A REVIEW OF THE LITERATURE AND PILOT STUDY ON THE EFFECTS OF RITALIN ON READING AND INTERPERSONAL RELATIONSHIPS OF HYPERACTIVE CHILDREN

A Seminar Paper Presented to the Faculty of the Graduate College Wisconsin State University at La Crosse

In Partial Fulfillment of the Requirements for the Degree Master of Science in Special Education of the Emotionally Disturbed

by
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June, 1971
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I recommend acceptance of this seminar paper to the Graduate College in partial fulfillment of this candidate's requirements for the degree Master of Science in Special Education of the Emotionally Disturbed. The candidate has completed the oral seminar report.

July 27, 1971

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This seminar paper is approved for the Graduate College.

August 3, 1971

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Abstract

The purpose of this study was to explore, through an investigation of the literature, the etiology, symptoms, neurologic concomitant, diagnosis, prognosis, and treatment of hyperactive children. A pilot study has been set up to determine how parents, teachers, and peers perceive the hyperactive child before any action is done to help him, when he is taking Ritalin a therapeutic drug, and when he is on a placebo. The change in behavior of the hyperactive child and his classmates will also be explored as well as changes in academic achievement.

As a result of a review and analysis of the literature, the writer has concluded that the following will be found to be true in the pilot study: the majority of the children will have abnormal electroencephalograms and these will mainly show a persistent occipital slow wave, those with a normal electroencephalogram will react in a more dramatic way to treatment, more boys than girls will be referred for the experiment, school work and test scores will improve as a result of an improvement in attending to task, hyperactivity and aggressiveness will decrease, and a follow-up study in ten years will show that few of the children will have made an adequate adjustment to society if they have not received psychotherapy.
Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>The Problem and Definition of Terms Used</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>The Problem</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Statement of the Problem</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Need of the Problem</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Definition of Terms</td>
<td>2</td>
</tr>
<tr>
<td>II.</td>
<td>Review of the Literature</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>The Hyperactive Child</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Etiology</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Neurologic Concomitant</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Symptoms and Diagnosis</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Effect on the Child and Others</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Pharmacotherapy</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Psychotherapy</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Behavior Modification</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Special Classroom</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Prognosis</td>
<td>51</td>
</tr>
<tr>
<td>III.</td>
<td>Analysis of the Literature</td>
<td>53</td>
</tr>
<tr>
<td>IV.</td>
<td>Procedure of the Pilot Study</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>General Design</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Population and Sample</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Data and Instrumentation</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Analysis</td>
<td>64</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
<td>Page</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------</td>
<td>------</td>
</tr>
<tr>
<td>V. Conclusions and Recommendations</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Conclusions</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>Recommendations</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>VI. References</td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>VII. Appendix</td>
<td></td>
<td>77</td>
</tr>
</tbody>
</table>
Chapter I  The Problem and Definition of Terms Used

The Problem- Statement of the Problem

Hyperactive children, no matter what the source of their hyperactivity, prove to be a problem both at home and at school (Stewart, 1957). The children are inattentive, hard to manage, poor learners, and have poor peer relations (Millichap, 1968a; Knobel, 1962). Studies have stated that certain drugs have improved behavior, concentrative ability, (Conners, 1959a) and intellectual functioning (Freed & Peifer, 1955). Although there have been many studies on pharmacotherapy and hyperactive children, the effects of drugs on learning, performance, and development in general of children is still uncertain.

Need of the Problem

Various authors believe hyperactive children can be helped by drug therapy, psychotherapy, behavior modification, special classrooms, or a combination of the above (Patterson, Jones, Whittier, & Wright, 1965; Conners, Eisenberg, & Sharpe, 1964; Freed & Peifer, 1955; Cruickshank, Bentzen, Ratzeburg, & Tannhauser, 1961). However, placebos and favorable attitudes of parents and teachers
have also produced positive results in hyperactive children's behavior (Freedman, 1953; Fisher, 1959). There is a need to know how parents, teachers, and peers perceive the hyperactive child before any action is done to help him, when he is taking therapeutic drugs, and when he is on a placebo. Moreover, as the hyperactive child improves in behavior, do the other children's behavior in the classroom improve? The direct effect on reading as a result of an increased attention span by the child needs to be explored. The research in the area of hyperactive children needs to be analyzed and more studies need to be planned and carried out.

Definition of Terms

Hyperactivity or hyperkinesis— a total daily motor activity, or movement of the body or any portion of it, which is significantly greater than the norm.

Cortex— the layer of gray matter that covers most of the surface of the brain. It plays an important role in the process of integration of reality, in patterning external situations, and in the learning process in general.

Diencephalon— the posterior part of the prosencephalon,
between the cerebral hemispheres and the mesencephalon. Operating through the activating system, it affects the cortex in a generalized manner without topographical localization and provides the individual with the experience of external reality through the convergence of sensory stimuli.

Reticular Activating System—located in the center part of the brain stem, it awakens the brain to a state of attention. It also assists in specifying or delineating the field of attention, so that pattern emerges.

Electroencephalogram (EEG)—a tracing made by an electroencephalograph, used in investigating the activity of the brain in health or disease.

Psychotherapy—one form of therapy in which a psychotherapist treats a patient by mental influences.

Occipital Region—a region of the brain located at the back of the cortex. It is the primary visual projection area.

Anorexia—a lack of appetite for food. It is sometimes a side effect of medication.

Central Nervous System (CNS)—the system of nerves in our
body consisting of the cerebral cortex, the brain stem, and the spinal cord.

Amphetamines- a group of drugs useful in the management of children with certain behavioral and learning problems and in hyperkinetic children, particularly those with postencephalic reactions. These drugs are stimulants.

Benzedrine- a central stimulant useful in the management of hyperactive children.

Dexadrine- a central stimulant, a little more potent than Benzedrine, useful in the management of hyperkinetic children.

Ritaline- a mild cortical stimulant that is less potent than amphetamine but more potent than caffeine.

Resperine- the principal active alkaloid of Rauwolfia serpentina which acts as an inhibitor of the sympathetic nervous system.

Chlorpromazine- a drug with a sedative property sometimes used to reduce hyperactivity and improve social behavior.

Thioridazine- a central sedative with behavioral effects similar to chlorpromazine.
Meprobamate—a mild tranquilizer that controls mild to moderate degrees of emotional upset. It has a central depressant action.

Antipsychotic Agents—drugs useful in treating conditions marked by psychotic disorganization of thought and behavior where psychomotor activity is increased or decreased.

Prochlorperazine—an antipsychotic agent with a stimulating action.

Perphenazine—an antipsychotic agent with a stimulating action.

Placebo—a medication given merely to humor the patient; especially, a preparation containing no medication but given for its psychological effect.

Cross-over design—a basic design used in a study in which each subject serves in every experimental drug and control condition.

Porteus Maze Test—a maze test designed to demonstrate the subject's impulsiveness and distractibility.
Chapter II  Review of the Literature

Etiology of the Hyperactive Child

The etiology of the hyperactive child is still uncertain. Some believe hyperactivity has an organic origin. It may be sub-cortical (Burks, 1960), a diffuse brain lesion (Millichap & Fowler, 1957 b), cortical (Knobel, 1959 a), a problem of integration between the cortex and diencephalon, or a cerebral chemical imbalance (Burks, 1960). Others believe hyperactive children are simply immature in their psychological make-up (Signor, ---; Barcai, 1959). Still others believe hyperactivity may result from either organic or psychological origins (Stewart, Pitts, Craig, & Dierruf, 1956; Knobel, 1952).

The cortical-sub-cortical interaction is extremely important in behavioral changes and in the expression of emotion (Jasper, 1952). The actual power to perceive, to think and to respond with something more than reflex action lies in the cortex, but the cortex has to be awakened by the reticular activating system in the central part of the brain stem. The reticular activating system assists in specifying the field of attention, so that pattern emerges. Pattern can only emerge when some
impulses are brought to the foreground of consciousness and some are depressed. If the mechanisms are faulty the child is over attentive because the cortex is sprayed with useless electrical stimuli which the individual cannot suppress from awareness (Burks, 1960). Brain integration is essential for a good perception, and a distorted perception will bring a chain of distorted experiences in the different facets of daily existence. The so-called normal skill to perform would be impaired and the child would try incessantly to learn how to perform (Knobel, 1959 a). The cortex functions and diencephalonic functions inhibit and modify each other (Burks, 1960).

Laufer, Denhoff, & Solomons (1957 b) state that the dysfunction of the diencephalon is in time overcome by the operation of normal maturational processes. Gastaut devised a clinical neurophysiological test which provides a method for the exploration of certain subcortical structures including the diencephalon. The results of the test are given in quantitative form, as the number of milligrams of Metrazol per kilogram of body weight required to obtain a specific type response clinically and in the EEG when the patient is exposed to the flickering of a stroboscope light within a certain range of frequencies. Six and one-half milligrams and
above is the normal photo-Metrazol threshold in children. Five and one-tenth is clearly abnormal. In an experiment with hyperactive children the mean photo-Metrazol threshold was 4.54 milligrams. The threshold mean for the normals was 6.35. The difference was highly significant.

Stewart et al. (1966) believe that hyperactivity is a brain dysfunction because of the prevalence of delayed speech development, current speech problems, poor coordination, and strabismus in the children.

Knobel (1952) believes there are criteria for differentiating whether the condition is of organic or psychogenic etiology. Children with positive findings in two out of three of the following examinations are labeled "organic". The examinations are a neurological exam, an electroencephalographic record, and psychological tests. The positive findings include a neurological participation as evidenced by focal or diffuse abnormalities on the EEG record, and mild neurological signs. Psychological signs include the Piotrowski's signs of organicity on the Rorschach, the Bender-Gestalt deviations, and abnormalities in the drawing of the human figure.

Piotrowski, in interpreting the Rorschach, looks for signs that derive the subject's self-percepts, acceptable and alien, and the subject's attitudes toward human
figures in his environment. The level of form accuracy gives insight into the degree of contact with reality that is inherent in the percept. Shading tones of the achromatic and chromatic values of the blot are significant in determining if the individual is trying to make contact with the external environment. Color denial on tests indicate a weakness of integration, but also a lack of ability to reject the pertinent emotional stimulation. Color naming on the tests is a pathological manner of handling affective stimuli from the outside. It shows cortical disorganization (Allen, 1958).

Knobel (1962) feels that an organic hyperactive child is erratic, and without direction or objective. The psychogenic hyperactive child shows some direction and intentionality in his aggressivity and impulsivity.

If the hyperactivity is organic, the cause might be a slower developing cortex as compared with the diencephalon. If this is true, especially of the neocortex, the child is more susceptible to damage at an early (quasi-embryonic) stage of development even after birth. The child may be affected after birth because the prefrontal cortex develops until approximately ten years of age (Knobel, 1959 a).

In a study of twenty-eight hyperactive children and twenty-eight controls, there was a tendency for more
hyperactive children than normals to report a history of accidents of pregnancy, delivery, and postnatal life which could have caused brain damage. There was no evidence that mothers of hyperactive children are predisposed by virtue of such factors as age, abortion rate, or general ill health to produce brain damage in the fetus. The hyperactive children were significantly more often than controls to have been hyper-irritable during the first three to six months of life (Werry, 1964).

Pasamanick, Rogers, & Lilienfeld (1955 b) found a relationship between certain abnormal conditions associated with childbearing and the subsequent development of behavior disorder in the offspring. A study was done with 1,151 cases and 902 controls born in Baltimore. In the white group, thirty-nine per cent of behavior problem children had been exposed to one or more abnormalities at birth such as Caesarian section and high forceps as compared with thirty-one per cent in the controls. In the non-white cases seventy-three per cent were exposed to abnormalities at birth as contrasted with fifty-four per cent in their matched controls. Both differences were statistically significant.

Unusually long or short labor, anoxia (blue baby), breech or other unusual presentation, hemorrhaging of
mother, cord about neck, twin birth, Caesarian section, and head misshapened or marked were reported by Burks (1960) to be much more common occurrences for hyperactive children than for normal children. Premature births for hyperactive children are five to one. Severe attacks of meningitis or encephalitis, and incidents of blows to the head involving concussion and unconsciousness were also found to be more common for this group.

Anderson (1963) did a study with thirty hyperactive children. The probable causes he found were prematurity in seven children, prenatal and paranatal with presumed cerebral anoxia in fifteen children, infectious disease during infancy in four children, trauma in one child, and unknown causes in three children. Anderson never found two children with this disorder in the same family which suggests that environmental factors are not particularly important. Twenty-two children had the onset below the age of two and the rest between the ages of two and five. The children's muscle coordination was poorer than their siblings.

Neurologic Concomitant of the Hyperactive Child

Many studies have investigated the relationship
between abnormal wave patterns in the cortex, as shown by abnormal electroencephalograms, and hyperactivity. Burks (1950) states that hyperactive children often have brain wave patterns that are distorted in ways suggesting organic pathology. Hyperactive children without abnormal electroencephalograms may suffer sub-cortical (deep brain) impairment which is not reflected into the cortex and, consequently, not seen in electroencephalograph tracings.

Millichap & Gordon (1968 b) state that electroencephalographic tracings are abnormal in approximately fifty per cent of children with the hyperactive syndrome as compared to an incidence of ten to twenty per cent in otherwise normal children of the same age.

A few experimenters believed there was not a difference in the number of abnormal electroencephalograms when comparing hyperactive and normal children (Stewart, 1957; Weiss, Werry, Minde, Klaus, & Sykes, 1968). However, Weiss et al. found that the hyperactive children who did have an abnormal electroencephalogram, showed a preponderance of one particular abnormal wave form- the multiple slow diffuse dysrhythmia. Werry, Weiss, & Douglas (1964) found an excess of minor dysrhythmias among hyperactives as compared with controls.
Cruickshank et al. (1961) studied forty hyperactive children and found that twenty-two had abnormal electrical activity. Moreover, an extraordinary high percentage of the recordings demonstrated a persistent occipital slow wave. Dr. Robert Cohn of the United States Naval Hospital, Bethesda, Maryland, indicates that there is good evidence that persistent occipital slow waves are representative of retarded physiological maturation processes of the brain. Knobel, Wolman, & Mason (1959 b) state that abnormalities in the occipital region are found to be related to aggressive behavior.

Burks has investigated abnormal electroencephalograms in two studies (1960 & 1964). In one experiment hyperactive children with abnormal electroencephalograms fell significantly low on five out of the six verbal tests on the Wechsler Intelligence Scale for Children, while hyperactive children with normal electroencephalograms fell down in only one of the verbal tests (arithmetic). In another study of one hundred and thirty-seven problem children, sixty per cent showed abnormal or dysrhythmic tracings in electroencephalograms. In the children with abnormal tracings the teachers were more concerned about their perceptual-discriminative processes than those with normal tracings. The abnormalities showed
greater retardation in reading than the normals according to achievement tests. The abnormalities showed more organic signs on psychological tests than the children with normal tracings.

Burks found that both groups were rated as significantly improved by their teacher after the administration of drugs, but the normal electroencephalogram group improved in a much more dramatic way. Burks concluded that the hyperactive children with normal electroencephalograms suffer from a dysfunction in subcortical portions of the brain while hyperactive children with abnormal tracings suffer from dysfunctions in subcortical and cortical areas of the brain. Thus when the drug, amphetamine in this case, results in improved impulse control and attentiveness, the normal electroencephalogram children are able to use their intact perceptual-intellectual faculties while the abnormal electroencephalogram children are less active and distractible but may continue to have specific learning disabilities.

Anderson (1963) in a study of thirty hyperactive children found that twenty-six of them had abnormal electroencephalograms, and that these were the twenty-six who were reading at least two years below the level expected based on their I. Q. tests.
Symptoms and Diagnosis of the Hyperactive Child

Four out of one hundred grade school children are hyperactive (Stewart, 1967; Signor, ---). Hyperactivity is more characteristic of males than females and affects more first born males (Laufer & Donhoff, 1957 a; Brown, 1969).

There are many ways in which the syndrome may be manifested. For example the child may be fidgety and restless, talk a great deal, inattentive, wear out his clothes faster than usual, be unable to take frustrations, get into fights easily, steal, lie, be the class "clown", have variability in school work from day to day, difficulty falling asleep or falls asleep at the proper time but awakens after a few hours, poor handwriting, poor school work especially in arithmetic and reading, poor powers of concentration, unpredictable behavior with reactions that are almost volcanic in intensity, inessantly active which sometimes leads him into danger, requires less sleep than his peers or siblings, is unable to take changes in accustomed routine, poor coordination, excessive demands without satisfaction, and a high pain threshold. The syndrome may also be manifested by irrelevant verbosity, skewed learning, the appearance of being lazy or careless, and have an inability to postpone
gratification (Pincus & Grasser, 1966; Knobel, 1952; Sainz, 1956; Knobel, 1959 a; Werry, 1968; Laufer & Denhoff, 1957 a; Stewart et al., 1966; Brown, 1959).

Questions have been raised if the child is hyperactive, neurotic, normally active, or does he really have an impaired ego. Hyperactivity may mask neurotic manifestations in some children who cannot express their neurotic conflicts in any other way (Barcai, 1969). A hyperactive child may or may not have an aggressive disposition, possibly depending on parental modes of punishment and control (Conners, Rothchild, Eisenberg, Schwartz, & Robinson, 1969 b; Werry, 1968).

Many of the clinical manifestations of the organic hyperactive children who respond to the stimulants are almost identical to those of anxious children whose ego is impaired. Both types manifest clinical grave handicaps in attention and reality assessment. Both are frequently perceived as aggressive, impulsive, unable to postpone gratification, prone to make excessive demands on the world, and unable to sustain an effort (Laufer, 1957 a, 1957 b).

Children that are hyperactive differ from those whose ego is impaired in that the former are usually more immature. They have poorer language abilities,
including difficulty with syntax, and they are unable to use sophisticated concepts. They are poor in symbolic communication generally, and they do not possess a sense of humor which allows them to transcend their immediate environment (Barcai, 1969).

The distinction between a normally "active" child and a hyperactive one is largely qualitative and not quantitative. The activity of a hyperactive child is inappropriate. For example, attention span is not merely shortened but inappropriate and unpredictable, at times riveted upon trivial aspects of the environment and at others appearing totally absent (Pincus & Grasser, 1966).

The hyperactive child finds it difficult to succeed in school. These children exhibit many varieties of intellectual deficits. They may be patchy or generalized. There is often a history of delayed developmental milestones. Often there is a selective difficulty with arithmetic and a delayed acquisition of reading and writing abilities (Cohn, 1951). In addition, learning disabilities may reflect difficulties in other areas such as hearing, understanding, memory and speech (Thelander, Phelps, & Kirk, 1958), and in the ability to generalize and classify (Pincus & Grassner, 1966).
Hyperactive children are poor readers because they are unable to sit quietly or to concentrate for a reasonable interval (Epstein, Harrington, Meagher, Rowlands, & Simons, 1968). Their reading difficulty may also be a result of inefficient patterning and processing capabilities of the brain (Burks, 1960). Cruickshank et al. (1961) believe these children differ not only in quantity but also in quality of intellectual functioning. The children may not be able to read or learn in other areas if he has an inability to organize auditory experiences in a meaningful manner. Foreground-background disturbances also affect the ability to read. The child may not see a word on the page because his attention is attracted to pictures or numbers, or the background may be lost to something in the foreground.

There might be another reason for failure in school. In a study with one hundred and sixteen boys it was found that the average hyperactive learning disabled child is at least one tenth second slower than a typical control in processing a single bit of information. Assuming a child has to process some nine bits per second to follow a normal conversation, the hyperactive child could be completely lost in a matter
of a few seconds, particularly since his attention span is also very short. Therefore, teachers should speak slowly, at about one half the normal rate of speech for hyperactive children (Dykman, Walls, Tetsuko, Ackerman, & Peters, 1970).

Sprague, Werry, & Davis, (1969 a) speculated that hyperactive children learn less, at least in a visual discrimination task, because they often are not orienting to or attending to the task when the visual stimuli are presented. Sprague and L. K. Toppe in 1966 gave a simple two-choice discrimination task to trainable children in a special education class. While the children were performing the discrimination task, the amount of seat wiggling was measured by a stabilimetric chair. Each slight movement activated a counter, and the total count gave some indication of the overall activity of the child. After the data was collected, the children were divided into upper and lower quartiles of activity, and the learning performance of these two groups was analyzed. The results showed that the low activity group performed significantly differently from the high activity group; the low activity group learned over trials whereas the high activity group remained near chance level. Therefore, Sprague's hypothesis seems to be confirmed.
It is essential that hyperactive children are identified early so the child may receive the necessary medical and educational help before he becomes hopelessly discouraged by his school failures (Toblesen & Karowe, 1969). Ninety per cent of hyperactive children seen in the clinics do not get treatment until they are in school, usually not until the first or second grades, and frequently not until later (Signor, -- ).

Physicians often can diagnose the condition and begin to help the parents with the problems of raising a hyperactive child long before the child goes to school (Stewart et al., 1966).

Early identification of hyperactive children in inner city schools is particularly important for three additional reasons: a) the incidence of organically determined overactivity and distractibility is probably higher in low-income populations than in middle-class populations because of the higher incidence in this group of neurological disorders resulting from deficiencies in prenatal, perinatal, and postnatal care (Pasamanick, Knoblock, & Lillienfeld, 1956 a); b) successful pharmacological treatment of low-income hyperactive children helps to overcome the widely held feeling among school personnel that unchangeable environment is the almost
exclusive cause of learning and behavior in "culturally deprived" children; and c) low-income families may accept a medical plan even when they will not or cannot avail themselves of mental health services (Tobiessen & Karowe, 1969).

There are some clues for detecting hyperkinesis in infancy. The infant may be exceedingly irritable and cries readily or he may be unusually placid and quiet. The child often has an advanced developmental schedule (Laufer & Denhoff, 1957 a).

Some children do not do, or did not do until very late, many of the things which are part of the usual developmental activities of infants and toddlers. Some walked without ever having crawled; some talked late, but were physically too active to play with blocks or with fitting, piling, or counting toys. As these children get a little older, they still prefer toys and games that are popular in first grade, kindergarten, or even nursery school. Some children are inactive physically and have little experience in running, skipping, hopping, and climbing. A deficit in the child's development can definitely affect him in school. If a child cannot follow a pencil with his eyes, but must turn his whole head as a baby does, he is at a disadvantage in reading.
If he still needs to grasp objects in order to count them, he will not be able to count merely by pointing and certainly not with his eyes alone (Cruickshank et al., 1961).

There are two screening tests that may be used to assess the child's brain processes. The first is the Flicker Fusion Test. This devise employs a flashing light that can be made to flicker at higher and higher frequencies until the subject reports that the light "fuses" into one steady light. Brighter children "fuse" at higher frequencies than do duller ones at the same chronological age. Many hyperactive children fuse at unusually low frequencies (Burks, 1960).

The second test is the Archimedes Spiral After-Effect Test. In this test a large circle with a dark line that spirals toward the center is twirled around. Most people get a visual after-effect of contraction after the spiral is turned. An experiment was done by H. F. Burks with several hundred first, fourth and eighth graders. Seventy-two per cent of the first graders, seventy-four per cent of the fourth graders, and eighty-nine per cent of the eighth graders saw the after-effect. Of the eighth graders nearly all of those who could not report an after-effect were having difficulty in social and academic areas. At the fourth grade level fifty-
four per cent of the behavior children saw no illusion while only twenty-four per cent of the normally behaved children could not see it. The results were statistically significant. Poor readers who were not hyperactive did not exhibit unusual difficulties in seeing the after-effect (Burks, 1950).

Psychological tests are often helpful in the diagnosis of hyperactive behavior disorders. The characteristic findings are those of disturbances in the visual-motor organizations and visual perception (Anderson, 1963). The hyperactivity of the child is an effort to overcome the incapacity of the brain to integrate the perceptual patterns (Bender, 1943). The Bender-Gestalt Test is good for discovering perceptual impairment. On the Wechsler Intelligence Scale for Children, the hyperactive child does much better on the verbal than on the performance portion (Anderson, 1963).

The Effect of Hyperactivity on the Child and Interpersonal Relations

The personal and social adjustment of the child is intimately linked with his emotional adjustment (Bond & Tinker, 1957; Knobel, 1959 a). Intellectual
achievements are dependent upon and determined by the drives, attitudes, wishes, feelings, and interests operating in the individual. There is a relation between the emotional and social adjustment of the individual, especially with regard to failure in reading (Gann, 1945).

By the time the child is referred in third, fourth, or fifth grade, the symptoms which lead to the referral often are secondary ones. These symptoms are manifestations of emotional problems which have been brought on by his own and other people's reactions to his hyperkinetic symptoms (Tobiesen & Karowe, 1969).

Children who are not successful in academic activities find little reward in them, perceive themselves negatively, are perceived by their peers negatively, and are thereby unable to relate to the school or its activities in any constructive manner (Bower, 1970). What a person is able or unable to learn partly depends on how he has learned to define himself. Often the hyperactive child has been cast in a negative role by the criticism of parents and teachers. The child then endeavors to perfect himself in the part to which he has been assigned, and grows more and more unmanageable the more his behavior is condemned. However, if we are
able to change the child's self-concept to a positive one, his attitude toward academics will change accordingly (Lecky, 1945).

Lecky did a study with children who were poor spellers. He found that the children made the same number of errors per page in their written work regardless of the difficulty of the material. He concluded that the children were spelling in terms of the concepts they held about their abilities as spellers (Fennimore, 1968). Fennimore found that improvement in reading is accompanied by a change in the concept of self (Fennimore, 1968).

Learning is conditioning. Learning takes place most advantageously under conditions of success. Hyperactive children with perceptual disorders have predominately had failure experiences in the school situation. Both the stimuli perceived and the responses made by the hyperactive child are the result of change, as well as of unplanned trial-and-error behavior. Because the odds are small that the child will produce the socially correct response to a given stimulus or series of stimuli by chance, the possibility that his behavior will produce positive social rewards is exceedingly small (Cruickshank et al., 1961).

Some hyperactive children may feel resentful when they are placed in slow groups as a result of the
scores of standardized tests. The child's hyperactivity, perseveration, distractibility, difficulty with figure-background relationships, and inability to follow directions make it impossible for them to respond adequately in a standardized testing situation (Cruickshank et al., 1961). Therefore, the child actually may be able to achieve more than what the teacher thinks but he will not because of his negative attitude.

The hyperactive children find it hard to make friends. They reject or are rejected by their peers. Their manners are so poor that it is difficult to associate with them. Many times they just want to boss others around or go their own way, disregarding the rights of others. In playing they participate in the games they like but do not care for other group activities. They do not withdraw from their peers; they reject them or are rejected. They follow a pattern of trying and losing (Knobel, 1959a).

The hyperactive child develops social behavior at a slower rate because he has a higher rate of punishment because of his high activity levels. If he tries to be friendly he may be "too friendly" and get punished. Soon he will have less interactions with peers and adults so he will not be punished (Patterson et al., 1965).
Hyperactive children need to strengthen their self-image and sense of personal worth. Until they are comfortable with themselves, they will not be likely to find success in peer relationships (Cruickshank et al., 1961).

Parents suffer from the strain of raising a constant troublemaker and from the mistaken feeling that their upbringing has somehow spoiled their child. They have found that punishment does not improve the child's behavior. They are at a loss of what to do. Some fathers may feel guilty because fathers who were hyperactive often have hyperactive children (Stewart, 1967).

Treatment

Pharmacotherapy

It is believed by many physicians and educators that psychopharmacologic agents, as tools of investigation and as means of therapy, have a potential of great importance in pediatric psychiatry (Cytryn, Gilbert, & Eisenberg, 1960). Children suffering from many disorders are given tranquilizers, anti-psychotic agents, and stimulants. All three types of drugs have been used with hyperactive children with varying results.
The majority of experimenters recommend drug therapy alone or when possible with psychotherapy, remedial tutoring, or special educational programming (Tobiessen & Karowe, 1969; Freed, 1957). Ayd (1957) believes children who respond best to drug therapy are those for whom other forms of psychological care and environmental adjustments are carried out at the same time.

The social implications are exceedingly important in pharmacotherapy. A child taking a drug has an effect on the family. The mere fact that the family knows the child is taking the drug modifies their attitude toward the child. The altered behavior of the child may also have a dynamic interrelationship with the remainder of the family. When the hyperactive child slows down he evokes a different response in his parents, siblings, and teacher (Fisher, 1959; Eisenberg, 1964).

Unfortunately sometimes the social effect of the child taking drugs is negative. There are three familial factors that may hamper the results. First there is the medication-rejecting family that needs to avoid medical intrusion into their problem which they are trying to minimize because of overwhelming guilt feelings. They feel that drugs have disturbing connotations and a stigma to them. Second is the child-rejecting family in which
the parents unconsciously reject their children. They are bothered by the presence of a sick child, which in turn reinforces their rejection and hampers therapy. Last, there is the child himself who may wish to control his family through his behavior deviation. Medical intrusion has to be rejected since it disturbs his plans (Knobel, 1962).

In school the hyperactive child taking drugs is like another child. The teacher is vulnerable to "halo effects" because she knows the child is receiving help (Eisenberg, 1954). Teachers often report completion of assignments, improved handwriting, increased ability to take turns, improved memory, improved organization of ideas and activities, improved peer relations, fewer angry outbursts, less daydreaming, and much greater cooperativeness (Tobiessen & Karowe, 1969).

Tranquilizers

Chlorpromazine is one tranquilizer that has been used in experiments with hyperactive children. Freed & Peifer (1956) administered chlorpromazine to twenty-five hyperactive children. The children served as their own controls by receiving placebos during part
of the experiment. There was improvement in eighty-four per cent of the cases and marked improvement in seventy per cent of the cases. There was a decrease in hyperactivity, a facilitation in the learning process as measured by psychological testing, increased emotional control, improved interpersonal relationships, and few side effects. The children's personality remained the same, therefore, psychotherapy may be beneficial.

Twenty-one out of twenty-five hyperactive children showed a lessening of overactivity and aggressiveness when they were given chlorpromazine in an experiment by Bakwin (1955). A few of the children, who were rated by teachers and friends, showed better learning ability.

Kursh observed fifty-eight children treated with chlorpromazine. They showed greater acceptance toward their own problems, improved interpersonal relationships, strengthening of emotional controls, and less hyperactivity (Bakwin, 1955).

Thioridazine, another tranquilizer, has also been used in studies. Alderton (1964) did a double-blind experiment with three experimental conditions, no-drug, placebo, and thioridazine, with nine male patients aged six to eleven and one-half in a hospital. Three children were mild brain damage cases and six were
primary childhood behavior disorders. All were hyperactive. Aggressive, affectionate, constructive, and destructive behavior, and activity level was determined by a time sample observation sheet. There were no differences in the frequency of affectionate or constructive behavior. The drug showed significantly lower levels of aggressive behavior than all conditions except one child in the no drug condition. Destructive behavior and over-activity were also significantly reduced with thioridazine. Alderton recommended the use of psychotherapy too since the personality of the children did not change.

Studies have been done investigating the effect of meprobamate, a minor tranquilizer, and prochlorperazine, a major tranquilizer used as an anti-psychotic agent, on hyperactive children. Cytryn et al. (1960) administered meprobamate, prochlorperazine, or a placebo to each of eighty-three children who had behavior disorders in a double-blind clinical trial. Concurrent psychotherapy was offered. Placebo produced equivalent results to either drug. The hyperactive children only showed moderate gains. This was defined as some amelioration in symptoms without a meaningful change in adjustment. Progress was determined on the basis of home, school, and clinic evaluations.
Cytryn et al. (1960) later conducted an experiment using meprobamate, prochlorperazine, and a placebo again. This time the parents were told that the capsules were to make the children "feel better", and "to make the world seem happier", during which time, with psychotherapeutic help, new and more satisfying behavior patterns could be established. These patterns, because they were more satisfying, could be expected to continue after medication had been discontinued, since the parents by then would have acquired greater understanding of the basic problem. The progress was scored separately in three areas: home, school, and clinic. With psychotherapy provided to all three groups the results failed to demonstrate any benefit from either drug over the placebo. Improvement was sustained after one month without the drug or psychotherapy in the cases where improvement was achieved.

Eisenberg, Cytryn, & Molling (1961), using the same conditions as in the preceding two experiments also did not find the drugs to be superior to the placebo condition. A fourth study was done by Eisenberg (1964) with seventy-seven children to confirm the results again.

Eisenberg et al. (1961) did an experiment with perphenazine, an antipsychotic agent with a stimulating
Stimulants on hyperactive children were first started by Charles Bradley, director of a home for disturbed children in East Providence, Rhode Island in 1937. They have been used successfully ever since (Signor,---). Behavioral characteristics of hyperactive children appear to be a function of the lack of organization and immaturity of the central nervous system. In some way, perhaps by changing the threshold for effective neural stimulation in midbrain structures the stimulants seem to reverse this pathology, bringing about improvement in attention and concentration which
allows better comprehension, improves learning, and results in a change in the child's behavior. The stimulants seem to "connect" input, organization, and output in the brain (Barcai, 1969; Knobel, 1962; Laufer & Denhoff, 1957a; Laufer et al., 1957b; Pasamanick et al., 1956a).

Stimulants may be used in the treatment of hyperactive children but special schooling and socialization opportunities are needed, along with the case work or psychiatric counseling for parents (Lesser, 1970).

Conrad & Insel (1967) believe that positive responses with the use of amphetamines are more likely to occur in children for whom there is substantial evidence of neurological disturbance and little evidence of psychopathogenic environmental conditions. In a small sample of hyperactive children, Conrad & Insel (1967) found that amphetamines have little effect on the child's visual perceptual functioning on his I. Q. scores. The improvement in school performance apparently results from an increased ability to attend, concentrate, and sit still in class.

Laufer et al. (1957b) in the second part of the experiment mentioned previously concerning the photometrazol threshold of hyperactive children, gave thirteen subjects, aged eight to eleven, from the original thrity-
two the drugs racemic amphetamine or d-amphetamine. Before medication their test result for metrazol was 4.8 milligrams which is abnormal. When on amphetamine the result was a mean of 6.7 milligrams which is normal. The significant difference was less than ,001. The results for the children were lower again once they were off amphetamine.

Charles Bradley conducted experiments with Benzedrine and hyperactive children. In one study (1937) half of the children taking Benzedrine responded in a spectacular fashion in school performance. More interest in school, a "drive" to accomplish as much as possible during the school period, and a speed of comprehension and accuracy of performance were increased in half of the cases. Three years later (1940 b) Bradley & Green gave Benzedrine to twenty-one children with neuro-psychiatric complaints. He found there were no differences in I. Q. tests nor psychomotor tests, but a dramatic improvement in school work. Bradley believed the reason for improvement in school was an improvement in the emotional attitude of the subject toward his intellectual task.

In a third experiment with nineteen children (1940 a), Bradley & Bowen found the following results after the administering of Benzedrine: increased attention to academic work, stimulation of effort in accomplishment
and greater spontaneous interest in school room tasks, occasionally a child seemed to learn easier, some had neater and better quality work, there was a variable effect in spelling, and almost all had a striking improvement in arithmetic. Bradley concluded that other things besides drugs effect the child. For example there may not have been a great improvement in spelling because visual imagery and memory are essential for success. On the other hand in arithmetic attention is the most important. Therefore if the attention is improved, arithmetic will be improved.

Burks (1960) believes that amphetamines such as Benzedrine probably act primarily on sub-cortical organs. Children with sub-cortical impairment improve to a significantly greater degree than children with a predominately cortical pathology.

Freedman (1958) believes in the use of stimulants such as Benzedrine and Dexedrine in contrast to tranquilizers in the treatment of emotional states of children. He states that the aim of the stimulants is, if not to cure mental disorder, at least to ameliorate the symptoms and restore function, and, in the child, to aid maturation and enable him to participate in educational programs. These goals cannot be achieved with heavy sedation which was the purpose of past drugs.
Drugs such as dextromethorphan sulfate, states Conner et al. (1969 b), increase the control over impulsive behavior and concentrative ability. There is a question of the possible role of attentional and inhibitory factory in the normal learning processes of children. Changes in inhibitory control may be essential features of the major cognitive changes that occur in development. In a study of forty-two children who were poor learners and had behavior problems, Conners found that there was a significant benefit from dextroamphetamine on achievement tests, Porteus Mazes, some visual perception tests, auditory, rote learning, symptomatology and activity level rated by parents. There was no effect on intelligence test scores, oral reading, copying of Bender designs, drawing of a man, auditory discrimination and memory, and tests of "motor inhibition". Arithmetic scores were most clearly influenced with reading showing a trend for improvement. These tests were given only one month after the administering of drugs which shows that changes in achievement level may be detected in an extremely short time.

Ritalin

Ritalin is thought to be primarily a central stimulating agent intermediate in effect between caffeine
and amphetamine, somewhat lacking the adrenergic effects of the latter (Conners et al., 1964). Ritalin has a strong central action. The exact action is unknown, but the physiological effect is certainly located in the central nervous system, probably the thalamus. There is strong evidence that at least some effect of Ritalin is on the cortex. It has the effect on immature nervous systems of inducing maturation chemically (Lytton & Knobel, 1959). Ritalin is equally effective in both organic and the psychogenic hyperactive child. Its stimulation of the cerebral cortex allows for a true integration of behavior (Knobel, 1962). Since Ritalin acts as a stimulant and arouses the cortex, it raises the reaction time of the child. This is opposed to tranquilizers which have the effect of drowsiness (Sprague, Barnes, & Werry, 1970).

Ritalin can be administered orally, intravenously, intramuscularly, or subcutaneously. Children are usually given Ritalin orally in divided doses preferably thirty to forty-five minutes before meals. Many patients respond to ten milligrams twice a day or three times a day. Others will require twenty milligram dosages (Physician, 1963). Today Ritalin is the first choice in drugs to treat hyperactive children because of minimal side effects (Sainz, 1966).
Zimmerman & Burgemeister (1958) gave twenty-six hyperactive, aggressive children either Ritalin or resperine treatment. Fifty per cent of the hyperactive children on Ritalin improved based on behavioral observation by the neuropsychiatrist, fifty per cent remained the same, sixty-six per cent were better on resperine and thirty-four per cent remained the same. No essential change took place following treatment with Ritalin or resperine in verbal intelligence response involving ideational material. Those on Ritalin showed more acceleration than the resperine group following treatment on performance tests of motor skill and speed of reaction. Toxic signs were infrequent and mild.

A study was attempted by Sprague et al. (1969 a) in which two pharmacologically contrasting drugs were utilized, namely Ritalin and thioridazine. A two-choice discrimination task was assigned to the hyperactive children. Thioridazine significantly increased the child's reaction time. There was no significant effect of drug on accuracy of performance.

Sprague et al. (1970) gave Ritalin, thioridazine, and a placebo to twelve emotionally disturbed boys who were under achievers. In a learning task Ritalin gave significantly higher accuracy scores, a faster reaction time, no effect on different dosage levels, and the best
results for "on-task" rating, teacher-initiated activity, pupil-initiated activity, and quality of day. All of the drugs showed slower reaction times when the number of stimuli in the learning task was increased. Activity was reduced in all three conditions.

On the basis of the above study and others done in Urbana, Illinois, it seems that Ritalin somehow permits the child to attend to the relevant aspects of the stimulus situation and filter out the distracting aspects as indicated by greater accuracy, faster reaction times, and less activity under the Ritalin condition (Sprague et al., 1970).

Some might find it hard to differentiate between a hyperactive child and a reactive behavioral. Sainz (1966) has a method of testing the children that is one hundred per cent effective. Place the child in a playroom, watched by the parent, and administer from ten to twenty milligrams of Ritalin. Complete disappearance of hyperkinesia ensues in fifteen minutes to one hour after oral administration of the drug in the hyperactive children, and overactivity increases in the other conditions. Also "organic" hyperactive children become worse or show no change on either phenothiazines or tranquilizers such as meprobamate or barbituates.
Knobel did some studies involving Ritalin. In one study (1962) with one hundred and fifty hyperactive children aged seven to fifteen, Ritaline was administered for forty-eight months. Results were recorded from parent and teacher reports. Hyperactivity and aggression diminished in all children with over all improvement greatly improved in forty per cent, moderately improved in fifty per cent, and not improved in ten per cent. There were no placebo control and minimal side effects.

Observation of twenty-three hyperactive children showed that they did poorly on the digit-span test of the Wechsler scale, their attention loses focus, and immediate recall fails (Knobel et al., 1959 b). In a second experiment Knobel et al. (1959 b) gave Ritalin to twenty hyperactive children. Fifteen children improved, two results were doubtful, and in three treatment failed. Improvement was based on parents' reports, own personal, periodic evaluation, and the classroom teacher's report. The teacher used the Burk's Behavioral Rating Scale, which gives a numerical appraisal in which a higher score represents a greater abnormality in behavior. The children obtained a mean decrease of 27.1 points from a previous mean of 70 points.

Eighty-one disturbed children, divided into three groups based on their scores from the Wechsler Intelligence
Scale for Children, were given Ritalin or a placebo by Conners & Eisenberg (1963). Three learning tasks, the Porteus Mazes, and a tremorgraph test was given to the children before and on Ritalin. The children on Ritalin showed significantly better test scores. Children with low I.Q.s displayed greater gains from the drug therapy than those with high I.Q.s. The children did not improve in paired-associate learning, in anxiety scales or in digit span scores. Conners felt that some improvement was due to positive attitudes.

In a Ritalin double-blind test with forty hyperactive children, Knights & Minton (1969) found the children on Ritalin were just as active as those on placebo, but their ability to inhibit distracting influences was enhanced. The Werry-Weiss-Peters Scale was used to measure activity. The Ritalin group significantly improved in the coding, picture completion, and block design parts of the performance on the Wechsler Intelligence Scale for Children. This was attributed to the children's increased ability to attend and not to more accurate motor control. Those on Ritalin showed a significant weight loss, change in diastolic blood pressure and heart rate increase relative to the placebo group. Knights concluded that Ritalin and other stimulants affect attention abilities more than motor control skills.
Sprague, Werry, Greenwold, & Jones (1969 b) studied the effects of various dosages of Ritalin upon accuracy and latency in the presentation of a matrix of stimuli containing either one, two, or three pictures. The child had a binary task; he pressed the "same" response if he thought the picture had been presented in the previous stimulus matrix or pressed "different" response panel if he thought the picture had not been presented in the prior matrix. Sprangue found that dosage had a significant effect but only if the task was relatively difficult (three stimuli). None of the children showed side effects.

S. J. Nichamin and H. M. Comly advocate Ritalin for hyperactive children resulting from organic or psychogenic etiologic factors. In a study with hyperactive children which Ritalin was used for periods up to eight months, the men found that there was a reduction in activity, improvement in attention span and motor coordination, more adequate responses, less impulsivity, and an increase of useful productivity. The responses of the children were evaluated by the reports of teachers and parents and by direct clinical observations. Minimal side effects consisted of anorexia, headaches, abdominal pain, and insomnia. A placebo was not used. It was believed that some parents' reports were distorted and
their expectations in regard to therapy could have colored
the final result of the study (Millichap & Boldrey, 1967 a).

The effects of Ritalin were evaluated in thirty
children with hyperactivity and learning disorders
(Millichap, 1968 a). There was an improvement in mean
scores on all of the neuropsychological tests applied
with a significant and beneficial effect attributable
to the drug in the Draw-a-Man and Frostig-Figure Ground
perception tests.

A review of the literature (Millichap, 1968 b)
showed that Ritalin is the drug of choice for hyperactive
treatment of children with amphetamine sulfate being the
second most successful drug. Of a total of three hundred
thirty-seven patients who received Ritalin, eighty-four per cent
were benefited; of four hundred and fifteen patients treated
with amphetamine sulfate, sixty-nine per cent showed
improvement in behavior.

Psychotherapy

Many hyperactive children have secondary distur-
bances with psychodynamic significance developing out of
the problems of living created by the primary hyperactivity
(Chess, 1960). Hyperactive children need help besides
drugs. They feel they are bad and failures. They are continually shouted at at home and at school. Parents must help the child so he will not be demoralized. Parents must try to keep their child away from emotionally frustrating experiences and keep him occupied with projects he can handle (Signor, --). It is generally felt that hyperactive children need psychotherapy, along with drugs to handle emotional problems (Laufer & Denhoff, 1957 a; Sainz, 1956; Lesser, 1970; Alderton, 1964; Freed & Peifer, 1956; Ayd, 1957; Tobiessen & Karowe, 1969; Cruickshank et al., 1961).

Placebo

A placebo is a medication given more to please than to benefit the patient. It is intended to act through a psychological mechanism. In the case of hyperactive children the parents' attitudes change when they know their child is taking drugs to help him. They respond toward the child favorably even when it is only a placebo that is taken. Giving a child a placebo distinguishes pharmacological effects from the effects of suggestion (Beecher, 1955; Knights & Hinton, 1969; Conners et al., 1964; Eisenberg, 1964).

Recent studies on the placebo effect indicate
that a beneficial response is not only engendered by the patient or parents' enthusiasm for the medication, but also is induced by the attitude of the physician (Freedman, 1958; Beecher, 1955; Bower, 1970).

Even a slight change in the behavior of the child which is the result of the knowledge on his part that he is taking a drug to help him, can have amazing results. The importance of any change in behavior lies in the effect which it produces upon the reactions of the social culture. If a small decrement in the rate of aversive behavior is immediately followed by approval of the peer group or the teacher, this should accelerate the acquisition of new behavior. As these new behavior patterns are acquired they should in turn lead to an even greater reaction from the peer culture (Patterson et al., 1965).

Behavior Modification

Experiments have been done to explore the idea of using behavior modification with hyperactive children. Palkes, Stewart, & Kahana (1963) used behavior modification on twenty hyperactive eight and nine year old boys who were not on drugs. Half of the boys were taught how
to use self-directed verbal commands such as stop, look, and listen, to establish self-control of voluntary behavior. The Porteus Maze Test Revision Series was utilized as a pretraining measure of impulsivity and the Porteus Extension Series for the post-training measure. There was a significant improvement in scores for the experimental group and not for the controls. The self-directed command group cut fewer corners, crossed over fewer lines, lifted their pencils less, and threaded the maze with fewer irregular lines than did the control group. The results tend to support A. R. Luria's theoretical position, which holds that the process of verbalization, appropriately directed, becomes a means for increasing the degree of behavioral integration. The learning of self-control of one's voluntary behavior can be thought of as a prototype of a form of internalization in which the child replicates certain components of a stimulus situation to which he has been previously exposed. The hyperactive child, not having adequately internalized these external verbal commands, which then signal expected behaviors, often uses his disruptive behavior to get the attention he so often cannot get through adequate, acceptable task performance. The only way he can get attention is by being the "class clown" (Palkes et al., 1968).
Patterson et al. (1965) also studied behavior modification and hyperactive children. Patterson used two hyperactive ten year old boys, one as the subject and one as the control. The frequency of occurrence of the following high rate responses: walking, talking, distraction, and "wiggling" were studied. The first set of conditioning trials took place outside of the classroom. During each time interval of ten seconds in which one of the high rate responses did not occur, the subject received an auditory stimulus (secondary reinforcer). The buzzer indicated that the child earned a piece of candy. After the session the child was given the candy.

In the second phase the subject was conditioned in the classroom wearing earphones. The other children were told that the candy the subject earned would be shared by them and the subject. Reinforcing schedules and some rewards were variable after the fifth trial. Observation data was collected before each conditioning session to see the effects of conditioning from the previous days. Patterson found that the child on behavior modification showed significantly fewer non-attending responses than the control. However, the control improved too. There was a drop of thirteen per cent in occurrence
of non-attending behavior from conditioning to follow-up phase. Motor movements for the experimental subject were only temporarily affected by the procedure but kept his over-all improvement.

Patterson feels that the experiment suggests the other children in the classroom are affected by the procedure and resulting change in the behavior of a hyperactive child when he is helped with behavior modification (Patterson et al., 1965).

Sprague & Werry (In press) believe there is a great potential for interaction between drugs and behavior modification. Psychopharmacological agents could reduce deviant behavior and set the stage for the beginning of operant conditioning.

Special Classroom

A special classroom for hyperactive children was designed by Cruickshank et al. (1961). His plan consisted of the recognition of four essential principles: the reduction of environmental space, the reduction of unessential visual and auditory environmental stimuli, the establishment of a highly structured program, and the increase of the stimulus value of the instructional materials themselves.
Two classrooms were set up, one was the control and the other experimental. Cruickshank found that while all children made some gain in their ability to differentiate figure from background, the children from the experimental classes made somewhat greater gains. Similarly, almost all of the children made some growth in social maturity, but those in the experimental group demonstrated this growth in more pronounced ways. The results of the Bender-Gestalt test only showed a significant difference in favor of the experimental group in a few instances. The results of psychiatric pre- and post-test evaluations were that there appeared to be a decrease in the amount of parental tension and anxiety. Some of the children in the project who needed (and need) psychotherapy achieved academically without it and without observable personality insults.

The area of the most dramatic improvement over the two-year period was in academic achievement. At the beginning only twelve out of thirty-nine children were able to even score on part or all of the achievement test. Even these twelve children's hyperactivity, perseveration, distractibility, difficulty with figure-background relationships, and inability to follow directions made it impossible for them to achieve true scores.
By the end of two years all of the children were able to perform on at least part of the test. There was not a demonstratable difference between the groups, but the total group of children made substantial gains.

Prognosis

The big question is what is the effect of hyperactivity during childhood as the child grows up and in his adult life? The hyperactivity itself is not the problem, but rather the social displacement and negative self-attitudes are the danger signals. Although the hyperactivity disappears, the child has already learned to fight, steal, lie, and generally not get along with others. The damage to the personality structure of hyperactive children can very well lead them into juvenile delinquency (Signor, ---; Burks, 1960; Anderson & Dearborn, 1952).

In a twenty-five year follow-up study of eighteen hyperactive children by Menkes, Rowe, & Kenkes (1957) it was found that of the eleven patients examined neurologically, eight had definite evidence of neurological dysfunction, one had equivocal evidence, and two had none. Menkes et al. also noted that hyperactivity was still present in three subjects aged twenty-two to twenty-three.
Hyperactivity in the others disappeared between the ages of eight and twenty-one. At the time of this study four subjects were institutionalized as psychotic, two others were retarded, and eight were self-supported. Of these eight, four had spent some time in institutions.

A five year follow-up study was done by Baumann, Ludwig, Alexander, Bergin, & Rauch (1962) with nineteen children aged five to twelve years at the Springfield Mental Health Center. It was found that acute symptoms decreased with age. There were better integrations of conceptualizations as a result of improved perception and a decrease in spatial distortion and perseveration. However problems in academic work continued, with only slight improvement. Impulsivity and aggressiveness, which had at first been characteristic, markedly diminished with time, but were replaced by withdrawn behavior. Peer-group relations continued to be disturbed. Short attention span remained a problem but was associated more with daydreaming and withdrawn behavior than with the restlessness seen initially. The syndrome of hyperactivity disappeared, but other problems were seen.

It has been found that adults who were hyperactive during childhood tend to go into jobs where they do not have to sit down. Also fathers who were hyperactive tend to have children who are hyperactive (Stewart, 1967).
Analysis of the Literature  Chapter III

In reviewing the literature it is apparent that much is unknown about the hyperactive child. The etiology of hyperactivity may be either psychological immaturity or have an organic origin. The organic defect may be cortical, sub-cortical, or from the reticular activating system. There appears to be a high correlation between hyperactivity and abnormal conditions of childbearing. Environmental factors are not believed to be causes of hyperactivity since the syndrome is not shared by all of the siblings in a family.

An electroencephalogram can distinguish an organic from a psychological immature hyperactive child only if there is cortical abnormality because electroencephalograms only trace brain waves in the cortex. Most experimenters favor the hypothesis that hyperactive children have a larger per cent of abnormal electroencephalograms than normals. All of the experimenters have found that the majority of abnormalities in the electroencephalograms show a persistent occipital slow wave. This is believed to represent a retarded physiological maturation process of the brain and possibly be related to aggressive behavior. Children with abnormal electroencephalograms have more problems with perceptual-discriminative processes and are more retarded in reading than those with normal tracings.
Children with normal electroencephalograms respond to drugs in a much more dramatic way than those with abnormal electroencephalograms. It is believed that drugs act primarily on sub-cortical organs.

The hyperactive syndrome, more characteristic in boys, may be manifested in many ways. The most common are special learning or reading disabilities, behavioral problems since infancy, reduced attention, increase of purposeless physical activity, and poor interpersonal relations. It is agreed that the overt hyperactivity is not simply a matter of degree but of quality. It is poor quality of intellectual functioning that hampers the children in school. Dykman's results (1970) may be extremely important in the education of hyperactive children if other studies confirm his findings that hyperactive children are slower in processing a single bit of information. If this is true hyperactive children will have to have special classrooms. Hyperactive children learn less because they are not orientating to or attending to the task when the visual stimuli are present.

It is agreed that the hyperactive child must be identified early so that he receives the necessary educational and medical help. Parents must be taught how to tolerate and help their child. Help in these areas will
improve the chances of the child's adjustment to his environment. Most of the time hyperactivity can be detected in infancy. Unusual behavior and deficits in development are signs to be investigated. Screening tests such as the Flicker Fusion Test and the Archimedes Spiral After-Effect Test may be used to assess the child's brain processes. Psychological tests are also helpful in the diagnosis of hyperactive behavior disorders.

If the child is not helped or understood emotional problems become the main concern. Poor school work, poor peer relations, and aversive comments by teachers and parents contribute to and reinforce a negative self-concept of the hyperactive child who never succeeds.

The general consensus of the literature studied is that pharmacotherapy is an extremely important aid to hyperactive children. Whenever possible it should be combined with special classrooms and psychotherapy. Not only do drugs physically help the child, but they aid him by changing the negative attitudes of others who come in contact with him to positive feelings since the people know the child is being helped.

Tranquilizers, rarely used today with hyperactive children, decrease hyperactivity and aggressiveness but
have no affect on learning. The problem with tranquili-
zers is that they cause heavy sedation which does not help
the child to learn.

Stimulants, which seem to "connect" input,
organization, and output in the brain, not only decreases
hyperactivity and aggressiveness but through increasing
attention span enable the child to accept academic stimuli
in a more productive manner. Stimulants do not improve
I. Q. scores or psychomotor test results but enables the
child to function up to his potential and succeed in
academic learning tasks. Arithmetic, requiring attentiveness,
is strikingly improved with the help of medication.
Reaction time is shortened by stimulants as opposed to
tranquilizers which lengthen reaction time. No clear
pattern of the effect of drugs on accuracy of responding
seems apparent at this time. The activity level of the
child while performing simple learning tasks is not
increased by stimulants.

Ritalin is the prevalent drug used today in the
treatment of the hyperactive syndrome because of its
effectiveness with both organic and psychogenic hyper-
active children and because it has few side effects.
Ritalin appears to induce chemical maturation of the
immature central nervous system. Similar to other
stimulants, Ritalin improves reaction time and behavior, increases attention span, and decreases hyperactivity. Hyperactive children, who usually do poorly on the performance section of the Weschler Intelligence Scale for Children, improved after taking Ritalin. This test and others show improvement in the child simply because of the child's increased ability to attend, not because he has more accurate motor control or he is more intelligent. Increased dosage of Ritalin is effective only if the task is relatively difficult.

The literature reveals that although drugs may change hyperactive children's behavior, it does not change their personality. Therefore, psychotherapy is needed. These children need help to build up their ego. Sometimes just being on drugs or even a placebo helps because others will start to react positively toward the hyperactive children.

More studies need to be done to investigate the possibilities of behavior modification on hyperactive children and on the rest of the children in the class. It has been shown once that other children's behavior changes favorably along with the positive change in the hyperactive child when behavior modification was used.
with the hyperactive child. Teaching hyperactive children to verbalize commands helps them internalize stimuli. This may also be a helpful technique to use in the classroom.

Special classrooms are needed for hyperactive children to reduce environmental space, reduce unessential visual and auditory environmental stimuli, to establish a highly structured program, and to increase the stimulus value of the instructional materials themselves. All of these principles enable the hyperactive children to focus on the learning material with greater ease in that situation and teaches them how to attend to task in other situations.

The prognosis of hyperactive children is not as good as one would wish. It is true that the hyperactivity diminishes with age, but unless helped, the children persist to have poor interpersonal relationships and learning difficulties. Some children resort to withdrawing from society. The teen years could mean juvenile delinquency and few seem to live normal adult lives. More studies are needed to determine the probability of the hyperactive child's adjustment to society. It must be determined what will help these children to succeed.
In the fall of 1971 the following pilot study will be conducted in La Crosse, Wisconsin under the direction of Dr. Edward Orman, psychiatrist at the La Crosse Guidance Clinic, and Mr. Kerry Nelson, Director of Special Education at Wisconsin State University-La Crosse. The subjects will consist of hyperactive children referred to Dr. Orman at the guidance clinic during the 1971-72 school year.
Chapter IV. Procedure of the Pilot Study

General Design

Each subject will be given the Gates-McKillop Reading Diagnostic Test Form I before he is put on Ritalin. After three weeks on the drug the subject will be given Form II of the same test to determine if his score would rise sharply simply because he would be attending more to the test. At this time the reading subtest from the Wide Range Achievement Test would be given to the subject. Two to three months after the start of the experiment each child would be given a placebo for a week. This would be done to see how his work is affected when he is taken off the medication and how people are going to react to him when his behavior is worse, but they still think the child is getting help. While on placebo the child would be given the subtest again. The Gates-McKillop Reading Diagnostic Test Form I would be repeated at the end of the experiment to see how many months gain were made once the child was able to attend to task.

The subject's teacher would fill out the "Behavior Problems of Middle Childhood" check list by Donald Peterson or the check list by C. Keith Conners. Each child would be rated on a one to five basis on each item before the subject has taken Ritalin, one month after taking the drug, on
placebo, and at the end of the study. The teacher, as well as the parents, will be told at the beginning that they will fill out check lists every month or two during the experiment so that they will not suspect something is different when the child is on placebo and they are given a check list.

The subject's mother would fill out the Werry-Weiss-Peters Activity Scale rating the child with "no, some, or much" on each item. This would be done before the child had taken Ritalin, one month after being on the drug, on placebo, and at the end of the study.

Each subject would be given "Thinking About Yourself", a self-rating list by Eli Bower, to determine if there is a discrepancy between the subject's perception of himself as he is and as he would like to be. This would be given before the subject has taken Ritalin, one month after being on the drug, on placebo, and at the end of the study to see if the child's perception of himself changes. While on placebo it would be noted if the child's perception of himself goes down because he cannot control himself as well as when he is taking Ritalin.

The class in which the subject is a member would be given a peer rating instrument called "A Class Play" by Eli Bower. Section I of the instrument contains
descriptions of twenty hypothetical roles in a play, with instructions directing each pupil to choose classmates who would be most suitable and natural in each of the roles. Section II elicits from each pupil an indication of the roles he would prefer, or which he thinks other people would select for him. The instrument would be filled out by the class before the subject has taken Ritalin, one month later, on placebo, and at the end of the project.

A sociogram would be given to the class at the same times that the "Class Play" is administered. Each pupil would indicate 1) the person who is his best friend, and 2) the person he would most like to work with on a committee. This also would determine if the hyperactive child is seen in a better light once he is being helped by Ritalin and once his teacher starts to react favorably toward him.

The experimenter would collect baseline behavior data on the subject and a randomly selected control in the room at various times during the day for three days before the subject takes Ritalin. This will be repeated one month later for three days, on placebo for three days, and then at the end of the experiment for three days. This will be done 1) to compare the subject's behavior with a normal
and 2) to see if the normal's behavior is affected by the improvement in behavior of the subject.

Population and Sample

The subjects will be male and female children aged seven to twelve referred to Doctor Edward Orman, a psychiatrist, by the La Crosse Children's Guidance Clinic. The children, all from La Crosse or neighboring towns, will have been diagnosed as hyperactive by Dr. Orman and recommended to receive Ritalin. The children will enter the experiment as they are referred to the clinic. This will not affect the experiment since each child is tested against himself.

Data and Instrumentation

The following materials will be used to evaluate the progress of the child both socially and academically:


2. The "Behavior Problems of Middle Childhood" check list by Donald Peterson (Peterson, 1961) or the check list by C. Keith Conners (Conners, 1969a).


7. Behavior Check List by Walker and Matson

8. Wide Range Achievement Test subtest: reading by J. F. Jastak, S. W. Bijou, and S. R. Jastak
   Wilmington, Delaware, 1965.

Analysis

The different check list results will be charted and conclusions drawn to determine the child's progress socially and academically once he is on Ritalin. The results from the placebo condition will also be analyzed. The reading scores will be compared and conclusions drawn. The changes, if any, of the behavior of the control observed using the Behavior Check List will be analyzed.
Conclusion

No matter what the origin is of the hyperactive syndrome, children exhibiting the syndrome must be helped immediately. Identification must be done before school age so that the school system is ready for this child. Drugs along with psychotherapy and special classrooms must be available. Drugs such as Ritalin are needed to aid maturation chemically and to enable the child to function in academic programs. If the hyperactive child can not learn with the normal amount of stimuli in a room and is slower in processing a single bit of information then a special classroom is indeed essential. Both the child and his parents need psychotherapy. The parents need to perceive their child in a positive manner and the child needs to develop a strong ego and self-esteem. Psychotherapy is also needed to help the child adjust so that poor behavior does not become a problem. If the child is well adjusted and taught to live with his problem, then he may be able to look forward to a normal life once he outgrows the hyperactivity.
Recommendations

After a review and analysis of the literature it is recommended that 1) doctors should be informed of the symptoms of hyperactivity and ways to diagnose the syndrome in order to provide early identification of the hyperactive child before school age. 2) Pharmacotherapy, specifically Ritalin, should be administered in order to prepare the child physically so he can benefit from special classroom settings. 3) Psychotherapy is essential for the child to develop a healthy personality. 4) A great deal of understanding is needed by everyone who comes in contact with the child so that the child can outgrow his hyperactivity without scars of a damaged ego because of harrassment and misunderstanding by others.
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Knobel, M., Wolman, M. B., & Mason, E. Hyperkinesis and organicity in children. Archives of General Psychiatry, 1959, 1, 310. (b)


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Werry-Weiss-Peters Activity Scale  (Werry, 1968)

<table>
<thead>
<tr>
<th>Behavior Area</th>
<th>No</th>
<th>Some</th>
<th>Much</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Meals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up and down at table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interrupts without regard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiggling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiddles with things</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks excessively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Television</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gets up and down during program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiggles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manipulates objects or body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks incessantly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interrupts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Doing Homework</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gets up and down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiggles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manipulates objects or body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks incessantly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requires adult supervision or attention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Play</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inability for quiet play</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constantly changing activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeks parental attention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talks excessively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disrupts other's play</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sleep</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty settling down to sleep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate amount of sleep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restless during sleep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Behavior Away From Home (except at school)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restlessness during travel</td>
<td></td>
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<td></td>
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<tr>
<td>Restlessness during shopping</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(includes touching everything)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restlessness during church/movies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restlessness while visiting friends, relatives, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>School Behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up and down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidgets, wiggles, touches</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Werry-Weiss-Peters Activity Scale (continued)

<table>
<thead>
<tr>
<th>No</th>
<th>Some</th>
<th>Much</th>
</tr>
</thead>
</table>

School Behavior
- Interrupts teacher or other children excessively
- Constantly seeks teacher's attention

To obtain a subtotal score, multiply the number of "no" answers by zero, the number of "some" answers by one, and the number of "much" answers by two. Add these together to obtain a total score. Scores should be computed each time the scale is given to assess the effects of treatment.
Behavior Problems of Middle Childhood Check List (Peterson, 1961)

<table>
<thead>
<tr>
<th>Conduct Problem</th>
<th>Personality Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disobedience</td>
<td>Feelings of inferiority</td>
</tr>
<tr>
<td>Disruptiveness</td>
<td>Lack of self-confidence</td>
</tr>
<tr>
<td>Boisterousness</td>
<td>Social withdrawal</td>
</tr>
<tr>
<td>Fighting</td>
<td>Proneness to become flustered</td>
</tr>
<tr>
<td>Attention-seeking</td>
<td>Self-consciousness</td>
</tr>
<tr>
<td>Restlessness</td>
<td>Shyness</td>
</tr>
<tr>
<td>Negativism</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Impertinence</td>
<td>Lethargy</td>
</tr>
<tr>
<td>Destructiveness</td>
<td>Inability to have fun</td>
</tr>
<tr>
<td>Irritability</td>
<td>Depression</td>
</tr>
<tr>
<td>Temper tantrums</td>
<td>Reticence</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>Hypersensitivity</td>
</tr>
<tr>
<td>Profanity</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Jealousy</td>
<td>Aloofness</td>
</tr>
<tr>
<td>Uncooperativeness</td>
<td>Preoccupation</td>
</tr>
<tr>
<td>Distractibility</td>
<td>Lack of interest in environment</td>
</tr>
<tr>
<td>Irresponsibility</td>
<td>Clumsiness</td>
</tr>
<tr>
<td>Inattentiveness</td>
<td>Daydreaming</td>
</tr>
<tr>
<td>Laziness in school</td>
<td>Tension</td>
</tr>
<tr>
<td>Shortness of attention span</td>
<td>Suggestibility</td>
</tr>
<tr>
<td>Dislike for school</td>
<td>Crying</td>
</tr>
<tr>
<td>Nervousness</td>
<td>Preference for younger playmates</td>
</tr>
<tr>
<td>Thumb-sucking</td>
<td>Specific fears</td>
</tr>
<tr>
<td>Skin allergy</td>
<td>Stuttering</td>
</tr>
<tr>
<td></td>
<td>Preference for older playmates</td>
</tr>
<tr>
<td></td>
<td>Masturbation</td>
</tr>
<tr>
<td></td>
<td>Hayfever or asthma</td>
</tr>
</tbody>
</table>

The child's teacher will rate each factor from one to five. One means the problem does not occur and five means it is a major problem. The rating will be computed each time the check list is given to the teacher to determine if improvement has been made once the child is on Ritalin.
A Sociogram

(Horace Mann-Lincoln Institute of School Experimentation, 1948)

1. My best friend is ____________________________.

2. The person I would most like to work with on a committee is ____________________________.

The sociogram will be administered to the class at the designated times. The number of times the subject is chosen is recorded.
**BEHAVIORAL CHECK LIST**

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Observer</th>
</tr>
</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Activity</th>
<th>Group</th>
<th>Time</th>
<th>Treatment Period</th>
</tr>
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<tbody>
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<table>
<thead>
<tr>
<th>Baseline</th>
<th>ELP Class</th>
<th>Regular Class</th>
<th>Follow-up</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Controls Operating: Group</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>TOI</th>
<th>TOD</th>
<th>TRD</th>
<th>OS</th>
<th>TO</th>
<th>H</th>
<th>D</th>
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<tr>
<th>TOI</th>
<th>TOD</th>
<th>TRD</th>
<th>OS</th>
<th>TO</th>
<th>H</th>
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</tbody>
</table>

TOI (Task Orientated Independent Behavior) Child is working independently at task.

TOD (Task Orientated Dependent Behavior) Working with teacher on task.

TRD (Task Related Deviancy) Dropped pencil, sharpened pencil, getting out new materials.

OS (Out of Seat)

TO (Talk Out)

H (Hand Raised)

D (Distraction) Look up from work.
Questionnaire by C. Keith Conners

1. Sits fiddling with small objects
2. Hums and makes other odd noises
3. Falls apart under stress of examination
4. Coordination poor
5. Restless or overactive
6. Excitable
7. Inattentive
8. Difficulty in concentrating
9. Oversensitive
10. Overly serious or sad
11. Daydreams
12. Sullen or sulky
13. Selfish
14. Disturbs other children
15. Quarrelsome
16. "Tattles"
17. Acts "smart"
18. Destructive
19. Steals
20. Lies
21. Temper outbursts
22. Isolates himself from other children
23. Appears to be unacceptable by group
24. Appears to be easily led
25. No sense of fair play
26. Appears to lack leadership
27. Does not get along with opposite sex
28. Does not get along with same sex
29. Teases other children or interferes with their activities
30. Submissive
31. Defiant
32. Impudent
33. Shy
34. Fearful
35. Excessive demands for teacher's attention
36. Stubborn
37. Overly anxious to please
38. Attendance problem

Each factor should be rated from one to five. One signifies that the problem does not occur and five means that the problem is very serious. Each time the questionnaire is given the score is added up to see if there has been any improvement. A check list such as this demonstrates where the problems are and help is needed.
"A Class Play" and "Thinking About Yourself" by Eli M. Bower are part of the kit "A Process for In-School Screening of Children with Emotional Handicaps". These instruments may not be reproduced without the permission of the California State Department of Education. The kit is distributed for research use by Educational Testing Service, New Jersey. Excerpts from the kit may be seen in Early Identification of Emotionally Handicapped Children in School by Eli M. Bower (1970).