

## THE USE OF COGNITIVE SELF-INSTRUCTION AS AN INTERVENTION FOR METACOGNITIVE FAILURE

Sarah D. Weidler

State College (PA) Area School District

The ability to monitor what is being understood is a major component of the comprehension process. Deliberate cognitive skills are required for comprehending discourse. The reader must coordinate a varying amount of information concerning the reading task and appropriate strategies for attacking the task. Brown (1982) and Flavell (1976) call this general knowledge that guides the selection and implementation of appropriate strategies "metacognition".

When considering the poor reader, there is evidence in the research that supports the view that poor readers have many strategy deficiencies and that their failure to respond to important informational units in discourse suggests a metacognitive failure. According to Rickards and Hatcher (1978), poor readers do not impose organization upon the text but rather require that some organization be provided for them. They fail to take advantage of the contextual and grammatical cues in written discourse as witnessed by their "piecemeal" and word-by-word style of processing (Garner, 1974). They appear to not expect the reading material to make sense and are therefore reluctant to make predictions from context (Smith, 1975). Essentially, to poor readers, written discourse is constructed from a series of isolated elements from which they may or may not extract meaning.

There have been attempts to help the poor reader apply strategies which are essential for comprehension monitoring, such as the application of self-questioning techniques which are intended to help the reader become more aware of comprehension failures (Andre and Anderson, 1978-79). A demonstration method was proposed by Collins and Smith (1980) which required the teacher to model questions which the student should ask before or during a reading task. Overall, comprehension monitoring strategies remain in a formative stage (Baker, 1979; Pace, 1980).

In recent years there has been an increasing interest in the

area of cognitive psychology in the possible application of cognitive behavior therapy (Meichenbaum, 1974; Mahoney & Arnkoff, 1979) to academic tasks including mathematics and reading (Egeland, 1974; Ryan, 1980). It has been demonstrated that the academic and social behaviors of school-age children can be effectively modified by using a variety of behavior modification programs (Drabman, 1976). Typically, behavioral contingencies have been administered or applied by external agents such as parents, teachers or therapists with teachers generally evaluating a child's performance in the classroom and administering appropriate consequences (Lovitt, 1973). Kazdin (1975) has acknowledged several disadvantages associated with complete reliance on external agents to administer classroom contingencies: 1) the external agent may not notice many behaviors; 2) as with operant conditioning, the external agent may become paired with cues for the target behavior encouraging the behavior to occur only in the presence of those cues; and 3) there may be problems with generalizing to external situations.

Considering these disadvantages, several researchers have emphasized the potential of self-control theories of behavior modification to help children to evaluate their own performances and apply appropriate contingencies. These researchers feel that self-control procedures can enable children to develop their own academic and social skills (Mahoney & Thoresen, 1974; Monahan & O'Leary, 1971; O'Leary & Dubey, 1979; Palkes, Stewart, & Freedman, 1972; Rosenbaum & Drabman, 1979).

A potentially important method for developing self-control in children is through self-instructional training, a form of cognitive restructuring, in which individuals are taught to make suggestions to themselves in order to guide their behavior. The important role of "talking to oneself" has been emphasized by many researchers (Meichenbaum & Cameron, 1974; Meichenbaum & Goodman, 1971; O'Leary & Dubey, 1979), and several researchers have successfully used self-instruction to alter children's performances on a variety of tasks (Bem, 1967; Meichenbaum & Goodman, 1971; Robin, Arnal & O'Leary, 1975).

Meichenbaum (1974) is one of the forerunners and primary advocates of the cognitive self-instruction technique. He suggests that the maladaptive behavior of problem children is a reflection of the use of poorly organized cognitions (thoughts, subvocal speech) and that cognitive training implements a task-analytic approach so that the child may be taught appropriate cognitions or "cognitive strategies" to act as mediating variables. In the area of reading, although the research is limited, cognitive training has shown positive findings for improved reading comprehension (Egeland, 1974; Ryan, 1981).

Since poor readers often lack the metacognitive knowledge necessary to monitor reading strategies conducive to comprehension, it was hypothesized that training poor readers to use cognitive self-instruction might provide a viable tool for implementing metacognitive strategies necessary for improved comprehension and independent functioning in reading situations.

## METHODOLOGY

### Subjects

The subjects were selected from the 1982-83 fourth, fifth and sixth grade populations of one elementary school in State College, Pa. Considering the experimental nature of this study, only five subjects were selected; one had to be dropped from the study due to illness. All subjects, two boys and two girls, were diagnosed as reading disabled and evidenced difficulty with comprehension monitoring rather than with word recognition. Determinations of reading disability were made on the basis of the results of the reading comprehension subtests of the *California Achievement Tests*, the *State College Informal Reading Inventory* and on the *State College Criterion Referenced Test*. All four subjects met the criteria for enrollment in the school district's Chapter One reading program. They all also fell within the average range of intelligence as assessed by the *Otis-Lennon Test of School Ability*.

### Procedures

Twenty individual sessions per subject were planned over a ten week period just prior to the end of the school year. This timetable required the experimenter to meet with each subject twice a week for ten weeks, generally on a Monday and a Friday for approximately thirty to forty-five minutes per session. The sessions were held in various quiet areas in the school with most sessions being conducted in a small trailer attached to the school's main building. During the sessions, each subject read aloud one short selection chosen from a SRA reading lab; several different labs were available to assure that each subject read a new selection rather than rereading a previous one. Most selections were expository in style. If the subject was totally unfamiliar with a selection's topic, the experimenter provided a brief explanation of any pertinent terms in order to acquaint the reader with the topic; the actual selection was not discussed. The selected stories were matched to each subject's instructional reading level. Both Terri and Karen were reading instructionally at a low to mid third-grade level; Terri's SRA selections ranged in readability from 3.0 to 3.5, while Karen's selections ranged from 3.3 to 3.5. Kurt was reading instructionally at a mid to high fifth-grade level; his SRA selections were rated at a readability of 5.5. Bob was reading instructionally at a low fifth-grade level; his SRA selections ranged in readability from 4.6 to 5.0. Each selection was also transcribed into a worksheet format for the purpose of coding miscues.

The *Reading Miscue Inventory* (Goodman & Burke, 1972) was used for coding miscues in order to obtain a reader profile for each selection (see Appendix). Since 25 miscues were required to complete one coding sheet, only the first 25 miscues were selected from each protocol (SRA selection). Each miscue which varied from the actual text was judged according to criteria which determined how it affected the syntactic, semantic, and graphic properties of the text. Analysis of the miscues was based on the following four questions taken from the *Reading Miscue Inventory*: 1) Is the miscue corrected?; 2) Does the miscue result in a grammatical structure which is acceptable within the dialect of the reader?; 3) Does the miscue result

in a meaning which is acceptable within the dialect of the reader?; and 4) Does the miscue result in a change of meaning? A final score on the coding sheet provided information about the patterns of grammatical relationships and comprehension miscues. Grammatical relationships were determined according to the patterns of responses obtained for columns #6 (correction), #7 (grammatical acceptability), and #8 (semantic acceptability) on the coding sheet. Quality of comprehension miscues was determined according to the patterns of responses obtained for columns #6 (correction), #8 (semantic acceptability), and #9 (meaning change) on the coding sheet. The following information from the *Reading Miscue Inventory* coding sheet was graphed for visual inspection: out of 25 miscues per story, those miscues which represented a strength, partial strength, or weakness in the category of Grammatical Relationships; and out of the same 25 miscues per story, those miscues which represented a no loss, partial loss, or loss in the category of Comprehension.

It was hypothesized that after the introduction of the intervention, cognitive self-instruction, each subject's protocol would contain higher quality miscues (as compared to miscues from baseline protocols). Higher quality miscues would be reflected by an increase in miscues in the areas of strength or partial strength and a decrease in miscues in the area of weakness in the category of Grammatical Relationships and by an increase in the miscues in the area of no loss or partial loss and a decrease in the miscues in the area of loss in the category of Comprehension.

The intervention, cognitive self-instruction, was introduced in three phases, each one fading progressively from an overt model to a semi-overt model and, finally, to a covert model.

### Experimental Design

The design was a multiple baseline across individuals (Kazdin, 1982). After recording baseline data for all four subjects for five sessions, the first phase of the intervention (overt self-instruction) was introduced to one randomly selected subject only; baseline data continued to be recorded for the other three subjects. At the end of the fifth week, four sessions later, the second phase of the intervention (semi-overt self-instruction) was introduced to the first subject while the first phase of the intervention was introduced to a second randomly selected subject; baseline data continued to be recorded for the remaining two subjects. At the end of the seventh week, four more sessions later, the final phase of the intervention (covert self-instruction) was introduced to the first subject, the second phase of the intervention was introduced to the second subject and the first phase of the intervention was introduced to the third randomly selected subject; baseline data continued to be recorded for the fourth subject. At the end of the ninth week, four sessions later, the first phase of the intervention was introduced to the final subject while the third subject was introduced to the second phase of the intervention and the second subject was introduced to the third phase of the intervention. Because of the time constraints of the school year, the first two subjects received all three phases of the intervention training; the third subject received two phases of training, and the fourth subject received only three sessions of the first phase of training.

The four experimental conditions will be described: baseline, overt self-instruction, semi-overt self-instruction, and covert self-instruction.

### Baseline

During the baseline condition, each subject read aloud one selection taken from the SRA labs. It was necessary for each subject to make at least twenty-five miscues per selection in order to fulfill the coding criteria for the *Reading Miscue Inventory*. Since the selections were matched to each subject's instructional level they were generally long enough to provide the necessary 25 miscues. Only on one or two occasions did a subject have to read more than one selection.

The experimenter recorded the oral miscues on a worksheet replicating each story. No prompts or interruptions occurred.

### Intervention

*Overt Self-Instruction.* During each session of the first phase of the intervention the experimenter read aloud one of the SRA selections previously read by the subject during the baseline phase; the experimenter reiterated not only the subject's same miscues but also applied appropriate correction strategies using self-instruction. After the correction strategies were modeled, the experimenter helped the subject progress through another baseline selection by pointing out miscues and encouraging self-instruction. The final step of this phase required the subject to apply self-instruction alone without the experimenter's aid. A miscue analysis was conducted only on this final step for the purpose of data collection.

The self-instruction correction strategies modeled for each subject contained elements which characterized metacognitive processes (Flavell, 1976) and Meichenbaum's self-instruction criteria. Variations of the following self-instructional statements were modeled: (1) "I am using self-instruction to help me better understand what I am reading."; (2) "I don't know this word. I'll skip it and read to the end of the sentence and then I'll come back to see if I can figure it out."; (3) "Now, let's see. I read the whole sentence, but I don't know this word. It starts with a 'br'. I know the sound a 'br' makes. What word will make sense?"; (4) "I just read a sentence. Did it make sense? If it didn't I'll go back and see if I can find my mistake so that it will make sense."; (5) "I just finished a paragraph. What did I find out? Did it make sense?"

*Semi-Overt Self-Instruction.* During the second phase of the self-instruction model, the experimenter again modeled the self-instruction procedure, although in a semi-overt manner (whispering); the subject practiced the procedures and finally performed the semi-overt self-instruction without the aid of the experimenter. As in phase one, the miscue analysis was only conducted on this final step.

*Covert Self-Instruction.* The final phase culminated the self-instruction procedure by fading it to a covert (silent) stage. This step was necessary if self-instruction was to have any utility in the classroom. The experimenter modeled the procedures, which were identical to the previous procedures, except that the self-instructions were to be "thought" rather than uttered aloud. The subject practiced covert self-instruction and then, while reading an SRA selection aloud, applied covert self-instruction without the aid of the experimenter. As in the

previous steps, a miscue analysis was only conducted on this final step.

### Interobserver Agreement

To assess the reliability of the miscue recording procedure, a point-by-point agreement ratio (Kazdin, 1982) was calculated. Five raters, four certified reading specialists and one graduate student who had received training in diagnostic testing procedures, volunteered to score five protocols which were randomly selected from a total of eighty protocols. Each rater scored the same five protocols. In a two hour training session, all the raters were instructed in the application of Goodman and Burke's miscue analysis criteria. Reliability was computed by comparing each protocol scored by an observer with the matching protocol scored by the experimenter. The miscues on the protocols were compared for agreements and disagreements in the categories of Grammatical Relationships and Comprehension. The total number of miscue agreements in both categories on all the protocols were then divided by the total number of miscue agreements plus disagreements. The interobserver reliability for the category of Grammatical Relationships was 79% and for Comprehension was 80%.

## RESULTS

Figures 1 and 2 illustrate the results of introducing the three phases of the intervention, cognitive self-instruction, in multiple baseline fashion across the four subjects. In both Figures 1 (Grammatical Relationships) and 2 (Comprehension) the number of miscues for Terri, Kurt, and Karen in the areas of Strength and Weakness and the areas of No Loss and Loss show a successive level change in the hypothesized direction at the point when the intervention was as introduced (when the experimenter introduced overt self-instruction to each subject).

The mean baseline number of Strength miscues varied from a low of 12.6 for Karen to a high of 16.0 for Terri. The mean number of Weakness miscues varied from a low of 6.0 for both Kurt and Bob to a high of 7.9 for Karen. The mean number of Partial Strength miscues varied from a low of 2.2 for Terri to a high of 4.8 for Bob.

An immediate increase in Strength miscues occurred for Terri, Kurt, and Karen when the intervention was introduced. Mean number of Strength miscues after the completion of the intervention varied from a low of 16.0 for Bob to a high of 20.6 for Karen.

An immediate decrease in Weakness miscues occurred for Terri and Karen when the intervention was introduced. Mean number of Weakness miscues after the completion of the intervention varied from a low of 1.6 for Karen to a high of 4.7 for Bob.

For all the subjects, except Kurt, there did not appear to be any major changes in level for the Partial Strength miscues when the intervention was introduced. Mean number of Partial Strength miscues after the completion of the intervention varied from a low of 2.1 for Terri to a high of 4.3 for Bob.

The mean baseline number of No Loss miscues varied from a low of 9.3 for Karen to a high of 13.6 for Terri. The mean number of Loss miscues varied for a low of 7.0 for Terri to a high of 9.1 for Karen. The mean number of Partial Loss

miscues varied from a low of 3.9 for Kurt to a high of 6.2 for Karen.

When the intervention was introduced there was an immediate increase in No Loss miscues for Terri, Kurt, and Karen. Mean number of No Loss miscues varied at the completion of intervention from a low of 13.7 for Bob to a high of 19.1 for Karen.

An immediate decrease in Loss miscues occurred at the point of intervention for Terri, Kurt, and Karen. Mean number of miscues at the completion of intervention varied from a low of 1.8 for Terri to a high of 8.0 for Bob.

For all subjects, except Bob, there did not appear to be any major change in level for Partial Loss miscues at the point of intervention. Mean number of Partial Loss miscues at the completion of intervention varied from a low of 3.3 for Bob to a high of 5.3 for Kurt.

**Table 1**  
Mean Number of Miscues in each area of Grammatical Relationships during Baseline and after Total Intervention

Subject	Strength		Partial Strength		Weakness	
	B	I	B	I	B	I
Terri	16.0	20.2	2.2	2.1	6.8	2.7
Kurt	14.7	18.9	4.3	2.4	6.0	3.7
Karen	12.6	20.6	4.5	2.8	7.9	1.6
Bob	14.2	16.0	4.8	4.3	6.0	4.7

B = Baseline  
I = Intervention

**Table 2**  
Mean Number of Miscues in each area of Comprehension during Baseline and after Total Intervention

Subject	No Loss		Partial Loss		Loss	
	B	I	B	I	B	I
Terri	13.6	18.4	4.4	4.8	7.0	1.8
Kurt	12.9	16.3	3.9	5.3	8.2	3.5
Karen	9.3	19.1	6.5	3.6	9.1	2.3
Bob	11.7	13.7	4.9	3.3	8.4	8.0

B = Baseline  
I = Intervention

Tables 1 and 2 illustrate each subject's mean change in number of miscues in the categories of Grammatical Relationships and Comprehension from baseline to the completion of intervention. In Table 1, mean improvements occurred for all four subjects in the areas of Strength and Weakness miscues, with Karen showing the greatest mean change in both areas. In Table 2, again mean improvements occurred for all four subjects in the areas of No Loss and Loss, with Karen showing the greatest mean change in both areas.

In examining individual data for both Grammatical Relationships and Comprehension clear treatment effects are evident in Terri's, Karen's, and Kurt's data, although of the three, Kurt's is least clear. For Karen, both Figures 1 and 2, baseline is stable with no upward trend in the data and at the point

of intervention show a dramatic change in level. Terri's data also show a fairly stable baseline with no discernible trend change and a notable shift in level at the point of intervention. Over all three phases of the intervention no major changes in trend occur, except during the Covert stage of self-instruction for Comprehension when there is a slight upward trend for Partial Loss miscues. For Kurt, baseline data show no major trend changes and at the point of intervention there is an observable shift in level, most notably for Strength miscues in Grammatical Relationships. Bob's data show no major trend changes during baseline and no major shifts in level at the point of intervention.

## CONCLUSIONS AND IMPLICATIONS

This study implemented an innovative procedure for addressing comprehension monitoring failure in poor readers, namely the use of cognitive self-instruction. It was hypothesized that if poor readers were trained to apply self-instruction to their reading that they would be more likely to monitor their understanding and, therefore, have better comprehension of discourse.

There are several interesting implications to be drawn from the results of this study. First, using each subject's baseline as a control, it is apparent that there was a definite treatment effect for three of the subjects, with Karen's and Terri's results being the most dramatic. After the training in self-instruction, Karen, Terri, and Kurt all applied self-instruction and were able to shift the quality of their miscues to a higher-quality level, suggesting that they were monitoring their comprehension at a more efficient level than prior to learning self-instruction.

A question could be posed as to why there were rather dramatic changes from baseline to intervention for Karen and Terri, a less potent change for Kurt, and no clear change for Bob.

One explanation may be the variation in the instructional reading levels of the subjects. Both Karen and Terri were reading instructionally on a low-mid third-grade level. Story construction of the SRA selections at this level were represented by shorter, less complex sentences, less conceptually difficult vocabulary, and shorter paragraphs. This type of discourse lent itself more readily to stopping, asking a question, and returning to the point of comprehension failure without losing an understanding of the sentence or paragraph. Kurt and Bob were reading instructionally on a fifth-grade level. The SRA stories at this level tended to contain compound and complex sentences which made it difficult to apply several of the self-instruction statements, such as to skip a word, read to the end of the sentence and then return to apply other word-recognition strategies. Both Kurt and Bob also tended to be much more fluent in their oral reading than either Karen or Terri, which seemed to make stopping at the end of sentences an unnatural place to pause; stopping at the end of paragraphs seemed more comfortable.

Another explanation may have been freedom of verbal expression. It was apparent to the experimenter that Karen and Terri were much more willing to interact verbally with the experimenter than either Kurt or Bob. When it was time for the overt self-instruction training, both Karen and Terri became involved and willingly modeled the experimenter's self-

instructions. Kurt appeared to be a shy and rather quiet child; when it was time to be trained in overt self-instruction, he resisted the training finding it embarrassing to talk to himself out loud. The procedures were slightly modified so that he would attempt to apply them. Bob was also rather nonverbal and had a difficult time adjusting to talking out loud to himself. Part of this problem may have been that Bob was used to repeating the same baseline procedure over a long period of time, and when it was time for the self-instruction training, he had a difficult time adjusting to the new procedure. The last three sessions also fell in the last two weeks of the school year, which may have made it difficult to attend to such a new and unusual procedure.

Although one of the major limitations in a study having such a small population is generalization, there appears to be some efficacy for training a child who has comprehension monitoring difficulties to use cognitive self-instruction. The previously mentioned limitations should be considered, such as instructional reading level, type of material, how freely the child expresses him or herself, and fluency of reading. The procedures for teaching a child self-instruction are not complex but require individual instruction. This may limit its practical value for the classroom but for clinical situations, if working with a child with severe comprehension monitoring difficulties, it could prove invaluable.

This research was conducted as a pilot study. The results of the study indicate that further research in the application of cognitive self-instruction as a plausible treatment for metacognitive failure is warranted. Certainly there should be continued adjustments and modifications to the self-instruction procedures. Continued use of a single-subject design may also prove useful if individual versus group effects are desired.

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