Attention Training Through Breathing Control To Modify Hyperactivity

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The use of a psychophysiological method for training children in the control of hyperactive behavior is explored. The method involved attention training through breathing control, incorporating biofeedback and operant conditioning principles to help the child develop self-control over excessive and distracting motor behaviors and to maintain attention in learning situations. Six children (age 6-8 years old), from a private school for children with learning disabilities, participated in the study, three assigned to a group given the breathing control and attention training and three assigned to a control group. Measures obtained before, during, and after training included respiration indices, attention and vigilance test performance scores, and teacher ratings of classroom behaviors. The findings supported the feasibility of the training approach and provided important information relevant for future refinements in training and evaluation procedures.

The problems of hyperactive (or hyperkinetic) children are well-known and create one of the more difficult situations faced by teachers today, particularly at the elementary school level. These children typically perform poorly and create frequent interruptions of regular class activities. Even more frustrating is the fact that the hyperactive child is often regarded as being intellectually capable of doing satisfactory school work, but excessive motor behavior, distractibility, and lack of attention preclude academic success.

The definition and description of hyperactivity is neither precise nor specific. Terms such as "hyperkinesis," "minimal brain dysfunction," "learning disorder," and similar terms have been used in the literature referring to this class of behavior in children. Part of the confusion in labeling and describing the disorder lies in the confounding of behavioral and neurological conditions with an array of learning deficiencies. However, two primary aspects of symptom patterns have usually emerged from descriptions of hyperactivity. First, persistent and high levels of activity represent a major basis for diagnosing hyperactivity (Chess 1960, Clements 1966, Millichap 1968, Schulman et al. 1965, Werry & Sprague 1969, Wunderlich 1969). Freedman has added that "The physical activity appears driven . . . so that the activity is beyond the child's control, as compared to other children. The child is distracted, racing from one idea and interest to another, but unable to focus attention" (1971, p. 2).

The second symptom pattern concerns the situational or social inappropriateness of motor activity (McConnell et al. 1964, McFarland et al.

1966, Patterson et al. 1965, Werry 1968). Werry and Sprague have suggested that activity level in the hyperactive child "lies at the upper end of the distribution of this behavioral trait in the population . . . having a qualitative element of situational inappropriateness, thus, bringing the child into conflict with his socio-familial environment" (1969, p. 397).

The causes of hyperactivity have been linked to various biological, psychological, social, and environmental factors. But no confirmatory studies implicate a particular factor as truly causative (Freedman 1971). Keogh (1971) has described three hypothetical relationships between causal factors and learning disorders which have often guided research and therapeutic programs. The hypotheses are not exhaustive or necessarily independent, but reflect three of the more common viewpoints concerning this matter. The first hypothesis represents the medical-neurological syndrome explanation; that is, learning problems are perceived as being caused by neurological impairment. The second hypothesizes that increased motor activity is the major obstacle to learning, due to the disruption of attention and prevention of accurate intake of information. The third suggests that learning problems are a function of hasty, impulsive decisions in learning situations.

The third hypothesis concerning the decision process has received less attention, perhaps because it rests on the questionable assumption that the sensory input of information itself is unimpaired. The other two appear to be more widely accepted, particularly the second – proposing the disruption of information acquisition. Treatment approaches designed to control hyperactivity as a means of eliminating learning disabilities are based essentially on the acceptance of the second hypothesis.

Two types of treatment programs. Since children afflicted with hyperactive disorders are often of normal or superior intelligence (Freedman 1971, Millichap 1968), it is particularly important that treatment programs be developed to aid them toward effective interaction with their environment. The two general treatment approaches most frequently employed can be classified as drug therapy and behavior modification.

Drug therapy (Haring 1969, Millichap 1968, Millichap et al. 1968, Wunderlich 1969) has improved the management of hyperactive and perceptually handicapped children and has led to small but significant improvements in the learning achievements of these children (Millichap et al. 1968). Nevertheless, these children often continue to exhibit behavior problems in the average classroom situation and fail to respond well to the teaching methods used in that setting. The drugs aid in alleviating the hyperactive behavior but may result in sedation or tranquilization of the child so that poor concentration and a short attention span still cause learning difficulties.

While the practice of drug therapy has grown considerably during recent years, it is not regarded as the ideal method of treatment. For the present, drug medication represents a convenient but imperfect alternative that is frequently selected as a treatment modality. But drug therapy is not equally effective with all children, and the optimal types and dosages of drugs differ among children. More importantly, there are questions concerning the long-term physiological and psychological effects of prolonged drug therapy which have not been answered. Also, more attention should be directed to learning deficits which result from the medication (Sulzbacher 1972).

The other popular treatment approach that has received attention in recent years and that offers considerable promise is behavior modification. This commonly involves an operant conditioning technique by which desirable behavior is conditioned or "shaped" and undesirable behavior is eliminated through the programmed use of reinforcements (Skinner 1963, Grossberg 1964). The technique has been employed with considerable success in a wide variety of situations, including the treatment of children with learning disabilities (Johnson 1969, Kuypers et al. 1968, O'Leary et al. 1969, Patterson et al. 1965, Walken 1969). In general, behavior modification techniques have provided encouraging results in children with specific behavioral or learning problems. While the techniques work to reduce hyperactive behavior, there have been problems encountered in their application.

A problem with behavior modification techniques. One common problem in the use of behavior modification involves the choice of specific behaviors to be shaped or altered. With hyperactive children, the focus generally has been on eliminating excessive motor activity with the hope that improvement in attention and performance would result. In order for the particular approach to be successful, however, each specific behavior to be controlled by the child must be identified, monitored, and reinforced appropriately by the investigator. Trained observers must watch the child during the procedure and must complete behavior checklists, or rating scales, for the selected behaviors of interest. When the number of behaviors being rated is large, as is usually the case in studies with hyperactive children, the task of effective monitoring and reinforcement becomes formidable. Likewise, as the number of specific behaviors to be controlled becomes more numerous, the training can be assumed to become more difficult for the child.

Many programs have also focused only on eliminating undesirable behaviors, such as excessive motor activity, without reinforcement directed at establishing desirable behavior, such as attending. While eliminating excessive motor activity may increase the probability that attending behavior will be exhibited by the child, the relationship certainly cannot be considered to be causal or perfect. The child may learn to inhibit motor behavior but still fail to attend to appropriate stimuli. Reinforcements should therefore be based upon the elimination of undesirable behaviors as well as upon the acquisition of desirable ones.

A proposed solution to the problem. Minimizing the number of behaviors to be controlled would simplify the training procedures for both the investigator and the child being trained. This requires the selection of a single "higher-order" behavior, the control of which would indirectly affect a group of other "lower-order" behaviors of interest to the investigator. Respiration behavior fits the qualification of a higher-order behavior and breathing has, in effect, been used as such for many years in the practice of yoga and Zen meditation. Similarly, breathing control is used as an exercise to aid in achieving physical relaxation in autogenic relaxation training (Schultz & Luthe 1959).

Breathing is a very sensitive behavior and is highly related to other bodily activities, especially gross body movements such as those so often displayed by hyperactive children. While breathing is controlled automatically to a large degree by the respiratory centers in the upper brain stem, there is a great deal of voluntary control over this function. By learning to control breathing so that recordings are regular in rate and amplitude, as well as free of movement artifacts, the child should be able to acquire self-control that extends to the control of disruptive motor-behaviors. The procedure requires the child to focus on one behavior instead of many. Visual feedback of respiration recordings is easily accomplished for the purpose of initial training.

Regularity of breathing is also an important characteristic of attending behavior. Woodworth & Schlosberg (1954) have noted, for instance, that breathing tends to become regular as well as more shallow and quickened during attention. The regulation of breathing during attention appears to be a part of an "attending" behavior pattern, involving few gross body movements, focused perceptual and cognitive processing systems, and altered physiological states. Maintenance of a regulated breathing pattern, therefore, should promote a behavior profile maximally receptive to environmental stimuli and maximally effective in interpreting and processing information.

The purpose of the present study was to explore the use of respiration feedback as a part of a breathing control and attention training technique for hyperactive children. Since the training involved a novel approach to the problems of modifying hyperactive behavior, the study focused on the feasibility of the technique as well as the assessment of its effects on attention and selected task performances.

SUBJECTS

Six boys (age 6-8 yrs.) participated in this study at Starpoint School, a school for children with learning disabilities located on the Texas Christian University campus. The school's screening and testing records indicated that the children had average or above average intelligence scores and there was no record of neurological impairment. All were diagnosed as hyperactive and four received medication, either Dexedrine (dextroamphetamine sulfate) or Ritalin (methylphenidate hydrochloride), during all or part of the duration of the study. There was no experimental intervention of the medication program for the purpose of the present study. Three children were randomly assigned to an experimental training group and three were assigned to a control group. There were two children in each group who received medication.

APPARATUS

The testing and training room was decorated to resemble a classroom at Starpoint School. Located at one end of the room were two training cubicles, separated by partitions, and each was equipped with a desk, an oscilloscopic display, and a response key. The display and response key were both removed from the room later in the study as a part of the training sequence. The room was also equipped with a teacher's desk, projection screen, a reward dispenser in one of the training cubicles, and a closed-circuit TV and microphone for monitoring purposes.

Adjacent to the training room was the instrumentation chamber which contained all recording and experimental programming equipment. An E&M Physiograph-Six and telemetry equipment were employed in the recording of respiration (impedance pneumography), and recordings could be obtained simultaneously from two children. For recordings, silver-disc sensors and a miniature transmitter were attached to the chest under the shirt. Visual access from the chamber to the training area, was via one-way glass, in addition to the closed-circuit TV system.

PROCEDURE

The study consisted of three phases, including pretesting, training, and posttesting. Participation in the study was a regularly scheduled activity which was integrated with the Starpoint School program. The testing and training phases lasted three and a half months, during which time the children participated generally in 2 one-hour long sessions per week.

Pretesting. Four attention and vigilance tests were administered to the children individually, and respiration recordings were obtained during each test. The tests required about 8 minutes each and included a visual discrimination test (VDT), a modification of the Design Recall and Matching Familiar Figures tests devised by Kagen (1965). It was chosen to measure vigilance, discrimination, and short-term memory. The visual vigilance test (VVT) was adapted from the Card Test of Schulman et al. (1965) as a measure of ability to maintain attention to repetitious visual stimuli and to discriminate between the alternatives. The auditory vigilance test (AVT) was a modification of the Tone Test reported by Schulman et al. (1965), chosen as an auditory version of the visual test for measurement of attention and discrimination. Finally, the light detection test (LDT), similar to a choice reaction-time task, was selected for its visual attention and discrimination qualities.

In addition, five Performance subtests of the WISC were administered. They included Digit Span, Picture Arrangement, Block Design, Coding (A), and Mazes.

Training. Upon completion of the pretesting phase, the subjects were assigned randomly to either the experimental (E) training group or the control (C) group. The training phase lasted approximately 11 weeks. The training procedures for Group E and Group C are described in the next two sections, followed by a description of the overall schedule of training activities and the generalization training.

Experimental Group. In this group the subject was trained to attend and control characteristics of his respiration recordings. This was done using principles of operant conditioning in conjunction with a feedback display of the respiration recording. That is, "shaping" procedures were employed; periods of regulated breathing were reinforced with tokens (plastic beads) which were later traded in by the child for candy or money.

The feedback display was presented on an oscilloscope in the subject's cubicle which contained vertical deflection of the respiration pattern and a target beam. The target beam represented an "idealized" breathing pattern, with amplitude, rate and slope characteristics perfectly regulated, and adjusted individually for each subject. To the extent that the subject was able to maintain breathing comparable to the target pattern, the small plastic reinforcement beads were dispensed into a clear plastic container located near him.

The training periods were conducted in discrete trial periods (10 sec. to 1 min. in length) and were accompanied by illumination of a small green lamp serving as a cue signal. The length of the training periods and reinforcement schedules was determined individually for each child within each session, using past behavior as the criterion for judging current performance. Brief intervals of time intervened between training periods, and training sessions typically included an intermission for a game or story reading.

Control Group. The training cubicle for Group C was essentially the same as that for Group E, and training for the two groups was conducted simultaneously. Subjects in Group C, however, did not receive instructions and training in breathing control, and were not provided with feedback of their own respiration records. Instead, the feedback display used in the training of a Group E subject was displayed simultaneously for training of a Group C subject. The instructions to Group C were to observe the display closely and to press a key on the desk when the two display beams were coincident. Thus, the training task for Group C was essentially a vigilance task based upon the same display used by Group E.

Reinforcements for Group C were determined on the basis of general performance and conduct during the session. Group C received beads in a plastic container at the conclusion of the session, and at that time the subjects from both groups counted the number of beads they were awarded and traded them in for rewards.

Training schedule. The first training session for each subject was given individually for providing preliminary instructions and appropriate training for his group. Each subject then received eight training sessions (two per week), with one subject from each group participating at the same time. These sessions lasted about 30-40 minutes, with a 5-minute break occurring midway through the session for a game or story. The next three training sessions involved all subjects from both groups, which introduced social factors and represented a gradual extension toward the regular school setting. Each child received training during every session.

The beads earned by each child were traded for rewards (a variety of candies) at the end of each session.

Following the first 12 sessions, the training procedures were progressively altered in each session. The group setting was maintained but the emphasis of the training was changed in an attempt to maximize the transfer of training effects from the training environment to other settings, particularly school.

Generalization training. The objective of the generalization training was to extend the practice of breathing control to other situations, especially those having to do with academic performance and attention maintenance. During these sessions, stimuli used in the training cubicle, such as the feedback display and cue light, were eventually eliminated and the setting gradually approximated regular classroom activities. Respiration recordings were continued throughout the sessions.

In the initial generalization sessions, Group E subjects were given training in the regulation of breathing without the aid of the target pattern. That is, reinforcement was provided periodically, contingent upon regulated breathing records which were free of movement artifacts. Later, respiration feedback was eliminated from the training and, subsequently, sessions included presentations of travel slides, movies, academic lessons presented by the experimenter-teacher, and a lesson presented by the regular first-grade instructor from Starpoint School. Use of the training cubicles was eliminated in the final sessions; both groups were mixed together in the seating arrangements.

Throughout the initial generalization sessions (until respiration feedback to Group E was eliminated from training) Group C continued to perform the vigilance task display and reinforcements comparable to those given Group E subjects continued to be awarded at the end of each training period. These reinforcements were based in part upon a general evaluation by the experimenters of performance and behavior control.

To increase group awareness and social facilitation within each group during generalization training, rewards for each subject were based upon the combined beads earned by the members of his group. Money was also used as a reward during the concluding sessions since this was the mode of reinforcement currently in use at Starpoint School. Thus, pennies were awarded on the basis of accumulated beads across sessions.

Posttesting. The posttesting phase was a replication of the tests conducted during pretesting. The procedures were the same for both test phases.

RESULTS

The results are presented separately for respiration and performance measures during pre and posttests, respiration measures during story-reading periods, and for teacher ratings of hyperactive behavior in the classroom.

Pre and Posttest Measures: Respiration and Performance. Four respiration measures were obtained during the first, middle, and last minutes of the pre and posttests for the VVT, AVT, and LDT. The data were combined for the three 1-minute measurement periods for each test. (Respiration measures were not recorded during the VDT because of the excessive arm movements required by the test.) The respiration measures were obtained as follows:

(1) Peak-to-peak interval – This measure represented the average distance (in mm.) between successive inhalation peaks across the three respiration records.

(2) Peak-to-peak variability – The standard deviation of the peak-to-peak distance scores throughout the three 1-minute respiration records was used as a measure of the variability of breathing periodicity.

(3) Inhalation-amplitude variability – This measure was obtained by determining the standard deviation of scores (in mm.) for the height of the inhalation phases throughout the three 1-minute respiration records, with the mean height of the respiration phases standardized for each subject.

TABLE I. Respiration and performance measures for attention and vigilance tasks during pre and posttesting.

	Group E			Group C		
RESPIRATION MEASURES	S1	S2	S3	S1	S2	S3
Peak-to-Peak Interval						
Pretest	10.4	12.6	12.5	17.7	12.5	12.4
Posttest	11.2	12.1	11.0	14.5	11.1	11.5
Peak-to-Peak Variability						
Pretest	2.7	2.6	3.0	5.2	3.4	2.6
Posttest	3.2	2.0	1.6	5.0	3.6	2.2
Inhalation Amplitude Variability						
Pretest	5.6	3.4	3.8	4.0	5.0	3.7
Posttest	5.9	4.4	2.6	6.9	6.3	3.9
Record Irregularities						
Pretest	27.4	5.5	6.0	7.3	10.8	5.6
Posttest	8.2	2.8	2.0	9.3	8.0	2.0
PERFORMANCE MEASURES						
Visual Discrim. Test						
Pretest	60	64	66	56	62	56
Posttest	60	60	80	66	74	86
Light Discrim. Test						
Pretest	56	98	84	74	98	94
Posttest	86	100	100	90	98	100

(4) Record irregularities – Three judges, working independently, counted irregularities during each 1-minute respiration record, with an irregularity defined as a sharp, vertical shift in the waveform of at least twice its normal amplitude. Scores from the judges were averaged to yield a measure of irregularities for the three 1-minute periods for each test.

The performance measures were obtained in pre and posttesting sessions for each of the attention and vigilance tests. Scores reflect the percentage of responses which were accurate in each test.

Table I contains the measures of respiration and performance for the attention and vigilance tests during pre and posttesting. The respiration measures were averaged across tasks and are reported separately for each child. Subjects in both groups tended to show slightly faster breathing (that is, shorter peak-to-peak measures) during posttests as compare to pretests. Measures for both groups were generally similar, except for the relatively slow breathing rate (larger peak-to-peak scores) for Subject No. 1 in Group C. Pre to posttest changes in the peak-to-peak variability scores were not substantially different for the two groups, but they were lower for Group E, especially during posttests. Scores for inhalation-amplitude variability generally increased from pretest to posttest, but increases were the greatest and average posttest scores were the highest in

TABLE II. Respiration measures during story-reading periods for weeks 2, 5, and 10 of training.

RESPIRATION MEASURES	Group E			Group C		
	S1	S2	S3	S1	S2	S3
Peak-toPeak Interval						
Week 2	10.6	10.3	14.6	16.3	12.1	11.9
Week 5	11.9	10.3	12.4	15.8	12.2	11.7
Week 10	11.6	11.8	11.6	19.2	12.2	12.2
Peak-to-Peak Variability						
Week 2	2.7	2.8	3.9	3.4	4.0	1.4
Week 5	2.3	1.4	1.3	5.0	3.5	2.3
Week 10	2.2	1.4	1.0	8.1	2.2	2.2
Inhalation Amplitude Variability						
Week 2	4.6	2.4	3.5	6.3	5.4	3.3
Week 5	3.2	3.2	1.2	7.1	7.9	2.9
Week 10	4.9	3.1	1.9	4.2	2.4	3.4
Record Irregularities						
Week 2	4.3	0	14.1	15.3	9.3	5.7
Week 5	6.0	2.4	14.8	14.7	7.3	5.1
Week 10	3.1	1.5	0	2.3	1.5	1.8

TABLE III. Teacher ratings of hyperactive behavior in the classroom before, midway through, and after training.

RATINGS OF HYPERACTIVITY	Group E			Group C		
	S1	S2	S3	S1	S2	S3
Before Training	6.5	7.0	6.0	6.5	4.5	7.0
Midway Training	5.0	6.0	6.0	5.5	4.0	6.0
After Training	3.5	4.5	4.5	4.5	3.5	2.0

Group C. The scores for record irregularities tended to decrease from pretest to posttest, particularly for Group E.

The performance measures for the attention and vigilance tests employed were unsatisfactory in that they lacked discriminability due to the generally high and near-perfect scores. For this reason, and the fact that data from one subject were incomplete, the results from two tests (AVT and VVT) were omitted from Table I. The performance results presented in Table I show no marked group differences, although the overall improvement in scores on the Visual Discrimination Test tended to favor Group C. As was true in the majority of these tests, however, the high scores by most subjects on the Light Detection Test precluded a meaningful comparison between the groups with respect to change in pre to posttest scores.

Respiration measures were regularly obtained in story-reading periods during training sessions throughout the study as a means of examining the child's behavior in the context of a more typical classroom activity. The story-reading periods came during "breaks" in the regular training activities, and were disassociated from the reinforcements and controls which were part of the training schedule. Thus, these periods were used as a partial check on the generalizability of training to other situations. Table II presents the respiration measures recorded in sessions during Weeks 2, 5, and 10 (early, intermediate, and late phases) of the training schedule.

All but one subject (No. 3 of Group E) evidenced slight increases in peak-to-peak measures from Week 2 to Week 10, indicating tendencies for slower breathing over time. Scores of peak-to-peak variability decreased from Week 2 to Week 10 in Group E, but generally increased in Group C. The overall level of these scores was also lowest in Group E. The individual changes between Weeks 2 and 10 for the inhalation-amplitude variability scores were too diverse for detection of a meaningful trend. Finally, most of the subjects evidenced fewer record irregularities by Week 10, with little difference in change between the groups.

Two of the children's teachers rated their hyperactive behavior in the classroom before training began, midway through training, and after training (see Table III for average ratings). The rating scale ranged from 1 to 7, with 7 reflecting an extreme level of hyperactivity. It is noted in the ratings that hyperactivity tended to decline similarly in both groups. The largest improvement in the ratings involved Subject No. 3 of Group C, particularly between the ratings midway and after training.

DISCUSSION

The descriptive statistics summarized provide qualified support for the effectiveness and feasibility of using respiration recordings in training for the control of hyperactive behavior in children. In comparison to the control group, the children given breathing control and attention training tended to show more favorable changes from pretest to posttest periods and throughout training in terms of reduced irregularities associated with breathing periodicity and depth. (A more complete and detailed report of the procedures and results can be found in Simpson & Nelson, 1972.)

Success in breathing control, however, varied among the three children in the experimental group. For instance, one child (Subject No. 3) quickly became very adept at controlling breathing and clearly understood the association between regulated respiration and reinforcement. At the same time, Subject No. 1 had much more difficulty in regulating his breathing. It should be pointed out, however, that the latter child exhibited some evidence of cerebral palsy. Furthermore, his scores on the WISC subscales were the lowest of all the children in the study, he was the only child incapable of completing the attention and vigilance tests, and he exhibited poor motor coordination.

While the overall differences between the two groups included in the present study were not great, they should be regarded as conservative estimates of the effects of breathing control training. The children in the control group were rewarded for performing satisfactorily in the training tasks given, and thus, in effect, for attending and controlling excessive behaviors. Reinforced behaviors, therefore, were similar for both groups. Furthermore, it was not possible to prevent discussions between members of different groups, and the amount of information exchange between groups regarding training procedures was not known. During discussions with the children at the end of the study, however, one child in the control group expressed the notion that because the respiration sensors were always used, his reinforcements were probably associated with his breathing as well as maintaining attention.

Breathing control and attention training appears to be a promising approach to the self-control of behavior as it was observed in the training setting, but the control was not generally transferred to other settings, such as the classroom. For instance, the difference in behavior control exhibited in the training room as compared to the classroom was usually quite dramatic, with much more overt hyperactivity shown when the child was not in the training setting. This observation was supported by the comments of instructors from Starpoint School who also observed the children on occasion in the training room. Although generalization of the training appeared to be limited, one exception was noted by an instructor; on one occasion a child from Group E verbally commented on his use of breathing control during a writing lesson in a regular class period.

Transfer of training effects is an extremely significant aspect of procedures such as those used here, but the limited scope of the present study precluded substantial generalization training. To enhance the generalization effect, emphasis should be extended to reinforced training in the classroom, or other learning settings. In other words, as training progresses, it should be incorporated as much as possible into the actual learning situation. While the transfer of breathing control in the present study was limited, an encouraging observation was the tendency for Subjects No. 2 and No. 3 in Group E to maintain the most regulated breathing patterns of all children during story-reading periods in the training setting (while no reinforcements were being provided). However, since the pretest measures for these two children also tended to be relatively low, these findings are only suggestive and the breathing control cannot be attributed entirely to training effects.

Assessment of training effects on tests of attention and vigilance in the present study was generally unsuccessful. The tests were designed on the basis of those used in previous research, but test scores for the children in this study were typically near perfect which precluded effective measurement of improvements associated with training. Tests used in future research, therefore, should be based upon more extensive pilot work and test development.

Medication was not included as a controlled variable, but it is an important factor to consider in evaluating the results. One child in each group received no medication during the study, and one child in each group was maintained throughout the study on Ritalin. In the judgement of both teachers and training personnel, the two children on Ritalin were indeed the most hyperactive in their groups. Among those without regular medication, one child in Group E (Subject No. 2) was observed to become particularly disruptive both in the regular classroom as well as in the training setting.

By coincidence, medication was begun during the study for both of the remaining two children during the seventh week of training.

Subject No. 3 in Group E was given Dexedrine, but in the opinion of Starpoint School instructors it had little effect on his behavior. The effect of medication for the Subject (No. 3) child in Group C appeared to be much more dramatic. Given Ritalin, the behavior ratings for this child reflected marked improvements during the remainder of the study. The improvements from pretest to posttest performance scores were also generally the largest for this child.

CONCLUSIONS

The present study was a preliminary evaluation of a training approach using respiration recordings for aiding control of hyperactive behavior. The method involved breathing control and attention training which incorporated the use of biofeedback and operant conditioning principles for the purpose of training children in the self-control of attention and of motor behaviors which were excessive or distracting in learning situations.

Experience obtained in the present research suggests that training could be improved by increasing the flexibility and individualization of the training schedule for each child, taking into account his specific behavioral and learning problems. The training should also be incorporated as much as possible into the learning setting itself in order to achieve better transfer of training. The use of respiration recordings appeared effective as a monitor to reflect the general behavior pattern and as a basis of reinforcement during training.

With refinements in the training procedure, the proposed technique appeared to be a feasible and effective means of behavior control and should be considered for further examination. – *Institute of Behavioral Research, Texas Christian University, Ft. Worth, Texas 76129.*

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news

AN END TO HYPOCRISY? Under new standards issued by New York City School Chancellor Irving Anker, city schools will no longer promote virtually all students regardless of their educational progress. According to the new standards published in the *New York Times*, "pupils in the fourth through eighth grades will as a general rule not be promoted if they are more than a year behind grade level in reading . . . New graduation standards will also require that pupils receiving a diploma after the eighth grade be no more than a year behind in reading." At present, students can be up to two years and seven months behind and still be promoted.

Another provision, however, stipulates that pupils who are not promoted will not merely repeat the grade they have failed. Rather, they will be given individually prescribed programs based on their needs and deficiencies.

PEP PILL USAGE for hyperactive children is up 55% over the past two years, said Dr. Daniel J. Safer of Johns Hopkins University's Department of Child Psychiatry. Stimulant drugs are being prescribed for approximately 600,000 elementary-age hyperactive children. Safer told *Education Daily* he based his estimate on a study indicating a rise from 1.1% to 1.7% of public school children on stimulants done by a Baltimore County Health Department colleague whom he declined to name because the study is not scheduled for release until fall.

THE SPRINGER EDUCATIONAL FOUNDATION is offering a summer program for children with learning disabilities from July 8-August 2 with an accent on intense reading instruction and sensory-motor integration. The teacher-pupil ratio is always 2:1 or less. Designed for l.d. children aged 6-12, the program costs $40. Registration deadline is June 28. Write Sister Jacqueline Kowalski, Springer Educational Foundation, 1579 Summit Road, Cincinnati, Ohio 45237.

A FREE LIST of reprints will be sent to you by the National Society for Autistic Children, Inc. Write 621 Central Avenue, Albany, N.Y. 12206.

THROUGH A JOINT agreement, 17 Illinois school districts and the University of Illinois are cooperating in a program to assist preschool children in rural areas. Believed to be the first program if its kind, it features the registration and diagnostic screening of all 3- to 5-year-olds living in the districts.

Children that need special help with physical, emotional or mental problems will attend one of six classes in the University's Col. Wolfe School. Others will be helped at home by their parents, advised by university staff members. The children at the Col. Wolfe School will follow a curriculum developed by Merle Karnes, called Precise Early Education of Children with Handicaps. Parents will not pay tuition for the sessions.