THE EFFECTS OF KNOWLEDGE OF RESULTS ON INITIAL CONCEPT LEARNING IN HYPERACTIVE; NON-HYPERACTIVE, IMPULSIVE; AND NON-HYPERACTIVE, NON-IMPULSIVE THIRD GRADE BOYS

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THE EFFECTS OF KNOWLEDGE OF RESULTS ON INITIAL CONCEPT LEARNING OF HYPERACTIVE; NON-HYPERACTIVE, IMPULSIVE; AND NON-HYPERACTIVE, NON-IMPULSIVE THIRD GRADE BOYS

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ABSTRACT

THE EFFECTS OF KNOWLEDGE OF RESULTS ON INITIAL CONCEPT LEARNING IN HYPERACTIVE; NON-HYPERACTIVE, IMPULSIVE; AND NON-HYPERACTIVE, NON-IMPULSIVE THIRD GRADE BOYS

By

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The purpose of the study was three fold. The primary focus was an investigation of the effects of corrective feedback (knowledge of results) on the concept learning performances of hyperactive and non-hyperactive boys. Secondly, the study attempted to identify the role impulsivity plays in the performances of these boys. And lastly, an analysis of the behavioral characteristics used to identify the study populations was conducted.

In order to carry out the study, three groups of third-grade boys were identified. The boys were either hyperactive; non-hyperactive, impulsive; or non-hyperactive, non-impulsive. Equal numbers from each behavioral group were randomly assigned to one of the following corrective feedback treatments: (1) telling S he was right after a correct response and telling him he was wrong after an incorrect response; (2) telling S he was right after a correct response and saying nothing after an incorrect response; (3) saying nothing after a correct response

and telling S he was wrong after an incorrect response. Each S was then administered a Wisconsin-type card sorting task, requiring him to sort cards on the basis of either shape, color, or number.

Based on the findings of the study the following conclusions were drawn:

1. Hyperactive and impulsive boys perform as well as non-hyperactive; non-impulsive boys on simple concept learning tasks;

2. Hyperactive and impulsive boys utilize knowledge of results in the same ways they are utilized by non-hyperactive, non-impulsive boys;

3. Hyperactive boys are more impulsive than non-hyperactive boys, but this impulsivity does not appear to be a factor in their performance on simple concept learning tasks; and

4. Aggressive behaviors account for a large part of the behaviors noted in hyperactive boys.

The several recommendations for teachers and for future research in this area include:

1. It is recommended that future research focus on more complex classroom performance tasks such as reading or math skills rather than simple concept learning tasks. These are areas to which the present investigation cannot generalize.

2. It is recommended that future research look at alternative roles impulsivity might play in classroom performance rather than the effects of impulsivity on specific concept learning. A suggested focus might review the relationships between impulsivity and Locus of Control or other motivational variables.

3. It is recommended that future research projects do not use the MFFT to identify impulsivity in hyperactive boys. This measure does not appear to be related to teacher perceptions of impulsivity.

4. It is recommended that classroom teachers emphasize the use of corrective feedback when introducing new topics and concepts in the classroom. And further, when those topics and concepts are unusually difficult, teachers should give feedback to children which indicate a correct response has been made, or an incorrect response has been made.

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By

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CHAPTER I

THE PROBLEM

Several studies indicate that current treatment methods with hyperactive children are inadequate for educational purposes. The most common treatment procedure, involving the use of stimulant drugs, has been found to significantly reduce the amount of disruptive behavior in the classroom. However, follow-up studies reveal that after several years children who are treated via this procedure are still functioning deviant to educational and social norms. Because the plight of the hyperactive child in the classroom remains unchanged, research focusing solely on the educational characteristics of these children has been intensified.

The majority of the research involving educational characteristics of hyperactive children has centered on general intellectual functioning and global measures of achievement. While differences in intelligence appear not significant, groups of hyperactive children perform less well than non-hyperactive children on most measures of achievement. Studies focusing on these performance differences include investigations of attentional deficits, impulsivity, verbal mediation, and motivational characteristics. Despite their

efforts, the important changes necessary to providing successful educational experiences for hyperactive children are difficult to interpret from these studies. One reason for this difficulty has to do with the identification of hyperactive children. Many of the investigations utilize heterogeneous study populations. This heterogeneity is due to inconsistency in referral to clinics, inadequate selection criteria, wide ranges of age, and poorly conducted behavioral ratings. Reported estimates subsequently suggest that 4 to 15 percent of the entire elementary school population (including a male to female ratio of 8 to 1) may be hyperactive (Eisenberg, 1972; Stewart, 1966). This wide-range estimation is singularly due to the inability of educators, physicians, and psychologists to agree upon what constructs and behaviors are indicative of hyperactivity. Without homogeneous study populations, acquiring clear experimental results will continue to be a problem.

Some studies have eluded to the role impulsivity plays in learning. Generally, studies with non-hyperactive children indicate that students performing below educational norms tend to be more impulsive as a group than are students performing at or above those norms. Whether impulsivity accounts for the poor school performance of hyperactive children is not clear. Studies using hyperactive children have typically implicated impulsivity as a factor in their educational problems without careful investigation. Many educators assume that since hyperactive children are more impulsive than non-

hyperactive children, and since they perform less well than non-hyperactive children on most learning tasks, then impulsivity must account for the poorer performance. The true variable studied here is not impulsivity, but presence or absence of hyperactive behavior. To properly implicate impulsivity, a third treatment group is required; a group identified as non-hyperactive and impulsive. If the hyperactive group and the non-hyperactive, but impulsive, group perform in similar ways, then impulsivity may be more clearly implicated. It is not enough to show that hyperactive subjects are more impulsive than non-hyperactive subjects, unless it can also be demonstrated that impulsivity affects the learning of a desired behavior.

It has been suggested that hyperactive children show difficulty in the initial stages of learning. One explanation for this difficulty concerns the frustration that is caused by a delay in receiving reinforcement. Briefly, when reinforcement is withheld for short periods of time, frustration develops. This frustration then causes interference in learning. Investigations studying the differences between knowledge of results and reinforcement, using non-hyperactive children, provide data which conflict with this view. The general finding indicates that telling a learner he has made a correct or an incorrect response (giving him knowledge of results) affects initial learning of a concept; and, giving this information does not function in the same ways reinforcement functions. Imposing a delay in giving subjects corrective

feedback does not interfere with learning, as would be suggested if that feedback were reinforcing. Whether corrective feedback functions differently in hyperactive children, e.g., as a reinforcer, is important information for educators of these children. Also, it is important for teachers to know that some types of feedback may serve to frustrate a hyperactive child and inhibit his learning whereas this same feedback facilitates learning in other children.

The following study had three intended foci. The primary focus was to investigate the effects of corrective feedback on the concept learning performances of hyperactive and non-hyperactive boys. Secondly, the study attempted to identify more clearly the role impulsivity plays in the performances of these boys. And lastly, a post hoc analysis of the behavioral characteristics used to identify the study populations was conducted. The purpose of this final analysis was to investigate the relationships between the two variables most commonly used to identify hyperactive children; namely, impulsivity and aggression.

REVIEW OF THE LITERATURE

The purpose of the following review is to acquaint the reader with the research from which the study evolved. The specific intent here is to explain the need for an investigation into the effects corrective feedback may have on concept learning in children who present hyperactive; non-

hyperactive, impulsive; and non-hyperactive, non-impulsive behaviors in the classroom. The review is clearly not meant to be a comprehensive review of the literature relevant to the topic of hyperactivy. Such reviews have appeared periodically and are available elsewhere (Werry, 1968; Werry and Sprague, 1969; Keogh, 1971; Grinspoon and Singer, 1973).

The hyperactive child has sustained the interest of physicians, psychologists, and educators for a decade and a half. While specific delineation of the characteristics identifying the hyperactive child have eluded researchers, there are global behaviors which appear consistently in the literature. These behaviors include involuntary and constant over-activity, short attention span, impulsivity, unpredictable and explosive behavior, inappropriate and aggressive acts toward other children, and learning disorders (Davids, 1971; Douglas, 1972).

Initial research on the hyperactive child has been dominated by the medical and psychological fields. Research from these points of view has clearly focused on the etiological aspects of hyperactivity (Anderson, 1963; Cantwell, 1973; Satterfield, 1971, 1974; Werry, 1968). Despite vast amounts of information concerning diagnosis and treatments, follow-up studies reveal a rather poor educational prognosis for children treated via current methods. Weiss et al. (1971) conducted a study investigating the effects of drugs (generally chlorpromazine) on 64 hyperactive children who had been treated for two to six years. At the time of

follow-up (four to six years after initial visits) evaluations suggested that while hyperactivity had diminished with age, social, psychological, attentional, and learning disorders persisted. Mendelson, Johnson, and Stewart (1971) followed up a group of 83 hyperactive children (aged 12 to 16 at follow-up) who had been treated with either dextroamphetamine or methylphenidate (Ritalin). Follow-up took place two to five years after subjects had initially been seen in a clinic. The study indicated that 60 percent of the group showed improvement for at least six months after initiation of drug treatment. By the end of the study the majority of subjects showed some improvement in concentration, impulsivity, and excitability. However, all symptoms were still considered problematic. Also, these children were still considered by the school to present social and educational problems.

What the above studies indicate is that the presenting behaviors of hyperactive children may be alleviated, at least temporarily, but current treatment methods are not sufficient in and of themselves to change the tide of an unsuccessful school experience. Thus, in recent years, some attempts have been made to study the educational characteristics of hyperactive children. Included are investigations of attentional deficits (Anderson, Holcomb, and Doyle, 1973; Sykes, 1969; Sykes et al., 1971), impulsivity (Hall, 1972; Kuchta, 1974; Juliano, 1974; Meichenboum and Goodman, 1969), verbal mediation (Meichenboum and Goodman, 1969; Camp, unpublished; Camp and Blom, unpublished), and motivational characteristics

(Freibergs and Douglas, 1969; Baumler, 1975; Worland, 1974, Firestone, 1974). The intent of these studies has been to provide the educator with information more relevant to teaching the hyperactive child.

The Problem of Identification

At present, many of the above studies offer results that are difficult to interpret and often conflict with one another. One reason for this is the experimental populations that are used. Several investigators have raised this issue time and again (Freeman, 1966, 1968, 1972; Arnold, 1973; Grinspoon and Singer, 1973). The Grinspoon and Singer article points out that typically the study populations used in hyperactivity research are heterogeneous in behavioral composition; and, even when the same constructs are used to identify treatment populations, there is little agreement on the criteria for selection into the study. This situation makes it difficult to glean clear experimental results, for the variance within the populations is often as large as it is between them. Further, difficulty is encountered when one attempts to compare results across several studies. The need for more consistent behavioral identification is essential to further research in this area.

One method of obtaining more homogeneous study populations is the use of multiple instrument ratings, rather than single instrument ratings across several people. For the categorization of hyperactive children, this would seem helpful since the presenting behaviors are so varied. These children are

considered distractible, aggressive, overactive, etc. A single subscale, rating all of these behaviors, would be inappropriate, for whole subscales alone have been used to identify children who are, for example, aggressive (Miller, 1973). To design one rating scale for identification of hyperactive children would be, and has proved to be, a monumental task. Identification of more homogeneous populations might be improved if several subscales were used; one to measure aggressiveness, one to measure impulsivity, and one to measure distractibility. Assuming these scales are related, children receiving ratings at a level of one and one-half standard deviations above the mean (norm or sample population) on all scales would then be considered hyperactive. Even where rater agreement may be moderate, stringent selection criteria should produce a more homogeneous study population.

Impulsivity and Hyperactivity

One area of current educational research interest centers around the impulsivity characteristic of hyperactive children. Impulsivity has been found to affect both reading ability (Kagan, 1965) and inductive reasoning (Kagan, Pearson, and Welch, 1966) in non-hyperactive children. Children who are more impulsive tend to have poorer reading skills and perform less well on tests of inductive reasoning than do reflective children. More recently, Messer (1970) has found that children who failed a grade were, as a group, more impulsive than their classmates. Also noted, however, was the lack of a difference in verbal intelligence between these groups.

Juliano (1974) attempted to relate activity levels and impulsivity to performance in hyperactive and normal children, aged eight through eleven. The task consisted of learning dot patterns from a series of prototypes and their distortions. Hyperactive subjects required significantly more trials to reach criterion than did normal subjects. Correlations between performance on the learning task and measures of impulsivity and activity level were reportedly small and not significant. But, correlations between diagnostic category (hyperactive or non-hyperactive) and impulsivity, and activity level were moderate (.25 and .50, respectively) and significant at $P<.05$. In an earlier study, Campbell, Douglas, and Morgenstern (1971) also compared the cognitive styles of hyperactive and non-hyperactive children (aged six to thirteen). Hyperactives were found to be more impulsive, more field dependent, and more constricted in their ability to control attention. Kuchta (1974) investigated these same cognitive styles in hyperactive and non-hyperactive boys. His study design involved a pretest-posttest of each cognitive style. Among his pretest findings was a less efficient, impulsive conceptual tempo in the hyperactive population. An attempt was made to modify this impulsivity by giving direct, to-the-test instruction on more efficient problem-solving strategies. His conclusions suggest that inefficient problem-solving strategies, specifically impulsivity, may be the reasons for the hyperactive child's learning problems. He further states that these inefficient strategies can be modified with instruction.

It is clear from this study that hyperactive children may be more impulsive than non-hyperactive children. However, it is not clear whether impulsivity alone can be implicated in the learning problems of hyperactive children.

The above studies, when viewed together, provide a confusing picture. One one hand, hyperactive subjects perform more poorly than non-hyperactive subjects. They also appear to be more impulsive. On the other hand, the Juliano (1974) study reports that there is no significant correlation between performance and impulsivity. A more convincing approach to dealing with this problem is the use of an impulsive, non-hyperactive control group in future studies. If the concept learning decrement is a problem associated with impulsivity, then both hyperactive and non-hyperactive, impulsive groups should perform in similar ways. If the reported differences are due to something other than impulsivity, then the hyperactive group should perform in one way, the non-hyperactive group in another.

Concept Learning and the Effects of Corrective Feedback

Several investigators have noted a performance decrement in hyperactive children on various learning tasks (Freibergs and Douglas, 1969; Kuchta, 1975; Worland, 1974). Freibergs and Douglas suggest that introducing a delay in reinforcement produces frustration in hyperactive children, and furthermore, that the frustration serves to interfere with the presolution phase of learning. In the past, investigators, studying non-hyperactive children, have suggested that reinforcement has littel affect on initial learning.

Meyer and Seidman (1960) suggest that positive reinforcement will enhance the latter stages of learning; i.e., it will facilitate improvement on a task which is already familiar to subjects. This is in keeping with Hurlock's (1924) classic study which found praise most effective in improving performance. Initial learning of a concept, however, is greatly facilitated by giving subjects corrective feedback (called knowledge of results). Buss and his associates (1956) conducted a series of studies in an attempt to understand the effects of varying feedback conditions on concept learning. Their studies consisted of giving subjects the Wisconsin Card Sorting Test. This test involves learning the concepts of color, shape, and number. The procedure used by Buss allowed subjects to sort 64 cards on the basis of an unknown concept. After each single card sort, the subject was given feedback from one of the following categories: Group I - "right" for a correct response, "wrong" for an incorrect response (RW); Group II - "right" for a correct response, no comment for an incorrect response (RN); Group III - nothing for a correct response, "wrong" for an incorrect response (NW). General findings indicate that under conditions of RW and NW, subjects learned concepts significantly faster than under the RN condition. Several other studies, using subjects ranging from kindergarten level through freshman college, support the results of Buss and his associates (Travers, Van Wagenen, Haygood, and McCormick, 1964; Levine, Leitenberg, and Richter, 1964). Essentially,

telling a learner he has made a wrong response effectively improves his performance. Telling the learner he has made a correct response does not do this. In the first case, knowledge of an incorrect response appears to elicit a search for possible alternatives. In the latter situation, if the learner makes an incorrect response he never really knows it. Hence, a search for the correct alternative does not occur as often (Spence et al., 1963; Levine et al., 1964).

The above studies were conducted mainly to investigate the differential reinforcement effects of knowledge of results. Generally this issue has since been settled. If knowledge of a correct response (or an incorrect response) serves as a reinforcer, then delaying reinforcement should interfere with learning. Studies by Hockman and Lipsitt (1961), Brachbill, Bravos, and Starr (1962) and Kintsch and McCay (1964) reveal that introduction of a delay between subject's response and the feedback given subject, fails to inhibit the effectiveness of the type of corrective feedback. Anderson (1967) after a comprehensive review of the problem, suggests that knowledge of results functions not as a reinforcer, but more as corrective feedback.

Telling a non-hyperactive child he has made a wrong response may elicit nothing more than a renewed search for an alternative answer, as the literature indicates. But, evidence also exists suggesting that telling a hyperactive child that he has made a wrong response may lead to something other than a renewed search for an alternative answer. It is

apparent that investigators from both areas of research would benefit from an investigation into the effects of corrective feedback on initial concept learning in hyperactive and non-hyperactive children.

PURPOSE OF THE STUDY

The primary purpose of this study was to investigate the effects of knowledge of results (corrective feedback) on the concept learning performance of three groups: hyperactive; non-hyperactive, impulsive; and non-hyperactive, non-impulsive third grade boys. The study consisted of randomly assigning samples from each of the three groups to one of the following treatment conditions: (1) telling the child he was right after a correct response and telling him he was wrong after an incorrect response (RW); (2) telling the child he was right after a correct response and saying nothing after an incorrect response (RN); (3) saying nothing after a correct response and telling him he was wrong after an incorrect response (NW).

There were also two ancillary purposes of this study. The first was to investigate the problem of identifying hyperactive children. In doing so, teacher ratings of hyperactivity were compared with their ratings of aggression. The second purpose was to investigate the relationship between teacher ratings of both hyperactivity and aggression (these were the measures used to identify the hyperactive population) and measures of impulsivity in the total population of third grade boys.

1.

2.

3.

4.

5.

HYPOTHESES

1. It was hypothesized that type of corrective feedback would have an effect on concept learning performance of third grade boys.

2. It was hypothesized that group membership would have an effect on the concept learning performance of hyperactive; non-hyperactive, impulsive; and non-hyperactive, non-impulsive third grade boys.

3. It was hypothesized that type of corrective feedback would interact with the concept learning performance of hyperactive; non-hyperactive, impulsive; and non-hyperactive, non-impulsive third grade boys.

4. It was hypothesized that a positive relationship exists between teachers' ratings of hyperactivity and their ratings of aggression.

5. It was hypothesized that no relationship exists between teachers' ratings of hyperactivity, or aggression, and measures of impulsivity.

CHAPTER II

DESIGN OF THE STUDY

There were two independent variables that were of primary interest in this study. The first variable, type of corrective feedback, involved three treatment conditions (levels). They were (1) telling the subject he was right after a correct response and telling him he was wrong after an incorrect response (RW); (2) telling the subject he was right after a correct response and saying nothing after an incorrect response (RN); and (3) saying nothing after a correct response and telling the subject he was wrong after an incorrect response (NW). The second variable, an attribute variable, included three characteristic behavioral groups. These were a hyperactive group (HA); a non-hyperactive, impulsive group (NHA/I); and a non-hyperactive, non-impulsive group (NHA/NI). Subjects from each of these groups were randomly assigned to one of the three treatment conditions. A series of three concept learning tasks were administered to each subject. Performance on these tasks served as the dependent variable in the study, the dependent measure being trials to criterion, summed across the three tasks.

In the interest of obtaining unbiased treatment effects, a third independent variable, initial task, was included in

the study. The initial task was the first of the three concept learning tasks each subject was required to learn. The use of initial task as a variable was prompted by studies which suggested a sorting by shape preference among third graders (Mitler and Harris, 1969; 1970). The possibility existed that the initial task might have an effect on concept learning performance, either by itself or by interacting with the group or treatment variables. In order to control for this possibility, the initial task was included in the study as an independent variable. Subjects within each group and treatment were randomly assigned one of the following concept presentation series: color-number-shape, color-shape-number, shape-color-number, shape-number-color, number-color-shape, number-shape-color.

One level of age, intelligence, and sex each were utilized to control for possible confounding in the study. Many criticisms of studies investigating hyperactivity have been leveled at the heterogeneity of the study populations. Inclusion of wide ranges of age and more than one level of intelligence in single study populations have resulted in unreliable conclusions about hyperactive children.

Two supplementary purposes of this study concerned the correlations between behavioral ratings made by teachers, on all males originally rated, and correlations between those ratings and measures of impulsivity.

SPECIAL DEFINITIONS

Hyperactive

A subject was categorized as hyperactive if he received a behavioral rating at least one and one-half standard deviations above the mean (standardization population) on the Aggression scale of the School Behavior Checklist and a behavioral rating at least one and one-half standard deviations above the mean (subject population) on the Hyperactivity scale of the Behavior Rating Scale.

Impulsive

A subject was categorized as impulsive if he scored a mean response time of ten or less seconds and a total error rate of 15 or above on the Matching Familiar Figures Test.

Concept Learning Performance

Concept learning performance is the total number of trials to criterion summed across the three concept identification tasks taken from the Wisconsin Card Sorting Test.

INSTRUMENTS AND INSTRUMENTATION PROCEDURE

Three instruments were used to identify the experimental population. These were the School Behavior Checklist (Miller, 1972), the Behavior Rating Scale (Conners, 1969), and the Matching Familiar Figures Test (Kagan, 1965). Below is a description of each instrument and the procedures used to obtain information and selection of study group subjects.

School Behavior Checklist (SBCL, Form A2; Ages 7-13)

The purpose of this checklist is to give teachers an organized, objective method for communicating their perceptions of children in their classrooms. The inventory is comprised of four sections (Appendix A, Part 1). The first

section asks for demographic information on the child and his parents. Section two is designed to elicit from the teacher global comparisons between the child being rated and all other children taught by the teacher. These comparisons are concerned with educational and emotional adjustment. The third section involves five global ratings concerning the child's intellectual ability, general academic skills, performance, social adjustment, and personal appeal. The fourth section consists of 96 items listed in a true-false format. From these items, seven subscales have been delineated (Appendix A, Part 2); Low Need Achievement, Aggression, Anxiety, Hostile Isolation, Extraversion, and Total Disability.

The SBCL was chosen for its ability to categorize children who are aggressive. While Miller (Manual, pp. 32-40) suggests that increasing scores on the scale do not necessarily mean increasing aggression, he does maintain that the probability that the child belongs to the aggressive subgroup increases as the score increases. In this study, any child receiving a T-score of at lease 65 on the Aggression subscale was considered as belonging to the subpopulation, aggressive. A T-score of 65 represents one and one-half standard deviations above the standard population and is considered by Miller to be the point of departure for an interpretation of category membership. Other reasons for using the SBCL include the high test-retest and split-half reliabilities reported for the Aggression subscale (.83 and .90, respectively). Several investigations reveal considerable

evidence supporting the construct validity of the SBCL scales. Interested readers are referred to the SBCL manual where elaboration of these studies can be found (Miller, 1972). Criterion-related studies indicate impressive ability of the SBCL to delineate pathological disorders from normal populations. Of interest in this study was the Aggression subscale which has been found to have acceptable predictive stability (.68) over an 18-month period.

Behavior Rating Scale (BRS)

The BRS was originally developed for the purpose of objectively noting behavioral changes in children being treated with drugs. The total scale contains 39 items which have been factored into five subscales. The subscales are identified by inattentiveness, aggressivity, anxiety, hyperactivity (Appendix B), and sociability.

It should be pointed out that the BRS was not chosen for use in this study because of its sound measurement characteristics. Little has been done in the way of development using APA guidelines (Joint Committee; APA, AERA, NCME, 1974). The only studies available are validational in focus (Conners, 1969; Kupietz, 1972). Both the Conners and Kupietz studies view the ability of the BRS to identify behavioral differences in previously categorized populations; e.g., Public School, Special School, and Psychiatric Outpatients.

There are two major reasons why the BRS was chosen for use in this study. First, it is a widely used scale in hyperactivity investigations. It was hoped that by including

a commonly used scale, this study would have some generalizability to similar investigations. Secondly, the hyperactivity subscale does not include within subscale measures of hyperactivity or aggression. Other rating scales (Davids, 1971; Bell, Waldrop, and Weller, 1972) include these under a total scale which purports to measure the same factor. For example, the Davids (1971) Rating Scale for Hyperkinesis consists of seven items. One of the seven items asks for a rating of hyperactivity--the very behavioral characteristic that the total scale attempts to measure.[1] This is an undesirable measurement characteristic, and one which the BRS avoids.

Matching Familiar Figures Test (MFFT)

The MFFT is purported to measure in children a conceptual tempo. This, conceptual tempo, represents one way in which children approach and solve problems. It is in effect a learning style, individual for each child. This particular style is measured along a continuum ranging from reflective to impulsive (R-I). The test itself consists of 12 pairs of stimulus and response cards. Each stimulus card contains a picture of a familiar object. The response card contains 6 variants of the object found on the stimulus card.

Each subject is given the task of finding, and pointing to, the picture on the response card which is exactly like the stimulus picture. The subject's latency to the first

[1]Some investigators may argue that there is a difference between hyperkinesis and hyperactivity. However, the literature relevant to the topic clearly uses the two terms interchangeably.

response (i.e., length of time) is recorded as are the number of errors. For each set of cards the subject is given six chances to find the correct picture. The mean response time and total number of errors are calculated across the twelve sets of cards. Taken together, these represent the child's conceptual tempo. Essentially then, conceptual tempo involves the speed at which a child attempts to solve the problem together with his ability to solve the problem correctly. A child who responds very quickly and makes frequent mistakes, is judged more impulsive. Conversely, the child who takes maximal time to make his responses and solves the problems with relatively few mistakes, is considered more reflective.

The problem solving process has been suggested by Kagan (1966) to include the following five phases:

1. Decoding of the problem; comprehension of the problem.
2. Selection of a likely hypothesis on which to act in order to arrive at a solution.
3. Implementation of the hypothesis.
4. Evaluate the validity of the solution arrived at in phase 3.
5. Report of solution to an external agent.

Kagan suggests that conceptual tempo affects the second and fourth phases of the problem solving process. Either selection of an answer or the evaluation of that answer is emphasized by the child. Impulsive children tend to emphasize choosing an answer, whereas reflective children are reported to emphasize the correctness of an alternative.

Conceptual tempo proves to be relatively stable over time and across various learning situations. Kagan (1965) has reported stability coefficients for response time in a number of studies. These range between .48 and .62 for both boys and girls over a 12-month period. Some studies using tasks from the Haptic Visual Matching Test (HVMT) give support to generality of the R-I dimension. Kagan (1965) reports these coefficients, representing correlations between response times, range from .67 to .87.

An important limitation of the MFF measure of R-I should be noted. All tasks, including those used in generality studies, involve a problem solving situation where several response alternatives are available all at once, and only one must be selected. At this time, caution should prevail when generalizing to other types problem solving tasks.

Instrumentation Procedure

Each participating third grade teacher was given a packet of materials which contained a cover letter (Appendix C) giving a brief overview of the study, directions for completing the scales, and enough rating scales for each male in her classroom (all participating teachers were female). The entire SBCL and the Hyperactive subscale of the BRS were attached together. Teachers were asked to complete all information within one week.

During the week following completion of all behavior ratings, all third grade males from the participating classrooms were administered the MFFT. Each subject (S) was

given a card with a number on it from one to eight. He was then directed to go to a designated room within the school building. Upon entering the room, S was directed to the table corresponding to the number on his card.

The assessment situation consisted of one MFFT booklet, a stop watch, a score sheet (hidden from view behind the propped-up booklet), and an examiner (E).

After E recorded S's name and his teacher's name, he spoke the following directions (taken from the MFFT booklet):

> "I am going to show you a picture of something you know and then some pictures that look like it. You will have to point to the picture on this bottom page (point) that is just like the one on this top page (point). Let's do some for practice."

E then showed S the practice items and helped him to find the correct answer. E then spoke the following:

> "Now we are going to do some that are a little bit harder. You will see a picture on top and six pictures on the bottom. Find the one that is just like the one on top and point to it."

E recorded latency to the first response (in half-seconds) using the stop watch, the number of errors for each item, and the order in which the errors were made. When S was correct, he was praised. When wrong, E told subject,

"No, that's not the right one."

Responses were recorded until a maximum of six errors were made or the correct items were located.

After S completed all 12 items, he was given the number card and sent back to class. The teacher then gave the card to another male. This process was used until all males in all classes had been administered the test.

All males were categorized into three groups based on the information obtained using the above instruments. The categories included males who were hyperactive (regardless of impulsivity measure); non-hyperactive, impulsive; and non-hyperactive, non-impulsive. These three groups then represented the pool from which the experimental subjects were selected. The entire pool was used for investigation of the two ancillary research questions.

SUBJECTS

Subjects used in the study were third grade males enrolled in one of three elementary schools from either the Holt Public School District or the Grand Ledge Public School District, in central, lower Michigan. Holt supplied one school which contained three regular third grade classrooms and a total of 48 males. Grand Ledge supplied the other two schools which together contained five regular third grade classrooms and a total of 66 males. The total of 114 males represented the total pool from which experimental subjects were selected. The mean age of the subject pool was 108.63 months (S.D. = 5.37) during the month of April, 1976.

Teachers completed ratings on 112 males which were considered usable for subject categorization. From this population, 12 males were identified as hyperactive, 100 males non-hyperactive, 30 males were identified as impulsive, 82 males non-impulsive (see Special Definitions).

Before subjects could be included for further study, two additional requirements were considered. One required that subjects range in age from 96 to 120 months. This age range has been used in other investigations studying hyperactive and impulsive children. To facilitate comparison between findings of this and other studies, the same age range was selected for use in this study. A second reason was to enable comparisons to be made between homogeneous subject populations. Children falling on either side of the suggested age range have a higher probability of belonging in a third grade classroom because of an unusual developmental, learning, or behavioral characteristic. To avoid confounding of the experimental effects, these children were excluded from the study. The second requirement was average intellectual functioning. It was assumed that intelligence level would correlate with the number of trials needed to reach criterion on the concept learning tasks. In order to accomodate low, average, and high intelligence levels in the study, the design would require a substantially larger sample population. The average range of intelligence was chosen to reduce the total necessary sample size and because of its availability.

Obtaining intelligence test scores proved to be a difficult task. Some of the problems encountered included schools which did not have any scores, scores which were more than one year old, and refusal to release scores. The number of usable scores amounted to 21 from the total third grade population of the three schools. Because of this situation,

global ratings made by the classroom teacher on section two of the SBCL were used as general indicators of intelligence. Any child who received a rating of less than three or greater than seven, on a scale from one to nine, was excluded from the study.

All 12 hyperactive subjects met the additional requirements and were included in the study. A randomly picked sample of 18 subjects was taken from the group identified as non-hyperactive, impulsive. And, 24 subjects were randomly picked from the pool of non-hyperactive, non-impulsive subjects who met the additional requirements. These last two sample sizes were chosen for two statistical reasons. The first reason was to gain maximum power from the proposed statistical test. Generally, power is affected by sample size, alpha level, population variance, and size differences between the means being tested. Sample size is a concern in this study. The larger the sample population, the better is the statistical chance of detecting differences between obtained means at a specified alpha level. The second reason was to maintain proportional cell frequencies. These were required before any post hoc comparisons could be made between cell means.[2] Thus, the three sample sizes (12, 18, and 24) represented the largest groups possible that still maintained proportionaltiy once they were assigned to experimental cells.

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[2]Readers interested in further discussion of this statistical topic are referred to Glass and Stanley (1970).

The age characteristics of the resulting experimental groups and treatments are given in table 1. Comparisons

Table 1. Mean ages (in months) and standard deviations for groups and treatments.

		Treatments			
		RN	RW	NW	Row Means
GROUPS	HA	$\bar{x}$ =112.50 SD= 3.42 N = 4	$\bar{x}$ =106.25 SD= 6.40 N = 4	$\bar{x}$ =111.75 SD= 7.50 N = 4	$\bar{x}$ =110.17 SD= 6.18 N = 12
	NHA/I	$\bar{x}$ =104.83 SD= 7.17 N = 6	$\bar{x}$ =103.33 SD= 7.63 N = 6	$\bar{x}$ =110.83 SD= 3.20 N = 6	$\bar{x}$ =106.33 SD= 6.81 N = 18
	NHA/NI	$\bar{x}$ =108.00 SD= 3.74 N = 8	$\bar{x}$ =108.75 SD= 5.37 N = 8	$\bar{x}$ =107.75 SD= 7.09 N = 8	$\bar{x}$ =108.17 SD= 5.34 N = 24
	Column Means	$\bar{x}$ =107.94 SD= 5.60 N = 18	$\bar{x}$ =106.39 SD= 6.49 N = 18	$\bar{x}$ =109.67 SD= 6.07 N = 18	

between means were made across behavioral groups classifications and treatments using age as the dependent variable. The purpose of these comparisons was to increase assurance that age would not confound the effects of the experimental variables. A two-way analysis of variance was used to determine if there were main effects between groups HA, NHA/I, and NHA/NI; between treatments RN, RW, and NW; or an interaction effect between the two variables based on age characteristics. A summary of the analysis is presented in Table 2.

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Table 2. Summary ANOVA for groups by treatment using age as the dependent variable.

Sources of Variation	df	SS	MS	F	
Treatment (T)	2	96.78	48.39	1.38	n.s.*
Group (G)	2	107.00	53.50	1.53	n.s.
T x G	4	189.72	47.43	1.35	n.s.
Residual	45	1576.50	35.03		
Total	53	1970.00	37.17		

*n.s. = not significant at an alpha level of .1.

The results indicate that there are no significant effects due to treatments, groups, or their interaction. Hence, the use of age as a covariate in the ensuing study was not required. Reasonable assurance is given that age would not confound the effects the independent variables might have on concept learning performance.

DELIMITATIONS

Based upon the characteristics of the subject population discussed in the preceding section, generalization of the findings is subject to the following limitations:

a. Limited to males identified as hyperactive; non-hyperactive, impulsive; or non-hyperactive, non-impulsive.

b. Limited to hyperactive males not taking stimulant or any other medication (the purpose of which is to control hyperactivity) for at least one month prior to initiation of the study.

c. Limited to males possessing intellectual ability in the normal range.

d. Limited to males aged 96-120 months.

TREATMENT CONDITIONS

The treatment variable, type of corrective feedback, contained three levels. All treatments were conditional upon the type of response made by the subject (S).

Treatment condition one, RW, involved telling S he was right after each correct response and telling him he was wrong after each incorrect response.

Treatment condition two, RN, involved telling S he was right after each correct response and saying nothing to him after each incorrect response.

Treatment condition three, NW, involved saying nothing to S after each correct response and telling him he was wrong after each incorrect response.

When feedback required telling S he was right, one of the following responses was given by the examiner (E):

1. "Yes, that's the right one!"
2. "Right!"
3. "Yep, that's it!"
4. "Yes, that's correct!"
5. "That's the right one!"

When feedback required telling S he was wrong, one of the following responses was given by E:

1. "No, that's the wrong one!"
2. "Wrong!"
3. "Nope, that's wrong!"
4. "No, that's wrong!"
5. "That's the wrong one!"

TASK AND PROCEDURES

Task

The concept identification task was adapted from the Wisconsin Card Sorting Test (Berg, 1948). The test consists of a set of 24 response cards and four stimulus boards. Each card (3 x 5 inch) contains pictures having three variable stimuli; shape, color, and number (Appendix D). Each stimulus board (3 x 22 inch masonite) contains the same set of four stimulus cards--one red triangle, two green octagons, three yellow crosses, and four blue circles. The only difference between boards is the order in which the cards appear. Based on the stimulus number these orders are 1234, 4321, 2413, and 3142.

To eliminate ambiguity, the deck of 24 response cards was selected from the 64 cards originally in the Wisconsin version of the test. These cards were selected so that on any one sort, the subject could not use the same stimulus for more than one dimension. For example, a card containing three blue circles could be sorted under the stimulus card four blue circles on the basis of either shape or color. E cannot determine the correctness of such a sort and therefore cannot determine what feedback is appropriate. Thus, all cards resulting in this type of ambiguity were eliminated. When the subject made a response, E always knew the correctness of that response.

Procedure

Each third grade teacher was given two sets of cards. One set contained five cards, each having a number from one to five on it. The second set of cards contained the names of each male in her class who was to participate in the study. Also, on the card were the treatment condition to which that child had been randomly assigned and the order in which tasks were to be learned by the child (color, shape, number; shape, color, number; etc.).

Five subjects were given a numbered card and a name card by the teacher. They were then instructed to take the cards to a designated room within the school. Upon entrance to the room, each S was directed to the table corresponding to his number card.

The experimental setting included a set of 4 stimulus boards propped up (one behind the other) at 3/4 arm's length in front of each S, a stack of 24 response cards, and two examiners. One examiner (E_1) served as recorder and did not interact with S at all. The other examiner (E_2) conducted all activity. Both Es had a master list containing each child's name, teacher, treatment condition, task sequence, but not group designation.

Upon agreement between E_1 and E_2 of the pre-set treatment and task sequence, E_2 spoke the following directions to S:

> "See these cards up here (points to stimulus board)? I want you to take each one of these cards (points to response cards) and put it up here in front of the one you think it goes with. I'm not going to tell you which one it is. You have to guess. You mustn't ask me any questions. Try the first one."

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S was then given one card at a time until the deck of 24 had been gone through three times (48 trials) or a criterion of ten consecutive correct responses reached. After every 6 responses, regardless of correctness, the stimulus board was flopped down bringing the next one into view. This was done in order to keep the child from developing a response set for position of stimulus cards. After the task was completed, the stack of boards was replaced and all cards returned to the original order. E_2 then spoke the following:

"Now, let's try it again."

This procedure was used until all three concept tasks were completed.

Upon completion of the tasks, S was debriefed and sent back to class with only the number card. His teacher then gave the number card plus a subject card to the next pupil. When all males from one classroom had completed the learning tasks, the number cards were sent to the next classroom and the process was started over.

NULL HYPOTHESES

Main Study Analysis

There were three major hypotheses investigated in this study. The focus of each hypothesis concerned the effects of treatments (RW, RN, NW), groups (HA, NHA/I, NHA/NI), or the interaction of treatments and groups on concept learning performance. The following represent the specific null hypotheses that were tested:

1. The type of corrective feedback will not have an effect on concept learning performance.

2. Group membership will not have an effect on concept learning performance.

3. Concept learning performance will not vary according to group status interacting with type of corrective feedback.

Besides the three major hypotheses, three additional hypotheses were considered in the main study. All of these involved the variable, initial task. Again, this variable was included in the study to control for the confounding effects it may have had on the experimental variables of interest. The following are the null hypotheses tested to determine the effects of initial task on concept learning performance:

1. Initial task will not have an effect on concept learning performance.

2. Concept learning performance will not vary according to group status interacting with initial task.

3. Concept learning performance will not vary according to type of corrective feedback interacting with initial task.

In cases where main variable effects were found to be present, appropriate post hoc comparisons were made. The purpose of these comparisons would be to identify between which means differences occurred. When main effects were found not to be present, no post hoc comparisons were made.

Ancillary Research Analysis

Several questions were raised regarding the relationships between ratings of hyperactivity and ratings of aggression, and each of those with three measures of impulsivity. Because

the initial data used to identify the study population was available, the following null hypotheses were tested:

1. No relationship exists between teacher ratings of hyperactivity and teacher ratings of aggression.

2. No relationship exists between teacher ratings of hyperactivity and mean response time (latency) on the MFFT.

3. No relationship exists between teacher ratings of hyperactivity and the number of errors on the MFFT.

4. No relationship exists between teacher ratings of hyperactivity and the presence of impulsivity.

5. No relationship exists between teacher ratings of aggression and mean response time on the MFFT.

6. No relationship exists between teacher ratings of aggression and the number of errors on the MFFT.

7. No relationship exists between teacher ratings of aggression and the presence of impulsivity.

STATISTICAL ANALYSIS

Main Study Analysis

The first three null hypotheses for the main study were tested using a Two-Way Analysis of Variance (fig. 1). This test was chosen for its ability to test for the separate effects of two or more independent variables. The three F-ratios of interest, the two main effects and their interaction, were considered statistically significant when found to be larger than the tabled F-value for alpha = .05. The

purpose of using this probability level was to guard against the possibility of a Type I error; i.e., accepting a false hypothesis as true.

Any main effects associated with the two variables were further analyzed using Tukey post hoc comparison procedures. The Tukey technique was chosen for its ability to make pair comparisons between means calculated from cells with equal numbers of subjects (Glass and Stanley, 1970). Comparisons were considered significant if the obtained confidence interval, at alpha = .05, did not include zero.

Figure 1. Variable Matrix for Group Membership vs. Type of Corrective Feedback.

		Treatment		
		RW n = 18	RN n = 18	WN n = 18
GROUPS	HA n = 12	$\bar{x}$ trials to criterion n = 4		
	NHA/I n = 18	n = 6		
	NHA/NI n = 24	n = 8		

n = 54

The last three null hypotheses included in the main study were tested using two, Two-Way Analyses of Variance. The variables of interest were group, treatment, and initial task. The two Analyses of Variance (ANOVAs) were chosen over the single, more efficient Three-Way ANOVA because of

the small cell frequencies that would have resulted from assignment of subjects to all cells of a 3 x 3 x 3 factorial design. The HA group, having only 12 subjects would have had one subject per cell for six of the nine HA cells. And the NHA/I group (n = 18) would have had only two subjects per cell. The resulting statistical power, i.e., the ability of the test to detect differences that truly exist between means, would have been quite limited in the three-factor design. The most efficient way of eliminating the cell frequency problem was to use two, Two-Factor ANOVAs to test the initial task versus treatment and group variables. However, the use of multiple ANOVAs on the same data, requires a trade-off. The power gained by the use of more than one ANOVA is offset by an increase in the probability of making a Type I error. The multiple ANOVAs provide redundant information for each of the independent variables in the study. The total number of F-tests for the ANOVAs calculated on the three independent variables is nine. Three of these F-tests are repetitions of the F-tests for each independent variable. It is this redundancy that serves to unnecessarily inflate the probability of making a Type I error (alpha). It was determined by the investigator that the increase in statistical power was the more important concern in this study and therefore outweighed the concern for making a Type I error. The three tests of interest from the two ANOVAs (initial task, initial task by treatment, and initial task by group) were considered statistically significant when

found to be larger than the tabled F-value for alpha = .05. The variable matrices for these tests are presented in figure 2. Any significant differences found to be present were further analyzed using the same post hoc comparison procedures described earlier.

Figure 2. Variable Matrices for Initial Task vs. Type of Corrective Feedback Variables and Initial Task vs. Group Membership Variables.

		Initial Task		
		Shape n = 18	Color n = 18	Number n = 18
TREATMENTS	RW n = 18	$\bar{x}$ trials to criterion n = 6		
	RN n = 18			
	NW n = 18			

n = 54

		Initial Task		
		Shape n = 18	Color n = 18	Number n = 18
GROUPS	HA n = 12	$\bar{x}$ trials to criterion n = 4		
	NHA/I n = 18	n = 6		
	NHA/NI n = 24	n = 18		

n = 54

Ancillary Research Analysis

The null hypotheses for the ancillary research questions investigating relationships between variables with continuous measures were tested using a Pearson produce-moment correlation statistic and a follow-up large sample approximation, t-test. The variables included behavior ratings of hyperactivity and aggression, and response latency and number of errors on the MFFT. Measures on all third graders (N = 114) were used in the analysis. The t-test was used to test the null hypothesis that each correlation coefficient was not significantly different from zero. Correlations were considered significant if resultant t-values were larger than the tabled t-value at alpha = .05.

The two null hypotheses investigating relationships between behavior ratings and the dichotomously measured, impulsivity variable (impulsive or non-impulsive; see Special Definition) were tested using a point bi-serial correlation coefficient (r_{pb}) and a large sample approximation, t-test. The statistic, r_{pb}, is a nonparametric correlation coefficient which will measure to what extent two variables are related; one of which is measured dichotomously, the other measured continuously. The follow-up t-tests were considered to be significant if found to be larger than the tabled t-value for alpha = .05.

LIMITATIONS

Based upon the above design, procedures, and instruments, the following study has several limitations which should be clearly noted. These include the following:

a. Limited to the ability (reliability and validity) of the SBCL to correctly categorize aggressive and non-aggressive males.

b. Limited to the ability (reliability and validity) of the BRS to correctly categorize hyperactive and non-hyperactive males.

c. Limited to the ability (reliability and validity) of the MFFT to correctly categorize impulsive and non-impulsive males.

d. Limited to the ability of the global rating component of the SBCL to correctly assess intellectual ability in males.

e. Limited to the ability of the concept learning tasks to measure successful concept learning.

f. Limited to the ability of Two-Way Analysis of Variance to test for differences in the obtained data.

g. Limited to the abilities of the Pearson product-moment and point bi-serial statistics to successfully measure degree of relationship.

CHAPTER III

RESULTS OF THE ANALYSES

Main Study Analysis

The major purpose of this study was to investigate the effects that either corrective feedback or the identified behavioral characteristics may have on concept learning performance. The means and standard deviations for the total trials required to reach criterion in each cell of the variable matrix are presented in Table 3. Prior to the use of a Two-Way Analysis of Variance, consideration was given to the three assumptions underlying the statistical procedure. They are the following: (1) normality of the population from which the sample was drawn; (2) independence between observations; and (3) homogeneity of variance across independent variables. The first two assumptions are of little concern here because the test is "robust" with respect to normality, and subjects were given no opportunity to converse with each other during or after the learning tasks. The third assumption, however, presents a major concern since the ANOVA is not "robust" with respect to homogeneity when cell sizes are unequal. Inspection of column and row standard deviations reveal substantial size differences. Therefore, a Levene's test for Equality of

Table 3. Mean Trials to Criterion for Each Cell of the Treatment by Group Variable Matrix.

			TREATMENT			
			RW	RN	NW	Row Totals
GROUPS	HA	Mean*	61.50	90.50	76.75	76.25
		SD	29.08	23.16	29.05	27.57
		N	4	4	4	12
	NHA/I	Mean	48.67	102.17	71.17	74.00
		SD	28.98	6.88	41.01	35.57
		N	6	6	6	18
	NHA/NI	Mean	47.75	104.75	52.50	68.33
		SD	15.69	17.26	13.33	30.26
		N	8	8	8	24
	Column Totals	Mean	51.11	100.72	64.11	
		SD	23.03	16.26	28.90	
		N	18	18	18	

*Lower means indicate faster learning.

Variances (Glass and Stanley, 1970) was performed on both the and group variables. Summaries for both Equality of Variance tests are presented in Tables 4 and 5. The small, non-significant F-values provide evidence that the variances between groups and between treatments are homogeneous. The assumption of equality of variances is therefore supported.

Table 4. Summary ANOVA for Levene's Test of Equality of Variances for Treatments (T).

Sources of Variation	df	SS	MS	F	
Between T	2	822.87	411.44	1.58	n.s.*
Within T	51	13,255.45	259.91		

*n.s. = not significant at an alpha level of .05.

Table 5. Summary ANOVA for Levene's Test of Equality of Variances for Groups (G).

Sources of Variation	df	SS	MS	F	
Between G	2	192.77	96.39	.42	n.s.*
Within G	51	11,663.29	228.69		

*n.s. = not significant at an alpha level of .05.

All assumptions having been met, the Two-Way Analysis of Variance was performed. Table 6 presents the results of that analysis. Only the type of corrective feedback variable (treatment) had an effect on concept learning performance. Both group main effect and the interaction effect proved not statistically significant. These results provide for the following conclusions about the null hypotheses:

1. The null hypothesis which states that the type of corrective feedback will not have an effect on concept learning performance is rejected;

2. The null hypothesis which states that group membership will not have an effect on concept learning performance is supported; and

3. The null hypothesis which states that concept learning performance will not vary according to group status interacting with the type of corrective feedback is also supported.

Appropriate post hoc comparisons were utilized to compare the means between types of corrective feedback. The purpose of these comparisons was to identify where the statistical differences were specifically located. Inspection of the group means suggests that group two (RN) is probably "causing" the difference identified in Table 6 (see also Table 3,

Table 6. Summary ANOVA for Concept Learning Task.

Sources of Variation	df	SS	MS	F
Treatment (T)	2	23,823.82	11,911.91	21.81*
Group (G)	2	611.40	305.70	.56
T x G	4	2,523.02	630.76	1.16
Residual	45	24,574.75	546.11	
Total	53	51,532.98	972.32	

*F-value is significant beyond an alpha level of .05.

column Totals for treatment means). In order to gain support for this hypothesis, the three following comparisons were made: (1) group two (RN) versus group three (NW); (2) group two RN versus group one (RW); and (3) group one (RW) versus group three (NW). In Table 7 these comparisons are presented.

Table 7. Contrasts on the Independent Variable, Type of Corrective Feedback.

Contrast	Difference Between Means	Confidence Interval*	Decision
$\bar{x}_{RN} - \bar{x}_{NW}$	36.61**	21.02 to 52.20	Significant
$\bar{x}_{RN} - \bar{x}_{RW}$	49.61	34.02 to 65.20	Significant
$\bar{x}_{RW} - \bar{x}_{NW}$	-13.00***	-2.59 to 28.59	n.s.

*Confidence intervals calculated with an alpha level = .05.

**The positive difference indicates that the RN group took longer to learn the tasks.

***The negative difference indicates that the NW group took longer to learn the tasks.

Statistics were calculated using the Tukey post hoc comparison technique. The logical comparisons, based on an inspection of the Column Means (Table 3), are between feedback conditions which include giving information of a wrong response (W) and the condition not having that feature. As indicated in Table 7, the inclusion of W apparently leads to faster learning. Whether the W feature is paired with no information given for a right response (N), or knowledge of a right response (R), apparently makes little difference. The RW condition produces somewhat faster learning than the NW condition, but the difference is not statistically significant.

The third independent variable investigated in the main study was the initial task given subjects. Two separate, Two-Way ANOVAs were used to test for main effects of the three variables. The variables, treatment and initial task were analyzed first. The means and standard deviations for the total trials to criterion for the treatment by initial task variable matrix are presented in Table 8. The need for a Levene's test for equality of variance has been eliminated in this situation because of equal cell sizes. The assumption requiring homogeneity of variance is "robust" in situations where cell sizes are equal.

The summary table for the Two-Way Analysis of Variance for treatment versus initial task is presented in Table 9. One of the two main effects and the interaction effect are statistically significant. The first, type of corrective feedback (treatment), was expected. This F-test is redundant

Table 8. Mean Trials to Criterion for Each Cell of the Treatment by Initial Task Variable Matrix.

			TREATMENT			
			RW	RN	NW	Row Totals
INITIAL TASK	Shape	Mean	39.83	103.83	45.17	62.94
		SD	3.37	5.31	12.02	30.73
		N	6	6	6	18
	Color	Mean	73.17	99.50	63.50	78.72
		SD	28.85	21.34	19.11	27.04
		N	6	6	6	18
	Number	Mean	40.17	98.00	81.00	73.06
		SD	7.81	19.60	41.13	35.39
		N	6	6	6	18
	Column Totals	Mean	51.11	100.72	64.11	
		SD	23.03	16.26	28.90	
		N	18	18	18	

Table 9. Summary ANOVA for Treatment by Initial Task using Trials to Criterion as the Dependent Variable.

Sources of Variation	df	SS	MS	F
Treatment (T)	2	23,836.70	11,918.35	26.99*
Initial Task (I)	2	2,299.70	1,149.85	2.60
T x I	4	6,063.63	1,515.91	3.43*
Residual	45	19,869.17	441.54	
Total	53	52,069.20	982.44	

*F-value is significant beyond an alpha level of .05.

with the same main effect reported in Table 6. The interaction effect involves the type of corrective feedback and initial task. In order to determine whether the interaction was ordinal or disordinal, the mean trials to criterion were plotted in

figure 3. Clearly, the interaction effect is ordinal with respect to treatment condition RN versus conditions RW and NW. The interaction suggests that for each initial task, the RN feedback condition is consistently inferior (i.e., requires more trials to reach criterion) to either RW or NW feedback conditions. And, the magnitude of these differences varies across initial tasks. The interaction between RW and NW feedback conditions is disordinal with respect to initial task. Disordinality is apparent because the magnitude of the differences between conditions changes with each initial task, and the superiority of one treatment over the other also changes with respect to initial task. The RW condition proves superior to the NW condition when the initial task is number; but the two are equivalent when the initial task is shape or color. Support for these results is given in Table 10, where the following post hoc comparisons were developed:

1. Using shape as the initial task.
   a. RN versus NW
   b. RN versus RW
   c. RW versus NW

2. Using color as the initial task.
   a. RN versus NW
   b. RN versus RW
   c. RW versus NW

3. Using number as the initial task.
   a. RN versus NW
   b. RN versus RW
   c. RW versus NW

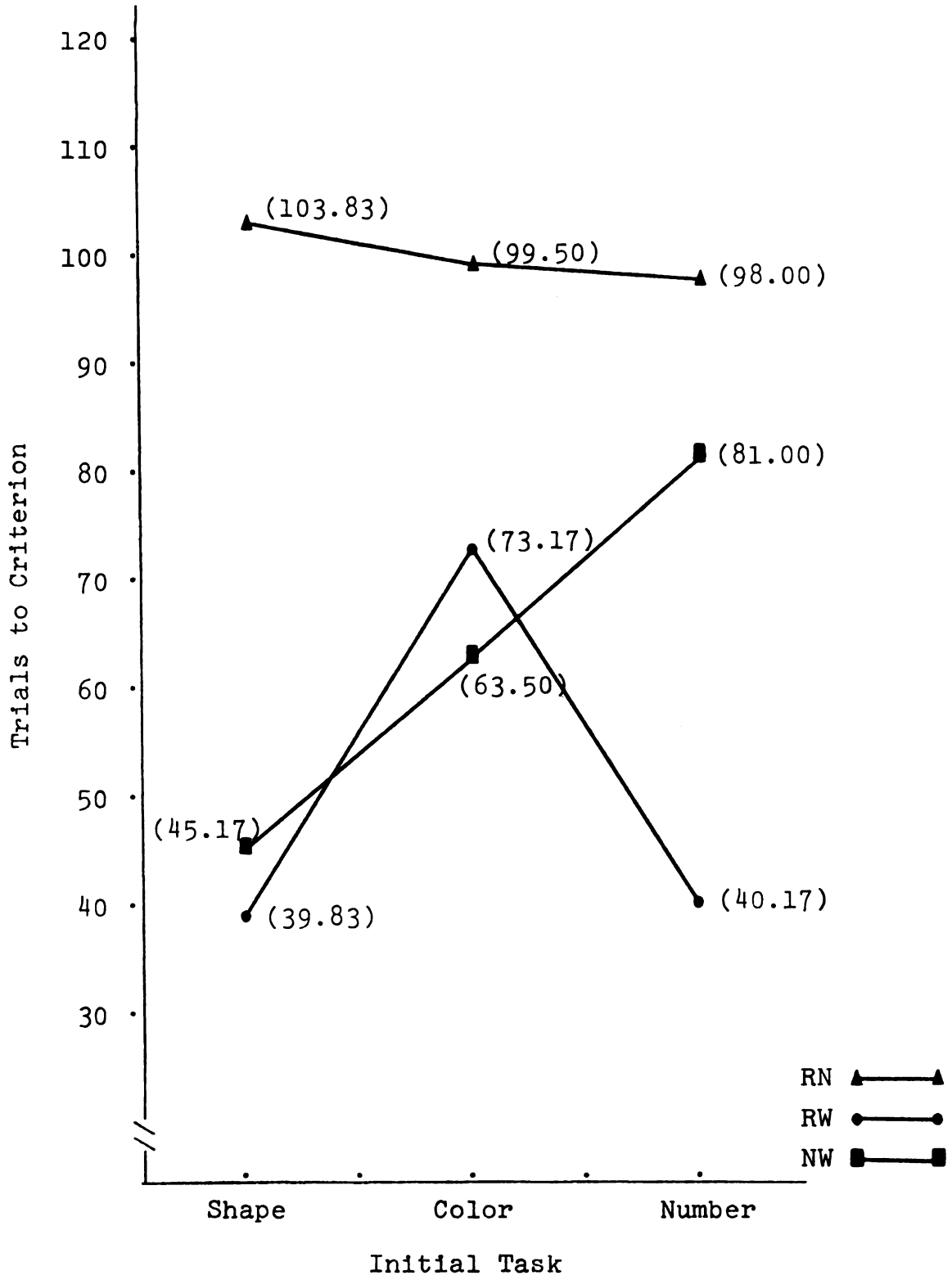

Figure 3. Mean Number of Trials to Criterion for Each Type of Corrective Feedback Versus Initial Task (note lower means indicate faster learning).

Table 10. Contrasts for Each Initial Task on the Independent Variable, Type of Corrective Feedback.

Contrast	Difference Between Means	Confidence Interval*	Decision
Shape			
$\bar{x}_{RN} - \bar{x}_{NW}$	58.66**	44.62 to 72.70	Significant
$\bar{x}_{RN} - \bar{x}_{RW}$	64.00	49.96 to 78.04	Significant
$\bar{x}_{RW} - \bar{x}_{NW}$	5.34	-8.70 to 19.38	n.s.
Color			
$\bar{x}_{RN} - \bar{x}_{NW}$	36.00	21.96 to 50.04	Significant
$\bar{x}_{RN} - \bar{x}_{RW}$	26.33	12.29 to 40.37	Significant
$\bar{x}_{RW} - \bar{x}_{NW}$	9.67	-4.37 to 23.71	n.s.
Number			
$\bar{x}_{RN} - \bar{x}_{NW}$	17.00	2.96 to 31.04	Significant
$\bar{x}_{RN} - \bar{x}_{RW}$	57.83	43.79 to 71.87	Significant
$\bar{x}_{RW} - \bar{x}_{NW}$	-40.83	26.79 to 54.87	Significant

*Confidence intervals calculated with an alpha level = .05.

**Mean differences are interpreted the same way here as in Table 7.

Figure 4 shows the same mean trials to criterion plotted with the variable corrective feedback on the abscissa. Here the interaction between variables is disordinal with respect to all three initial tasks; i.e., the tasks change their mean position order with each type of corrective feedback.

Differences between the means of the initial task and group membership variables were also analyzed using a Two-Way ANOVA. Inspection of the cell, column, and row standard deviations (Table 11) provides evidence that the assumption

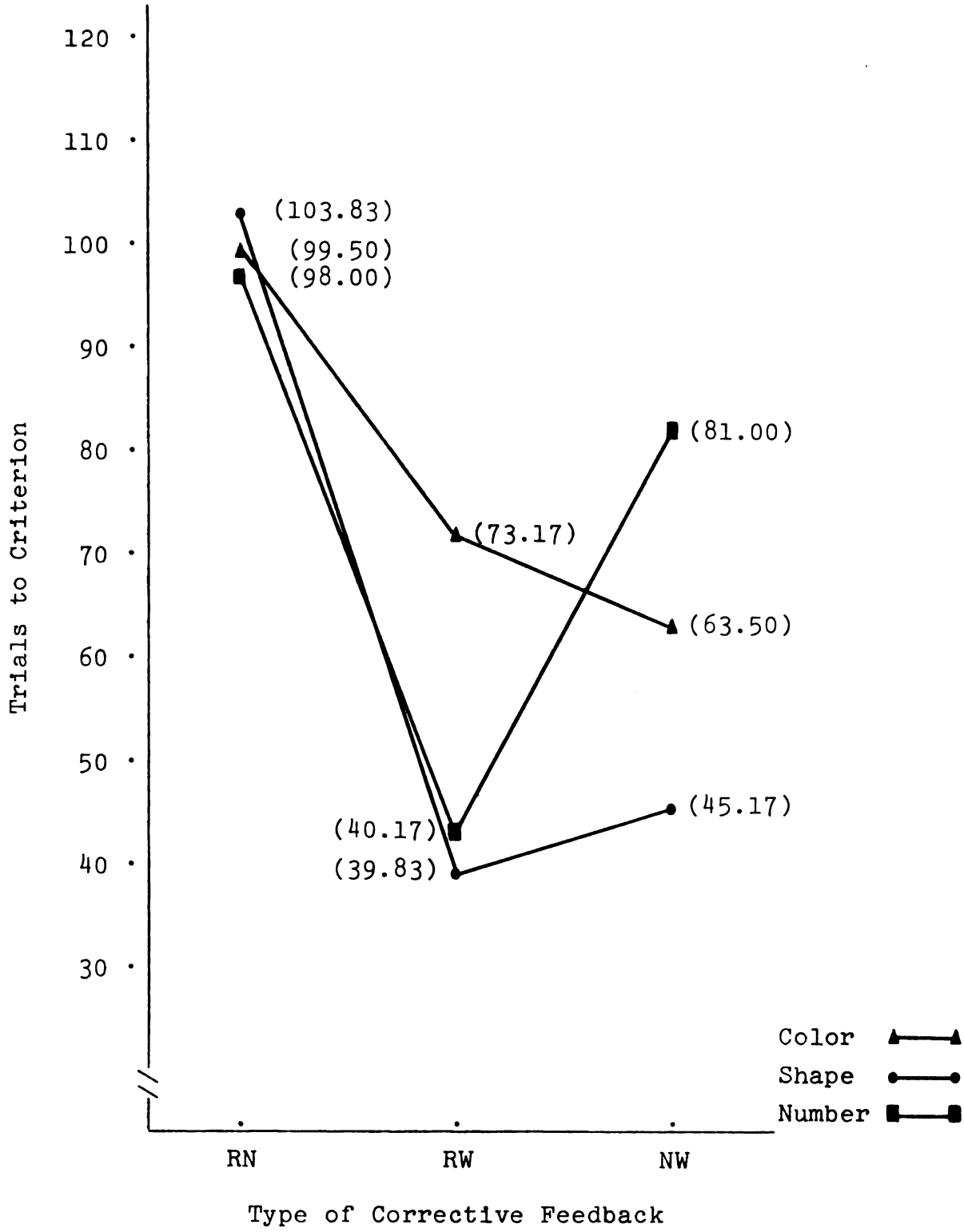

Figure 4. Mean Number of Trials to Criterion for Each Initial Task Versus Type of Correct Feedback.

Table 11. Mean Trials to Criterion for Each Cell of the Initial Task by Group Variable Matrix.

			GROUP			
			HA	NHA/I	NHA/NI	Row Totals
INITIAL TASK	Shape	Mean	69.00	63.00	59.88	62.94
		SD	35.62	33.61	30.18	30.73
		N	4	6	8	18
	Color	Mean	70.25	80.67	81.50	78.72
		SD	25.75	25.62	31.14	27.04
		N	4	6	8	18
	Number	Mean	89.50	77.33	61.63	73.06
		SD	21.81	47.41	30.20	35.39
		N	4	6	8	18
	Column Totals	Mean	76.25	73.67	64.67	
		SD	27.43	35.34	30.83	
		N	12	18	24	

of homogeneity of variance for the statistical test has been satisfied. All other assumptions underlying this test are also presumed to have been satisfied. In Table 11 the mean trials to criterion and the standard deviations for each cell of the variable matrix are presented. The summary ANOVA is presented in Table 12. As expected, the group main effect is not significant. This is, again, a redundant F-test. Results in Table 12 also provide evidence that both the initial task main effect and the interaction effect were not statistically significant. Since neither variable appears to have an effect on concept learning performance in this study graphing of mean performance is not warranted.

Table 12. Summary ANOVA for Group by Initial Task Using Trials to Criterion as the Dependent Variable.

Source of Variation	df	SS	MS	F	
Group (G)	2	707.62	353.81	.34	n.s.*
Initial Task (I)	2	2,299.70	1,149.85	1.10	n.s.
G x I	4	2,122.71	530.68	.51	n.s.
Residual	45	46,939.17	1,043.09		
Total	53	52,069.20	982.44		

*n.s. = not significant at an alpha level of .05.

The results of the above statistical analyses provide for the following conclusions concerning the initial task variable:

1. The null hypothesis which states that the type initial task will not have an effect on concept learning performance is supported;

2. The null hypothesis which states that concept learning performance will not vary according to group status interacting with initial task is supported; and

3. The null hypothesis which states that concept learning performance will not vary according to type of corrective feedback interacting with initial task is rejected.

Ancillary Research Analysis

Several supplementary research questions were proposed in the study. The first of these suggested that teacher ratings of hyperactivity (BRS) and their ratings of aggression (SBCL) were related. A Pearson product-moment correlation and a significance test of that correlation were calculated on the entire third grade population originally rated. The results of these calculations are presented in Table 13. The ratings of hyperactivity and aggression were found to be correlated, $r = .654$. The subsequent t-test is singificant at alpha = .001.

Therefore, the null hypothesis of no relationship between these variables is rejected. The total variance accounted for by each variable is .428, given by the coefficient of determination (r^2).

Table 13. Pearson Product-Moment Correlation Coefficient Between Ratings of Hyperactivity and Aggression

r	r^2	N	Significance
.654	.428	109	.001

All other research hypotheses concerned relationships between the behavioral ratings and the three measures of impulsivity. Teacher ratings of hyperactivity and aggression were each correlated with the two component measures of impulsivity, response latency and number of errors. The behavioral ratings were also correlated with impulsivity, when it was used as a dichotomous variable (based on the definition of impulsivity used in the study). Correlations between the behavioral ratings and the two component measures of impulsivity were also calculated using the Pearson product-moment correlation procedure. The two correlations between behavioral ratings and impulsivity, used as a dichotomous variable, were calculated using a point bi-serial correlation coefficient. All six correlation coefficients are presented in Table 14. The table indicates that ratings of hyperactivity are correlated substantially with the number of errors made on the MFFT (.684). Response latency also correlates

significantly with ratings of hyperactivity (.188), but this correlation is less than moderate. These same two variables, when correlated with ratings of aggression, are found not to be significant and in fact approach zero (-.003 and .05). An interesting result is noted in the correlations between behavioral ratings and the dichotomous measure of impulsivity (.02 and .04). From neither ratings of hyperactivity nor ratings of aggression can one predict presence or absence of impulsivity as defined in this study.

Table 14. Correlations Between Behavioral Ratings and Measures of Impulsivity.

Ratings		Response Latency	Number of Errors	Impulsivity
Hyperactive (BRS)	r_2	.188	.684	.020
	r^2	.035	.468	.000
	N	109	109	109
	Sig*	.025	.001	n.s.
Aggression (SBCL)	r_2	.050	-.003	.040
	r^2	.003	.000	.002
	N	109	109	109
	Sig	n.s.	n.s.	n.s.

*Sig - provides significance level beyond .05, otherwise, designated n.s. (not significant).

CHAPTER IV

SUMMARY AND DISCUSSION

How to provide a successful educational experience for the hyperactive child has proved to be a perplexing problem for educators and psychologists. The major reasons for this are inconsistent identification of these children and our inability to understand their presenting educational problems.

Typically the hyperactive child is performing substantially below grade norms but has average or above general intellectual functioning. Some investigators suggest that these children do not perform as well as normal achieving children on concept learning tasks. Several reasons for these performance differences have been put forth. Some of these include the hyperactive child's impulsive characteristic, his poor attentional skill, his inability to use verbal mediation, or his unusual motivational attributes.

In order to further investigate the proposed differences in concept learning performance and the role impulsivity might play in that learning, three groups of children with distinct behavioral characteristics were identified. These groups included 12 hyperactive (HA); 18 non-hyperactive, impulsive (NHA/I); and 24 non-hyperactive, non-impulsive

(NHA/NI) third grade boys with average intellectual functioning. Also of interest was the hypothesis that hyperactive children may utilize knowledge of results (corrective feedback) differently than non-hyperactive children. In order to investigate this hypothesis, equal numbers of boys from each behavioral group were randomly assigned to one of three corrective feedback treatments, including (1) telling the subject he was right after a correct response and telling him he was wrong after an incorrect response (RW); (2) telling the subject he was right after a correct response and saying nothing after an incorrect response (RN); and (3) saying nothing after a correct response and telling the subject he was wrong after an incorrect response (NW). All subjects, under each treatment condition, were required to learn three concepts to a specified criterion on a Wisconsin-type card sorting task. The concepts to be learned were shape, color, and number. Because of a noted preference for the shape concept in third grade boys, the initial task given each subject was included in the study as an independent variable.

Supplementary investigations were concerned with the relationships between ratings of hyperactivity and aggression and relationships between both types of behavioral ratings and three measures of impulsivity; response latency, number of errors, and a combination of these (this combination was defined earlier; see Special Definition).

A total of three, two-factor Analyses of Variance (ANOVA) were used to test for main effects among the three independent

variables; treatment, group, and initial task. Three, two-factor ANOVAs instead of one, three-factor ANOVA were used to increase statistical power.

The research questions investigating relationships between behavioral ratings and between behavioral ratings and measures of impulsivity were analyzed using correlation coefficients and subsequent significance tests.

The following is a summary of the findings based on the null hypotheses tested: (1) behavioral group membership (HA, NHA/I, or NHA/NI) did not have an effect on concept learning performance; (2) no significant interaction was found to exist between corrective feedback condition (RN, RW, and NW) and behavioral group membership; (3) subjects learning under the RN feedback condition required significantly more trials to reach criterion, regardless of initial task or group membership, than did subjects performing under RW and NW feedback conditions; (4) the initial concept task given subjects did not, by itself, affect total performance on the three learning tasks; (5) feedback condition RW facilitated faster learning when the initial task required learning the number concept; (6) both RW and NW feedback conditions were equivalent in facilitating faster learning than the RN condition, for shape and color concepts; (7) a significant, positive relationship was found to exist between teachers' ratings of hyperactivity and their ratings of aggression; (8) also, teachers' ratings of hyperactivity were found to be positively, and significantly, related to

both response latency and the total number of errors committed on the MFFT. However, no relationship was found to exist between hyperactivity and impulsivity as defined in the Special Definition; and (9) teachers' ratings of aggression in third grade boys are not related to either, component measures of impulsivity or impulsivity as defined in this study.

DISCUSSION

There were two major issues addressed in the study. One issue concerned the differential effects corrective feedback may have on the concept learning performances of hyperactive and non-hyperactive boys. The second issue concerned the role impulsivity may play in the concept learning performances of these same boys.

Several studies investigating hyperactivity have suggested that poor classroom performances by hyperactive children are due to an inability to learn concepts at the same rate non-hyperactive children learn them. Even more specific is the notion that this inability is demonstrated in the pre-solution, or initial stages of learning. One factor affecting initial learning of concepts is corrective feedback (knowledge of results). That is, telling the child he has made a correct or an incorrect response to a problem, after each response. The only research focusing on feedback given to hyperactive children in concept learning situations

involves reinforcement theory. Results of these studies indicate that, generally, hyperactive children perform as well as non-hyperactive children when under reinforcement treatments. The general understanding, in the field of Educational Psychology, is that reinforcement has its greatest effect on the latter stages of learning. That is, when learning involves an improvement in performance. Knowledge of results, on the other hand, has its greatest influence on the early stages of learning. That is, when the learner is attempting to understand the task and determine alternative responses. Whether corrective feedback functions differently in the early stages of learning for hyperactive boys than for non-hyperactive boys, seemed to be an important question.

The results of this study indicate that hyperactive boys performed as well as non-hyperactive boys on the three concept learning tasks. Also, corrective feedback, while having an expected effect on concept learning performance, did not have a variable effect that was different for hyperactive and non-hyperactive boys. These results are in disagreement with the literature suggesting hyperactive children perform less well than non-hyperactive children on concept learning tasks. The noted effects of corrective feedback on the performance of all groups supports the previous literature on knowledge of results. Telling the learner only that he has made a correct response fails to facilitate a search for alternative hypotheses. Also, when

information of a wrong response is included in feedback, the learner more effectively corrects his mistakes.

It should be pointed out that the data in Table 3 show some interesting trends. Hyperactive subjects receiving the RN treatment performed superior to non-hyperactive subjects receiving the same treatment. Also, hyperactive subjects performed inferior to non-hyperactive subjects when receiving either of the treatments that gave feedback for a wrong response. None of these observed differences are statistically significant. Even so, these data may suggest that hyperactive children did not utilize information of a wrong response as efficiently as did non-hyperactive children. Perhaps larger sample sizes would indicate that true differences do exist. Even though cell variances were homogeneous, they were quite large. Support for the existing results, however, is found with investigations using the some concept learning tasks and normal study populations (Mitler and Harris, 1969; 1970). These studies have found variances for all cell populations (N = 20 per cell) to be quite large. Buss et al. (1956), using the same task and feedback conditions, also noted large within cell variances (N = 15 per cell). Such results suggest that the large variances found in the present investigation were more a function of the tasks and treatments than they were the small populations used in the study. An alternative explanation for finding non-significant differences between groups and treatments is the possibility of similar study populations. Perhaps the study populations were more

alike than not alike on the variables of aggression and hyperactivity. Based on the criteria for inclusion in hyperactive group membership, this seems to be an unlikely possibility.

The studies by Mitler and Harris (1969, 1970) have suggested that third grade children show a sorting preference for shape over color and number concepts. After noting this preference in the results of their study, the initial task given subjects was included as an independent variable to be analyzed in this study. This variable served mainly as a control for the confounding effects it may have had on the total performances of the study population. The initial concept learned did not, by itself, affect total trials-to-criterion performance. However, in combination with feedback condition, an effect was noted. For all groups the feedback condition RW facilitated faster learning when the initial concept to be learned was number. Mitler and Harris note that this is the most difficult concept for these children. For color and shape tasks, feedback conditions RW and NW were equally effective in facilitating performance. Hence, a general conclusion can be drawn from these data. When the task is difficult, giving continual feedback of both right and wrong responses facilitates learning best. When the task is not so hard, giving either information of wrong response or of both right and wrong responses will facilitate learning.

If impulsivity were to play a major role in concept learning performance, then both the HA and NHA/I groups would be expected to perform in a similar manner. The findings indicate that this was not the case in this study. There were no significant differences between the three groups on their concept learning performances. Also, the obtained cell means presented in Table 3 indicate that the NHA/I group performances varied almost directly with the NHA/NI group performances. Rather than varying with the HA group performances, as would be expected if impulsivity were a relevant factor in the performances of hyperactive children. The only case where the performances of the NHA/I and NHA/NI groups were not alike, was when they were given the NW treatment condition. However, the unusually large standard deviation in the NHA/I group cell indicates that one or two individual scores artificially inflated the cell mean.

While it is clear from the results that neither hyperactivity or impulsivity affect the concept learning performances of third grade boys, the relationship between the two variables is not so easily understood. The general finding in this regard indicates that the behaviors associated with hyperactivity are related to impulsivity and the behaviors associated with aggression are not related to impulsivity. Ratings of hyperactivity were positively related to both response latency and the total number of errors on the MFFT. These findings are in agreement with Juliano (1974) who also found measures of impulsivity to be correlated with a group

identified as hyperactive. Based on these data, it can be concluded that third grade boys receiving higher ratings of hyperactivity can also be expected to be more impulsive than boys who receive lower ratings of hyperactivity. An interesting finding complicates this issue, however. Boys who were identified as impulsive were not necessarily the same boys who received higher ratings of hyperactivity (see correlation, Table 14). A reasonable explanation for this finding may suggest that impulsivity, as measured by the MFFT and as defined in this study, is different from the impulsivity that teachers perceive in the classroom. The highly significant correlation between response latency and ratings of hyperactivity may, by itself, more closely reflect teacher perceptions of impulsivity.

IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Based on the definitions, limitations, and findings of this study, the following implications and suggestions may be made regarding hyperactive and impulsive third grade boys with average intelligence:

1. Hyperactive and impulsive boys perform as well as non-hyperactive, non-impulsive boys on simple concept learning tasks.

2. Hyperactive and impulsive boys utilize knowledge of results in the same ways they are utilized by non-hyperactive, non-impulsive boys.

3. Hyperactive boys are more impulsive than non-hyperactive boys, but this impulsivity does not appear to be a factor in their performance on simple concept learning tasks.

4. Aggressive behaviors account for a large part of the behaviors noted in hyperactive boys.

5. It is recommended that future research focus on more complex classroom performance tasks such as reading or math skills rather than simple concept learning tasks. These are areas to which the present investigation cannot generalize.

6. It is recommended that future research look at alternative roles impulsivity might play in classroom performance rather than the effects of impulsivity on specific concept learning. A suggested focus might review the relationships between impulsivity and Locus of Control or other motivational variables.

7. It is recommended that future research projects do not use the MFFT to identify impulsivity in hyperactive boys. This measure does not appear to be related to teacher perceptions of impulsivity.

8. It is recommended that classroom teachers emphasize the use of corrective feedback in the classroom. And further, when those topics and concepts are unusually difficult, teachers should give feedback to children which indicate a correct response has been made, or an incorrect response has been made.

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APPENDICES

APPENDIX A

Part I

SCHOOL BEHAVIOR CHECKLIST BOOKLET

Clinic No. _____

SCHOOL BEHAVIOR CHECK LIST-FORM A2

FOR AGES 7-13

Child's Name _____ Date _____
LAST FIRST MIDDLE INITIAL

Age _____ Date of Birth _____
MONTH DAY YEAR

SEX
__ 1—Male
__ 2—Female
__ 0—No Inf.

Home Address _____ Phone No. _____

City _____ State _____ Zip _____

RACE
__ 1—Black
__ 2—Red
__ 3—White
__ 4—Yellow
__ 0—No Inf.

RELIGION
__ 1—Catholic
__ 2—Jewish
__ 3—Protestant
__ 4—Other
__ 9—None
__ 0—No Inf.

CURRENT SCHOOL GRADE
__ 1—1st
__ 2—2nd
__ 3—3rd
__ 4—4th
__ 5—5th
__ 6—6th
__ 7—7th
__ 8—8th
__ 9—9th
__ 10—10th
__ 11—11th
__ 12—12th
__ 13—College
__ 14—Post Grad.
__ 15—Pre-Sch.
__ 99—None
__ 00—No Inf.

NO. SIBLINGS

	Bro.	Sis.
None	__	__
One	__	__
Two	__	__
Three	__	__
Four	__	__
More	__	__
No Inf.	__	__

Teacher's Name _____ Years of Experience ____ School _____

PARENT INFORMATION

NAME: FATHER _____ Age ___ MOTHER _____ Age ___

OCCUPATION: FATHER _____ MOTHER _____

MARITAL STATUS

Mo.	Fa.	
__	__	1—Married
__	__	2—Separated
__	__	3—Divorced
__	__	4—Widowed
__	__	5—Remarried
__	__	6—Unmarried
__	__	7—Other
__	__	0—No. Inf.

HIGHEST EDUCATION OBTAINED

Mo.	Fa.	
__	__	1—Sixth Grade
__	__	2—Ninth Grade
__	__	3—Twelfth Grade
__	__	4—2nd Yr. College
__	__	5—4th Yr. College
__	__	6—Post Graduate
__	__	7—Other
__	__	0—No Inf.

ESTIMATED FAMILY INCOME
__ 1—$2,999 or Below
__ 2—$3,000-$4,999
__ 3—$5,000-$7,999
__ 4—$8,000-$14,999
__ 5—$15,000-$24,999
__ 6—$25,000 or Above
__ 0—No Inf.

SES

Note: On Items 1-6, read each statement and answer "Yes" or "No".

(1) I would rate this pupil as one of the best adjusted I have known in my teaching career YES____ NO____

(2) I would rate this pupil as one of the most seriously disturbed I have known in my teaching career YES____ NO____

(3) I think this child should be referred for treatment for an emotional problem YES____ NO____

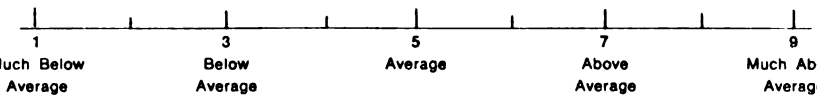
(4) This child is currently receiving treatment for an emotional problem YES____ NO____

(5) I think this child should be referred for special education for a learning disability YES____ NO____

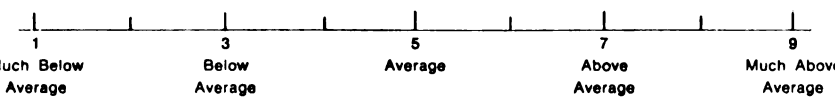
(6) This child is currently receiving special education for a learning disability YES____ NO____

Note: On items 7-11, please rate each child on a 9-point scale. Marker points are designated at odd numbers but feel free to place an X anywhere along the line between 1 & 9.

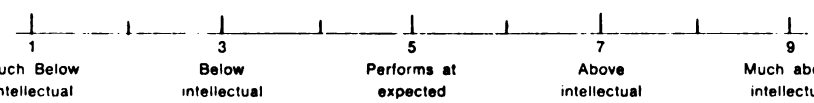
(7) How would you personally rate this pupil's intellectual ability?



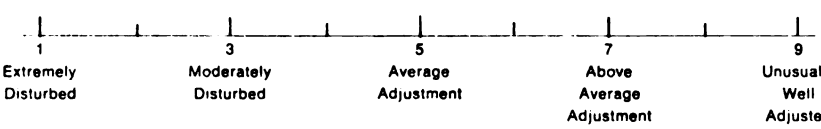
(8) How would you rate this pupil's academic skills?



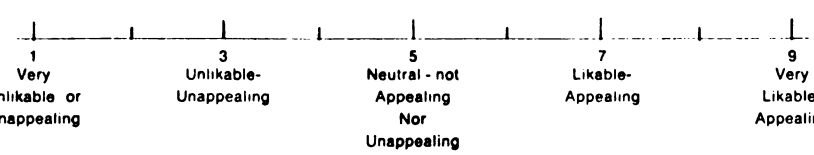
(9) How would you rate this pupil's overall academic performance?



(10) How would you rate this pupil's social and emotional adjustment?



(11) How would you rate this pupil's personal appeal?



DIRECTIONS: **Below you will find statements often used by teachers to describe children's behavior. Read each statement and decide if it describes the child being rated. If it does, mark (T) TRUE; if not, mark (F) FALSE.**

EXAMPLE
#1. (T) (F)
#2. (T) (F)

Note: It is important to mark EACH statement. If you are in doubt, check the answer which is most correct.

1. Is friendly (T) (F)
2. Tends to give up if has something hard to finish (T) (F)
3. Interrupts whoever is speaking (T) (F)
4. Penmanship (handwriting) at least one grade level below age expectation (T) (F)
5. Starts fighting over nothing (T) (F)
6. Is a helpful child (T) (F)
7. Is alert in class (T) (F)
8. Poorly coordinated when doing things with hands, such as coloring or pencil work (T) (F)
9. Reading ability at least one grade level below age expectation (T) (F)
10. Just stands around on the playground (T) (F)
11. Acts up when adults not watching (T) (F)
12. Volunteers to recite in class (T) (F)
13. Hits and pushes other children (T) (F)
14. Hands shake or is nervous when called on to recite (T) (F)
15. Finds fault with what other children do (T) (F)
16. Approaches a difficult task with an air of defeatism (T) (F)
17. Is considerate of others (T) (F)
18. Fails to carry out tasks (Homework assignments, seat work, etc.) (T) (F)
19. Lacks ambition to do well in school (T) (F)
20. Does things to get others angry (T) (F)
21. Will put up an argument when told not to do something (T) (F)
22. Does homework (T) (F)
23. Teases other children (T) (F)
24. Is afraid of making mistakes (T) (F)
25. Is bossy with other children (T) (F)
26. Is easily upset by changes (T) (F)
27. Is sure of self (T) (F)
28. Uses abusive language toward other children (T) (F)
29. Has changeable moods (T) (F)
30. Gives in when another child insists on doing something another way (T) (F)
31. Does not respect other people's belongings (T) (F)
32. Does not forget things which anger her/him (T) (F)
33. Seems to be off in own world (T) (F)
34. Is infuriated by any form of discipline (T) (F)
35. Likes an audience all the time (T) (F)
36. Finds it hard to study (T) (F)
37. Has to have everything own way (T) (F)
38. Works well alone (T) (F)
39. When angry, will refuse to speak to anyone (T) (F)
40. School performance is far below capabilities (T) (F)
41. Has no friends (T) (F)
42. Behind at least one school grade due to academic difficulties (T) (F)
43. Seems dull; slow to catch on (T) (F)
44. Will not ask questions even when unsure as to how to do the work (T) (F)

45. Fights back if another child has been asking for it (T) (F)
46. Never seems to be still for a moment (T) (F)
47. Argues with me (T) (F)
48. Is able to concentrate on things (T) (F)
49. Boasts of own toughness (T) (F)
50. Seems to think of self as worthless (T) (F)
51. Tries to be the center of attention (T) (F)
52. "Drags feet" when requested to do something (T) (F)
53. Accepts adult suggestions (T) (F)
54. Sulks when things go wrong (T) (F)
55. Becomes frightened easily (T) (F)
56. Resents even the most gentle criticism of work (T) (F)
57. Distractible; can't concentrate (T) (F)
58. Able to see the bright side of things (T) (F)
59. Fights with smaller children (T) (F)
60. Spelling performance at least one grade level below age expectation (T) (F)
61. Fearful of being hurt at play (T) (F)
62. Is stubborn (T) (F)
63. Never speaks up even when there is cause to be angry (T) (F)
64. Is interested in schoolwork (T) (F)
65. Tries to get other children into trouble (T) (F)
66. Does things just to attract attention (T) (F)
67. Never fights back, even if someone hits or pushes first (T) (F)
68. Prefers to be around adults, rather than play with children (T) (F)
69. Is popular with his classmates (T) (F)
70. Does things which are normal for children much younger (T) (F)
71. Never sticks up for self when picked on by other children (T) (F)
72. Threatens to hurt other children when angry (T) (F)
73. Average or above I.Q. (Intelligence Quotient) (T) (F)
74. Does not take orders when other children are in charge (T) (F)
75. Prefers to be alone and play alone (T) (F)
76. Finishes classroom assignments (T) (F)
77. Gives other children dirty looks (T) (F)
78. Deliberately interrupts what is going on by asking silly questions (T) (F)
79. Slow in making friends (T) (F)
80. Seems as happy as most children (T) (F)
81. Finds fault with instructions given by adults (T) (F)
82. Seems unconcerned when misbehaving (T) (F)
83. Cries easily (T) (F)
84. Is afraid of strange adults (T) (F)
85. Is self-confident (T) (F)
86. When angry, will do things like slamming the door or bang ng the desk (T) (F)
87. Acts in a "dare-devil," fearless manner (T) (F)
88. Has difficulty speaking clearly when excited or upset (T) (F)
89. Has a "chip on shoulder" (T) (F)
90. Becomes embarrassed easily (T) (F)
91. Bright, but doesn't apply self (underachiever) (T) (F)
92. Disturbs other children with boisterous behavior (T) (F)
93. Behind at least two school grades due to academic difficulties (T) (F)
94. Arithmetic skill at least one grade level below age expectation (T) (F)
95. Much anxiety — afraid of such things as storms, school, death, injury, war (considered phobic) (T) (F)
96. Frequent headaches, stomach aches or other non-specific physical complaints (T) (F)

APPENDIX A

Part 2

SCHOOL BEHAVIOR CHECKLIST SUBSCALES

SCHOOL BEHAVIOR CHECK LIST (SBCL)
SCALES AND ITEM CONTENT - MALE & FEMALE
FORM A2, AGES 7-13

SCALE 1: LOW NEED ACHIEVEMENT (LNA)
N=28

2.		Tends to give up if has something hard to finish.
6.	(-)	Is a helpful child.
7.	(-)	Is alert in class.
8.		Poorily coordinated when doing things with hands such as coloring or pencil work.
12.	(-)	Volunteers to recite in class.
16.		Approaches a difficult task with an air of defeatism.
18.		Fails to carry out tasks (homework assignments, seat work, etc.).
19.		Lacks the ambition to do well in school.
22.	(-)	Does homework.
27.	(-)	Is sure of self.
33.		Seems to be off in own world.
36.		Finds it hard to study.
38.	(-)	Works well alone.
40.		School performance is far below capabilities.
43.		Seems dull; slow to catch on.
44.		Will not ask questions even when unsure as to how to do work.
48.	(-)	Is able to concentrate on things.
52.		"Drags feet" when requested to do something.
53.	(-)	Accepts adult suggestions.
57.		Distractible; can't concentrate.
58.	(-)	Is able to see the bright side of things.
64.	(-)	Is interested in schoolwork.
69.	(-)	Is popular with classmates.
70.		Does things which are normal for children much younger.
76.	(-)	Finishes classroom assignments.
82.		Seems unconcerned when misbehaving.
85.	(-)	Is self-confident.
91.		Bright but doesn't apply self (underachiever).

SCALE 2: AGGRESSION (AGG)
N=36

3.		Interrupts whoever is speaking.
5.		Starts fighting over nothing.
11.		Acts up when adults not watching.
13.		Hits and pushes other children.
15.		Finds faults with what other children do.
17.	(-)	Is considerate of others.
20.		Does things to get others angry.
21.		Will put up an argument when told not to do something.

23. Teases other children.
28. Uses abusive language toward other children.
29. Has changeable moods.
34. Is infuriated by any form of dicipline.
35. Likes an audience all the time.
37. Has to have everything own way.
39. When angry will refuse to speak to anyone.
45. Fights back if another child has been asking for it.
46. Never seems to be still for a moment.
47. Argues with me.
49. Boasts of own toughness.
51. Tries to be the center of attention.
54. Sulks when things go wrong.
56. Resents even the most gentle criticism of own work.
59. Fights with smaller children.
62. Is stubborn.
65. Tries to get other children into trouble.
66. Does things just to attract attention.
72. Threatens to hurt other children when angry.
77. Gives other children dirty looks.
78. Deliberately interrupts what is going on by asking silly questions.
81. Finds fault with instructions given by adults.
82. Seems unconcerned when misbehaving.
86. When angry will do things like slamming the door or banging the desk.
87. Acts in a "daredevil", fearless manner.
89. Has a "chip on shoulder".
92. Disturbs other children with boisterous behavior.

SCALE 3: ANXIETY (ANX)
N=18

10. Just stands around on the playground.
14. Hands shake when called on to recite.
24. Is afraid of making mistakes.
26. Is easily upset by changes.
27. (-) Is sure of self.
50. Seems to think of self as worthless.
55. Becomes frightened easily.
61. Is fearful of being hurt at play.
68. Prefers to be around adults, rather than play with children.
75. Prefers to be alone and play alone.
79. Is slow in making friends.
83. Cries easily.
84. Is afraid of strange adults.
85. (-) Is self-confident.
88. Has difficulty speaking clearly when excited or upset.
90. Becomes embarrassed easily.

95. Much anxiety - Afraid of such things as storms, school, death, injury, war (considered phobic).
96. Frequent headaches, stomach aches or other nonspecific physical complaints.

SCALE 4: ACADEMIC DISABILITY (AD)
N=8

4. Penmanship (handwriting) at least one grade level below age expectation.
9. Reading ability at least one grade level below age expectation.
42. Behind at least one school grade due to academic difficulties.
43. Seems dull; slow to catch on.
60. Spelling performance at least one grade level below age expectation.
73. (-) Average or above I.Q. (Intelligence Quotient).
93. Behind at least two school grades due to academic difficulties.
94. Arithmetic skill at least one grade level below age expectation.

SCALE 5: HOSTILE ISOLATION (HI)
N=7

31. Does not respect other people's belongings.
32. Does not forget things which anger her/him.
41. Has no friends.
63. Never speaks up even when there is a cause to be angry.
67. Never fights back even if someone hits or pushes first.
71. Never sticks up for self when picked on by other children.
74. Does not take orders when other children are in charge.

SCALE 6: EXTRAVERSION (EXT)
N=12

1. Is friendly.
3. Interrupts whoever is speaking.
35. Likes an audience all the time.
39. When angry will refuse to speak to anyone.
46. Never seems to be still for a moment.
51. Tries to be the center of attention.
56. (-) Resents even the most gentle criticism of own work.
58. Is able to see the bright side of things.
66. Does things just to attract attention.
75. (-) Prefers to be alone and play alone.
80. Seems as happy as most children.
89. (-) Has a "chip on shoulder".

SCALE 7: TOTAL DISABILITY (TD)
N=95

This scale includes all items except number 31. The following items are scored negatively for the Total Disability scale:

1.	48.
6.	53.
7.	58.
12.	64.
17.	69.
22.	73.
27.	76.
38.	80.

APPENDIX B

HYPERACTIVITY SUBSCALE OF THE BEHAVIOR RATING SCALE

Directions: On each item listed below, please rate the child as to the extent each behavior is present.

1. Sits fiddling with small objects

not at all just a little quite a bit very much

2. Restless or overactive

not at all just a little quite a bit very much

3. Disturbs other children

not at all just a little quite a bit very much

* 4. Appears to lack leadership

not at all just a little quite a bit very much

5. Excitable

not at all just a little quite a bit very much

* 6. Submissive

not at all just a little quite a bit very much

7. Teases other children or interferes with their activities

not at all just a little quite a bit very much

8. Excessive demands for teacher's attention

not at all just a little quite a bit very much

9. Overly anxious to please

not at all just a little quite a bit very much

*10. Fearful

not at all just a little quite a bit very much

11. Hums and makes other noises

not at all just a little quite a bit very much

*These items do not add into the Hyperactivity scale. They are to prevent response set. Adapted from the Behavior Rating Scale, Conners, 1969.

APPENDIX C

COVER LETTER TO TEACHERS

Third Grade Teacher:

Your class of male third graders has been selected to participate in a research study, but only if you also give your consent.

The purpose of the study is to look at the effects of different feedback conditions on concept learning in males who exhibit specific behavior patterns. Third grade males have been chosen first because they are old enough to understand the concept learning task directions without extensive pre-training and secondly because they are young enough to reduce the number of confounding variables that are inevitably introduced with age.

Your major role in this study will be to complete the attached behavior check list for each male in your class. We realize that this is a time consuming task--approximately 10 minutes for each child. After these forms are completed (you will have a week to complete them) some of the males in your class will be identified for further study. This further study will consist of our giving each child a test to determine an impulsive or reflective conceptual tempo, and two concept learning tasks. All three together will require approximately one hour of the child's total time away from his school work, but divided into two sessions.

Should you agree to participate, you will receive the following from us. Dr. Gaston Blom, child psychiatrist at M.S.U., and I will analyze all behavior check lists from your class. We will interpret these for you. The findings will be valuable in identifying characteristics of aggression, prosocial behavior, anxiety, need achievement, academic disability, and hyperactivity in your male pupils. We will further offer suggestions for dealing with problem behavior patterns. Finally, you will receive a report on the study itself. The report will deal with the rationale for the study, what was hypothesized, how information was handled, the results, and the implications for classroom teachers.

Thank you for your cooperation.

William D. Frey
Instructor
Department of Elementary and Special Education
Michigan State University

Enclosure

APPENDIX D

CONTENTS OF CARDS IN THE CONCEPT LEARNING RESPONSE DECK

There exists one card in the response deck for each of the following symbol combinations:

1. Two red circles
2. Three red circles
3. Three red hexagons
4. Four red hexagons
5. Two red crosses
6. Four red crosses
7. One yellow circle
8. Two yellow circles
9. Two yellow triangles
10. Four yellow triangles
11. One yellow hexagon
12. Four yellow hexagons
13. Two blue triangles
14. Three blue triangles
15. One blue hexagon
16. Three blue hexagons
17. One blue cross
18. Two blue crosses
19. One green circle
20. Three green circles
21. Three green triangles
22. Four green triangles
23. One green cross
24. Four green crosses