



8-1981

The Effects of Study Carrels on the Behavior and Academic Performance of Distractible Elementary School Children

Robert William Johnson
University of Tennessee - Knoxville

Follow this and additional works at: https://trace.tennessee.edu/utk_graddiss



Part of the [Psychology Commons](#)

Recommended Citation

Johnson, Robert William, "The Effects of Study Carrels on the Behavior and Academic Performance of Distractible Elementary School Children. " PhD diss., University of Tennessee, 1981.
https://trace.tennessee.edu/utk_graddiss/3071

This Dissertation is brought to you for free and open access by the Graduate School at TRACE: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Doctoral Dissertations by an authorized administrator of TRACE: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

To the Graduate Council:

I am submitting herewith a dissertation written by Robert William Johnson entitled "The Effects of Study Carrels on the Behavior and Academic Performance of Distractible Elementary School Children." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Richard A. Saudargas, Major Professor

We have read this dissertation and recommend its acceptance:

John W. Lounsbury, William A. Poppen, Robert G. Wahler

Accepted for the Council:


Carolyn R. Hodges

Vice Provost and Dean of the Graduate School


(Original signatures are on file with official student records.)

To the Graduate Council:

I am submitting herewith a dissertation written by Robert William Johnson II entitled "The Effects of Study Carrels on the Behavior and Academic Performance of Distractible Elementary School Children." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.


Richard A. Saudargas, Major Professor

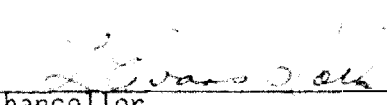
We have read this dissertation
and recommend its acceptance:







Accepted for the Council:



Vice Chancellor
Graduate Studies and Research

THE EFFECTS OF STUDY CARRELS ON THE BEHAVIOR
AND ACADEMIC PERFORMANCE OF DISTRACTIBLE
ELEMENTARY SCHOOL CHILDREN

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Robert William Johnson II

August 1981

3036731

DEDICATION

This dissertation is dedicated to my family--to my mother and father for their continued encouragement and love, to my wife for her patience, humor, and emotional support, and to my son who was always in my thoughts. Together they made this achievement possible.

ACKNOWLEDGMENTS

Grateful acknowledgment is made to my committee--Dr. John Lounsbury, Dr. Robert Wahler, and Dr. William Poppen--for their assistance in the preparation of this dissertation. I especially would like to express my gratitude to the chairman of my committee, Dr. Richard Saudargas, for his assistance in planning, conducting, and evaluating this research. His patient counseling and his dedication helped me persevere through the many months needed to complete this dissertation. In addition, I want to thank him for being my mentor throughout my graduate training.

Appreciation is extended to the two teachers who allowed me to manipulate their classes for half the school year and to the undergraduate students who served as observers.

I would also like to express my appreciation to my best friend and wife, Lynn, for typing the many drafts of this dissertation and for being there when I needed her.

ABSTRACT

The primary purpose of this study was to investigate the effects of study carrels on distractible students. A secondary objective was to determine whether behavioral contrast effects resulted from working in the study carrels. Four third grade and two fifth grade students served as subjects. An ABAB single subject design was employed with the fifth graders. Observers collected data on the subjects' behaviors. During the intervention condition, the subjects did their independent seatwork while seated in a study carrel. To examine for behavioral contrast, data were collected during the period immediately after the students used the carrels.

The study carrels had positive effects on the third grade students. The school work behavior of two third graders increased and their distractible behaviors decreased both times they used the carrels. The carrels were similarly beneficial for the other two third grade students the second time they used them. The study carrels had moderate effects on the academic performances of the third graders. Six of the eight comparisons indicated that, on the average, a student completed more academic work when he used the study carrel. The carrels did not effect any notable changes in the behaviors of the fifth grade students. Behavioral contrast appeared to be present in some of the students' behaviors, but it was difficult to detect. One third grade student displayed very noticeable contrast effects. Her distractible behaviors increased substantially after she worked in the study carrel.

Although study carrels can have beneficial effects on students'

behaviors, they are not equally effective with all students. In addition, the positive effects of the carrels may diminish over time and some students may display behavioral contrast effects. The results suggested that further research on the various effects of study carrels is needed and that applied research should examine behavioral contrast.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Research on Study Carrels	4
II. METHOD	11
Setting and Subjects	11
Independent Variable	12
Dependent Variables	13
Procedures	15
III. RESULTS	19
IV. DISCUSSION	62
LIST OF REFERENCES	71
APPENDIX	75
VITA	77

LIST OF FIGURES

FIGURE	PAGE
1. The percentage of intervals and frequency per 20 minutes of John's behaviors during the carrel and noncarrel times across experimental conditions	23
2. The mean percentage of academic work completed by John during the carrel and noncarrel times of each experimental condition	29
3. The percentage of intervals and frequency per 20 minutes of Cathy's behaviors during the carrel and noncarrel times across experimental conditions	31
4. The mean percentage of academic work completed by Cathy during the carrel and noncarrel times of each experimental condition	37
5. The percentage of intervals and frequency per 20 minutes of Dick's behaviors during the carrel and noncarrel times across experimental conditions	39
6. The mean percentage of academic work completed by Dick during the carrel and noncarrel times of each experimental condition	45
7. The percentage of intervals and frequency per 20 minutes of Ben's behaviors during the carrel and noncarrel times across experimental conditions	46
8. The mean percentage of academic work completed by Ben during the carrel and noncarrel times of each experimental condition	52
9. The percentage of intervals and frequency per 20 minutes of Mary's behaviors during the carrel and noncarrel times across experimental conditions	54
10. The percentage of intervals and frequency per 20 minutes of Bill's behaviors during the carrel and noncarrel times across experimental conditions	58

CHAPTER I

INTRODUCTION

Scientific information concerning classroom environments which are most conducive to learning is decidedly limited. Frequently, the designs of schools and classrooms are influenced by traditional beliefs and whichever educational theories are currently in vogue. One such idea is the use of study carrels, or cubicles, as educational aids for distractible students. The fundamental logic for the use of study carrels seems to have face validity. The presumption is that carrels aid in reducing the task irrelevant stimuli which distract students and hinder their academic performance. As a result, carrels are thought to help distractible students improve their behavior so that they are able to attend to their academic tasks.

The impetus for research on stimulus reduction techniques, such as study carrels, was provided by Strauss and Lehtinen (1947). They designed the first comprehensive classroom program to modify the hyperactive behavior of brain-injured children. They believed that the central problem of brain-injured children was an unusually high responsiveness to environmental stimulation, which made it difficult for such children to function effectively in the classroom. In order to maximize the students' distractibility, visual and auditory distractions within the room were reduced and the desks were placed in corners facing the wall or behind a screen. Strauss and Lehtinen reported that their program had positive effects on the behavior of brain-injured children.

The first experimental test of the Strauss and Lehtinen program was conducted by Cruickshank, Bentzen, Ratzeburg, and Tannhauser (1961). The subjects were hyperactive, learning disabled children who had average to low average intelligence. Extensive matching was employed to form two experimental and two control groups. The experimental classrooms had four elements which Cruickshank et al. considered essential for teaching brain-injured and nonbrain-injured hyperactive children. These elements were as follows:

1. The elimination or reduction of nonessential visual, auditory, and tactile stimulation.
2. Reduced space through the use of three-sided cubicles.
3. A very structured educational and classroom program.
4. An increase in the stimulus value of the teaching materials.

The teachers of the experimental group adhered to the specialized techniques and instructional programs, but the control group teachers were free to use any appropriate teaching method, including aspects of the experimental program.

A pretest-posttest design was employed using several standardized tests. The statistical analyses consisted of numerous t tests on the change scores of the measures over a period of one school year. Both groups demonstrated significant improvement on the Vineland Scale of Social Maturity and Syracuse Visual Figure-Background Test. Neither group improved significantly on the Stanford-Binet Intelligence Scale or Goodenough Intelligence Test. The experimental group made significant gains on six of 10 Bender Gestalt scoring categories. Academic achievement was not evaluated. When the posttest scores were compared, the only significant difference between the two groups was in favor of

the experimental group on one Bender Gestalt scoring category. A follow-up one year after the children returned to typical classrooms found no significant differences between the two groups. The results provided little support for the minimal stimulation classroom condition for hyperactive children (Meyer, 1968; Ross & Ross, 1976).

Another study on minimally stimulating classroom environments was conducted by Haring and Phillips (1962). They reasoned that emotionally disturbed children, who were hyperactive and distractible, would benefit from environmental and instructional techniques similar to those used by Cruickshank et al. (1961). Three groups of emotionally disturbed children were compared. The experimental group was two highly structured special education classrooms which utilized a minimal stimulation environment. A prominent feature in these classrooms was five booths or three-sided study carrels. The assumption was that the carrels, which reduced distracting conditions, would help the children manage their hyperactive behavior and increase their tolerance for independent work. The second group of subjects remained in their regular classroom setting. The third group of subjects attended a comparatively nonstructured, permissive special education classroom.

The subjects' gain scores on the California Achievement Test and Behavior Rating Scale were compared. On both measures the experimental group made significantly greater gains than either control group. These results appeared to provide support for the use of a highly structured, minimally stimulating environment to educate emotionally disturbed children. However, no direct observational measures of the students' behaviors were included in the study.

Both the Cruickshank et al. (1961) and Haring and Phillips (1962)

studies suffered from methodological flaws. Nevertheless, they are cited as support for the use of minimal stimulation techniques in classrooms with hyperactive, distractible children. The carrels in both studies were only one of many independent variables and neither study had specific evidence relating to their effects. Neither Cruickshank et al. nor Haring and Phillips suggested that the use of study carrels, by themselves, would result in an improvement in a student's behavior and academic achievement. Teachers, however, have popularized the use of isolated desk placements or carrels as a method for helping distractible students control their behavior and complete their school work. In a nationwide survey of special education classes for learning disabled children, 46 percent of the teachers reported that they found cubicles advantageous in reducing stimulation and 72 percent indicated that they used some form of room arrangement for this purpose (Rogan & Lukens, 1969). Even though study carrels appear to be an accepted method for reducing irrelevant stimuli, research on the value of using carrels in the classroom has been inconclusive.

Research on Study Carrels

Rost and Charles (1967) evaluated the use of study booths by mildly retarded, hyperactive children in their special education classrooms. The experimental group did independent work in the booths, located at the rear of the room, for one and a half to two hours out of a five hour day. After one semester, there were no significant differences between the experimental and control groups' posttest scores on the Wide Range Achievement Test.

Three studies which evaluated cubicles were done by Somervill and

his associates (Somervill, Hill, White, York, & Hayes, 1978; Somervill, Jacobsen, Warnberg, & Young, 1974; Somervill, Warnberg, & Bost, 1973). The three studies employed similar methodology, experimental tasks, and dependent variables, but different subject populations. Each study assessed the effects of three stimulation conditions on the subjects' performance of perceptual and motor tasks. The subjects were tested in small groups under either increased, normal, or reduced stimulation levels. During the reduced stimulation condition, the subjects sat in individual three-sided cubicles. In the first study (Somervill et al., 1973), distractible and nondistractible first grade boys were compared. The second study (Somervill et al., 1974) compared distractible and nondistractible, institutionalized mentally retarded children. The subjects for both studies were selected on the basis of a behavioral rating scale completed by their teachers. The third study (Somervill et al., 1978) compared preschool, disadvantaged black children and preschool, advantaged white children.

The basic conclusions of all three studies were similar. The very high levels of visual and auditory stimulation hindered the task performance of all children, particularly the distractible and black subjects. Under each stimulation condition, the distractible and the black children took longer than the nondistractible and the white children to complete the task. None of the subject groups, distractible, nondistractible, black, or white, performed better in the cubicles than in the normal or increased stimulation conditions. In each case the authors concluded that using cubicles to reduce stimulation would not have beneficial effects on students' task performance.

The results of Gorton's (1972) research appear to conflict

with Rost and Charles (1967) and the Somervill studies (Somervill et al., 1978; Somervill et al., 1974; Somervill et al., 1973). Gorton compared the arithmetic performance of organically retarded, familial retarded, and normal children during four classroom environmental conditions, total seclusion, auditory seclusion, visual seclusion and non-secluded. The treatment that approximated the use of study carrels was the visually secluded condition. Both the normal and familial retarded children performed best when secluded visually. The organically retarded children performed best in the total seclusion condition. Gorton concluded that controlling visual stimulation is an important factor in improving academic performance.

This study suggested that academic performance can be improved by manipulating the environment to reduce irrelevant stimulation. It does not provide direct support for the use of study carrels in the classroom. Similarly, the research by Somervill and his associates does not demonstrate that using study carrels in the classroom is not beneficial for students. None of those studies were conducted in the students' regular classrooms, where their distractibility was most likely to interfere with their behavior and academic performance. Therefore, the validity of generalizing the research results to the real classroom is questionable. To determine whether study carrels are beneficial educational tools, they should be evaluated in the classroom where the distractible child must work and confront the natural distractors of his environment.

Scott (1970) conducted an exploratory study on the effects of four stimulus conditions on the arithmetic performance of four hyperactive, emotionally disturbed boys. The research was conducted in the

subjects' classroom where they were the only students. Three subjects performed best while working at their desks with music playing. Their next best performance was while working in study booths without music.

Jenkins, Gorrafa, and Griffiths (1972) assessed the effects of isolation on the number of pages completed in a reading workbook by eight mentally retarded children. During the intervention phase of the research, subjects worked in individual study rooms, which were adjacent to the classroom. All eight children performed better in isolation than during the first classroom week and seven children completed more pages while in isolation than during the second week of working in the classroom. This study appears to support the use of stimulus reduction techniques in order to improve academic performance, but generalizing from study rooms to study carrels is inappropriate. In addition, it is not possible to implement the procedure used because classrooms seldom have individual study rooms adjacent to them.

Shores and Haubrich (1969) used a single subject ABAB design to assess the effects of cubicles on the reading rate, arithmetic rate, and attending behavior of three emotionally disturbed children. Data were collected while the subjects did independent seatwork at their desks during the baseline phases and while seated in three-sided study cubicles during the intervention phases. The cubicles resulted in a significant increase in the attending to task behavior, but no significant results were obtained for the academic measures. The authors concluded that cubicles had a direct effect on attending behavior, but no immediate influence on academic performance.

The research has not demonstrated unequivocally that distractible students would or would not benefit behaviorally and academically

from using study carrels in their classrooms. The studies reviewed employed a variety of treatment conditions, various types of subjects, different experimental tasks, few dependent variables which would be considered direct measures of distractibility, and various experimental designs. This diversity of research procedures and results makes it difficult to formulate a knowledgeable theory about the use of study carrels. Since teachers are concerned about students who are easily distracted from their work and attest to the effectiveness of stimulus reduction techniques, more research is needed to evaluate such methods.

Theoretically, study carrels are supposed to aid students who are distractible by reducing distracting stimuli, thereby making it easier for them to attend to their work. Most of the studies reviewed selected subjects on the basis of a "syndrome" and presumed, erroneously, that distractibility was a factor in the "syndrome." There is no indication that any diagnostic group of subjects is more or less distractible than normals (Doleys, 1976). Furthermore, the basis for classifying a stimulus as distracting should be functional. Stimuli cannot be considered distracting independent of their effects on a subject performing a specified task at a given time (Doleys, 1976). In addition, behaviors, indicative of distractibility, have been associated with low academic achievement (McKinney, Mason, Perkerson, & Clifford, 1975).

Distractible behaviors seem to have a unique status apart from any diagnostic category and probably affect a child's academic functioning. Distractibility should be thought of as descriptive of situation specific behaviors, and the task of managing such behaviors approached accordingly. Therefore, in order to investigate a method for helping distractible students, subjects should be selected on the

basis of their distractibility (assuming it is dysfunctional) and the research should be conducted in the setting where they are easily distracted.

The purpose of this study was to investigate the effects of using study carrels with distractible students in the regular classroom. Subjects were selected because their distractibility interfered with their academic performance. Both behavioral data, indicative of distractible behaviors, and academic performance data were collected.

A second objective of this study was to determine whether behavioral contrast effects resulted from working in the study carrels. Behavioral contrast is a change in responding in the presence of one stimulus as a function of an opposite change in response rate in the presence of a second stimulus (Freeman, 1971; Reynolds, 1961). For example, contrast effects would be present if distractible behaviors decreased when the students worked in the carrels, then increased, relative to the base rate, when the carrels were removed. Although most of the research on contrast has been done with animals, several applied studies have found effects similar to behavioral contrast (Forehand, Breiner, McMahon, & Davies, 1981; Johnson, Bolstad, & Lobitz, 1976; Meichenbaum, Bowers, & Ross, 1968; Wahler, 1975). In all of these studies contrast-like effects referred to a desired behavior change in the treatment setting, but the opposite behavior change in a different untreated setting. Simon, Ayllon, and Milan (1980) found contrast-like effects when they altered the token reinforcements at three learning stations within a classroom. To determine whether behavioral contrast effects existed in the present study, behavioral and academic data were

collected during the period immediately after the students finished working in the study carrels.

CHAPTER II

METHOD

Setting and Subjects

The study was conducted at an elementary school within an urban city school system in East Tennessee. The school contained kindergarten through sixth grade and had an enrollment of approximately 520 students during the year.

One third grade teacher and one fifth grade teacher volunteered to participate in the study. Mr. Tanner, a fifth grade teacher, was 25 years old and had been teaching for three years. Ms. Shaw, a third grade teacher, was 28 years old and was in her fourth year of teaching.

The teachers were asked to identify students whom they considered distractible. Distractibility was defined as being hyper-responsive to environmental stimulation (Doleys, 1976). Specifically, distractible students were described as children who exhibited varying amounts of some or all of the following behaviors:

1. They allowed extraneous sights and sounds to interfere with their work.
2. They were diverted from their work easily by other students.
3. They appeared inattentive to instructions.
4. They engaged in disruptive activities.
5. They did not complete assignments because of the preceding behaviors (Somervill et al., 1973).

Other selection criteria were that the students had average academic ability and intelligence and were not enrolled in any special education program.

After discussing the potential subjects with each teacher, the researcher observed the classrooms and students during the independent seatwork time in the morning. Two students in Mr. Tanner's fifth grade class and four students in Ms. Shaw's third grade class were designated as subjects. Each student exhibited all the behaviors previously described to the teachers. A review of their cumulative records revealed that every student had scored within the average range of intelligence on the Otis-Lennon Mental Ability Test and had received grades of C or better in most of their academic subjects. In addition, all subjects had received numerous unsatisfactory grades in the areas of conduct or effort, indicating that their behavior or work habits needed improvement.

Independent Variable

The independent variable was a three-sided study carrel which was placed around the student and desk, so that the open side was behind the pupil. The carrels were large appliance cartons which had been cut to the appropriate size for the student and desk. The carrels were constructed so the student could not see the classroom while seated at his/her desk. The third grade carrels were 43 inches high, 27 inches across the front, and 31 inches along each side. The fifth grade carrels were 52 inches high, 34 inches across the front, and 35 inches along each side.

Dependent Variables

Behavioral measures. Trained observers, using a state-event observation system (Saudargas & Creed-Murrah, 1981, Appendix A) collected data on the behaviors of the subjects. The observation system employed a 30 second instantaneous time sampling procedure for recording the students' state behaviors, which were behaviors that occurred for varying lengths of time. A frequency counting procedure was used for recording the event behaviors of the students and teachers. Event behaviors had very short durations. At the beginning of each 30 second interval the observer recorded the state behaviors that were occurring at that moment. During the remainder of the 30 second interval the observer recorded each event behavior as it occurred.

The following five behaviors were the major dependent variables:

1. School work (SW): While doing academic work or listening to the teacher's directions or lectures the student had to have his/her head and eyes oriented toward the work materials or the teacher.
2. Looking around (LK): The student's head and eyes were oriented away from his/her work or the classroom activity.
3. Social interaction with another child (SIC): Any verbal or nonverbal interactions between the target student and any other students. They had to be oriented toward each other.
4. Approach child (AC): The target student attempted, either verbally or nonverbally, to obtain the attention of another student.
5. Other child approach (OCA): Another student attempted, either

verbally or nonverbally, to make contact with the target student.

The hypothesis was that, when the students worked in the study carrels, they would display more school work behavior and less of the other four behaviors, which were indicative of distractibility.

Observer reliability checks were conducted on each subject approximately once every four observation sessions. Reliability was calculated by dividing the number of times observers agreed on the occurrence of a behavior by the number of times observers agreed plus the number of times they disagreed on the occurrence of a behavior. The observer reliability combined across the six subjects and five behaviors was 81 percent.

Academic measures. The academic dependent variable was the percentage of work completed during each portion of the observation period. In addition, the percentage of work correct of that completed was calculated. These data were collected on the third grade subjects only. Although an attempt was made to gather the same data on the fifth graders, the nature of their weekly independent spelling assignment made the task of obtaining the data impractical.

The academic measures were taken from the daily independent assignments on which the students worked while Ms. Shaw instructed the reading groups. The assignments included a lesson from the spelling book or phonics workbook, several exercises from the English book, and a handwriting lesson on the chalkboard. The entire class was instructed to do the spelling or phonics first, then the English, and finally the handwriting lesson. In order to determine the percentage of work

completed in each part of the observation periods, the whole class marked their papers with designated times (e.g., 10:45). Only data on the target students' academic work was collected, however.

Procedures

The experimental design for each student was a single subject reversal design (Bailey, 1977; Hersen & Barlow, 1976). The design for the third graders was baseline-intervention-baseline-intervention, while a baseline-intervention-baseline design was employed in the fifth grade. The third grade subjects and fifth grade subjects did not alternate conditions on the same days, but all subjects within the same classroom changed conditions at the same time.

Data were collected Monday through Thursday mornings while the teachers instructed reading groups and the remaining students did independent seatwork assignments. Mr. Tanner had three reading groups, each of which received one half hour of instruction between 9:00 a.m. and 10:30 a.m. Ms. Shaw taught three reading groups between 10:00 a.m. and 11:10 a.m. Each group worked with Ms. Shaw for approximately 20 to 25 minutes per day. A schedule was arranged with the teachers so that each subject had his/her reading group either first or last. This allowed the observation period to be a continuous hour for the fifth grade subjects and an uninterrupted 50 minutes for the third grade subjects.

The observation period for each subject was divided into two intervals. Throughout both the baseline and intervention phases, the first half of an observation period was labeled the carrel time and the second half was labeled the noncarrel time. During the carrel observation time of the intervention phases the students used the study

carrels. On Monday and Wednesday, the carrel time for the fifth graders was from 9:30 a.m. until 10:00 a.m. and the noncarrel time was from 10:00 a.m. until 10:30 a.m. On Tuesday and Thursday, the carrel time was from 9:00 a.m. until 9:30 a.m. and the noncarrel time was from 9:30 a.m. until 10:00 a.m. Three third grade subjects, John, Cathy, and Ben, had their carrel time from 10:20 a.m. until 10:45 a.m. and their noncarrel time from 10:45 a.m. until 11:10 a.m. every day. The carrel time for Dick, the other third grade subject, was from 10:00 a.m. until 10:20 a.m. and the noncarrel time was from 10:20 a.m. until 10:45 a.m. each day. These beginning and ending times corresponded to the times the students marked on their academic work.

Baseline. Before beginning baseline, each class was told by the researcher that they would participate in a project which was concerned with helping students do better work. The researcher demonstrated the study carrels and explained that several students would be selected to use the carrels. The day before baseline began the researcher again met with each class and had them practice the method with which they were to put time marks on their papers.

The baseline period consisted of the usual classroom routine, except that the teachers told the students to mark their papers at the designated times. After the first week of baseline the researcher discovered that the third grade subjects were not consistent about placing the time marks on their academic work. When a second demonstration did not correct the problem the procedure was amended. For the remainder of the study, the researcher entered the classroom at the beginning and end of each carrel or noncarrel time, circulated around

the room spot checking various papers to be certain that the time marks were present, reminded those who forgot to write the time marks, and left the room. The subjects' papers were always checked during this procedure. Although collection of the fifth grade academic data was discontinued, the fifth graders, along with the third grade students, continued to place time marks on their academic work throughout all phases of the study.

The day that the second baseline commenced, the researcher informed the subjects that they would not use the carrels for several weeks. The observations continued during the designated time periods.

Carrel intervention. Several days before beginning the intervention phase the researcher met individually with each subject to explain that he/she had been selected as one of the students who would work in the study carrel. The third grade subjects agreed to participate, but were generally noncommittal. Bill, a fifth grader, was excited about using the carrel. Although the other fifth grade subject, Mary, expressed concern that she would not be able to talk while seated in the carrel, she was cooperative in the classroom and used the carrel appropriately.

The classes did not know when the intervention phase was to begin until the researcher entered the room shortly before the reading groups started and informed them who would be using the study carrels. The researcher remained in each classroom for the first three days of the intervention phase to help the students learn how to place the carrels around their desks. After the initial adjustment period, the subjects were able to set up and put away their carrels by themselves

without disrupting the other students.

When not in use, the carrels were folded and stacked against a wall in one corner of the classroom. At the beginning of the reading group instruction or immediately following a subject's reading group, he/she would get the carrel, place it around his/her desk, and begin working. When the teachers told the students to mark their papers with the time, they also reminded the subjects to set up or remove the study carrels. After the first several days of the intervention phase, the subjects adapted to the procedures and needed few prompts during the remainder of the study. The second intervention phase in the third grade was managed in a similar manner. The researcher simply instructed the students to use the carrels again.

The students always worked in the study carrels during the carrel time of the observation period. The observers began recording data as soon as the carrel was in place and the subject was seated at his/her desk. The noncarrel observations began after the carrel was removed and the subject returned to his/her desk. The only difference between the baseline and intervention phases was that the subjects did their academic work while seated in a study carrel during the carrel observation time. There were no differences between the baseline and intervention phases during the noncarrel observation time.

CHAPTER III

RESULTS

There was considerable variation in the behavior of every subject during all phases of the research. In order to reduce the variation, consecutive two day averages were plotted on the graphs of each behavior. The behaviors of school work, looking around, and social interaction with another child are presented as the percentage of intervals in which the behaviors occurred. The approach child and other child approach behaviors are presented as the rate of occurrence per 20 minutes of observation time.

The behaviors which occurred during each baseline and respective intervention phases were compared using Mann-Whitney tests (Table 1). The carrel and noncarrel times were analyzed separately. Within each baseline and intervention phase the behaviors which occurred during the carrel and noncarrel times were compared using Wilcoxon Matched Pairs Signed Rank tests (Table 2). The dependent variable of school work behavior was analyzed separately for each subject. The other dependent variables, looking around, social interaction with another child, approach child, and other child approach, were consolidated and analyzed as one behavior. These four behaviors were combined because they were indicative of distractibility. The raw scores for each distractible behavior were converted to standard z scores and the sum of the four standard scores for each observation day were used in the statistical

TABLE 1. The Probability Values Resulting from the Mann-Whitney Tests.

	Carrel Time ^a		Noncarrel Time ^b	
	Base 1	Base 2	Base 1	Base 2
	vs. Carrel 1 ^c	vs. Carrel 2 ^c	vs. Carrel 1 ^c	vs. Carrel 2 ^c
<u>John</u>				
School work	.0029	.0071	.1112	.1190
Distractible Behaviors	.0029	.0001	.0749	.1423
<u>Cathy</u>				
School Work	.0036	.0022	.0749	.2296
Distractible Behaviors	.0003	.0022	.0384	.0222
<u>Dick</u>				
School Work	.1251	.0089	.1977	.4207
Distractible Behaviors	.0571	.0089	.3228	.1788
<u>Ben</u>				
School Work	.5000	.0080	.4286	.2327
Distractible Behaviors	.2981	.0256	.1539	.2877
<u>Mary</u>				
School Work	.2643		.2890	
Distractible Behaviors	.4286		.3700	
<u>Bill</u>				
School Work	.2981		.2610	
Distractible Behaviors	.4840		.0780	

^aCarrel time was the first half of an observation period.

^bNoncarrel time was the second half of an observation period.

^cCarrel 1 and carrel 2 were the intervention conditions.

TABLE 2. The Probability Values Resulting from the Wilcoxon Matched Pairs Signed Rank Tests.

	Carrel Time ^a vs. Noncarrel Time ^b			
	Base 1	Carrel 1 ^c	Base 2	Carrel 2 ^c
<u>John</u>				
School Work	.087	<.001	.278	<.001
Distractible Behaviors	.074	.087	.017	.002
<u>Cathy</u>				
School Work	.216	<.001	.483	.004
Distractible Behaviors	.016	.005	<.001	.024
<u>Dick</u>				
School Work	.065	.016	.139	.014
Distractible Behaviors	.074	.382	.051	.012
<u>Ben</u>				
School Work	.423	.404	.325	.042
Distractible Behaviors	.232	.423	.170	.216
<u>Mary</u>				
School Work	.384	.005	.312	
Distractible Behaviors	.216	.161	.416	
<u>Bill</u>				
School Work	.410	.246	.416	
Distractible Behaviors	.064	.188	.483	

^aCarrel time was the first half of an observation period.

^bNoncarrel time was the second half of an observation period.

^cCarrel 1 and carrel 2 were the intervention conditions.

analyses. A probability level of .05 was used to determine whether or not a test was significant.

The academic performance data are presented as the average percent of work completed by each subject during every carrel and noncarrel time. The researcher calculated the academic measures by allotting points to the assignments. Each required answer on the spelling or phonics and English lessons and each word of the handwriting lesson was worth one point. After totalling the amount of work (i.e., number of points) done during both the carrel and noncarrel times and calculating the percentage completed during each time, the percentage correct was computed. No statistical analyses were done on the academic data.

The graphs of John's behaviors are presented in Figure 1. During the carrel time of both intervention phases, relative to the previous baselines, John displayed statistically significant increases in the percentage of intervals in which he engaged in school work (Table 1). His median percentage of intervals for school work during the carrel time of the first baseline was 45 percent. This increased to a median of 77 percent during the first intervention phase. With a return to baseline, John's median percentage of school work dropped to 54 percent. When the carrel was introduced a second time, his median percentage of school work increased to 79 percent. There were no significant differences between the baseline and intervention phases in John's percentages of school work behavior during the noncarrel times. His median percentages of school work for the noncarrel times of the first baseline and intervention phase and the second baseline and intervention phase were 51, 44, 56, and 45 percent, respectively.

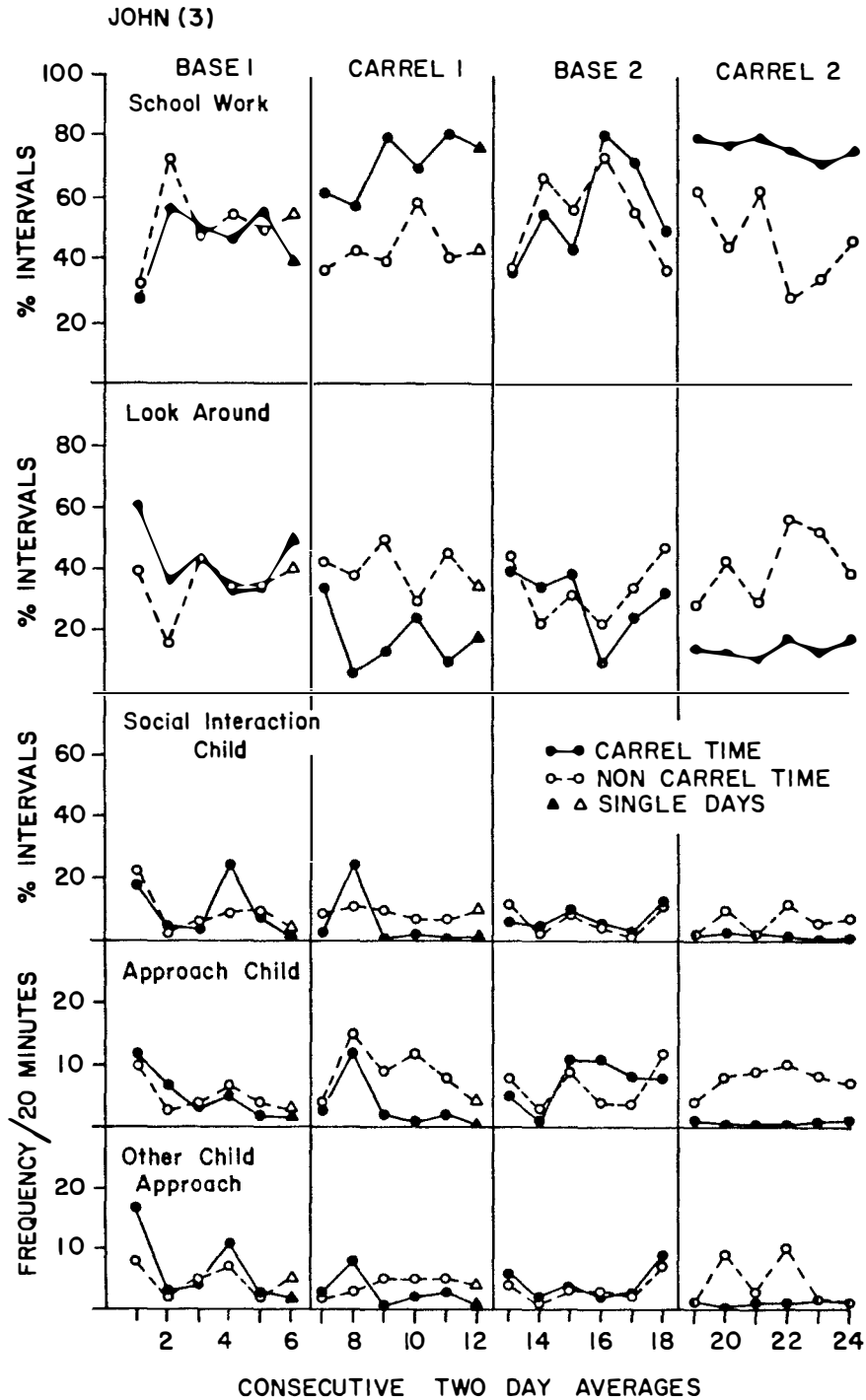


Figure 1. The percentage of intervals and frequency per 20 minutes of John's behaviors during the carrel and noncarrel times across experimental conditions. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

During the carrel times of both intervention phases John engaged in school work significantly more often than he did during the noncarrel times (Table 2). There were no significant differences in John's percentages of school work between the carrel and noncarrel times of either baseline.

The graph of John's school work behavior shows an immediate change in level as soon as he began using the study carrel during both intervention phases. In addition, his school work behavior continued to increase as he worked in the study carrel during the first intervention condition. Although an increasing trend appeared to be present during the carrel time of the second baseline it was accounted for by the four days of points 16 and 17. Those four days followed a week of vacation. The second week after vacation John's school work behavior returned to its previous level. During the noncarrel time of the second intervention phase, John's school work behavior declined over time to a level that was consistent with his level during the first intervention phase. However, his school work behavior remained at a consistently high level during the carrel time of the second intervention phase.

The percentage of intervals in which John was looking around during the carrel time decreased from a median of 45 percent during the first baseline to a median of 18 percent during the first intervention phase and from a median of 30 percent during the second baseline to a median of 14.5 percent during the second intervention phase. John's percentage of looking around during the noncarrel time remained relatively stable during the first baseline and intervention phases and increased from the second baseline to the second intervention phase.

The respective median percentages for looking around during the non-carrel times were 37, 40, 34.5, and 43 percent for each phase.

When the carrel and noncarrel times of each phase were compared John evidenced less looking around during the carrel time of each intervention phase than during the noncarrel time. The median percentage of John's looking around behavior decreased from the carrel to the non-carrel time during the first baseline and increased slightly during second baseline.

The graph of John's looking around behavior is generally the inverse of his school work behavior. A change in levels between the carrel times of the baseline and intervention phases is readily observable. The four days following vacation also showed a change in the percentage of time spent looking around, resulting in an apparent downward trend during the carrel time of the second baseline. If the vacation had not intervened, the respective increasing and decreasing slopes for school work and looking around may not have occurred. During the noncarrel time of the second intervention phase John's looking around behavior increased as his school work behavior decreased. However, during the carrel time his looking around behavior remained at a consistently low level.

The median percentage of intervals in which John was interacting with another child during the carrel time were less during each intervention phase, relative to each baseline. The median percentage of social interaction decreased from 5 percent during the first baseline to 0 during the first intervention phase and from 4.5 percent during the second baseline to 0 during the second intervention phase.

The median percentages for social interaction during the noncarrel time increased slightly between each baseline and associated intervention phase. The respective median percentages for social interaction during the noncarrel times of each phase were 8, 10, 5, and 7 percent.

John engaged in less social interaction during the carrel times of both intervention phases than during the noncarrel times. His median percentage of social interaction for the first baseline was greater during the noncarrel time than during the carrel time. However, the median percentages of carrel and noncarrel times for the second baseline were approximately equivalent.

The comparisons of the frequencies of John's approaches to another child indicated that he engaged in this behavior less often during the carrel time of each intervention phase than during the carrel time of the associated baselines. His median frequencies per 20 minutes were 4.4 approaches during the first baseline, 2 approaches during the first intervention phase, 6.1 approaches during the second baseline, and 0 approaches during the last intervention phase. John more than doubled his median frequency of approaches from 4 during the first noncarrel baseline to 9.2 during the first noncarrel intervention phase. His median frequencies of approaches for the noncarrel times of the last two phases were equal, 7.3 approaches per 20 minutes.

John's median frequencies indicated that he approached another child more frequently during the noncarrel time of both intervention phases than in the carrel time. During the baseline phases there were no remarkable differences between the carrel and noncarrel times in the median frequencies of John's approach behavior.

When John worked in the study carrel he was approached by other children less often during the intervention phases, relative to the baseline phases. The median frequencies of other child approaches for the carrel time were 4 approaches per 20 minutes during the first baseline, 0 approaches during the first intervention phase, 3.2 approaches during the second baseline, and 0.9 approaches during the second intervention phase. John was approached by other children slightly more often during the noncarrel time of the first intervention than during the first baseline noncarrel time. The other child approaches were almost equal for the noncarrel times of the second baseline and intervention phases. The median frequencies of other child approaches for the noncarrel times of each phase were 3.2, 5, 2.9, and 3 approaches per 20 minutes, respectively.

Within each baseline phase, there were no basic differences between the median frequencies of other child approaches for the carrel and noncarrel times. However, the median frequencies indicated that other children approached John more often during the noncarrel time than during the carrel time of each intervention phase.

The graphs of the social interaction, approach child, and other child approach behaviors covary to some degree because of the nature of the behaviors. Both approach behaviors were reflected in the social interaction behavior when an initial approach resulted in an interaction between the two children lasting for a period of time. The graphs indicate that John approached other children more frequently than they approached him. With the exception of two days during the first intervention phase, using the study carrel reduced all three of

John's interaction behaviors to consistently low levels. However, the frequency of John's approaches to other children increased substantially during the noncarrel time of the first intervention phase, relative to the carrel time. This frequency diminished slightly during the non-carrel times of the second baseline and intervention phases.

The statistical analysis of the four distractible behaviors revealed that they occurred significantly less frequently during the carrel times of both intervention phases than during the carrel times of the associated baselines (Table 1, page 20). There were no significant differences between the noncarrel times of each baseline and intervention phase. The comparisons of carrel and noncarrel times within each condition indicated that during the second intervention phase, the distractible behaviors occurred significantly less often during the carrel time (Table 2, page 21). This same comparison was not significant for the first intervention phase. The distractible behaviors occurred significantly more often during the carrel time of the second baseline than during the noncarrel time. This result appears to be contrary to the graphs of the four behaviors and was the product of combining and analyzing the standard scores for the behaviors.

The average percentage of work that John completed during the carrel and noncarrel times are presented in Figure 2. John completed more work during the carrel time in every condition than during the noncarrel time. His average percentage of work completed during the carrel time increased from the first baseline to the first intervention phase and decreased between the second baseline and intervention

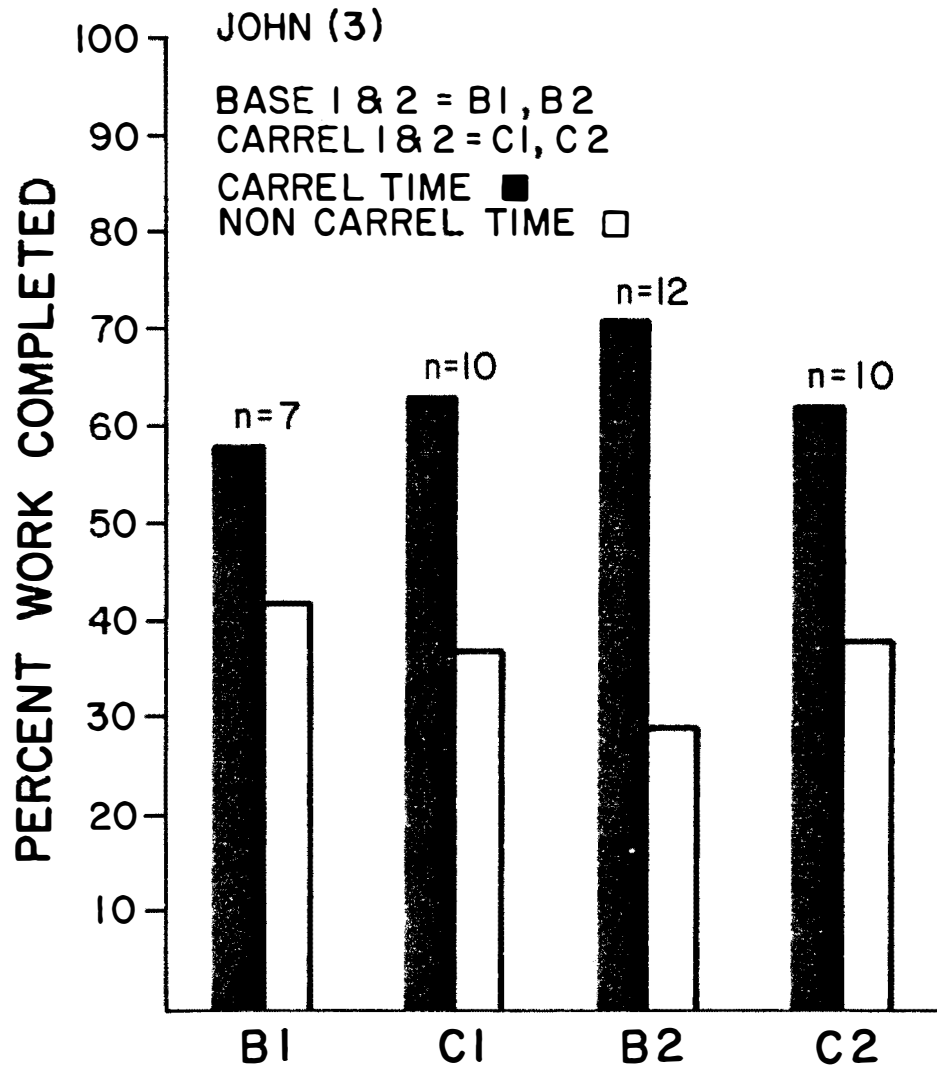


Figure 2. The mean percentage of academic work completed by John during the carrel and noncarrel times of each experimental condition. The n's represent the number of days for which the academic work was computed in each condition. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

phases. For the noncarrel time, John completed more work during the first baseline than during the first intervention phase and less work during the second baseline than during the second intervention phase. John's average percentages of accuracy of the work completed were 86, 68, 53, and 62 percent for the carrel time of each condition and 87, 61, 69, and 57 percent for the noncarrel times.

The graphs of Cathy's behaviors are presented in Figure 3. The percentage of intervals in which Cathy exhibited school work behavior was significantly greater during the carrel times of both intervention phases than during the carrel times of the related baseline phases (Table 1, page 20). Her median percentage of intervals for school work behavior increased from 50 to 70 percent between the first baseline and intervention phases and from 55 to 79.5 percent between the second baseline and intervention phases. There were no significant differences between the baseline and intervention phases in Cathy's percentages of school work behavior during the noncarrel times. Cathy's median percentages of school work behavior during the noncarrel times decreased from 65 to 45 percent between the first baseline and intervention phases and from 53 to 37.5 percent between second baseline and intervention phases.

Cathy engaged in school work behavior significantly more often during the carrel times of both intervention phases than during the noncarrel times (Table 2, page 21). There were no significant differences in the percentages of Cathy's school work behavior between the carrel and noncarrel times of either baseline.

The graph of Cathy's school work behavior shows a dramatic

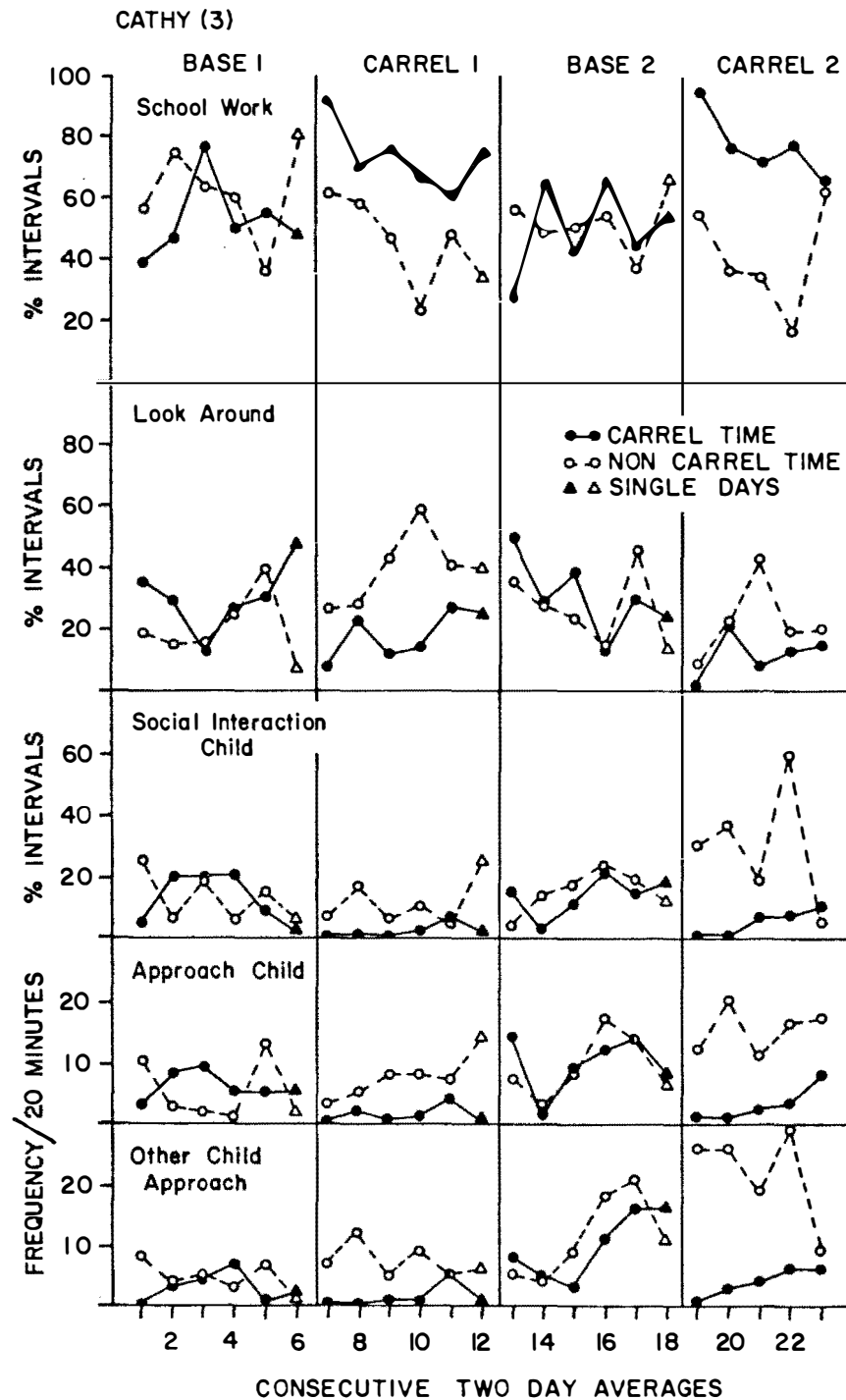


Figure 3. The percentage of intervals and frequency per 20 minutes of Cathy's behaviors during the carrel and noncarrel times across experimental conditions. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

change in level when she began using the study carrel during both intervention phases. However, the trends of the school work behavior declined throughout the intervention phases. This decreasing trend also was evident in the noncarrel times of each intervention phase. Cathy's percentages of school work behavior were less variable when she used the study carrel than during any of the times she did not work in the carrel.

The median percentage of intervals in which Cathy was looking around during the carrel time decreased between both associated baseline and intervention phases. The median percentages of looking around behavior were 28 and 18 percent during the first baseline and intervention phases, respectively, and 27 and 14 percent during the second baseline and intervention phases, respectively. During the noncarrel times, Cathy's median percentages of looking around behavior increased notably from 16 to 40 percent between the first baseline and intervention phases and decreased slightly from 25 to 21 percent between the second baseline and intervention phases.

Within condition comparisons of the carrel and noncarrel times indicated that Cathy displayed less looking around behavior while working in the study carrel than during the noncarrel times of the intervention phases. During the first baseline, Cathy's median percentage of looking around behavior was greater for the carrel time than for the noncarrel time. During the second baseline, there was only a small difference in the median percentages.

The graph of Cathy's looking around behavior shows that the level of her looking around behavior dropped immediately each time the

study carrel was introduced. This change in level complemented the increase in her school work behavior. However, just as her school work behavior showed a declining trend during the carrel time of each intervention phase, Cathy's looking around behavior evidenced a small increasing trend. This increasing trend also was present during the noncarrel time of each intervention condition. The graph shows a decreasing trend for looking around behavior during both the carrel and noncarrel times of the second baseline. There was not a corresponding increase in school work behavior, but there were associated increases in the three interaction behaviors.

The median percentage of intervals in which Cathy was interacting with another child during the carrel time decreased from 10 percent in the first baseline to 0 in the first intervention phase and from 13 percent in the second baseline to 4 percent in the second intervention phase. Although there was only a small difference in Cathy's median percentages for social interaction during the noncarrel times of the first baseline and intervention phases, 9 and 8 percent, respectively, she displayed a noticeable increase in social interaction behavior during the second intervention phase. Her median percentage increased from 12 percent during the second baseline to 24.5 percent during the second intervention phase.

Within each baseline, there was very little difference between Cathy's median percentages of social interaction behavior during the carrel and noncarrel times. However, Cathy engaged in less social interaction behavior during the carrel times of both intervention phases than during the noncarrel times.

Cathy approached another child less frequently during the carrel time of each intervention phase than during the carrel time of each previous baseline. Her median frequencies of approaches per 20 minutes for the first baseline and intervention phases and for the second baseline and intervention phases were 5.8, 0, 8.4, and 1.9 approaches, respectively. During the noncarrel time Cathy doubled her median frequency of approaches from 2.6 for the first baseline to 5.4 for the first intervention phase. Cathy's frequency of approaches to another child during the noncarrel time continued to increase to a median of 7.4 approaches for the second baseline and 13.5 approaches for the second intervention phase.

Cathy's median frequencies indicated that she approached another child more often during the noncarrel time of both intervention phases than while using the study carrel. Within the first baseline, Cathy's median frequency of approaches during the carrel time was twice her median frequency during the noncarrel time. Within the second baseline, only a small difference existed between the carrel and noncarrel median frequencies of approaches.

Approaches of other children to Cathy occurred less often when she worked in the study carrel than during the carrel time of each baseline. The median frequency of other child approaches during the carrel time was 2 approaches per 20 minutes for the first baseline, 0 approaches for the first intervention phase, 11.2 approaches for the second baseline, and 3.7 approaches for the second intervention phase. During the noncarrel time, the median frequency of approaches of other children to Cathy increased slightly from 4.2 approaches per 20 minutes

for the first baseline to 6 approaches for the first intervention phase. Between the second baseline and intervention noncarrel times the median frequency of other child approaches to Cathy more than doubled from 10 to 22 approaches per 20 minutes.

Within the first baseline and both intervention phases, the median frequencies of other child approaches indicated that Cathy was approached less often during the carrel time than during the noncarrel time. This effect was more evident during the intervention phases. Within the second baseline, the median frequency of other child approaches was slightly more during the carrel time than during the noncarrel time.

The graphs of Cathy's social interaction, approach child, and other child approach behaviors show a small increasing trend during the carrel time of the first intervention phase. This trend is reflected in the decline of school work behavior, as well as in an increase of looking around behavior. The accelerating trend continued into both the carrel and noncarrel times of the second baseline, but increased in both level and slope during the carrel time. At the same time, Cathy was exhibiting less school work and looking around behaviors. With the advent of the study carrel in the second intervention phase, Cathy's three interaction behaviors diminished considerably. Nevertheless, they tended to increase in frequency throughout the intervention phase, along with a corresponding decline in school work behavior and increase in looking around behavior. The three interaction behaviors remained relatively high during the noncarrel time of the second intervention phase.

The statistical analysis of Cathy's four distractible behaviors indicated that they occurred significantly less during the carrel time of both intervention phases than during the carrel time of the respective baselines (Table 1, page 20). In addition, the distractible behaviors occurred significantly more often during the noncarrel time of each intervention phase than during the noncarrel time of the associated baseline. All comparisons of carrel and noncarrel times within each phase were statistically significant (Table 2, page 21). Within the intervention phases the distractible behaviors occurred less when Cathy worked in the study carrel than during the noncarrel times. The opposite was true for the baseline phases in which the distractible behaviors occurred more during the carrel times than the noncarrel times. As with John, this result appears to be contradictory to the graphs of the four behaviors, however, it was the product of using weighted standard scores to statistically analyze the behaviors.

The average percentage of work that Cathy completed during each carrel and noncarrel time are presented in Figure 4. Cathy completed more work during the carrel time than the noncarrel time of each condition except the first baseline. When comparing baseline and associated intervention phases, Cathy completed more work when using the study carrel each time than during the baseline carrel times. A comparison of the noncarrel times indicated that Cathy completed less work during each intervention phase than during the respective baseline phase. For the work completed, Cathy's average percentages of accuracy were 88, 89, 74, and 77 percent for the carrel time of each phase and 92, 94, 92 and 84 percent for the noncarrel times.

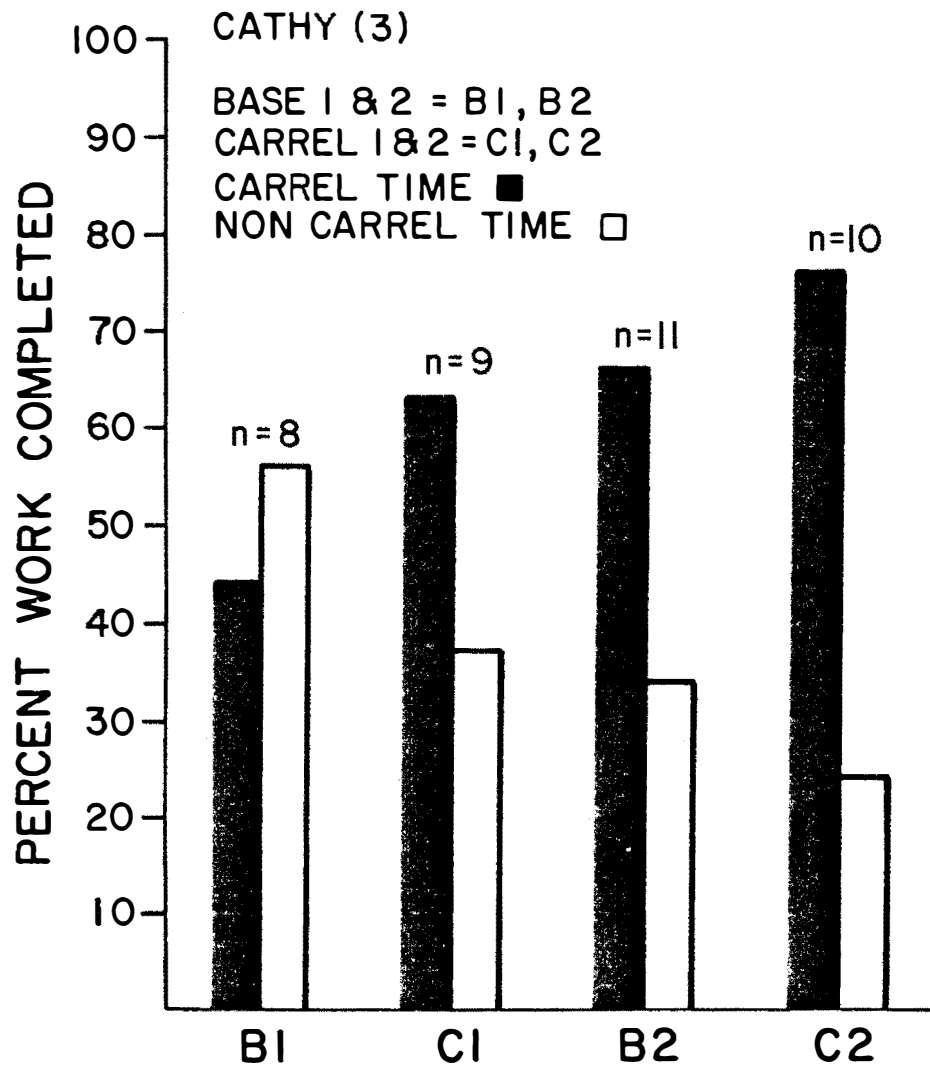


Figure 4. The mean percentage of academic work completed by Cathy during the carrel and noncarrel times of each experimental condition. The n's represent the number of days for which the academic work was computed in each condition. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

The graphs of Dick's behaviors are presented in Figure 5. Dick engaged in significantly more school work behavior during the carrel time of the second intervention phase than during the carrel time of the second baseline (Table 1, page 20). There were no statistically significant differences in Dick's school work behavior between the carrel times of the first baseline and intervention phases or between the noncarrel times of both baseline and associated intervention phases. During the carrel times Dick's median percentages of school work behavior were 74 and 70 percent for the first baseline and intervention phases, respectively, and 57.5 and 75 percent for the second baseline and intervention phases, respectively. During the noncarrel times, Dick's median percentages of school work were 70, 60, 60, and 56 percent, respectively, for each phase.

Comparisons of the carrel and noncarrel times within each intervention phase indicated that Dick engaged in school work behavior significantly more often during the carrel time than during the noncarrel time (Table 2, page 21). There were no significant differences in Dick's school work behavior between the carrel and noncarrel times of each baseline.

The graph of Dick's school work behavior shows that he maintained a fairly consistent level of school work through the first baseline and intervention phase carrel times. There was a noticeable decrease in the percentage of Dick's school work behavior with the advent of the second baseline. However, when he began using the study carrel during the second intervention phase, Dick's level of school work behavior

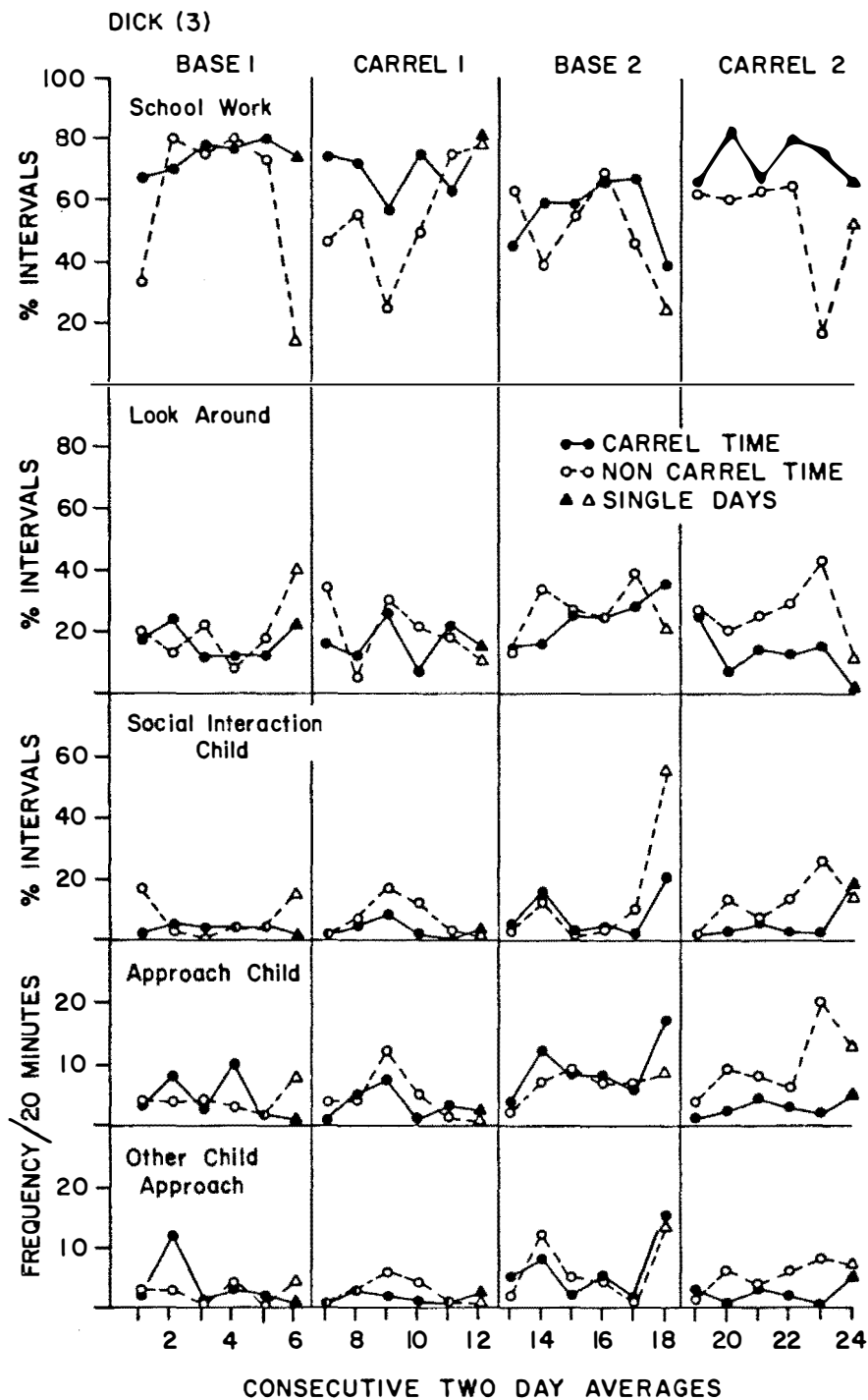


Figure 5. The percentage of intervals and frequency per 20 minutes of Dick's behaviors during the carrel and noncarrel times across experimental conditions. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

immediately returned to approximately the same level he had achieved during the first two conditions.

The median percentage of intervals in which Dick was looking around during the carrel times remained about the same between the first baseline and intervention phase and decreased considerably from the second baseline to the second intervention phase. The median percentages for looking around behavior during the carrel time were 15, 14, 21.5, and 10 percent, respectively, for each phase. During the noncarrel time the median percentages for looking around behavior were basically equivalent between the first baseline and intervention phases and between the second baseline and intervention phases. For the first baseline and intervention phases the median percentages of looking around were 15 and 16 percent, respectively. These increased to a median percentage of 25 percent for each of the noncarrel times of the second baseline and intervention phases.

When Dick's carrel and noncarrel times were compared within each phase there were no readily distinguishable differences between the median percentages of looking around behavior through the first three phases. Within the second intervention phase, however, Dick displayed considerably less looking around behavior during the carrel time than during the noncarrel time.

An inspection of the graph of Dick's looking around behavior shows that, for both the carrel and noncarrel times of the first two conditions, Dick's looking around behavior remained at a consistently low level. During both the carrel and noncarrel times of the second baseline, the graph shows that Dick's looking around behavior began to

increase. When Dick worked in the study carrel during the second intervention phase his looking around behavior was reduced to a level slightly lower than it had been during the first two conditions. Dick's looking around behavior during the noncarrel time of the second baseline remained at a high level.

Through the first three conditions the median percentages of Dick's social interaction behavior during the carrel time were essentially equivalent. During the first baseline and intervention carrel times, the median percentages were 4 and 3 percent, respectively. The median percentage of Dick's social interaction behavior declined from 3.5 percent during the carrel time of the second baseline to 0 for the second intervention phase. During the noncarrel times the median percentages increased from 0 to 5 percent between the first baseline and intervention phase and from 5 to 8 percent between the second baseline and intervention phase.

Within the first baseline, the median percentages indicated that Dick displayed less social interaction behavior during the noncarrel time than during the carrel time. Within the first intervention and second baseline phases, Dick interacted with other children slightly more during the noncarrel time than during the carrel time. Dick engaged in social interaction much less during the carrel time of the second intervention phase than during the noncarrel time.

The frequency of Dick's approaches to another child during the carrel time decreased from a median of 4 approaches per 20 minutes for the first baseline to 2.2 approaches for the first intervention phase and from 7.9 to 2.2 approaches between the second baseline and intervention

phases. During the noncarrel times of the first baseline and intervention phases the decrease in the median frequency of Dick's approaches from 4 to 2 was similar to the frequency reduction that occurred in the carrel time. However, Dick evidenced a small increase in the median frequency of approaches from 6.6 to 8.2 approaches during the noncarrel time of the second baseline and intervention phases.

The median frequencies indicated that Dick approached another child the same number of times during the carrel and noncarrel times of the first baseline and approximately the same number of times during the carrel and noncarrel times of the first intervention phase. Within the second baseline, Dick's median frequency of approaches declined somewhat from the carrel to the noncarrel time. His median frequency of approaches almost quadrupled from the carrel time to the noncarrel time of the second intervention phase.

Dick was approached by other children approximately the same number of times per 20 minutes during the carrel times of the first baseline and intervention phases. Other children made fewer approaches to Dick during the carrel time of the second intervention phase than during the carrel time of the second baseline. The median frequencies of other child approaches to Dick during carrel time of each phase were 2, 2.2, 4.7, and 1.2 approaches per 20 minutes. During the non-carrel times the median frequencies of other child approaches increased from 0 approaches during the first baseline to 2 approaches during the first intervention phase, to 4 approaches during the second baseline, to 5 approaches during the second intervention phase.

The median frequencies of other child approaches indicated that,

for the first three conditions slightly fewer approaches were made to Dick during the noncarrel time than during the carrel time. Within the second intervention phase, the median frequency of other child approaches to Dick during the noncarrel time was more than four times the median frequency during the carrel time.

The graphs of Dick's social interaction, approach child, and other child approach behaviors demonstrate that there were no dramatic changes in these behaviors, relative to the baseline, when Dick used the study carrel during the first intervention phase. When the second baseline was instituted, the frequencies of Dick's approaches to another child and other child approaches to Dick increased during both the carrel and noncarrel times. The frequencies diminished immediately when Dick worked in the study carrel during the second intervention phase. The levels of the two approach behaviors remained high and the level of the social interaction behavior increased during the noncarrel time of the second intervention phase.

The statistical analysis of Dick's distractible behaviors indicated that they occurred significantly less during carrel time of the second intervention phase than during the carrel time of the second baseline (Table 1, page 20). The first baseline-intervention phase comparison of the carrel time was not significant, but the distractible behaviors occurred less during the intervention phase. There were no significant differences between the noncarrel times of the baseline and intervention phases. The distractible behaviors occurred significantly less during the carrel time of the second intervention phase than during the noncarrel time (Table 2, page 21). There was no

significant difference between the carrel and noncarrel times of the first intervention phase. Within each baseline the distractible behaviors occurred more frequently during the carrel time than the noncarrel time, but the comparisons did not reach significance.

The average percentages of work that Dick completed are presented in Figure 6. Dick completed more work during the carrel time than during the noncarrel time of the first baseline and both intervention phases. On the average Dick completed considerably more work both times he used the study carrel than during the carrel time of each baseline. During the noncarrel times, Dick completed less work in the intervention phases than in the respective baseline phases. Dick's average percentages of work done correctly of the work completed were 78, 73, 66, and 41 percent for the carrel times and 85, 72, 67, and 60 for the noncarrel times.

The graphs of Ben's behaviors are presented in Figure 7. During the carrel time of the second intervention phase, Ben displayed significantly more school work behavior than during the carrel time of the previous baseline (Table 1, page 20). Ben's median percentage of school work increased from 35 percent during the second baseline to 62 percent during the second intervention phase. There were no significant differences in Ben's school work behavior between the carrel times of the first baseline and intervention phases nor between the noncarrel times of both baselines and respective intervention phases. The median percentages of school work behavior for the first baseline and intervention carrel times were both 45 percent. For the noncarrel times the median percentages of Ben's school work behavior for each

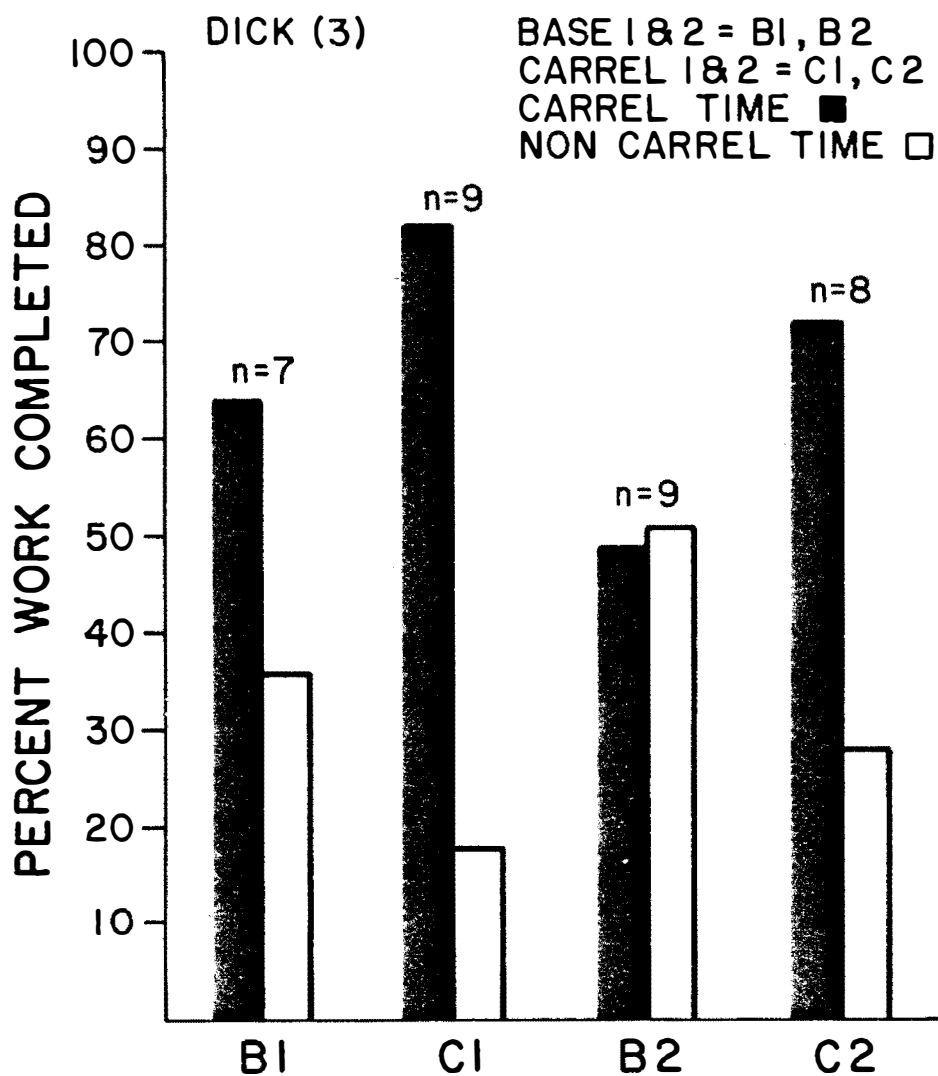


Figure 6. The mean percentage of academic work completed by Dick during the carrel and noncarrel times of each experimental condition. The n's represent the number of days for which the academic work was computed in each condition. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

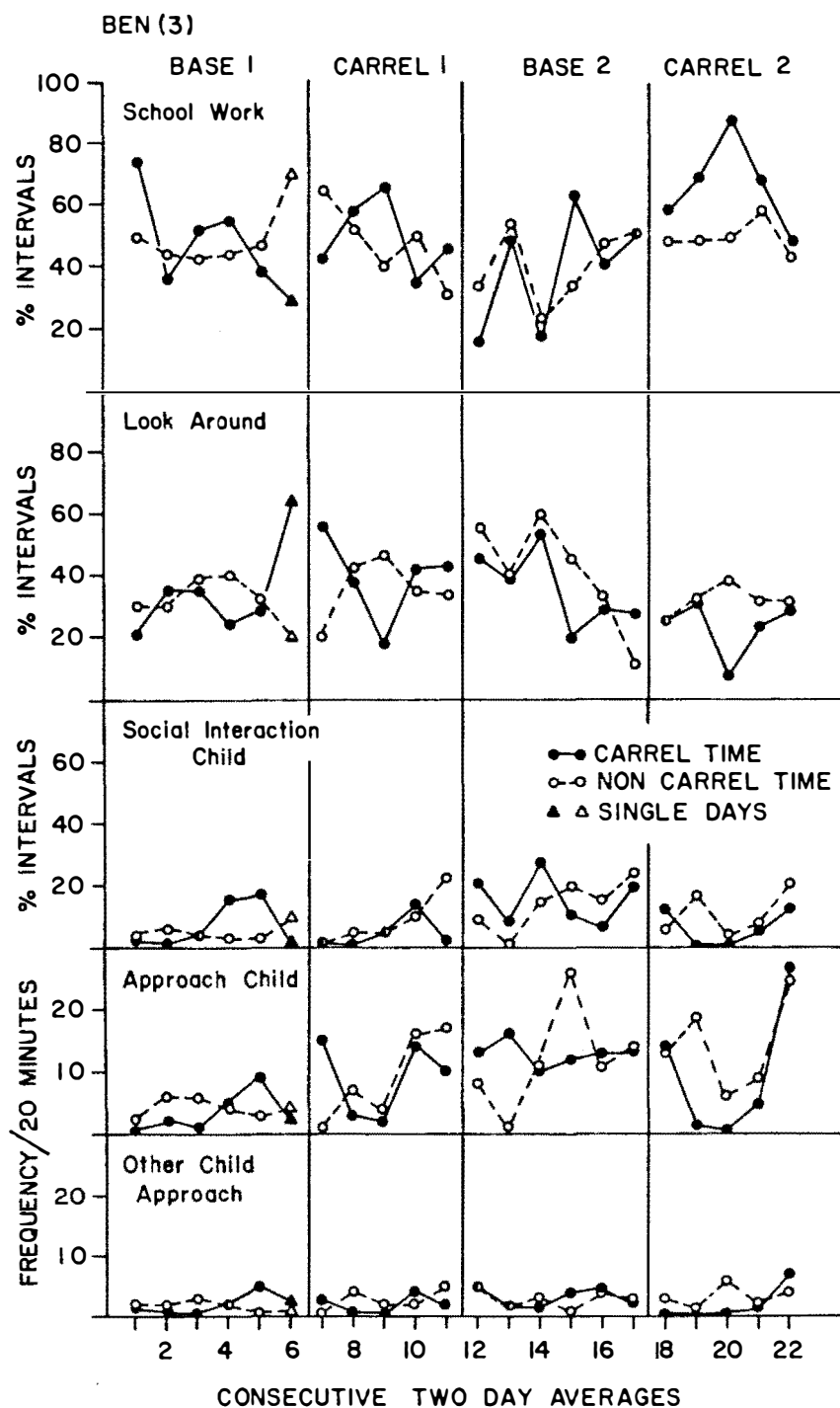


Figure 7. The percentage of intervals and frequency per 20 minutes of Ben's behaviors during the carrel and noncarrel times across experimental conditions. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

phase were 50, 45, 57, and 53 percent.

Ben engaged in school work behavior significantly more often while working in the study carrel than during the noncarrel time of the second intervention phase (Table 2, page 21). None of the other comparisons between the carrel and noncarrel times of each phase were significant.

The graph of Ben's school work behavior shows a subtle declining trend during the carrel time of the first baseline. Although the trend seemed to reverse during the first six days of the carrel intervention, it declined again during the last four days. Throughout the first intervention phase, Ben's school work behavior during the noncarrel time decreased. With the beginning of the second baseline, a noticeable drop in Ben's school work behavior occurred during the carrel time. However, the percentage of school work behavior during both the carrel and noncarrel times increased during the second baseline. The positive trend continued and appeared to increase slightly over the first six days of the second carrel intervention. Just as in the first intervention phase, Ben's school work behavior declined during the last four days that he used the study carrel. Throughout all four phases, Ben's school work behavior was the most variable of the third grade subjects.

The percentage of intervals in which Ben was looking around during the carrel time increased from a median of 34 percent during the first baseline to a median of 41.5 percent during the first intervention phase and decreased from a median of 29 percent during the second baseline to a median of 23.5 percent during the second intervention phase. Between the first baseline and intervention phases of

the noncarrel time, the median percentage of Ben's looking around behavior decreased from 39 to 34 percent. The median percentage during the noncarrel time of the second baseline and intervention phases decreased from 43.5 to 28.5 percent.

Ben displayed less looking around behavior during the carrel times of both baselines and the second intervention phase than during the noncarrel times, according to the median percentages. This difference was most evident during the second baseline. Within the first intervention phase Ben engaged in more looking around behavior during the carrel time than during the noncarrel time.

The graph of Ben's looking around behavior shows that, during the carrel time of the first intervention phase Ben's looking around behavior decreased as his school work behavior increased, but then increased as his school work behavior decreased. Throughout both the carrel and noncarrel times of the second baseline, Ben's looking around behavior decreased. Except for two days during the carrel time, Ben's looking around behavior appeared to remain level throughout the second intervention phase.

The median percentage of intervals in which Ben socially interacted with another child remained about the same between the carrel times, as well as between the noncarrel times, of the first baseline and intervention phases. The median percentages were 3 and 3.5 percent, respectively, for the carrel time of the first baseline and intervention phases and 5 percent for the noncarrel times of both phases. During both the carrel and noncarrel times of the second baseline the median percentages of Ben's social interaction behavior increased

substantially to 11.5 and 10.5 percent, respectively. The percentage of Ben's social interaction behavior decreased to a median of 1.5 percent during the carrel time of the second intervention phase. However, the median percentage for the noncarrel time of the second intervention phase remained at a high level, 9 percent.

Ben exhibited slightly less social interaction behavior during the carrel times of the first baseline and intervention phases than during the noncarrel times. There was only a small difference in Ben's social interaction behavior between the carrel and noncarrel times of the second baseline. Within the second intervention phase, Ben interacted with other children less during the carrel time than during the noncarrel time.

The frequency of Ben's approaches to another child during the carrel time increased from a median of 2 approaches per 20 minutes for the first baseline to 7 approaches for the first intervention phase. Ben's approaches to another child increased again to a median frequency of 11.7 approaches during the carrel time of the second baseline and then decreased to a median frequency of 4.7 approaches when Ben worked in the study carrel during the second intervention phase. The median frequencies of Ben's approaches to another child during the noncarrel times were 4 approaches per 20 minutes for both the first baseline and intervention phases and 9.5 approaches each for the second baseline and intervention phases.

The median frequency of Ben's approaches to another child was greater during the carrel time of the first intervention phase than during the noncarrel time and was less during the carrel time of the

second intervention phase than during the noncarrel time. Within the baseline phases, the median frequency of Ben's approaches to another child was less during the carrel time of the first baseline and more during the carrel time of the second baseline than during the respective noncarrel times.

The frequency of approaches of other children to Ben remained at a very low level throughout both the carrel and noncarrel times of all phases. During the carrel time of each phase the median frequencies of approaches to Ben were 0.8, 0.6, 2.2, and 0 approaches per 20 minutes. The median frequencies of approaches to Ben during the noncarrel time of each phase were 1, 1.9, 2.2, and 2.2 approaches per 20 minutes. When Ben worked in the study carrel during the second intervention phase, he was approached by other children less frequently than during the carrel time of the previous baseline. He also was approached less often while using the study carrel than during the noncarrel time of the second intervention phase.

The graphs of Ben's social interaction, approach child, and other child approach behaviors indicate that there were basically no changes in the behaviors between the first baseline and carrel intervention phases. In fact, Ben's approaches to another child appeared to increase during both the carrel and noncarrel times of the first intervention phase. A corresponding, but smaller, increasing trend also was evident in Ben's social interaction behavior. The relatively higher levels of social interaction and approach child behaviors continued throughout the second baseline phase. When Ben used the study carrel during the second intervention phase, these behaviors generally

diminished. However, the behaviors remained at the higher levels during the noncarrel time of the second intervention phase. The graphs show that Ben approached other children more frequently than he was approached and that the high frequency of his approaches accounted for the amount of time that he displayed social interaction behavior. The excessive variation in Ben's approach child behavior also is evident when inspecting the graphs.

The statistical analysis of Ben's four distractible behaviors indicated that they occurred significantly less when Ben worked in the study carrel during the second intervention phase than during the carrel time of the previous baseline (Table 1, page 20). Within the second intervention phase, however, there was no significant difference in the distractible behaviors between the carrel and noncarrel times. None of the other comparisons between baseline and intervention phases or between carrel and noncarrel times were significant.

The average percentages of work that Ben completed are presented in Figure 8. Ben completed slightly more work during the carrel time of the first baseline than during the noncarrel time and considerably more work during the carrel time of the second intervention phase than during noncarrel time. Within the first intervention phase and the second baseline, Ben completed somewhat more work during the noncarrel time than during the respective carrel times. A comparison of the carrel times indicated that Ben completed less work during the first intervention phase and substantially more work during the second intervention phase than in the associated baseline phases. Ben's average percentages of work done correctly of the work completed were 85, 94,

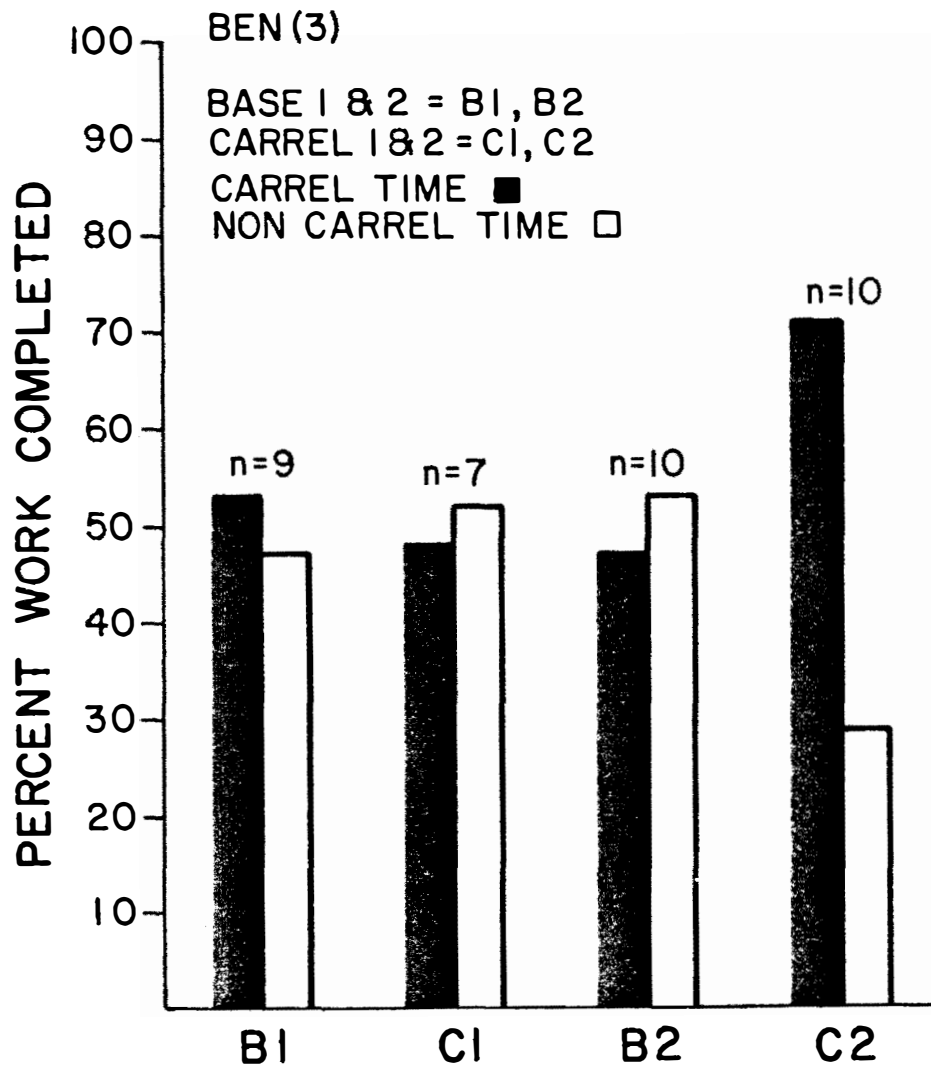


Figure 8. The mean percentage of academic work completed by Ben during the carrel and noncarrel times of each experimental condition. The n's represent the number of days for which the academic work was computed in each condition. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel 1 and 2 were the intervention conditions.

86, and 76 percent for the carrel times of each phase and 88, 85, 82, and 84 percent for the noncarrel times of each phase.

The graphs of Mary's behaviors are presented in Figure 9. There are no significant differences in the percentage of intervals of Mary's school work behavior between the first baseline and intervention phase of either the carrel or noncarrel times. During the carrel times, Mary's median percentage of school work behavior increased from 70 percent during the first baseline to 79 percent during the intervention phase, then decreased to 75 percent during the second baseline. The median percentages of Mary's school work behavior decreased from 64 percent to 61.5 percent and to 59 percent during the noncarrel times of each successive phase. Mary exhibited more school work behavior during each carrel time than during each associated noncarrel time, but the only significant difference occurred within the intervention phase (Table 2, page 21).

The graph of Mary's school work behavior shows an increasing trend during the carrel time of the first baseline. When Mary used the study carrel her school work behavior declined at first, then increased during the last four days of the intervention phase. Throughout the carrel time of the second baseline phase the percentage of Mary's school work behavior appeared to decline.

Basically, there was no change between the carrel times of the first baseline and intervention phase in the percentage of intervals in which Mary displayed looking around behavior. The median percentages of looking around behavior during the carrel time were 10 percent for the first baseline and 11 percent for the intervention phase. The

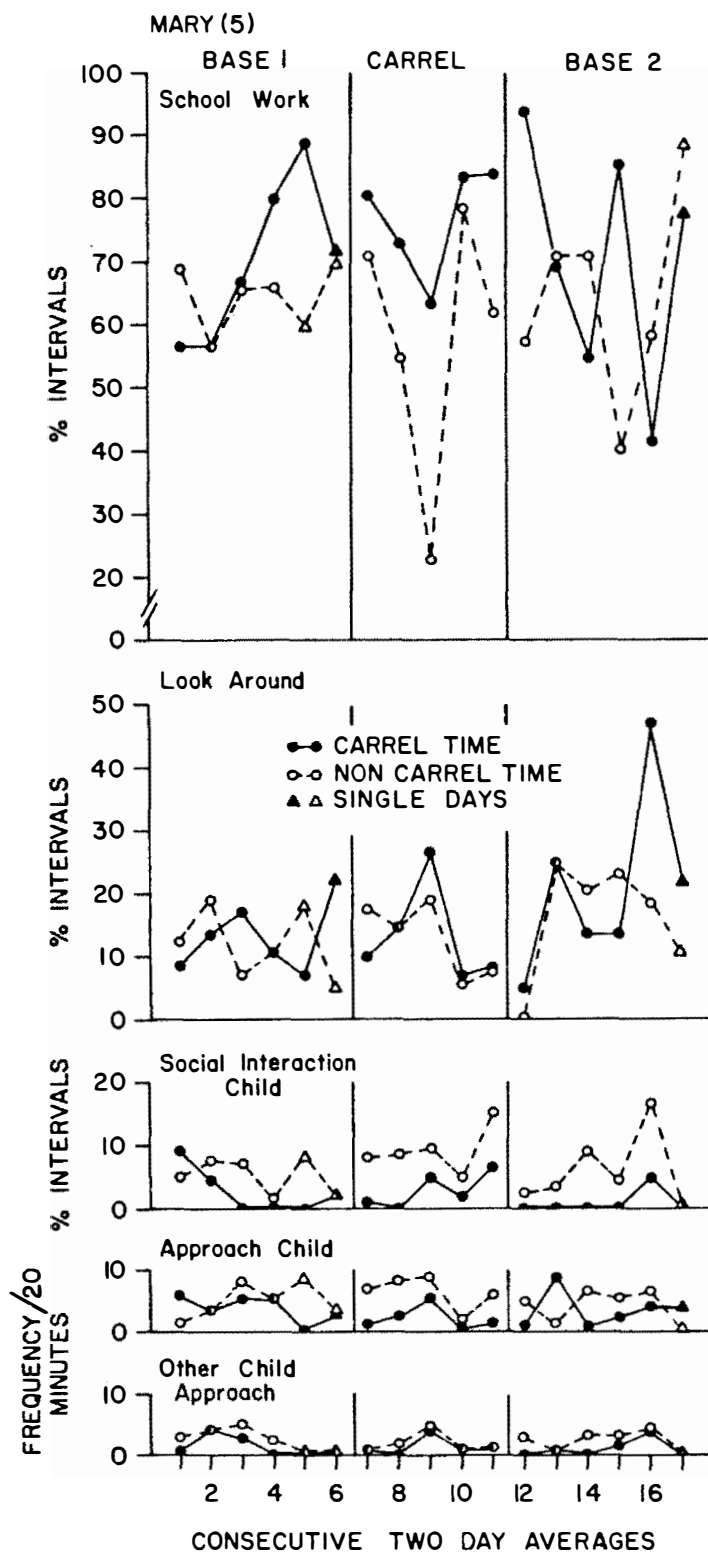


Figure 9. The percentage of intervals and frequency per 20 minutes of Mary's behaviors during the carrel and noncarrel times across experimental conditions. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel was the intervention condition.

median percentage increased to 17 percent during the carrel time of the second baseline. Only small increases occurred in the median percentages of Mary's looking around behavior during the noncarrel times of each condition. The median percentages for the noncarrel times were 8.5, 10.5, and 11 percent for each successive phase. Although Mary displayed less looking around behavior, according to the median percentages, during the noncarrel time of the second baseline than during the carrel time, the differences between the carrel and noncarrel times of the first two phases were not remarkable.

The graph of Mary's looking around behavior shows that, in general, her looking around behavior increased whenever her school work behavior decreased, although not to the same degree. The percentage of time that Mary spent looking around appeared to remain fairly level throughout the carrel and noncarrel times of the first two phases. During the carrel time of the second baseline there was a noticeable increase in Mary's looking around behavior, which corresponded to the decline in her school work behavior.

The median percentage of intervals in which Mary was interacting with another child was zero for the carrel time of each phase. Mary exhibited social interaction behavior more during the noncarrel time of each phase than during the carrel time. During the noncarrel time of the intervention phase, Mary displayed more social interaction behavior, relative to the previous baseline. The median percentages for Mary's social interaction behavior during the noncarrel time of each phase were 5, 7.5, and 4 percent.

Mary approached another child less frequently during the carrel

time of the intervention phase than during the carrel time of the previous baseline. The median frequencies of Mary's approaches during the carrel time were 2.6, 1.6, and 3 approaches per 20 minutes for each successive phase. During the noncarrel time of the intervention phase, Mary made more approaches to other children than during the previous baseline. She also approached other children more frequently during the noncarrel time of the intervention phase than during the carrel time. Within the first baseline, Mary exhibited more approach child behaviors during the noncarrel time than during the carrel time. The median frequencies of Mary's approaches to another child during the noncarrel time of each successive phase were 3.8, 5.2, and 2.6 approaches per 20 minutes.

There was no difference in the median frequencies of other child approaches to Mary during the carrel time of the first baseline and intervention phases. Both median frequencies were 0.8 approaches per 20 minutes. The median frequency of other child approaches declined to zero for the carrel time of the second baseline. There was very little difference between the median frequencies of other child approaches for the first baseline and intervention noncarrel times. The median frequencies of other child approaches for the noncarrel times were 2.1 approaches for the first baseline and 1.9 approaches per 20 minutes for the intervention phase. The median frequency increased to 2.6 approaches per 20 minutes for the noncarrel time of the second baseline. Within each phase, Mary was approached by other children more frequently during the noncarrel time than during the carrel time.

The graphs of Mary's social interaction, approach child, and other child approach behaviors do not demonstrate any noteworthy changes between the carrel times of the first baseline and intervention phase. There appeared to be small increases in Mary's social interaction and approach child behaviors from the noncarrel time of the first baseline to the noncarrel time of the intervention phase. Nevertheless, when the four distractible behaviors were compared statistically, there were no significant differences between the first baseline and intervention phases or between the carrel and noncarrel times within each phase.

The graphs of Bill's behaviors are presented in Figure 10. There were no significant differences in the percentage of intervals in which Bill exhibited school work behavior between the carrel times of the first baseline and intervention phase or between the noncarrel times of the first two phases (Table 1, page 20). Bill's median percentages of school work behavior during the carrel times were 79 percent for the first baseline, 82.5 percent for the intervention phase, and 80 percent for the second baseline. During the noncarrel time, Bill's median percentages of school work behavior were 75 and 74.5 percent for the first baseline and intervention phases, respectively. The median percentage increased to 81 percent for the second baseline. Although Bill exhibited more school work behavior during the carrel time of the first baseline and intervention phase than during each related noncarrel time, neither of the differences was significant (Table 2, page 21).

The graph of Bill's school work behavior shows that during the first two days he worked in the study carrel his school work behavior

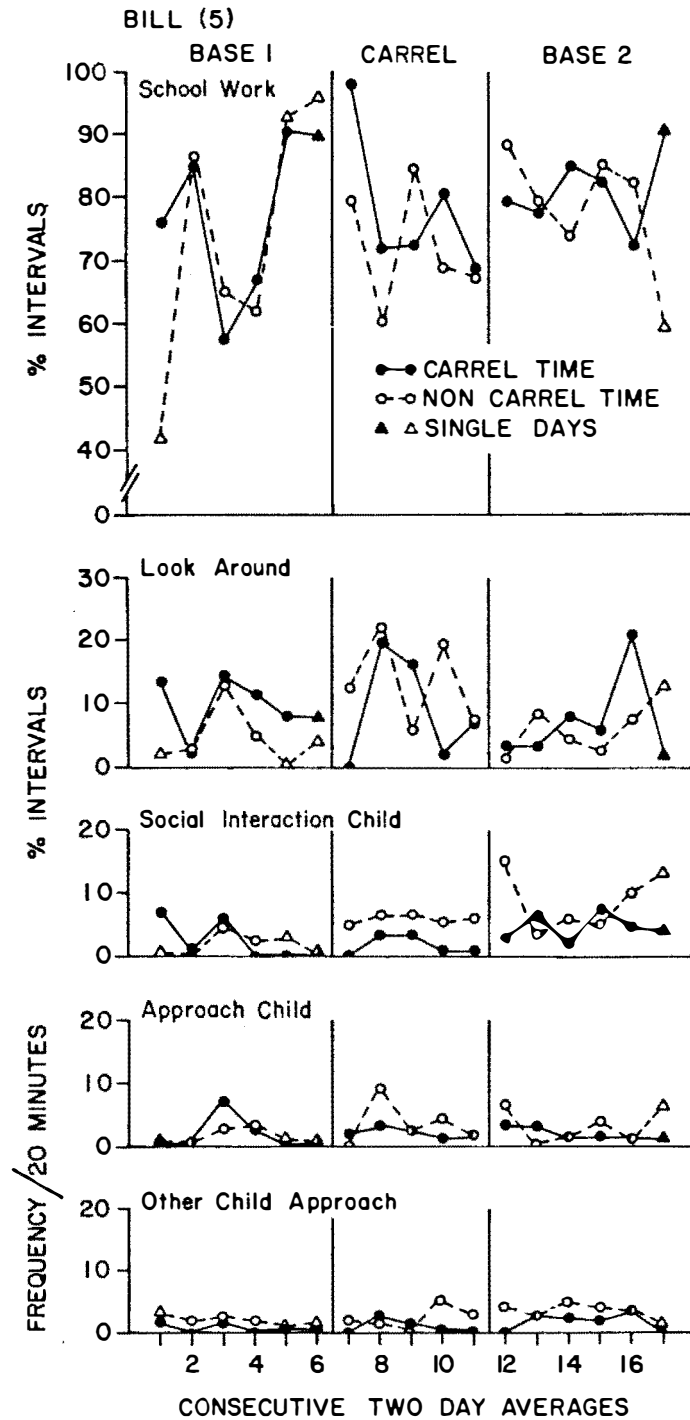


Figure 10. The percentage of intervals and frequency per 20 minutes of Bill's behaviors during the carrel and noncarrel times across experimental conditions. The carrel and noncarrel times were the first and second halves, respectively, of an observation period. Carrel was the intervention condition.

increased, but then decreased to a lower level. Although Bill's school work behavior was more variable during both the carrel and noncarrel times of the first baseline, the variability lessened during the intervention phase and second baseline.

The median percentage of Bill's looking around behavior during the carrel time decreased from 10 percent for the first baseline to 2 percent for the intervention phase. Then it increased to 7 percent for the second baseline. During the noncarrel time, the median percentage of intervals in which Bill was looking around increased from 3 percent for the first baseline to 11 percent for the intervention phase, then decreased to 5 percent for the second baseline. The median percentages indicated that Bill exhibited less looking around behavior during the carrel time of the intervention phase than during the noncarrel time. Within each baseline, Bill's looking around behavior was greater during the carrel time than during the related noncarrel time.

An examination of the graph of Bill's looking around behavior shows that there was a subtle declining trend during the carrel time of the first baseline. When Bill worked in the study carrel, his looking around behavior decreased immediately, then increased sharply, indicating an inverse relationship with the school work behavior. During the remainder of the carrel intervention, Bill's looking around behavior declined. Bill's looking around behavior also appeared to decline during the noncarrel time of the intervention phase. Throughout the second baseline, there appeared to be an increase in Bill's looking around behavior during both the carrel and noncarrel times.

The median percentage of intervals in which Bill exhibited

social interaction behavior was zero for the carrel times of the first baseline and intervention phases. The median percentage increased to 4 percent for the carrel time of the second baseline. During the non-carrel times, Bill's social interaction behavior increased during each successive phase. The median percentage of Bill's social interaction behavior during the noncarrel times of each phase were 2, 5.5, and 10 percent. Within each phase, Bill interacted with other children more during the noncarrel time than during the carrel time.

From the first baseline to the intervention phase, the median frequencies of Bill's approaches to another child increased during both the carrel and noncarrel times. During the second baseline, the median frequency of approaches for the carrel time decreased slightly, relative to the intervention phase. The median frequency for the non-carrel time of the second baseline also decreased, relative to the intervention phase. Within each baseline there was little difference between the median frequencies of approaches for the carrel and non-carrel times. Bill exhibited fewer approaches to another child during the carrel time of the intervention phase than during the noncarrel time. The median frequencies of Bill's approaches to another child were 0.8, 1.6, and 1.4 approaches per 20 minutes during the carrel times of each successive condition and 1, 2.2, and 1.2 approaches per 20 minutes during the noncarrel times of each condition.

Approaches of other children to Bill increased during the carrel time of each successive condition. The median frequency of other child approaches during the carrel time increased from 0 approaches in the first baseline to 0.7 approaches in the intervention phase to 2

approaches per 20 minutes in the second baseline. During the noncarrel times, the median frequencies of other child approaches to Bill were 2, 1.7, and 3 approaches per 20 minutes for each successive condition. Within each phase, Bill was approached by other children more frequently during the noncarrel time than during the carrel time.

The graphs of Bill's social interaction, approach child, and other child approach behaviors do not show any notable changes between the carrel times of the first baseline and intervention phase. Throughout the carrel and noncarrel times of all three phases there appeared to be a small but continuous increasing trend in Bill's social interaction and other child approach behaviors. Within the intervention phase, the three behaviors were more evident during the noncarrel time than during the carrel time. The statistical analyses of the four distractible behaviors indicated that there were no significant differences between the first baseline and intervention phase or between the carrel and noncarrel times within each phase.

For the six subjects, 84 statistical comparisons were calculated (see Table 1, page 20, and Table 2, page 21). Twenty-nine of the tests were significant at $p < .05$. The chance probability of obtaining 29 significant results out of 84 tests is much less than .001, when the tests are independent (Sakoda, Cohen, and Beall, 1954). Of the 29 significant tests, six were significant at $p < .001$, 13 were significant at $.001 < p < .01$, and 10 were significant at $.01 < p < .10$. Although some of the significant results may have occurred by chance, it is unlikely that all of them did.

CHAPTER IV

DISCUSSION

The results of the research suggested that study carrels can be effective in helping distractible students attend to their academic work. Two third grade students, John and Cathy, displayed statistically significant increases in their school work behavior both times they used the study carrels. Dick and Ben demonstrated a significant increase in their school work behavior during the carrel time of the second intervention phase. These results replicated those of Shores and Haubrich (1969), who found that study carrels increased the attending to task behavior of 11 and 12 year old boys who were emotionally disturbed and academically retarded from two to four years. The school work behavior of the fifth graders did not change appreciably when they worked in the study carrels. Only Mary displayed more school work behavior during the carrel time, relative to the noncarrel time, of the intervention phase. In addition, the study carrels did not effect any notable changes in the other measured behaviors of the fifth graders.

The study carrels had a significant positive effect on the distractible behaviors of the third grade students. The data showed that the first time they worked in the carrels the prevalence of each of John's and Cathy's behaviors was less between and within experimental conditions. During the second intervention phase, all four third graders exhibited decreases, relative to the previous baseline and to

the associated noncarrel time, in each distractible behavior when they used the study carrels. This was the first study to include direct observational data on several behaviors which are indicative of distractibility. Shores and Haubrich (1969) were the only other researchers who measured the subjects' behavior when they worked in the study carrels. The dependent variables in other research on study carrels were measures of academic performance.

The study carrels appeared to have a moderate effect on the students' academic performances. When the baseline and intervention phases were compared, Cathy and Dick completed more work, on the average, both times they used the carrels and Ben completed more work the second time he used the carrel. John exhibited more school work behavior each time he used the carrel, but only completed more work, on the average, during the first baseline-carrel intervention comparison. These findings are in agreement with those of Jenkins et al. (1972) who found that, when children worked in isolation rooms, most of them completed more reading workbook pages, on the average, than when they worked in their special education classroom.

Of the eight comparisons between the baseline and carrel intervention phases, five indicated that when a subject displayed more school work behavior while using a study carrel he/she also completed more academic work, on the average. There did not appear to be an association between a subject's daily percentage of work completed and the daily behavioral measures of school work. There also were no discernible relationships among a subject's percentage of work done correctly, percentage of work completed, and school work behavior. In order to

maintain a naturalistic study the researcher exerted very little control over the academic assignments. As a result, the quantity and degree of difficulty of the assignments, which was not consistent from day to day, probably influenced the academic measures.

At the conclusion of the study, Ms. Shaw was asked to rate the effectiveness of the carrels with each student. Her perceptions of the carrels' effectiveness concurred with the data. She thought the carrels were very beneficial for John and Cathy and had little effect on Dick's and Ben's behaviors during the first intervention phase. During the second carrel intervention phase, Ms. Shaw believed that both Dick's and Ben's behaviors improved considerably, with the carrels benefitting Dick somewhat more than Ben. She stated that the study carrels were slightly more effective with John and Cathy when they used them the second time than during the first intervention phase. According to Ms. Shaw, the carrels were more effective the second time because the students were accustomed to them and knew what behaviors were expected from them.

The present study was the first to be conducted in the regular classroom and only the third (Somervill et al., 1974, Somervill et al., 1973) to select subjects on the basis of their distractibility. Other research was done in simulated classrooms (Gorton, 1972; Somervill et al., 1978; Somervill et al., 1974; Somervill et al., 1973). The subjects probably behaved differently in the simulated classrooms than in their regular classrooms. Those studies that were conducted in the subjects' natural surroundings used children who attended special education classrooms (Cruickshank et al., 1961; Haring & Phillips,

1962; Jenkins et al., 1972; Rost & Charles, 1967; Scott, 1970; Shores & Haubrich, 1969). The researchers selected these subjects because they believed that distractibility was an integral component of their handicaps (i.e., hyperactive, emotionally disturbed, mentally retarded).

Presenting and analyzing the data of each individual subject, rather than combining the data of all subjects as previous research did, demonstrated that the study carrels did not have uniform effects on all subjects. The study carrels appeared to be most effective with the third grade subjects, while the fifth grade subjects did not seem to benefit from using them. Although other research found study carrels to be effective with subjects of approximately the same age as Bill and Mary (Gorton, 1972; Jenkins et al., 1972; Shores & Haubrich, 1969), those subjects had some learning or behavioral handicaps. The present results suggested that study carrels may not be effective with older children who are considered distractible, but otherwise normal. Since only two older subjects were used in this study, future research should address this question.

The results also demonstrated that the students were affected differentially by the study carrels. The carrel appeared to have a negative effect on Ben the first time he worked in it because his looking around and approach child behaviors increased when he used it. It also seemed that initially, the study carrel, itself, was distracting Ben. According to Ms. Shaw, Ben used the carrel to conceal his inappropriate behavior from her. Although Dick completed more academic work when he used the carrel the first time, his other behaviors did not change. The study carrels did not have positive

effects on Ben's and Dick's behaviors until they used them a second time. John and Cathy benefitted from the carrels immediately. Some children may take longer to adjust to a study carrel and may need initial instructions from the teacher regarding appropriate behavior while working in the carrel.

The effects of the study carrels on some children may diminish when they are used for extended periods of time. This was particularly evident with Cathy and less so for John. Both times Cathy used the carrel her school work behavior declined and her distractible behaviors increased throughout the intervention phases. When students are required to work in carrels for long periods of time during a day or for numerous consecutive days, they may habituate to the carrel. Other children who sit near the target student also may become accustomed to the carrel after a period of time and not be inhibited from approaching the target student. Research on the habituation effects of study carrels is needed to determine optimum lengths of time that a student can work in a carrel. The durations probably will vary considerably between students. Having students use the study carrels at their regular desks may not be the most beneficial procedure. It may be more advantageous for the students to work in the carrels in an area of the room away from other children.

In addition to the direct effects that the carrels had on the students' behaviors, some of the results suggested that behavioral contrast effects occurred after the students worked in the study carrels. The present research was analogous to the basic animal research on behavioral contrast. Typically in such research, the

animal is trained to respond to two different discriminative stimuli using identical variable interval reinforcement schedules. After the behavior has stabilized, the reinforcement schedule for one stimulus is altered (frequently to an extinction schedule), while the other remains unchanged. If the response rate to the unchanged stimulus increases while the rate to the changed stimulus decreases, positive behavioral contrast exists. Negative behavioral contrast exists when there is a decrease in responding to one stimulus as a function of increased responding to the second stimulus (Schwartz & Gamzu, 1977).

In the present research, the discriminative stimuli were represented by the carrel and noncarrel times. Although the reinforcement schedules for each time could not be specified, it was reasonable to assume that they were similar, and probably were some form of intermittent schedule. The study carrel differentiated the carrel and noncarrel times and altered the reinforcement schedule for the carrel time. Since there was less chance for a distractible behavior to be reinforced while a subject worked in the study carrel, it seemed likely that the behavior would increase in frequency during the noncarrel time where it continued to be reinforced.

Cathy's behaviors provided the most obvious examples of contrast effects. During each intervention phase there was a noticeable increase in her distractible behaviors and decrease in her school work behavior after working in the study carrel each day. Contrast effects appeared to be present in the behaviors of other subjects, particularly the social interaction, approach child, and other child approach behaviors, but were difficult to detect. Basic research has shown that

behavioral contrast is sometimes a weak phenomenon and may take time to occur (Reynolds, 1975). If the carrel conditions had been longer in the present research, the contrast effects might have been more noticeable.

Other than the present study, the research by Simon et al. (1980) was the only other study which was analogous to the basic research on behavioral contrast. Although Simon et al. found distinct contrast effects with children in the same classroom setting, they did not replicate their results. Other applied research results have been attributed to contrast-like effects (Forehand et al., 1981; Johnson et al., 1976; Meichenbaum et al., 1968; Wahler, 1975). For example, decreases in certain undesirable behaviors and increases in other appropriate behaviors in one setting (e.g., home) covaried with increases in undesirable behaviors in an untreated setting (e.g., school). These studies were not direct analogues of basic research, however, because the contrast effects occurred between different settings.

Applied researchers who design behavior change interventions should be alert for the occurrence of contrast effects in subjects' behaviors. The behavioral contrast effects could account for either increases or decreases in behaviors that are associated with target behaviors. In either case, teachers and parents, who implement most behavior change strategies, should be advised that behavioral contrast might occur. Researchers who study the effects of carrels, or any other behavior management technique, may inadvertently create problems for the teacher at other times during the day. In order to investigate

this possibility, future research should measure subjects' behaviors at times other than during the intervention time. In addition to the target behaviors, classes of behaviors that might be expected to covary should be measured. Other researchers also have discussed the need for investigating covariations in behaviors that result from interventions (Willems, 1974). Certainly, more applied research should examine behavioral contrast and behavior covariation and specify the associated behaviors and to what extent they covary.

The present research design could be criticized because the reading group and carrel times were the same for each subject every day. Another procedure would be to alternate the carrel time and reading group time on a random basis. In addition, having the students use the study carrel at various times during the day might have produced different results. However, the experimental control necessary in order to implement such procedures is not always possible in applied research. Classrooms and instructional programs usually are very structured and the research design must be adapted to the setting. A research design that could have been used to evaluate study carrels is the multi-element baseline design (Ulman & Sulzer-Azaroff, 1975). In this design a distinctive stimulus is correlated with each experimental condition and the conditions are alternated on a random basis. In other words, the days on which the students used the carrels would have been selected randomly. It is possible that habituation to the carrels would not develop when using this procedure. Future research will need to compare the effects of various designs on behaviors.

To summarize practical considerations from the present research,

teachers who use study carrels need to be aware of related variables which might influence the carrel's effects on a student's behavior. First, not every student will benefit from working in a study carrel. Some children may find the carrel, itself, distracting and take longer to adjust to working in it. Since the positive effects of study carrels appeared to diminish over time, they may be more beneficial when used for a few days at a time, rather than for numerous consecutive days. In addition, the length of time a student uses a carrel each day should be monitored to determine when its effectiveness begins to wane. Another suggestion is that teachers should be prepared to manage behavioral contrast effects if they occur. Finally, teachers should not necessarily expect improved academic performance when students work in study carrels unless contingencies are placed directly on the academic performance.

LIST OF REFERENCES

LIST OF REFERENCES

- Bailey, J. S. A handbook of research methods in applied behavior analysis. Tallahassee, FL.: Plenum Publishing Co., 1977.
- Cruickshank, W. M., F. A. Bentzen, F. H. Ratzeburgm & M. T. Tannhauser. A teaching method for brain-injured and hyperactive children. Syracuse, N.Y.: Syracuse University Press, 1961.
- Doleys, D. M. Distractibility and distracting stimuli: Inconsistent and contradictory results. Psychological Record, 1976, 26, 279-287.
- Forehand, R., J. Breiner, R. J. McMahon, & G. Davies. Predictors of cross setting behavior change in the treatment of child problems. Unpublished manuscript, University of Georgia, 1981.
- Freeman, B. J. Behavioral contrast: Reinforcement frequency or response suppression? Psychological Bulletin, 1961, 75, 347-356.
- Gorton, C. E. The effects of various classroom environments on performance of mental task by mentally retarded and normal children. Education and Training of the Mentally Retarded, 1972, 7, 32-38.
- Haring, N. G. & E. L. Phillips. Educating emotionally disturbed children. New York: McGraw-Hill, 1962.
- Hersen, M. & D. H. Barlow. Single case experimental designs: Strategies for studying behavior change. New York: Pergamon Press, 1976.
- Jenkins, J. R., S. Gorrafa, & S. Griffiths. Another look at isolation effects. American Journal of Mental Deficiency, 1972, 76, 591-593.
- Johnson, S. M., O. D. Bolstad, & G. K. Lobitz. Generalization and contrast phenomena in behavior modification with children. In E. J. Mash, L. A. Hamerlynck, & L. C. Handy (Eds.), Behavior modification and families. New York: Brunner/Mazel, 1976.
- McKinney, J. D., J. Mason, K. Perkerson, & M. Clifford. Relationship between classroom behavior and academic achievement. Journal of Educational Psychology, 1975, 67, 198-203.

- Meichenbaum, D. H., K. S. Bowers, & R. R. Ross. Modification of classroom behavior of institutionalized female adolescent offenders. Behavior Research and Therapy, 1968, 6, 343-353.
- Meyer, W. J. Cerebral dysfunction. In G. O. Johnson & H. D. Blank (Eds), Exceptional children research review. Washington, D.C.: The Council for Exceptional Children, 1968.
- Reynolds, G. S. Behavioral contrast. Journal of the Experimental Analysis of Behavior, 1961, 4, 57-71.
- Reynolds, G. S. A primer of operant conditioning. Glenview, Il.: Scott, Foresman and Company, 1975.
- Rogan, L., & J. Lukens. Education, administration, and classroom procedures. In Minimal brain dysfunction in children. Public Health Service Publication No. 2015, U.S. Department of Health, Education, and Welfare, 1969.
- Ross, D. M. & S. A. Ross. Hyperactivity: Research, theory, and action. New York: John Wiley & Sons, 1976.
- Rost, L. J. & D. C. Charles. Academic achievement of brain-injured and hyperactive children in isolation. Exceptional Children, 1967, 34, 125-126.
- Sakoda, J. M., B. H. Cohen, & G. Beall. Test of significance for a series of statistical tests. Psychological Bulletin, 1954, 51, 172-175.
- Saudargas, R. A. & V. Creed-Murrah. State-event student and teacher observation system. Unpublished manuscript, The University of Tennessee, 1981.
- Schwartz, B. & E. Gamzu. Pavlovian control of operant behavior. In W. K. Honig & J. E. R. Staddon (Eds.), Handbook of operant behavior. Englewood Cliffs, N. J.: Prentice-Hall, 1977.
- Scott, T. J. The use of music to reduce hyperactivity in children. American Journal of Orthopsychiatry, 1970, 40, 677-680.
- Shores, R. E., & P. A. Haubrich. Effect of cubicles in educating emotionally disturbed children. Exceptional Children, 1969, 36, 21-24.
- Simon, S. J., T. Ayllon, & M. A. Milan. Behavioral compensation: Contrast-like effects in the classroom. Unpublished manuscript, Georgia State University, 1980.

- Somervill, J. W., G. A. Hill, P. Y. White, D. C. York, & D. M. Hayes. Distractibility among advantaged and disadvantaged preschool children: Effects of cubicles vs. high levels of stimulation on task performance. Urban Review, 1978, 10, 35-44.
- Somervill, J. W., L. Jacobsen, L. Warnberg, & W. Young. Varied environmental conditions and task performance by mentally retarded subjects perceived as distractible and nondistractible. American Journal of Mental Deficiency, 1974, 79, 204-209.
- Somervill, J. W., L. S. Warnberg, & D. E. Bost. Effects of cubicles versus increased stimulation on task performance by first-grade males perceived as distractible and nondistractible. Journal of Special Education, 1973, 7, 169-185.
- Strauss, A. A., & L. E. Lehtinen. Psychopathology and education of the brain-injured child (Vol. 1). New York: Grune & Stratton, 1947.
- Ulman, J. D., & B. Sulzer-Azaroff. Multielement baseline design in educational research. In E. Ramp & G. Semp (Eds.), Behavior analysis areas of research and application. Englewood Cliffs, N. J.: Prentice-Hall, 1975.
- Wahler, R. G. Some structural aspects of deviant child behavior. Journal of Applied Behavior Analysis, 1975, 8, 27-42.
- Willems, E. P. Behavioral technology and behavioral ecology. Journal of Applied Behavior Analysis, 1974, 7, 151-165.

APPENDIX

APPENDIX A

OBSERVATION SHEET

Saudargas-Creed-Murrah

Sheet#: _____

(GR:) M T W R F Start: End: Total:
 Student Date Day (circle) Time

School Class Activity 1. ISW:TPsnt 3. SmGp:Tied
 2. ISW:TSMGp 4. LgGp:Tied

Teacher Observer Referral Problem Ac. Beh

STATES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	E	%
SW																						
GS																						
LK																						
M																						
PLO																						
SIC																						
SIT																						
POP																						

EVENTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	E	Rate
RH																						
CAL																						
OS																						
OAG																						
N																						
AC																						
OCA																						

TEACHER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	E	Rate
TA/SW																						
TA/OFF																						
DIR-OPP																						
DIR-C+																						
APP																						
DIS																						

COMMENTS _____

VITA

Robert William Johnson II was born in Melrose Park, Illinois, on August 5, 1946. He graduated from Ft. Lauderdale High School in Ft. Lauderdale, Florida in June 1964. The following August he entered Florida Presbyterian College (now known as Eckerd College) and received a Bachelor of Arts degree in Psychology in June 1968.

He taught junior high school mathematics in Broward County, Florida, for five years before attending graduate school. In September, 1972, he entered Florida International University and received a Master of Science degree in School Psychology in August, 1974. After working as a school psychologist for three years, he continued his graduate work at The University of Tennessee, Knoxville. In August, 1980, he was awarded the Doctor of Philosophy degree with a major in Psychology.

Mr. Johnson is a member of the National Association of School Psychologists, the American Psychological Association (student affiliate), and Phi Kappa Phi. After graduation he will be employed as a school psychologist with the Knoxville City School System.

He is married to Lynn Peters of Plantation, Florida.