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Remediation Efforts for Hyperactivity: Training in Attention or Inhibitory Control

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ABSTRACT

To compare various cognitive treatment approaches for ameliorating difficulties of hyperactive children on tasks requiring sustained vigilance and accuracy, 48 hyperactive boys (mean age 9 years 4 months) were randomly assigned to one of four training conditions: inhibitory control training, attention training, combined training, or control. The combination of attentional and inhibitory control strategies was most effective in enhancing Ss' cognitive performance. Results were interpreted to support the hypothesis that impulse and attention control problems occur concurrently in hyperactive Ss, although remediation in attentional deploying strategies is necessary for enhancing their cognitive performance. Findings further suggest that training solely in inhibitory control is not sufficient for enhancing cognitive performance among hyperactive children. (Author)

Remediation Efforts for Hyperactivity: Training in Attention or Inhibitory Control[1]

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Abstract

The purpose of the present study was to compare various cognitive treatment approaches for ameliorating the difficulties of hyperactive children on tasks requiring sustained vigilance and accuracy. Differential training techniques comparing training in attention to inhibitory control indicated that a combination of attentional and inhibitory control strategies was most efficacious in enhancing cognitive performance of these children. The findings from the present research further were interpreted to support the hypothesis which suggests that problems with impulse control and attention occur concurrently in hyperkinetic children, although remediation in attentional deploying strategies is necessary for enhancing cognitive performance of these children. The results from this study further indicated that training hyperkinetic children solely in inhibitory control simply is not sufficient for enhancing cognitive performance.

Impulse Control or Selective Attention: Remedial Programs for Hyperactivity

Over the past several years, the central importance of deficits in attention and impulsivity in hyperactive children has been emerging in much of the clinical and research literature (Douglas, 1972, 1974; Douglas & Peters, 1980). Laboratory studies have provided important empirical data indicating that hyperactive children perform more poorly than their normal peers on tasks requiring sustained vigilance (Sykes, Douglas, & Morgenstern, 1973) and on problems necessitating decision speed and accuracy under conditions of response uncertainty (Campbell, Douglas, & Morgenstern, 1971). Douglas (1972, 1974) has further suggested that problems with attention and impulse control occur concurrently and impede the academic performance not only of hyperactive children but of children with a wide range of learning disabilities.

Several researchers have developed programs that train hyperkinetic children to respond less impulsively and to utilize more effective attentional deploying strategies. These programs have been described as self-instructional (Meichenbaum & Goodman, 1969, 1971) or as cognitive training programs (Douglas, Parry, Marton, & Garson, 1976). A trainer demonstrates appropriate planning and error-correction strategies on a range of perceptual tasks. The child is then taught to "self-instruct," ie., to verbalize the strategies prior to and during performance on the task. Often times the training program includes a self-management component, wherein the child is taught to verbally reinforce appropriate strategies with overt or covert praise statements (Douglas et al., 1976). Douglas (1972, 1974) has concluded that remedial efforts in attention and inhibitory control should be directed at teaching such children to "stop, look, and listen" before answering a question or responding to a task. According to Ross (1976), "stop" is the

injunction addressed at impulsivity, while "look and listen" instruct the child to attend selectively. In the area of academic behavior, the generalization of positive results from the training strategies have been reported by Douglas and her associates on oral and listening comprehension (Douglas et al., 1976) and by Egeland (1974) on reading comprehension.

Recently Ross (1976) has raised an important point regarding Douglas' (1972, 1974) analysis of the essential nature of the hyperactive child's deficits which has important implications for the essential ingredients incorporated into training programs with these children. Ross (1976) has questioned whether it is necessary to hypothesize both impulsivity and attentional problems in these children and has suggested that a conceptualization dealing with attention alone may be sufficient. Douglas and her colleagues (Douglas et al., 1976) have argued, however, that it would be unwise to ignore the impulsive aspects of the hyperactive child's behavior since problems with inhibitory control occur together with attentional deficits (Douglas, 1974). In training hyperactive children, Douglas and her associates (Douglas et al., 1976) have insisted that it is necessary to bring the child's tendency to respond impulsively under control before training in focusing and search strategies (attentional deployment) can begin.

The purpose of the present research was to determine whether training programs for hyperactive children need to invoke deficits of both strategies in attention and impulse control in ameliorating the difficulties of such children on cognitive tasks. In essence, this research sought to determine whether hyperkinetic children must be taught to "stop, look, and listen" or whether it simply is sufficient to teach them to "look and listen." The present research investigated the effect of differential treatment approaches on a task necessitating

sustained vigilance and accuracy. The treatment approaches included attentional deployment, inhibitory control, and a combination of these training conditions, each of which were examined with the presence of a control group.

Method

Subjects. Forty-eight hyperactive boys were randomly selected from special education classes in a large metropolitan school system. The mean age of the group was 9 years, 4 months. Each of the children participating in the study received ratings of 15 or above when their classroom teacher completed a Conners Teacher Questionaire (Conners, 1969) which has been found to be at least two standard deviations above the mean of a normative sample (Sprague, Cohen, & Werry, Note 1). IQ's for the children, which were derived from the Peabody Picture Vocabulary Test (Dunn, 1965), ranged from 85 to 102 with a mean of 92.33.

Training. Subjects were randomly assigned to one of four training conditions. Training for each of the children was conducted individually by University of Illinois research staff. For each of the four conditions, children participated in ten training sessions.

Inhibitory Control Training. This training condition was similar to that employed by Camp, Blom, Herbert, and Von Doorwick (Note 2). The training program presented the children with the "copy-cat" game, which introduced the child to asking himself the following four basic questions: What is my problem?, What is my plan?, Am I using my plan?, How did I do? Children were provided with self-instructional cue cards, designed to establish inhibitory control, elicit relevant mediators, and foster self-reinforcement.

Attention Training. This training condition focused on modifying critical stimulus aspects of the Matching Familiar Figures Test (MFF). Training took the form of exaggerating the differences between the stimuli on the variants of the

MFF, thus making the critical features of the variants more salient to the child. After this training condition had been completed, children were administered an alternative form of the MFF.

Combined Training. This group received a combination of both inhibitory control training and attention training.

Control. Although no children in the control group received any specific training designed to attentuate impulsivity or ameliorate attentional deficits, trainers worked with these children on remedial classroom activities while the remainder of the children were receiving specialized attention or impulsivity training.

Measures. To evaluate the efficacy of the training, children were administered the Matching Familiar Figures Test (MFF) (Kagan, Rosman, Day, Albert, & Phillips, 1964), a widely used measure of decision speed and accuracy under conditions of response uncertainty. The MFF has continually discriminated hyperactive children from their normal peers (Campbell, Douglas, & Morgenstern, 1971) and has been found to be sensitive to stimulant drug effects in these children (Brown & Sleator, 1979). In fact, Keogh and Donlon (1972) have recommended that school psychologists include Kagan's Matching Familiar Figures Test in their assessment battery. The MFF has been found to have generality to a variety of cognitive tasks including serial learning (Kagan, et al., 1964), inductive reasoning (Kagan, Pearson, & Welch, 1966) and intelligence (Brown & Quay, 1977). Most importantly, the MFF has been found to have generality to a number of academic measures

including reading (Kagan, 1965). Thus, it is assumed that successful modification of decision making and other behaviors associated with the Matching Familiars Test may result in correlated improvement in a number of very important related areas such as reading.

The MFF consists of twelve tasks. Each task contains one stimulus picture and a separate array of six pictures, one of which is identical to, and five of which are variations of one stimulus picture. Some of the variations are quite similar to the original stimulus while others differ significantly. The child is required to select the identical picture. He is allowed to select pictures from the array until he selects the identical one. His errors are recorded and the time it takes for him to make the first response (latency, which means the duration of time between the presentation of the stimulus and the response) is recorded. Errors and latency are averaged over the twelve tasks. The child thus receives two scores: error and latency.

Results

The means and standard deviations on the MFF error and latency scores for the four training conditions are presented in Table 1.

Insert Table 1 about here

A post-test design was utilized in which a 2(Attention Training) x 2(Inhibitory Control Training) multivariate analysis of variance was carried out for both MFF error and latency measures. The independent variables were attention (training and control) and inhibitory (training and control). The results of this analysis indicated significant main effects for Inhibitory Control Training $F(2, 43) = 12.91$, $p < .0001$, and for Attention Training $F(2, 43) = 73.68$, $p < .0001$. A significant interaction also occurred in the analysis, $F(2, 43) = 11.54$, $p < .0001$.

Separate univariate analyses of variance indicated that the Inhibitory Control Training was significant for the MFF latency scores $F(3, 44) = 26.39$, $p < .0001$. The MFF error score approached significance $F(3, 44) = 2.87$, $p < .09$.

Univariate analyses of variance further indicated that the Attention Training was significant for the MFF error measure $F(3, 44) = 130.38$, $p < .0001$. Significant interactions occurred for both MFF error $F(3, 44) = 5.22$, $p < .03$, and MFF latency measures $F(3, 44) = 23.31$, $p < .0001$.

The mean MFF error and latency scores for the four training conditions are presented in Figure 1.

Insert Figure 1 about here

Discussion

For hyperactive children, the present findings offer substantial evidence for the efficacy of cognitive training for enhancing sustained vigilance and accuracy under conditions of response uncertainty. The finding that rather large improvements occurred on both error and latency measures of the Matching Familiar Figures Test as a function of the Attentional and Combined training conditions, match or surpass other cognitive approaches which have attempted to improve MFF scores (Meichenbaum & Goodman, 1969, 1971).

Although this speculation is only conjecture, the known relationship between the MFF and other academically related tasks (Brown & Quay, 1977; Kagan, 1965) suggests that the findings of the present research might possibly result in concomitant improvement in other related areas of classroom instruction such as reading. More research must be generated, however, to determine for certain whether the results of the present study may be transferred to actual classroom instruction.

That the hyperactive children in the Attention, and Combined Training condition obtained fewer errors and longer latency scores than the children in the Inhibitory Control training condition suggests that a combination of attentional and inhibitory control strategies is most efficacious in enhancing cognitive performance in these children. Thus, the practitioner would be most wise to incorporate in his treatment regimen approaches which include a combination of strategies emphasizing both attention and inhibitory control. Although the reader must be cautious about the inference to be drawn concerning the nature of the hyperactive child's deficits on the basis of a training study, these results lend some credence to the speculation presented by Douglas and her colleagues (Douglas, 1972, 1974; Douglas et al., 1976) which suggest that problems with impulse control and attention occur concurrently.

The findings from the present research further indicate that training hyperactive children solely in inhibitory control is simply not sufficient for enhancing cognitive performance. This finding tends to support the hypothesis presented by Ross (1976) which suggests that attentional training alone may be sufficient for enhancing cognitive strategies of hyperkinetic children. The results from this study certainly support the remediation efforts of practitioners in teaching hyperactive children to "look and listen" as well as to "stop".

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Footnotes

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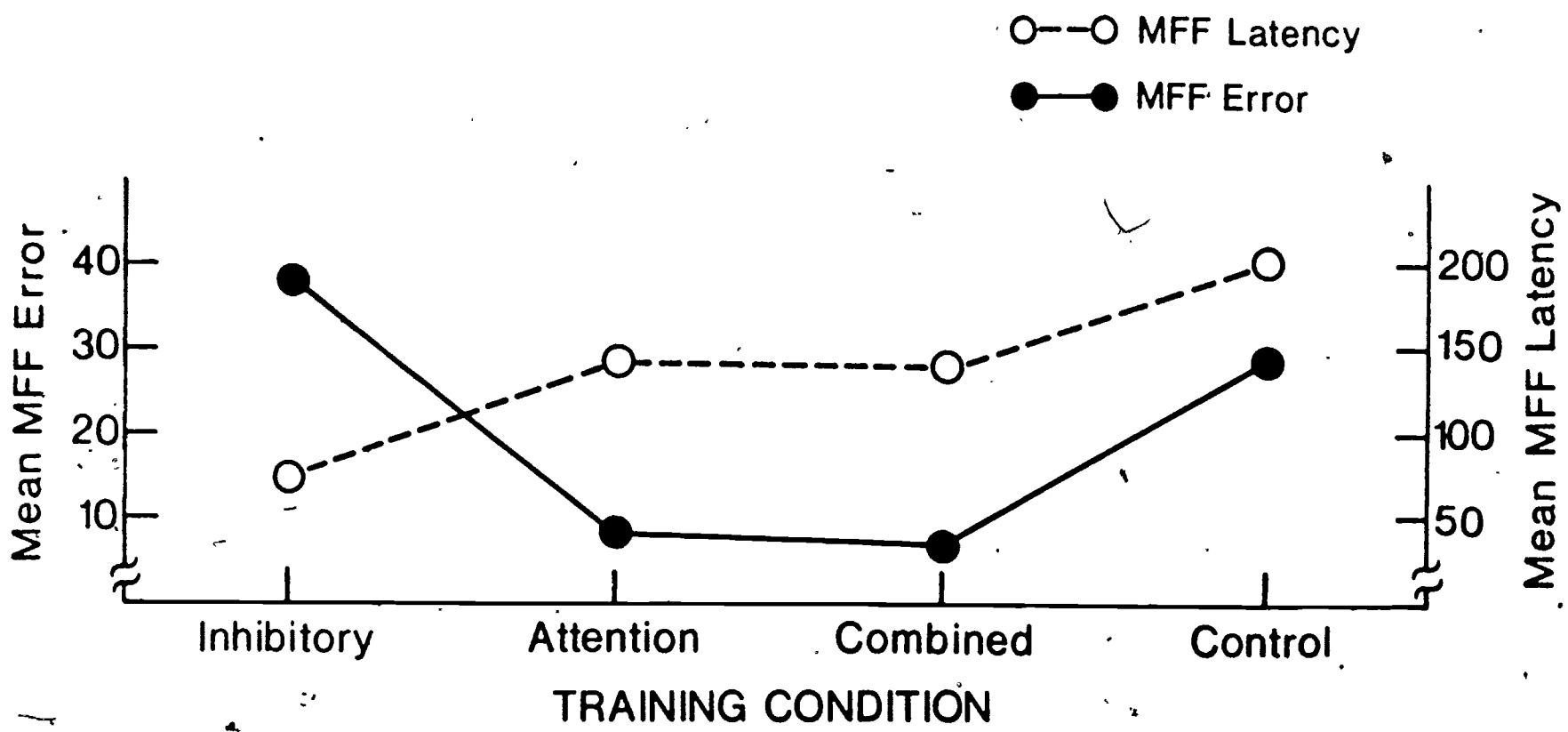
Table 1

Means and Standard Deviation for MFF Latency and MFF Error Scores for Hyperactive Children Under Four Training Conditions

Training Condition	Number of Errors		Latency (in seconds)	
	Mean	SD	Mean	SD
Inhibitory Control	38.00	7.86	76.75	19.57
Attention	8.33	6.12	140.08	51.46
Combined	7.00	4.26	136.25	49.44
Control	29.00	11.32	200.25	43.56

Figure Caption

Figure 1. Mean errors and latency measures of hyperactive children on the MFF (measure of impulsivity) under four training conditions.


MFF Latency
MFF Error
Mean MFF Error
40
30
20
10
200
150
100
50
Mean MFF Latency
Inhibitory
Attention
Combined
Control
TRAINING CONDITION