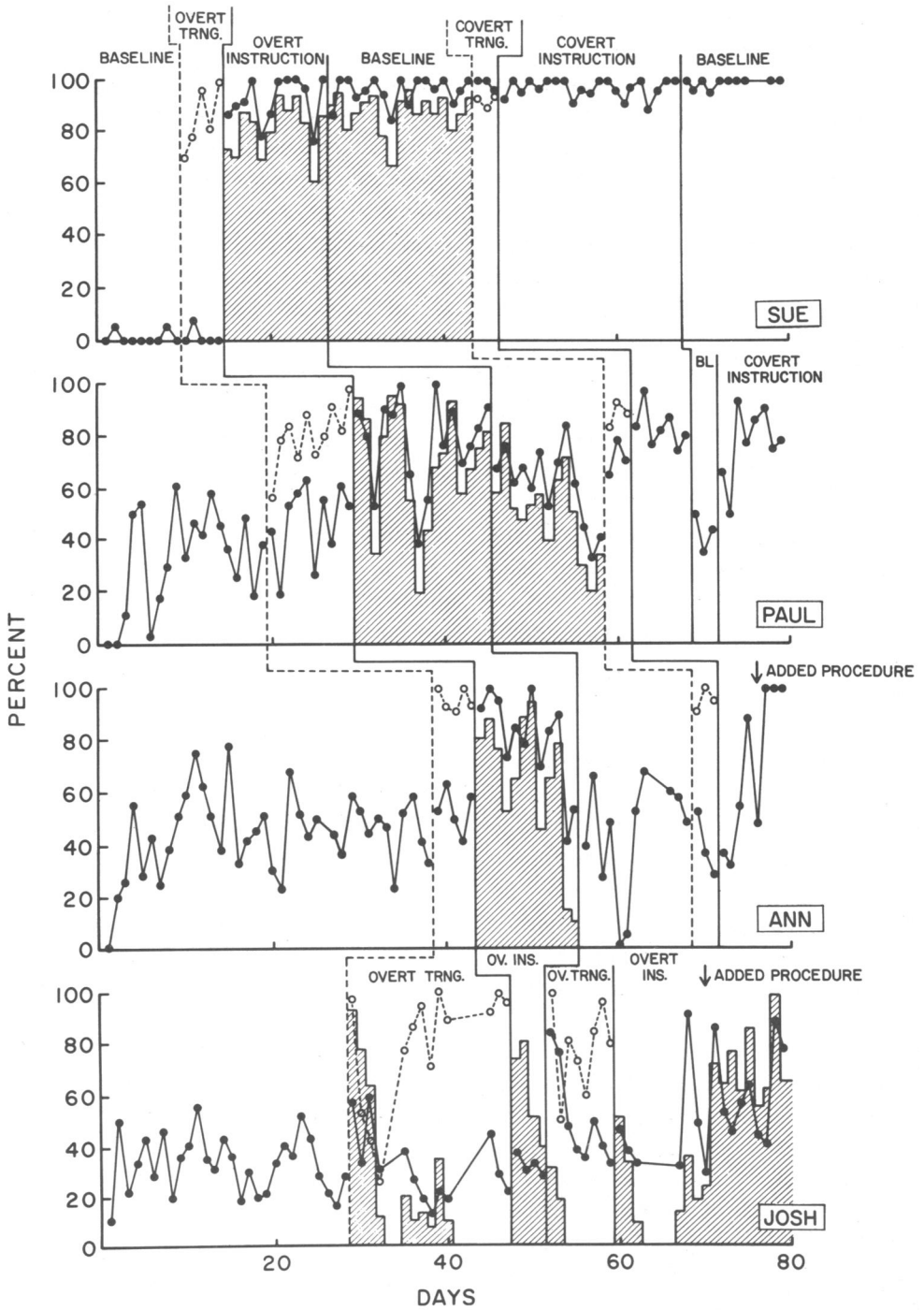

Figure 1. The percentage of correct items on worksheets and percentage of self-instructions daily across conditions. Open dots represent percentage correct on worksheets in the training setting, and solid dots represent the percentage correct on classroom worksheets. The shaded area shows the percentage of intervals or overt self-instructions. The arrows indicate the point at which the additional classroom procedure was introduced.

all 4 subjects, concomitant gains were not observed in the classroom when the children were not overtly instructing. The percentage correct for Sue in the classroom during baseline (M = 1), for example, showed no improvement with the introduction of overt training (M = 2) despite high preformance in the training environment (M = 86). Only after she began self-instructing in the classroom (overt instruction condition) did worksheet performance improve dramatically (M = 89%). During return to baseline, Sue continued to self-instruct, and worksheet performance gains were maintained (M = 94%).

Similar effects occurred for both Paul and Ann. Paul's percentage correct in the classroom during baseline (M = 36) increased only slightly with overt training (M = 46) when he was not self-instructing. Limited gains occurred despite his mastery of the task in the training environment. Only after he began self-instructing in the classroom (overt instruction condition) did performance gains of training generalize to the classroom (M = 79%). Unlike Sue, a downward trend in Paul's use of self-instructions occurred in the return to baseline and concomitant decreases in performance accuracy were observed (M = 43%).

Overt training also did not result in immediate changes in Ann's accuracy on classroom worksheets when self-instructions were not being emitted in the classroom (M = 52%). This occurred despite her mastery of the task in the training environment (M = 94%). Like Sue and Paul, after self-instructions were emitted at relatively high percentages in the classroom (overt instruction condition), performance accuracy increased substantially (M = 80%). With the return to baseline, Ann no longer self-instructed and performance accuracy fell dramatically (M = 38%).

These effects were not observed for Josh, whose self-verbalizations had, at best, transient control of worksheet performance in the classroom. Josh's performance accuracy in the classroom during baseline (M = 33%) showed little change with overt training despite his mastery of the task in the training environment. Unlike the other subjects, performance accuracy remained unchanged even after he began self-instructing in the classroom (overt instruction condition).

Covert training produced a similar pattern of results. Sue's performance was maintained during the covert instruction condition (M = 95%) and a final return to baseline (M = 98%). For Paul, covert training resulted in immediate improvement of performance accuracy (M = 73%) and in even greater gains (M = 83%) in covert instruction condition after being told to use covert instructions by his teacher. Although Paul's performance was not maintained in a return to baseline (M = 41%), the reintroduction of covert instruction produced prompt improvements (M = 77%) for the remaining days of the study. Covert instruction had minimal immediate impact on Ann's performance (M = 51% prior to additional procedure). The introduction of an additional procedure (i.e., she was required to work on a second worksheet) on 1 day produced an immediate improvement in her performance (M = 87% after the introduction of this procedure). It should also be noted that Sue, Paul, and Ann were anecdotally observed to use lip movements during covert instruction conditions, suggesting that self-verbalizations were being used. Josh never received covert training because overt training produced minimal effects on his classroom performance. Following a second overt training condition, both overt verbalizations and performance gains during the overt instruction condition were variable. The introduction of the additional procedure (as used with Ann) led to the most reliable changes in self-instructional use and small improvements in worksheet performance (M = 50% and 63% prior to and following the additional procedure, respectively).

The mean percentage of intervals in which on-task behavior was recorded across conditions is summarized in Table 1. With the introduction of overt training, Sue demonstrated immediate and substantial improvements in on-task behavior that were maintained throughout the study. Paul also showed changes in on-task behavior with the introduction of overt instruction and covert instruction conditions, reversing during return to baselines. The effects of training on Ann and Josh's on-task behavior

Table 1
Means across Experimental Conditions

	Conditions					
	BL	OI	BL	CI	BL	CI
Sue						
Min to complete worksheets	10	6.3	5.2	4.4	5.2	
% worksheets completed	94	100	100	99		
% intervals on-task	59	85	90	90	92	
Paul						
Min to complete worksheets	9.1	6.2	7.4	8.3	10	6.4
% worksheets completed	66	89	74	81	43	87
% intervals on-task	60	84	66	87	60	84
Ann						
Min to complete worksheets	7.2	9.1	9.4	9.3		
% worksheets completed	71	96	64	79		
% intervals on-task	68	77	72	86		
Josh						
Min to complete worksheets	3.2	5.4	4.3*	6.1*		
% worksheets completed	78	74	69	71		
% intervals on-task	62	69	74			

* Performance in overt instruction conditions.

were less clear because the largest changes were noted when they were required to complete additional worksheets.

The mean percentage of worksheets completed and the mean amount of time to complete them in minutes, averaged across experimental conditions, are also presented in Table 1. For three children, training produced increases in the percentage of worksheets completed. Changes were also noted in the amount of time it took the children to complete worksheets following training. For Sue and Paul, training led to a decrease in the amount of time, indicating that they may have worked more efficiently. The decrease noted for Paul occurred during overt but not covert instruction conditions. Both Ann and Josh, in contrast, demonstrated increases in the amount of time it took them to complete worksheets.

DISCUSSION

These findings support those of other studies, indicating that self-instructional training can be effectively used with preschoolers (e.g., Arnold & Forehand, 1979; Bornstein & Quevillon, 1976; Brown, Meyers, & Cohen, 1984; Bryant & Budd, 1982) and may help to explain, in part, contradictory results with young children (e.g., Billings & Wasik, 1985; Robin et al., 1975). The function of self-verbalizations was more clearly documented in this study than in previous research by demonstrating a positive relationship between the use of self-instructions in the classroom and substantial changes in correct responding on academic tasks for 3 subjects. These changes occurred on actual academic work that was part of the children's preschool curriculum and was performed in their regular classrooms, attesting to the applied significance of the findings.

The actual production of self-instructions in the classroom appeared to be pivotal to changes in performance. This was demonstrated by ensuring that self-instructions were emitted overtly prior to covert fading procedures typically used in self-instructional training. After children had acquired self-instructional skills in the training setting, for example, they did not spontaneously begin to use them in the classroom reliably and no change in classroom performance was observed. The teacher's instructions to use self-verbalizations, however, re-

sulted in a high rate of self-instruction use and substantial concomitant increases in correct responding by 3 of the subjects. Moreover, declines in the use of self-instructions usually resulted in parallel decreases in performance accuracy. The findings allow more conclusive statements about the effects of self-instructions than in previous studies that have not assessed children's acquisition of self-instruction skills as a function of training (e.g., Robin et al., 1975), that have provided no measurement of self-instructional use in the classroom (e.g., Billings & Wasik, 1985), or that have found extremely low rates of self-instructional use in the generalization environment (e.g., Bryant & Budd, 1982). Furthermore, these effects were demonstrated with controls for teacher attention and reward contingencies (cf. Bornstein & Quevillon, 1976; Gross & Wojinlower, 1984).

In addition to changes in performance accuracy, self-instructional training resulted in increases in the on-task behavior of several children and in an increase in the percentage of worksheets completed daily for 3 of the subjects. This is in contrast to the findings of Bryant and Budd (1982), who reported no change in the proportion of days that work was completed as a result of training. Furthermore, the amount of time to complete worksheets daily was altered for all 4 children. Two children began working at a slower pace, whereas the opposite was observed for two others. Of course, decisions about what is an appropriate or optimal pace may require additional data, such as normative rates and teacher judgments. That a slower pace was related to greater on-task behavior and the most consistent improvements in correct responding (Sue and Paul), however, suggests that slower and presumably more careful performance may have been a more positive result of training. Previous research has reported increases in on-task behavior with no change in performance accuracy (e.g., Burgio et al., 1980) or enhanced performance accuracy with little or moderate change in on-task behavior (e.g., Bryant & Budd, 1982). The minimal change in on-task behavior reported by Bryant and Budd (1982) may have been related to differences in subject characteristics; our subjects were not selected because of impulsivity per se. Nonetheless, research is needed to clarify factors related to these different outcomes.

Although positive effects of training were demonstrated for 3 children, the variability in performance across subjects is worthy of discussion. After overt training, for example, Sue showed high performance throughout all subsequent conditions and use of self-instructions during baseline. Paul and Ann, in contrast, showed either transient use or nonuse of self-instructions in baseline and declines in correct responding. Finally, Josh never demonstrated a reliable relationship between self-instructional use and correct responding, and classroom performance remained poor until an external contingency was introduced.

The different outcomes raise important questions about the effective use of self-instructional training with young children, as such differences are likely to be encountered by practitioners as well. As with subjects in the study by Robin et al. (1975), for example, Josh frequently emitted self-instructions while simultaneously engaging in incorrect motor responses (e.g., off-task behavior). This occurred despite the fact that he demonstrated correct use of self-instructions and performance change in training. Specialized procedures may be needed to ascertain that self-instructions retain a regulatory effect in settings different from those contained in individual training sessions (e.g., simulated distraction in training, Burgio et al., 1980). Additionally, the interaction among entry level prerequisite skills, task mastery, and training in influencing treatment outcome should be more closely examined. Sue, for example, did not require additional intervention after apparently mastering the skills necessary to perform at ceiling levels on the preread-ing task. Such was not the case for the other children, who required subsequent intervention to initiate or maintain appropriate performance levels. Attention to skill level and task mastery may help account for variable performance in interventions targeting academic skills (e.g., Rosenberg, Sindelar, & Stredt, 1985).

These factors, however, cannot fully account for performance differences in this study because each

subject demonstrated the prerequisite skills on prereading exercises examined here and mastery of the task before training was terminated. A greater proportion of the variance may be attributed to the manner in which self-instructions enhanced goal-directed behavior. As noted, subjects for whom training resulted in increased on-task behavior and a slower work pace were those showing the most consistent changes in performance accuracy.

A final issue of applied significance concerns the use of covert self-instructional training with young children. The fact that Sue showed high performance levels prior to covert training and Ann required an external contingency before this condition had a significant impact allows only tentative statements to be made. It would seem prudent, however, to refrain from proceeding to covert self-instructional procedures for children showing limited or transient success with overt self-instructions. Ann, for example, failed to respond to covert instructions after showing only transient effects in overt instruction. In contrast, the positive effects of covert instruction were clearly seen in both performance accuracy and on-task behavior by Paul, who had also demonstrated strong effects under overt instruction conditions. Training in overt self-instructional use in the classroom allows both the assessment of the impact of self-verbalizations on performance and their continued use over time. Teaching children to use overt self-instructions may also be a logical steppingstone to the use of presumably more sophisticated covert strategies in facilitating verbal regulation (e.g., Meichenbaum & Goodman, 1971).

Of course children probably learn not to "talk out" in the classroom; this may be especially salient to older children under the constraints of peer observation (Cole & Kazdin, 1980). Anecdotal observation of preschool peers in this study, however, failed to detect any adverse attention or reactions of other children toward children using overt self-instructions. Any inhibition in talking aloud was probably alleviated by having actual classroom teachers instruct subjects to verbalize overtly. Thus, at least with preschool populations, overt use of self-instruction may be an optimal strategy for ensuring proper production of self-verbalizations, assessment of their regulatory function, and evaluation of the continued use of self-control skills prior to covert training efforts.

REFERENCES

Arnold, S. C., & Forehand, R. (1979). A comparison of cognitive training and response cost procedures in modifying cognitive styles of impulsive children. *Cognitive Therapy and Research,* **2,** 183–187.

Bem, S. L. (1967). Verbal self-control: The establishment of effective self-instruction. *Journal of Experimental Psychology,* **14,** 485–491.

Billings, D. C., & Wasik, B. H. (1985). Self-instructional training with preschoolers: An attempt to replicate. *Journal of Applied Behavior Analysis,* **19,** 61–67.

Blount, R. L., & Stokes, T. F. (1984). Self-reinforcement by children. In M. Hersen, R. Eisler, & P. Miller (Eds.), *Progress in behavior modification* (Vol. 18, pp. 195–225). New York: Academic Press.

Bornstein, P. H., & Quevillon, R. P. (1976). The effects of a self-instructional package on overactive preschool boys. *Journal of Applied Behavior Analysis,* **9,** 179–188.

Brown, C. M., Meyers, A. W., & Cohen, R. (1984). Self-instruction training with preschoolers: Generalization to proximal and distal problem-solving tasks. *Cognitive Therapy and Research,* **8,** 427–439.

Bryant, L. E., & Budd, K. S. (1982). Self-instructional training to increase independent work performance in preschoolers. *Journal of Applied Behavior Analysis,* **15,** 259–271.

Burgio, L. D., Whitman, T. L., & Johnston, M. R. (1980). A self-instructional package for increasing attending behavior in educable mentally retarded children. *Journal of Applied Behavior Analysis,* **13,** 443–459.

Circus sequential tests of education progress. (1974). Princeton, NJ: Educational Testing Service.

Cole, P. M., & Kazdin, A. E. (1980). Critical issues in self-instructional training with children. *Child Behavior Therapy,* **2,** 1–23.

Eastman, B. G., & Rasbury, W. C. (1981). Cognitive self-instruction for the control of impulsive classroom behavior: Ensuring the treatment package. *Journal of Abnormal Child Psychology,* **9,** 381–388.

Friedling, C., & O'Leary, S. G. (1979). Effects of self-instructional training on second and third grade hyperactive children. *Journal of Applied Behavior Analysis,* **12,** 211–219.

Gross, A. M., & Wojinlower, D. A. (1984). Self-directed behavior change in children: Is it self-directed? *Behavior Therapy,* **15,** 501–514.

Guevremont, D. C., Tishelman, A. C., & Hull, D. B. (1985). Teaching generalized self-control to attention-deficit boys with mothers as adjunct therapists. *Child and Family Behavior Therapy,* **7,** 23–37.

Hobbs, S. A., Moguin, L. E., Tyroler, M., & Lahey, B. B. (1980). Cognitive behavior therapy with children: Has clinical utility been demonstrated? *Psychological Bulletin,* **87,** 147–165.

Kendall, P. D., & Wilcox, L. E. (1980). A cognitive-behavioral treatment for impulsivity: Concrete and conceptual training in non-self-controlled problem children. *Journal of Consulting and Clinical Psychology,* **48,** 80–91.

Meichenbaum, D., & Goodman, J. (1971). Training impulsive children to talk to themselves: A means of developing self-control. *Journal of Abnormal Psychology,* **77,** 115–126.

O'Leary, S. G., & Dubey, D. R. (1979). Applications of self-control procedures by children: A review. *Journal of Applied Behavior Analysis,* **12,** 449–465.

Palkes, H., Stewart, M., & Kahana, B. (1968). Porteus maze performance of hyperactive boys after training in self-directed verbal commands. *Child Development,* **39,** 817–826.

Robin, A. L., Armel, S., & O'Leary, D. (1975). The effects of self-instruction on writing deficiencies. *Behavior Therapy,* **6,** 178–187.

Rosenberg, M. S., Sindelar, P. T., & Stredt, J. (1985). The effects of supplemental on-task contingencies on the acquisition of simple and difficult tasks. *The Journal of Special Education,* **19,** 189–201.

Rosner, J. (1982). *Basic decoding skills book.* New York: Walker Educational Book Corporation.

Stokes, T. F., & Osnes, P. G. (1986). Programming the generalization of children's social behavior. In P. S. Strain, M. J. Guralnik, & H. Walker (Eds.), *Children's social behavior: Development, assessment, and modification* (pp. 407–443). Orlando, FL: Academic Press.

Received October 24, 1986
Initial editorial decision January 7, 1987
Revisions received April 13, 1987; June 29, 1987
Final acceptance August 14, 1987
Action Editor, Nancy A. Neef