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Testing the Efficacy of a Cognitive-Behavioral Treatment for Impulsivity with Female Juvenile Delinquents

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Abstract

This experiment was conducted in order to determine the efficacy of cognitive-behavioral treatment, involving self-instructions training for impulsivity, on female juvenile delinquents. An additional consideration was whether instructions educating subjects about the generalizability of self-instructions would lead to a decrease in impulsivity in a classroom situation. Thirty subjects were randomly assigned to 3 groups - Group 1 being trained in self-instructions and receiving generalizing instructions, Group 2 being trained self-instruction alone, and Group 3 serving as the attentional control group. The Matching Familiar Figures test was administered before and after treatment sessions and the Impulsive Behavior Scale was rated by the teachers at the same time. When the scores across groups were compared, it was found that although Group 1 and Group 2 made a significant improvement in terms of number of errors on the MFF as compared to Group 3, no difference was found in terms of the latency on the MFF or the rating on the ICBS. A Post-hoc Chi Square conducted on the case workers opinions as to whether the subjects has improved impulse control, revealed a significant difference among the groups. Results are discussed with implications for both the theoretical for both the theoretical aspects of this cognitive-behavioral treatment as well as the applied use of this treatment with juvenile delinquents.
Testing the Efficacy of Cognitive-Behavioral Treatment for Impulsivity with Female Juvenile Delinquents.

The importance of problem solving in today's competitive world is becoming more and more apparent. Not only are problem solving skills required in one's education, but they play a part in most decisions one makes in life.

There was a tendency in the 1950's for psychologists to neglect the importance of individual differences in the processing of information and to attribute superior problem solving to the richer repertoire of knowledge in older children. However, this was remedied by the early 1960's when research demonstrated that differences exist in the quality of problem solving that can be attributed to conceptual skills relevant to the task as well as to a motivational component (Kagan, 1965; Kagan, 1966; and Wohlwill, 1960).

The differences that existed in terms of conceptual skills were not related to intelligence. Rather, the differences were in terms of the stimuli initially selected and the degree of reflection regarding the suitability of the hypothesis being considered. Some children select and report solution hypotheses quickly without any thought for their probable accuracy, while others take more time to decide the validity of their solutions. The former group has been labelled as "impulsive" by Kagan, while the latter group has been labelled as "reflective" (Kagan, 1962).

The impulsive-reflective dimension seems to exert its influence
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at two points in the problem solving sequence. This sequence can be seen as involving four cognitive phases and one reporting phase (Kagan, 1966):

Phase 1: The decoding of the problem and the comprehension of the problem.

Phase 2: The selection of a probable hypothesis on which to act in order to arrive at a solution.

Phase 3: The cognitive implementation of the hypothesis.

Phase 4: An evaluation of the validity of the possible solution in Phase 3. If this hypothesis is not suitable, the individual returns to Phase 2 and chooses an alternative hypothesis.

Phase 5: The reporting of the solution.

The impulsive-reflective dimension operates at Phases 2 and 4 (the time of selection and evaluation). Previous research shows that the impulsive selection of a hypothesis is associated with inaccurate performance when the adequacy of the child's repertoire knowledge is controlled for (Kagan, 1962).

The tendency to be impulsive shows intra-individual stability over time and generality across situations (Kagan, Rosman, Albert & Philips, 1964). Wohlwill (1960) had proposed that in general, the tendency to analyze the problem and the possible solutions into their differential components increases with age and that at any age there are stable differences in this tendency.

Some individuals however, develop without gaining the problem solving skills that are necessary for effective problems solving.
Such individuals' behaviors are habitually characterized by poorly planned actions, hastily conceived and carried out in such a manner that the results are frequently more detrimental to the individual that his initial situation. Juvenile offenders, drug addicts, hyperaggressive children and sociopathic criminals have been found to rate high in impulsivity (Wishnie, 1979).

A large number of techniques purported to modify impulsiveness in children have been researched. Various populations characterised by impulsivity have been studied: aggressive children (Culliman, Epstein & Silver, 1977), hyperactive children (Meichenbaum & Goodman, 1971), emotionally disturbed children (Kendall & Finch, 1978), and children with learning disabilities (Steele & Barling, 1982).

Most of the studies on impulsivity make use of the error and latency scores on Kagan's Matching Familiar Figures Test (MFF) as measures of impulsivity, where impulsivity is defined as a tendency to neglect the analysis of stimulus and possible solutions when problem solving (Kagan, 1966). In this test, the child is shown a single picture of a familiar object (the standard) and six similar variants, only one of which is identical to the standard. The critical variables are response time to the child's first response (latency) and the number of errors made.

Though the MFF is widely used instrument, there is insufficient normative data to support it. Kendall and Finch (1978) reported reliability coefficients over two administrations spaced a week apart of 0.78 for latency and 0.74 for error scores. The test used in the second administration consisted of the same items which were spatially altered.
so that the variant stimulus that was identical to the standard was no longer in the same position as in the first administration. Yando and Kagan (1970) demonstrated that subjects who were given a series of tests similar to the MFF, maintained their relative rank on both response time and number of errors. The median correlation for 10 different tests administered over a 10-week period was 0.73 for response time and 0.68 for errors (p .05).

Neussle demonstrated that children identified as impulsive by the MFF take a significantly less amount of time and are less accurate on problems of concept identification that children identified as reflective (Neussle, 1972). Kagan (1966) reported a significant difference between the distractibility of children rated high on the MFF and those scoring low on the same test. Arizmedi, Paulsen, and Domino (1981), after reviewing the available literature on the MFF, report that the MFF can be tentatively viewed as valid instrument in assessing impulsivity but add that further research is necessary. They support the use of the MFF on the following grounds:

(1) Administration and scoring procedures are relatively simple and inexpensive.

(2) Based on empirical evidence, the MFF seems to be a reliable screening device at least for differentiating between extreme levels of reflection and impulsivity.

(3) The MFF does not rely on any subjective ratings as many of the other measures of impulsivity do.

(4) The MFF is difficult to fake as it requires performance rather than opinion.
(5) Although research on predictive validity is scarce, MFF scores appear to be reliable predictors of the impulsive-reflective dimension of behavior outside the testing environment.

Various techniques have been used in studies attempting to modify impulsivity. Forced delay (Heider, 1971; Kagan, Pearson & Welch, 1966), reinforcement contingencies (Debus, 1970 and Denneyu, 1972) and instructions for scanning strategies (Egeland, 1974 and Nelson, 1969) are some of the different methods used. However, except where strategies for scanning were emphasized, these methods were ineffectual in modifying both the latency of response and the number of errors on Kagan's MFF.

A number of investigators have reported changes in the desired direction for both latency and error scores using verbal self-instructions training as a program for modifying impulsivity (Finch, Wilkinson, Nelson, and Montgomery, 1975; Meichenbaum & Goodman, 1971). The self-instruction method stems from Luria's (1961, 1969) and Vygotsky's (1962) work on the role of speech both overt and covert in guiding one's behavior.

Luria suggested three stages in the internalized control of behavior. The child's performance is first controlled by the overt verbal instruction and reactions of external agents (e.g. parents). Then the child begins to regulate some of his own behavior through audible self-talk. Finally the child internalizes these self-statements and these become more important in their regulatory influences. As Luria quotes Vygotsky (1962),

"The function which is today divided between two persons will be internalized and become the independent mental function of the child himself." (1962, p.6)
Vygotsky's belief about the origin of cognitive development can be utilized in psychological assessment. Vygotsky has proposed a "zone of potential development" which is the difference in the child's performance when compared before and after having received the help of an adult. This difference reflects the ability of a child to benefit from adult provided organizational cues.

The self-instructional training method is one in which the child is taught to mediate his/her behavior through the use of covert self-instruction as to what to do and how to go about completing the problem successfully (Meichenbaum, 1977).

Verbal self-instruction training is specifically relevant to children lacking self control who respond quickly without any thought or evaluation of response alternatives. Kendall (1977), in his essay on the efficacy of verbal self-instruction enunciates a number of factors which makes verbal self-instruction so appropriate for the treatment of impulsivity. Firstly, research into the information seeking behavior of impulsive, emotionally disturbed children (Finch & Montgomery, 1973), reveals that these children think in pictures (iconic representation) rather than in words (symbolic representation). On the other hand, non-impulsive emotionally disturbed children of the same age think symbolically and thus make use of the verbal mediational process. Camp (1977), found that young aggressive boys fail to employ or employ inappropriately, verbal mediational activity. Spivack and Shure (1974), reported that children with self control problems have a lack of appropriate verbal mediation in means-end thinking. Another point that supports the use of training in self-instruction as a treatment for impulsivity, is that impulsive children
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show marked deficits in their evaluation of alternatives. Impulsives have been found to respond with only a minimum of information (Drake, 1970) and to utilize an inefficient process of scanning alternatives (Siegelman, 1969). The verbal self-instruction strategy is particularly relevant to the development of verbally mediated self control and provides both a verbally stated and a therapist modeled problem solving approach.

In recent years, self-instructional training has been studied as a possible treatment for a number of different problems besides impulsivity. It has been considered as a possible treatment to reduce test anxiety and speech anxiety (Meichenbaum, 1972; Wine, 1971; Sarason, 1973), and Meichenbaum and Cameron (1973) were even able to decrease the amount of "sick" talk of schizophrenics using self-instructional training. However, as Mahoney (1974) has pointed out, many of the studies conducted with self-instructional training have restricted their focus to experimental analogues with children. There is still inadequate empirical evidence in terms of the treatment's efficacy for applied clinical problems.

The application of self-instructional training to reduce impulsivity has also been subject to keen investigation with conflicting results. Meichenbaum and Goodman (1971) were unable to obtain a generalizing effect to classroom behavior though they were able to decrease the number of impulsive choices in different tasks. Robertson and Keeley (1974) were also unable to obtain any improvement in classroom behavior when they used a combined treatment of self-instruction and reinforcement. In contrast, Cam, Blom, Herbert and Von Doorwick (1976), Bornstein and
Quevillon (1976) and Kendall and Finch (1976, 1978) were successful in reducing impulsive behavior via the method of self-instruction both in follow up sessions and in classroom behavior.

Unfortunately, many of these studies have not used self-instruction training exclusive of other confounding treatment approaches. Both the Bornstein and Quevillon (1976) study and the Kendall and Finch (1976, 1978) studies made use of behavioral reinforcement schedule in addition to the self-instruction training. Besides, there is confounding effect of modeling inherent within the treatment itself. However, Meichenbaum and Goodman were able to demonstrate that the self-instruction training acted independent of modeling effects. Steele and Barling (1982) were also able to demonstrate that the beneficial effects of self-instruction augmented the effects of self-reinforcement per se.

As Steele et al. have commented (1982), more often than not generalizing results occur when the self-instruction is combined with a response contingent behavioral strategy. This has led Meichenbaum to propose that perhaps the subject may not realize that the self-instructions can be used to facilitate problem solving in situations besides that of solving the perceptual tasks. This leads to the hypothesis that perhaps information educating the subjects on the potential use of self-instruction could lead to a carry over of the beneficial effects of self-instruction training (Meichenbaum, 1977).

This experiment examines a number of hypotheses:

(1) The cognitive-behavioral method of self-instructional training reduces the number of impulsive choices made by female juvenile delinquents on the MFF test. Mahoney (1979) has commented that though
cognitive-behavioral approaches face several conceptual and methodological challenges, they have been found to be promising and in need of further research. No more urgent or challenging area exists than that of delinquency to further examine the impact of cognitive-behavioral treatment modes.

Only one published account attempting to reduce the impulsivity of juvenile offenders by means of self-instructional training exists (Williams & Akamatsu, 1978). No significant differences were found between the pre-treatment and post-treatment assessments on the MFF test. However, self-instructional training led to a significant improvement in performance on a related task (picture arrangement test). The authors believe that these confusing results may have occurred as a result of a number of methodological problems in the design. Firstly, the children's version of the MFF test was used as the training material while the adult/adolescent version of the MFF was used as the assessment task. This may have resulted in strong practice effects that masked any possibility of significant differences due to treatment. Secondly, only one treatment session was given to the subjects and this may have led to the lack of significant results on the MFF scores. Meichenbaum (1977) has suggested that at least four twenty minute training sessions should be provided to each subject.

(2) The population used in this experiment will be older than that used in most of the other experiments that examine the impact of verbal self-instruction training on impulsivity. Meichenbaum (1977), is of the belief that such cognitive-behavioral approach to treatment will be the most beneficial to children younger that those in grades three and four.
Thus this study also determines whether the method can be applied to adolescents with a mean age of 15 years and 11 months.

(3) Finally, it is predicted that educating the subjects about the beneficial effects of self-instruction will generalize to the reduction of impulsivity in classroom behavior.

Method

Study Setting

The present study was conducted at the Bon Air Learning Center, Bon Air, Virginia. This center houses female juvenile offenders between the ages of 11 and 18 years from the state of Virginia.

Subjects

The subjects for the present study were drawn from the total population of girls between the ages of 12 and 16.5 years at the Bon Air Learning Center, Virginia, during the month of June 1983. The identification of impulsive children was based on their initial assessment scores on the Matching Familiar Figures test (adolescent/adult version) developed by Kagan (1966).

Of the 84 girls who were initially tested, 36 girls scored above the cut off scores on latency to the first response and the total number of errors. However, only 30 girls were used in the analysis due to the fact that two girls were released from the institution, three girls were unable to complete the study and one refused to participate.

The cut off scores on the MFF test were as follows: Impulsives required an error rate of at least 16 and a mean latency
less than 24.78 seconds.

The mean age of the 30 subjects was 15 years and 11 months. In terms of racial characteristics, 21 of the subjects were white and nine were black. The mean I.Q. of the subjects was 92.3 as measured by Wechsler Intelligence Scale for Children - Revised (Wechsler, 1974). The offenses that had led to the commitments of the subjects ranged from 'drunk in public' to grand larceny. 'Violation of probation' was the most common charge (See Appendix A for detailed breakdown of offenses).

Apparatus

The Matching Familiar Figures test (MFF) was used to obtain two measures of impulsivity - the total number of errors and the latency of response.

The Impulsive Classroom Behavior Scale (ICBS), developed by Weinreich in 1975, was used to obtain the ratings of the subjects' impulsive behavior within the classroom setting. Weinreich constructed the behavior scale by choosing the most frequently used descriptions and adjectives for impulsive childhood behaviors from test books and studies on disorders associated with classroom settings. This nine item, five point scale has been found to be a reliable and sensitive measure of impulsive behavior (Kendall & Finch, 1978).

Four sets of training material were used to train the subjects in self-instruction:

1. A series of 25 plates on which pictorial stimuli were presented. The pictures on each plate had been quadrilaterally divided into a number of squares ranging from 4 to 12, and the squares had been rearranged. Subjects had to specify the correct the position of each square on a
on a separate answer paper.

2. A series of forty-two plates containing five pictures, four of which are conceptually similar. The task for the subject was to find the one picture that did not belong with the other four.

3. A series of figures were presented in a sequence. The subjects had to choose the one that came next from an array of alternatives.

4. A series of patterns superimposed on a grid of squares was presented. Subjects had to copy the patterns on another grid of squares so that each copy looked identical to the initial pattern presented.

Procedure

The subjects were randomly assigned to one of three groups:

Group 1 (educated-training group): the self-instructional training was used and additional instruction educating the subject about generalizing the effects of this training were presented.

Group 2 (training group): the self-instructional training method was used alone.

Group 3 (attentional-control group): the subjects were presented the training materials without any self-instructional training or generalizing instructions.

The initial assessment scores on the MFF (errors and latency) were used as pre-treatment measures of impulsivity. Four teachers were given the Impulsive Classroom Behavior Scale (ICBS) on which they rated each subject's behavior. This served as the pre-treatment measure on which changes in behavior outside the laboratory situation due to the treatment, were compared. The teachers were not informed as to which group each subject belonged to.
Training Sessions. All the subjects received four training sessions over a period of four weeks. The length of time between training sessions was kept constant at one week for all subjects. The subjects worked at a different set of training materials for each of the training sessions. All of the training sessions were conducted in the same room and each training session lasted for 30 minutes.

The attentional-control group (Group 3) received instructions as to how to perform the task and did not receive any intervention of any sort. Subjects were not given any time limits on the tasks and were given feedback as to the number of errors they had made on each item.

The educated-training group (group 2) received instructions as to how to perform the tasks and were also coached according to the cognitive-behavioral method of self-instructional training developed by Meichenbaum (1974, 1978). At the end of each training session, the experimenter educated the subjects about the use of self-instructions and encouraged the subjects to use the newly acquired method in situations outside the laboratory.

The training group (group 2) received the same instructions as Group 1 did, however they did not receive any additional instructions as to the benefit of self-instructions or their use in external situations.

No fixed number of items were completed across training sessions, rather, each subject worked at the tasks for 30 minutes and completed as many items as she was able to within that time. This ensured that the treatment groups (group 1 and 2) were not given additional time for rehearsal during the training.

In the educated-training group and the training group, subjects were
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taught a strategy of self-instruction that was expected to enhance problem solving skills (Meichenbaum, 1977). The procedure delineated by this cognitive-behavioral treatment involved the following sequence:

1. The experimenter performed the task while talking to herself aloud (cognitive modeling).

2. Subjects performed the task under the guidance of the experimenter's instructions (overt, external guidance).

3. Subjects performed the task while instructing themselves aloud (overt, self guidance).

4. Subjects performed the task while guiding their performance via private speech (covert, self-instruction)

These self-instructions contained:

1. Questions about the nature and demands of the tasks so as to compensate for possible comprehension difficulties

2. Answers to these questions in the form of cognitive rehearsal and planning.

3. Self-evaluative coping skills plus error correcting options in the course of performing the task.

4. Self reinforcement.

During the cognitive modeling stage, a coping model was used. Therefore, a planned error was made by the experimenter in one of the latter items. The experimenter worked through the error and corrected herself out aloud. This was expected to facilitate the subject in cognitively handling such error without a disruption in performance due to frustration.

In order to determine whether additional instructions served to
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genralize the beneficial effects of self-instruction to situations outside the laboratory, the subjects in group 1 received instructions at the end of each session, educating them about the importance of utilizing such strategies in other situations. Illustrations were given to the subjects in other situations. Illustrations were given to the subjects describing concrete examples of how self-instruction could be used constructively.

After the four training sessions, subjects were given the MFF once again in order to obtain a post-treatment score against which to compare the pre-treatment score. The test used in this post-treatment administration consisted of the same items which were spatially altered so that the variant stimuli were no longer in the same position as in the pre-treatment administration of the MFF. The pre-treatment and post-treatment administration of the MFF was conducted by a 'blind' experimenter who was unaware of the experimental condition to which each subject had been assigned.

The four teachers were once again made to rate the subjects behavior on the ICBS. They were requested to base their ratings on the behavior of the child over a fixed one week period thereby allowing any changes in behavior to be reflected in the ratings.

At the end of the experiment, individual debriefing sessions were held for each subject. The extent to which the subjects interacted with each other and discussed the experiment was investigated. An attempt was made to determine whether the subjects were aware of the different ways in which the 3 groups had been manipulated.

Post-hoc data was collected by the experimenter in order to test for a presumed drop in impulsive behavior for the subjects in group 1.
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(educated-training group). The case worker of each cottage within which the subjects are housed, was given a list of the subjects who resided within the cottage. The case workers were asked to comment on whether each subject had either "positively developed more impulsive control", "seemed to have developed more impulse control", or "definitely had not developed more impulse control" by the end of the four training sessions. The experimenter did not come in direct contact with the case workers and they were 'blind' as to which treatment group each subject had been in.

Design and Statistical Analysis

The characteristics of each group in terms of the initial level of impulsivity, as measured by the MFF test and the ICBS, were examined. A multivariate analysis of variance was used to compare the initial levels of impulsivity across groups.

A single factor multivariate analysis of covariance (MANCOVA) was then completed on the data. The independent variable in the MANCOVA was the group to which each subject had been randomly assigned (educated-training Group 1, training Group 2 or attentional-control Group 3). The pre-treatment scores—the number of errors on the MFF, the mean latency to first response on the MFF, and the rating on the ICBS—were covaried out of the analysis. The post-treatment scores on the same 3 variables served as dependent variables on which to compare the difference among the 3 groups.

A posteriori analysis of variance was conducted using the adjusted means, in order to test for specific predictions made about the differences among the 3 groups due to treatment effects. It had been predicted that when the scores on the MFF were examined there would be a significant
difference between the scores of Group 3 (attentional-control) vs. those of Group 1 (educated-training) and Group 2 (training). When the scores on the ICBS were considered, it had been hypothesized that there would be a significant difference between Group 1 (educated-training) vs. Group 2 and Group 3 (training group and attentional-control group respectively).

A Chi Square Statistic was used in the post-hoc analysis to determine whether there was an association between the ratings by the case workers and group membership. A Chi Square analysis was also used to determine whether the stronger association lay between ratings by the case workers and membership to Group 1 and Group 2.

Results

The obtained results may be examined in 3 sections:

1. The 2 factor MANOVA used to examine the 3 dependent variables by groups by administration.

2. The Single Factor MANOVA used to compare the 3 post-treatment scores across groups after they had been adjusted for the initial levels of impulsivity. The posteriori ANOVA to test for the specific predictions will also be included in this section.

3. The Post-hoc Chi Square analysis computed on the data obtained on the subjects' behavior from the case workers.

MANOVA

The Bartlett's test performed on the MANOVA in order to determine whether the assumption of homogeneity of variance has been violated indicated that there was no significant variability among the groups on each of the dependent variables, at a 5% level of significance. No significant difference was obtained for Box's M.
On examining the results of the MANOVA, significant differences were found among the groups \( F(6,50)=2.30 \ p<.05 \) and between the pre- and post-treatment administrations of the tests, \( F(3,25)=28.25 \ p<.05 \). Univariate analyses of variance indicated that a significant difference lay among the groups in terms of the number of errors on the pre-treatment administration of the MFF, \( F(2,27)=4.91 \ p<.05 \). However, no significant differences were obtained on the pre-treatment latency of response scores \( F(2,27)=1.65 \ p> .05 \); or on the pre-treatment ratings on the ICBS \( F(2,27)=.39 \ p>.05 \), when they were compared across groups.

On examining the univariate analyses of variance to determine which variables were significantly different across administrations, it was found that there was a significant drop in the number of errors committed on the post-treatment administration of the MFF \( F(1,27)=48.57 \ p<.05 \). A significant increase was found in terms of the latency to first response on the post-treatment administration of the MFF \( F(1,27)=43.4 \ p<.05 \). However, no significant difference was found in the post-treatment scores on the ICBS \( F(1,27)=.05 \ p>.05 \).

**MANOVA**

Results of the MANOVA computed on the 3 dependent variables — errors, latency, and the ICBS were as follows:

The WILKS test demonstrates that there was a significant difference among the groups after the pre-treatment scores had been covaried out of the analysis \( F(6,44)=3.15 \ p<.05 \). Univariate ANOVA's computed on the 3 dependent variables resulted in a significant difference among the groups in terms of 'errors' \( F(2,24)=10.20 \ p<.05 \). In order to test for specific hypotheses, comparisons were made among the adjusted treatment means for the 'errors' scores of the 3 groups. As predicted, a significant differ-
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ence was obtained between the 'error scores of the 'educated-training' Group 1 and the 'training' Group 2 as compared to those of the 'attentional-control' Group 3 $F(2,26)=5.31 \ p<.05$.

On examining the univariate ANOVA's computed on the adjusted means of the other 2 dependent variables, no significant difference was obtained among the 3 groups in terms of the 'latency' $F(2,24)=.34 \ p>.05$ or in terms of "ICBS" scores $F(2,24)=.99 \ p>.05$. No further computations were performed on these 2 variables.

**CHI SQUARE**

On examining the Chi Square statistic obtained on the nominal ratings of the subjects' behavior by the case worker, a value of 10.2 was obtained with 4 degrees of freedom significant beyond the .05 level, indicating that there was an association between the treatment group each subject has been assigned to and the rating of the subjects' behavior. The contingency coefficient to determine the strength of the association was $C=.5$. The maximum value for $C$ in a 3 X 3 table is .82. When the specific hypothesis (predicting that there should be a stronger association when Group 1 and Group 2 were measured as compared to Group 2 and Group 3) was tested for, a stronger association was obtained for Group 2 and Group 3 with a Chi-Square value of 11.5 with 2 degrees of freedom $p<.05$. The contingency coefficient obtained was $C=.53$ which must be compared with a maximum obtainable value of .71. The Chi Square value obtained when Group 1 and Group 2 were used in the analysis 2.19 with 2 degrees of freedom, indicating that there was no significant association between the ratings by the case workers and the membership of the subject to Group 1 or Group 2.

A summary of obtained results is provided in Table 2 and Figure 1.
Discussion

Significant results were obtained for all 3 of the major statistical operations performed on the data -- the MANOVA, the MANCOVA and the Chi Square. Each set of results will be discussed in the same order as reported above.

When the MANOVA was examined, a significant increase in the latency score and a decrease in the error score from the pre-treatment to the post-treatment administration of the MFF was obtained across the 3 groups. This positive change in scores may be attributed to a culmination of factors as mentioned below.

The practice effect due to performing conceptual-perception tasks over the training sessions could be expected to lead to a significant improvement in terms of the number of errors made on the MFF. However, practice effects would be expected to lead to a decrease in latency of response rather than an increase. The subjects' involvement in the research and the resulting high level of motivation may have contributed to the improvement in performance. Participation in the project was looked on as a privilege by the subjects and was seen as a welcome change from the Institution's daily schedule. This was evidenced in the attitudes and behavior of the subjects who would miss recreational activities (e.g. swimming) in order to attend the training sessions. Another indication that participation in the project was valued by the girls was the number of requests to participate made by the delinquent
residents not taking part in the project.

Although the subjects were randomly assigned to the 3 groups, they were significantly different in terms of their initial scores on the MFF $F(2,27)=4.91 \ p .05$. In order to provide an adjustment of the analysis for differences existing among subjects before the start of the experiment, the pre-treatment scores were covaried out of the analysis. Results of the MANCOVA demonstrate that, as hypothesized, there was a significant difference among the treatment groups in terms of the number of errors made on the MFF. Both the 'education-training' Group 1 and the 'training' Group 2 made significantly fewer errors on the MFF than did the 'attentional' control' Group 3. It seems, then that self-instructional training may reduce the number of impulsive choices a subject makes when presented with a conceptual-perception task.

In terms of the latency of first response to each items of the MFF, no significant difference was obtained among the 3 groups. This lack of significant results could have occurred for a number of reasons.

The demand characteristics (Orne, 1962) of the experiment could have negated the possibility of the latency of response being affected by treatment. The subjects were extremely uncomfortable during the initial assessment on the MFF. The tick of the stopwatch used to record latency was audible to the subjects and a number of the subjects inquired as to the reason for recording timings. This may have resulted in unnaturally short latency scores during the pre-treatment administration of the MFF. The continuous use of the stopwatch during the 4 training sessions may have served to dissipate some of this anxiety and therefore may account for the significantly longer latency.
scores. Another aspect of the training could have accounted for the lack of an increase in the latency scores of the 'educated-training' Group 1 and the 'training' Group 2. All the subjects were exposed to four training sessions of a half hour duration each. During these sessions, each subject was drilled in the technique of verbal self-instruction as a problem solving tool. It is possible that the subjects had internalized the strategy and that such extensive practice had led to the ability to utilize self-instruction within a shorter period of time. Another possible reason for the lack of significant results may be that the treatment was in fact ineffectual at increasing latency of response.

On examining the results of the MANCOVA, it was found that there was no significant difference among the teachers' ratings on the ICBS of the 3 groups. This lack of significant differences may have occurred because verbal self-instructional training was ineffectual in developing impulse control with or without generalizing instruction. However, a number of different factors may have affected these results, some of which are speculated below.

It was necessary to have 4 different teachers rate the subjects' behaviors on the ICBS as there was no single teacher in contact with all the subjects. It is probable, therefore, that the different standards used by the teachers may have added to the error term in the statistical analysis. All 4 teachers were unable to analyze the post-treatment forms at the same time. Two teachers were unavailable and therefore did not complete the ratings until 5 days after the other 2 teachers did. As the teachers had not been in contact with the
subjects over this period of 5 days, it is possible that they relied
relied on their memory during the rating of each subjects' behavior.
The cumulative result of the stereotyping and halo effects (Newcomb,
1961), could have resulted in the lack of significant results.

A number of reports from various personnel within the institu-
tion led the experimenter to believe that the educated-training group
had in fact benefited from the additional instruction as to the appli-
cability of verbal self-instruction in situations outside the laboratory.
The Principal of the school remarked to the experimenter that one of
the subjects in Group 1 had behaved with great restraint during a conflict
with one of the teachers. One of the subjects' in Group 1 received
an award for "Best Girl in her cottage for the month of July". A case
worker who came in daily contact with 7 of the subjects, mentioned that
3 of them had improved considerably in terms of impulse control and
had not received any negative points in their token economy program
for a month. Two of these subjects were from the 'educated-training'
Group 1 and one was from the 'training' Group 2. It was the experimenter's
subjective opinion that the subjects in the 'educated-training' Group 1
were more conscious of their 'impulsivity' and understood how verbal
self-instruction could benefit them. This opinion was based on conver-
sations that the experimenter had with each subject while walking to
and from the laboratory to the cottage/school. All the subjects talked
about the events that had occurred over the period between sessions,
especially about the number of positive and negative checks each had
received in their behavioral program. However, the experimenter noticed
that the subjects in the 'educated-training' Group 1 tended to talk
about their behavior in the context of impulsivity. Subjects in this group were more likely to discuss how they had either followed the guidelines that the experimenter had suggested and had exerted self-control or had 'just not been able to control' themselves. The subjects in the other 2 groups did not discuss their behavior in reference to impulsivity, but tended to blame external agents for their negative behaviors.

The Post-hoc Chi Square test was therefore performed to test for this expected gain in 'impulse control'. Results demonstrate that there was an association between the group to which each subject had been assigned and the rating of the subject's impulse control ('definite improvement', 'maybe some improvement' or 'no improvement'). However, further analysis demonstrated that unlike the initial hypothesis, the significant association lay between the 'training' Group 2 and the 'attentional-control' Group 3 rather than between Group 1 and Group 2. These results allow one to speculate that perhaps the verbal self-instructional training led to an increase in impulse control regardless of whether additional information educating the subjects about the applied use of verbal self-instruction was presented. These results must be treated with caution because not only was this post-hoc analysis, but the measure was statistically crude.

Meichenbaum (1977), has recommended that children younger than those Grades 3 and 4 would be better candidates for self-instructional training. It is the experimenter's belief that the training would be beneficial for delinquents identified as impulsive on the basis that these youth have as yet not developed self control. There is, therefore a "zone of potential development" that may be utilized (Vygotsky, 1962).
Impulsivity

From the basis of this study, it would be appropriate to recommend proceeding further in the study of this cognitive-behavioral treatment mode (i.e. verbal self-instruction training), as a benefit to female juvenile delinquents within an institutional setting. In order to broaden the scope of this area, research is needed to determine the applicability of verbal self-instructional training to a male delinquent population. Bowman (1979), in an attempt to decrease impulsivity in a male delinquent population using a cognitive-behavioral treatment package, found no significant difference between the subjects who had been provided the cognitive-behavioral treatment and those in the control group. However, the subjects were screened in a different manner and the training sessions followed a different pattern than that used in this study. Subjective ratings were used in the identification of 'impulsives' and there were more abstract components to Bowman's self-instructional training. This may have resulted in comprehension difficulties for the subjects.

Mahoney (1979) in his essay on cognitive issues in the treatment of delinquency, discusses his belief that delinquents do not need "moralizing therapy" so much as pointers on stimulus control. There is ample evidence that individuals are often accurate in predicting their own behavior -- partly on the basis on their personal beliefs (Bandura, 1977). Therefore, it would seem relevant to use a cognitive-behavioral perspective to make an effect on delinquents' abilities to problem solve and perform a desired response.

In conclusion, it may be speculated that the results of this study
Impulsivity

seem to be related to the concept of 'locus of control' (Rotter, 1966). The behavior of the subjects led the experimenter to hypothesize that perhaps the impulsive subjects become more 'internal' as a result of the cognitive-behavioral treatment. This speculation could have implications for further research into personality variables that may be correlated with impulsivity.
References


Camp, B. Verbal mediation in young aggressive boys. Unpublished manuscript, University of Colorado School of Medicine, 1977.


Table 1

Summary of offenses committed by subjects within groups.

<table>
<thead>
<tr>
<th>Type of Offense:</th>
<th>Sum for Group 1</th>
<th>Sum for Group 2</th>
<th>Sum for Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assault &amp; Battery</td>
<td>5</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Breaking &amp; Entering</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Curse &amp; Abuse</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Damaging Property</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Distribution of a Controlled Substance</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Disturbing the Peace</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Drunk in Public</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Grand Larceny</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Petty Larceny</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Possession of a Stolen Weapon</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Trespassing</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Truancy</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vandalism</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Violation of Probation</td>
<td>8</td>
<td>8</td>
<td>3</td>
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</table>
Table 2
Summary of the means and standard deviations on the dependent variables by groups by administration.

<table>
<thead>
<tr>
<th>Group:</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
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<tbody>
<tr>
<td></td>
<td>X</td>
<td>S.D.</td>
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<tr>
<td>Errors</td>
<td>30.60</td>
<td>10.71</td>
</tr>
<tr>
<td>1</td>
<td>13.87</td>
<td>7.13</td>
</tr>
<tr>
<td>Latency</td>
<td>28.80</td>
<td>4.57</td>
</tr>
<tr>
<td>ICBS</td>
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<td></td>
</tr>
<tr>
<td>Errors</td>
<td>25.20</td>
<td>8.70</td>
</tr>
<tr>
<td>2</td>
<td>16.21</td>
<td>5.47</td>
</tr>
<tr>
<td>Latency</td>
<td>25.60</td>
<td>7.04</td>
</tr>
<tr>
<td>ICBS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Errors</td>
<td>32.10</td>
<td>10.38</td>
</tr>
<tr>
<td>3</td>
<td>11.48</td>
<td>5.47</td>
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<tr>
<td>Latency</td>
<td>27.10</td>
<td>8.67</td>
</tr>
<tr>
<td>ICBS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Impulsivity

Summary of the mean scores by groups by administration in terms of errors, latency, and ICBS rating.

Mean Errors:

Mean Latency:

Mean ICBS Ratings:
Table 3
Tabular representation of the design.

Administration
Pre-treatment     Post-treatment

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Errors</th>
<th>Latency</th>
<th>ICBS</th>
<th>Errors</th>
<th>Latency</th>
<th>ICBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Educated-training)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 2</th>
<th>Errors</th>
<th>Latency</th>
<th>ICBS</th>
<th>Errors</th>
<th>Latency</th>
<th>ICBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Training)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 3</th>
<th>Errors</th>
<th>Latency</th>
<th>ICBS</th>
<th>Errors</th>
<th>Latency</th>
<th>ICBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Attentional-control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>