AN INVESTIGATION OF THE EFFECTS OF A REST PERIOD ON SIMPLE REACTION TIMES OF KINDERGARTEN CHILDREN

by

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CHAPTER I

INTRODUCTION

The present study was designed to help determine whether a rest period is essential to the kindergarten program. Many suggested schedules for kindergarten and nursery school programs of young children have included a rest time. In A Guide for Kindergarten Education (1970), which was prepared by the Virginia State Department of Education, the statement "Five-year-old children will need a rest period of one-half to three-quarters of an hour" has been made in reference to one-half day programs (p. 24). Foster (1939) stated, "There is no function which the nursery school should fulfill more conscientiously than that of providing for sleep, rest and relaxation" (p. 160). More recently, Neith Headley (1965) stated that when kindergarten children are together all day, the need for a long afternoon rest has been apparent by children's actions.

Although Silberstein (1963) stated that few areas of scientific discussion create as much passion among experts as those concerning sleep in childhood, he reported that little has been written on this topic and that we have little empirical data related to the effects of sleep and rest on small children. Also, he stated that disagreements are bound to arise when there is this much controversy in an area of child development.

Ames (1970), Spock (1968) and Foster (1939) are among the writers who agreed that napping does have some value to a child. Ames stated that it was a factor in the child's relationship with others and with the child himself. Spock observed that many children stopped going to sleep at naptime between the ages of three and four but that most of them still required a real rest or at least a quiet play period indoors after lunch until they were five or six. Foster believed that children should have an opportunity to sleep every day and that most schools expected children to rest quietly for an hour. If there was no sign of sleep after that, they were allowed to resume previous activities.

Spock (1968), Gardner (1964), Foster (1939) and Fromme (1956) agreed that sleep and rest requirements seemed to vary from child to child. Spock and Gardner stated that the child's natural demand for rest and sleep provide the best guides for satisfaction of his needs. According to Spock, decisions as to amount and kind of rest depend on the individual child's temperament and activity and, according to Fromme, the amount of time a child spends napping, as well as the age at which he terminates this habit, varied considerably among children. He reported that it was a mistake for parents to believe that their children must nap for a certain length of time each day. Gardner further stated that it is not possible to state a precise number of hours of sleep that all children of a given age need, or to give a precise age at

which all children may give up an afternoon nap or rest period. Foster found that four-year-olds will nap only two or three days out of the week. Beyond the age of two, the child may or may not spend some time during the day for sleeping. Fromme believed that quiet activities will accomplish much the same purpose as the scheduled naptime.

Statement of the Problem

As empirical findings related to rest and the young child are sparce in the literature, most of the references which have been cited are opinions, but they have been generally accepted by specialists and educators as support for the need for rest periods in preschool and kindergarten programs.

The present study was an attempt to add to knowledge in this area of concern by investigating the effects of a rest period on children's performance on a simple reaction time (SRT) task. The study determined the SRT's of 32 public school kindergarten children in the morning, before a rest period, and after a rest period. Possible performance differences related to: (a) sex, (b) class, (c) measurement periods and (d) trials were studied.

CHAPTER II

LITERATURE REVIEW

A number of writers have given opinions as to the value of a rest period in a kindergarten program. However, little research related to this topic has been published. The literature reviewed is related to four major areas: the value of a rest period, advice to parents regarding rest and sleep of young children, scheduling a rest period and studies of reaction time of children.

Value of a Rest Period

Headley (1966) stated that there were great differences of opinion concerning the value of kindergarten rest periods. He stated that some persons believe it is a waste of the teacher's and the children's time. Headley further stated the belief that it was not wholesome to expect children to be wakefully quiet for a long period of time. Still others thought that rest time can be a satisfactory experience for children.

In his considerations of the value of rest, Sheehy (1954) asked, "Should children have rest periods?" He stated that the answer has to be found in each situation and depends on several variables: (a) the length of the school day, (b) the distance children travel to and from school, and (c) the kind of living children have outside school and in school.

In Rudolph and Cohen's (1964) opinion, rest periods

automatically included in every kindergarten program call for fresh appraisal. Just how resting originally came into the kindergarten program is unknown. Rudolph and Cohen further stated that it is "good" and "necessary" for children and adults to relax between periods of hard work. It was also believed that it is possible for children to relax completely and thoroughly without stretching out on rugs and with eyes closed. They believed that scheduled rest was often unnecessary and a waste of valuable time in a short program. Relaxation should not be legislated into a program and tyrannically enforced.

Advice to Parents and Teachers Regarding Rest and Sleep of Young Children

Several books have provided advice for parents and teachers regarding rest and sleep of young children. Books by Ames (1970), Heffernan (1970), and Gesell and Ilg (1946) implied that some five-year-olds need a daily nap and some do not. Many five-year-olds nap only occasionally, and boys were reported to have napped more often than girls. For the five-year-olds who do not take a nap, a change of activity provides the needed rhythm.

Better Homes and Gardens Baby Book (1969), commonly used as a guide by parents, agreed that four and one-half or five-year-old children sleep some days and not on others. Even though most five-year-old children no longer nap, Better Homes and Gardens Baby Book recommended that they should

observe some rest period during the early afternoon.

Rudolph and Cohen (1964) and Smart (1973) have stated that as children mature they sleep less and by age five most children no longer require a regular nap. Smart (1973) stated, "Children vary widely in hours of sleep, consistency of patterns, distribution of sleep between night and day, soundness of sleep and effects of various influences on sleep. How much sleep is enough?" (p. 21).

Spock (1961) stated that during infancy sleep patterns can be more easily modified by parental guidance and that the sleep patterns resulting from infancy tend to persist. In Ryan's (1969) opinion, eating and sleeping habits should be set in preparation for the pattern of going to school. He recommended that ten to twelve hours of sleep with a regular bed-time and rising time are appropriate. Silberstein (1963) disagreed about children requiring twelve hours of sleep per day and expressed the belief that adults have traditionally rather than scientifically based ideas related to the amount of sleep needed by children.

Sheehy (1954) stated that children have different rest requirements. It can no longer be said that all six-year-olds must have a definite amount of sleep. When children are in school all day, there should be some provision for a quiet time when children can rest on cots. Those who resist may engage in a quiet activity so they will not disturb others and also give themselves a change of pace.

Scheduling a Rest Period in the Kindergarten Program

Many themes were recurrent in textbooks regarding the scheduling of a rest period. According to Widmer (1970), snack and rest time constitute the "pause that refreshes," and therefore rest periods should be integral parts of the pre-school program due to the higher metabolic rate and the more vigorous activity engaged in by these young, growing bodies. Moreover, Foster (1939), Mensing (1972), Wills (1967) and Read (1966) have indicated that a scheduled rest period is necessary after lunch in an all-day program. Mensing (1972) further stated that the rest period was an addition to the many short breaks that occur during the school day.

Early in the school year, most kindergarten teachers have asked each child to bring a towel or mat for the rest period, and the entire class stretched out on the floor for this time. However, some kindergartens have eliminated the rest period. The teachers found that well-spaced quiet times and passive activities served the purpose just as well (Ryan, 1969). The entire pre-school program was planned to give the children experience in a rhythm of activity, rest and activity (Todd and Heffernan, 1965). The teachers need, according to these authorities, to make the children aware of the necessity for rest after strenuous activity.

Fromme (1956) believed the most sensible thing to do is to approach the matter of afternoon naps as we do the job of feeding the child and reported that the child will eat if he

is hungry and he will sleep if he is tired. Fromme thought by helping the child to recognize the validity of the child's own desires, we encourage him to accept us and his growth simultaneously.

Empirical Findings Related to Simple Reaction Time in Children

A useful measure of performance is reaction time (RT) but to date little research involving this method has been conducted with young children. The RT is the interval between the onset of a stimulus and the beginning of the response. The RT designs have used both simple reaction time (SRT) and choice reaction time (CRT). The SRT has one stimulus and one response, and the CRT has more than one stimulus and more than one response.

Studies have reported that RT changes during the course of normal growth and development. In a recent study of 110 Ss, Surwillo (1972) found nearly a three-fold decrease in SRT over an age span of 4-17 years. He concluded that the reactions of children are slower and more variable than those of adults (Surwillo, 1972). McKeachie and Doyle (1966) state that RT varies with age. Young children and older persons are slowest. Luria (1932) accounted for this by suggesting that the decrease in RT with age is a consequence of increasing differentiation of the individual's central nervous system (Surwillo, 1972).

Elliott (1972) conducted an investigation in which 12

boys (ages 5-11) in each of 16 groups performed in four sessions, each composed of about 100 trials of various SRT tasks. Groups were in one of the 16 patterns in which incentive level might be high or low in each session. Differences between high incentive and low incentive conditions occurred in two ways: the reward for the high incentive condition was greater and its attainment was dependent upon speed of each reaction. Results indicated a modest decrease in speed among the subjects, most of which appeared with one practice session and one high incentive session. Four high incentive sessions in a row produced the best final performance.

Rourke and Czudner (1971) conducted a study with groups of "brain-damaged" and normal children (6-9 years-of-age and 10-13 years-of-age) in which Ss were subjected to an auditory RT procedure consisting of regular and irregular preparatory interval conditions. The preparatory interval (PI) was operationally defined as the interval between the onset of the warning signal and the onset of the RT stimulus. The data were analyzed by means of six analyses of variances. Except for the old normal group, there was a direct relationship between length of PI and RT in the regular procedure. In the group of young brain-damaged, the shorter the PI the longer the RT. The results of this study supported the contention that, as they grow older, brain-damaged children of the type used in the above study may adapt to and/or recover from the deficit(s)

involved in the inability to develop and maintain a state of readiness to respond.

The review of literature indicates indecision as to whether or not a rest period is of value in a kindergarten program. The use of RT appears to be one possible scientific method of approaching this problem.

CHAPTER III

METHOD

Subjects

The subjects (Ss) were 40 kindergarten children attending Pembroke Elementary School in Giles County, Virginia. The sample included students from two kindergarten classes, 10 boys and 10 girls in each. Responses from eight Ss, four girls and four boys, were not used in the final data analysis due to any one of the following reasons: (a) inability to follow directions, (b) more than seven absences during the 20-day testing period, and (c) uncooperative behavior and lack of interest. The Ss ranged in chronological age from 62 months to 74 months with a mean age of 69 months. Thirty-one Ss were right-handed and one S was left-handed.

Apparatus

Stimuli were presented to the S while he sat at a table. The S's right hand was placed in his lap. The task was performed on a simple reaction time device (see Figure 1). The S was seated in front of a stimulus screen and 15 inches from the stimulus. The index finger of S's left hand was placed on a telegraph key on the left side of the box platform. When the light, one-half inch in diameter, was illuminated, the S pushed the key on the right as quickly as possible using his left hand. The light remained illuminated until the S pressed the reaction key. The initiation of the light was determined

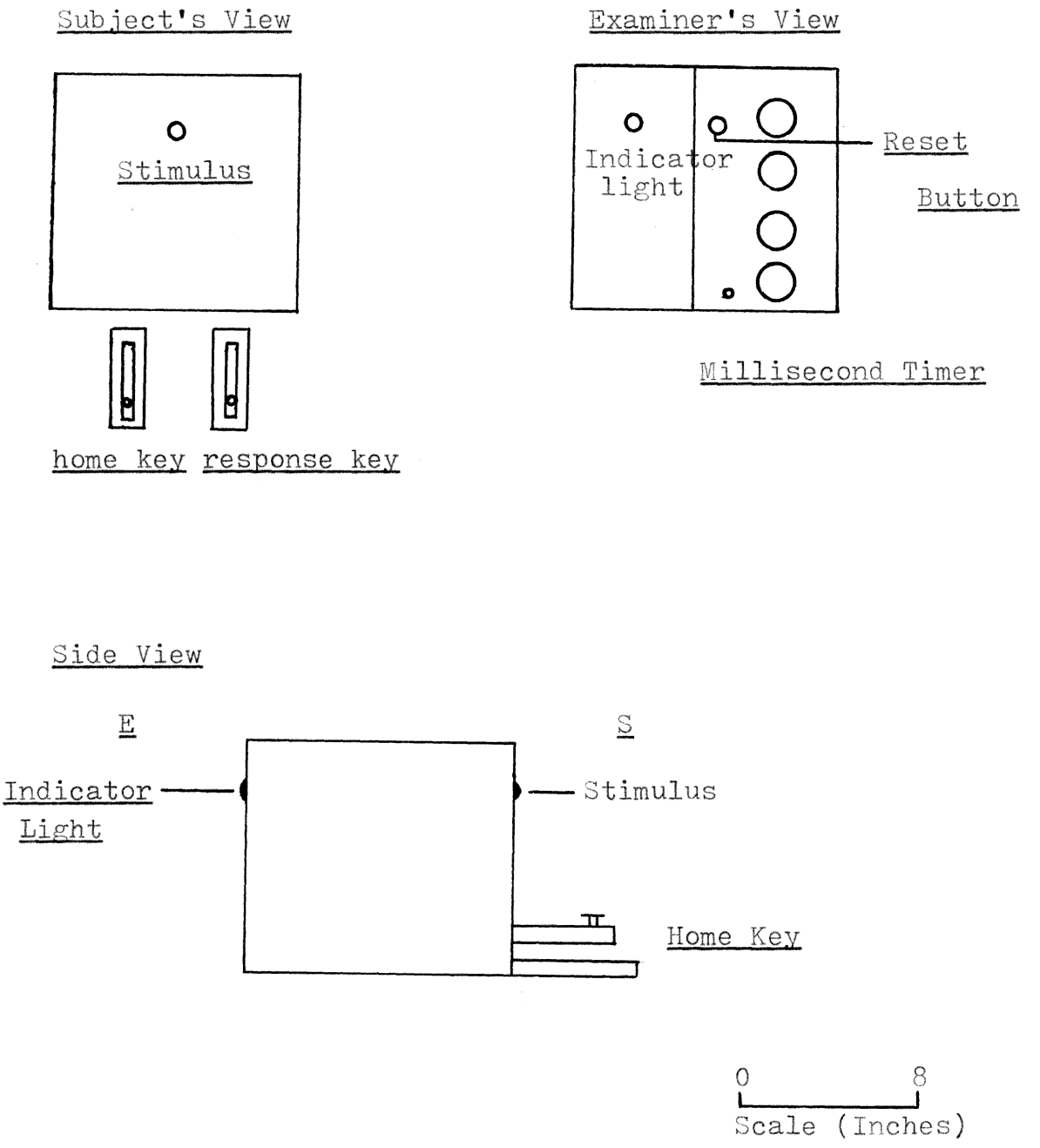

FIGURE 1. Apparatus

by the experimenter (E). Reaction time (RT) was measured in milliseconds by a Hunter-Klockcounter and was the latency between the stimulus presentation and a key-response. As soon as S saw the stimulus he responded by releasing the left key and pressing the right key.

Design

The Ss' performance schedule was according to the Latin Square Design (see Tables 1 and 2). The Latin Square Design was used to determine the sequence in which Ss were tested.

For each S, simple reactions were recorded five times in the morning, five times prior to rest, and five times following rest for twenty different days. A forty-five second interval was allowed for the absentees during their scheduled positions in the Latin Square Design. Make-ups were handled by testing the children in the position they would have been in if they had not been absent. Each S was tested in each possible order.

Procedure

A two-day practice period was employed. At this time the children became acquainted with the RT device. They were given instructions as to how to sit, were asked which hand and finger they would use, and were told what to do when the stimulus was given.

Data were collected by the writer for the first four days. The teacher's aide observed the procedure during this time. At the end of the initial four-day period, the teacher's aide

TABLE 1

Latin Square Design - Class One

Order of Students	Consecutive Days																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	2	*	4	5	6	7	8	9	10	*	12	13	14	15	16	*	18	*	20
2	2	*	4	5	6	7	8	9	10	*	12	13	14	15	16	*	18	*	20	1
*	*	4	5	6	7	8	9	10	*	12	13	14	15	16	*	18	*	20	1	2
4	4	5	6	7	8	9	10	*	12	13	14	15	16	*	18	*	20	1	2	*
5	5	6	7	8	9	10	*	12	13	14	15	16	*	18	*	20	1	2	*	4
6	6	7	8	9	10	*	12	13	14	15	16	*	18	*	20	1	2	*	4	5
7	7	8	9	10	*	12	13	14	15	16	*	18	*	20	1	2	*	4	5	6
8	8	9	10	*	12	13	14	15	16	*	18	*	20	1	2	*	4	5	6	7
9	9	10	*	12	13	14	15	16	*	18	*	20	1	2	*	4	5	6	7	8
10	10	*	12	13	14	15	16	*	18	*	20	1	2	*	4	5	6	7	8	9
*	*	12	13	14	15	16	*	18	*	20	1	2	*	4	5	6	7	8	9	10
12	12	13	14	15	16	*	18	*	20	1	2	*	4	5	6	7	8	9	10	*
13	13	14	15	16	*	18	*	20	1	2	*	4	5	6	7	8	9	10	*	12
14	14	15	16	*	18	*	20	1	2	*	4	5	6	7	8	9	10	*	12	13
15	15	16	*	18	*	20	1	2	*	4	5	6	7	8	9	10	*	12	13	14
16	16	*	18	*	20	1	2	*	4	5	6	7	8	9	10	*	12	13	14	15
*	*	18	*	20	1	2	*	4	5	6	7	8	9	10	*	12	13	14	15	16
18	18	*	20	1	2	*	4	5	6	7	8	9	10	*	12	13	14	15	16	*
*	*	20	*	2	*	4	5	6	7	8	9	10	*	12	13	14	15	16	*	18
20	20	1	2	*	4	5	6	7	8	9	10	*	12	13	14	15	16	*	18	*

*Note: Ss whose scores were not used in analysis

TABLE 2

Latin Square Design - Class Two

Order of Students	Consecutive Days																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	*	2	3	4	5	6	*	8	9	10	*	*	13	14	15	16	17	18	19	20
	2	3	4	5	6	*	8	9	10	*	*	13	14	15	16	17	18	19	20	*
	3	4	5	6	*	8	9	10	*	*	13	14	15	16	17	18	19	20	*	2
	4	5	6	*	8	9	10	*	*	13	14	15	16	17	18	19	20	*	2	3
	5	6	*	8	9	10	*	*	13	14	15	16	17	18	19	20	*	2	3	4
	6	*	8	9	10	*	*	13	14	15	16	17	18	19	20	*	2	3	4	5
	*	8	9	10	*	*	13	14	15	16	17	18	19	20	*	2	3	4	5	6
	8	9	10	*	*	13	14	15	16	17	18	19	20	*	2	3	4	5	6	*
	9	10	*	*	13	14	15	16	17	18	19	20	*	2	3	4	5	6	*	8
	10	*	*	13	14	15	16	17	18	19	20	*	2	3	4	5	6	*	8	9
	*	*	13	14	15	16	17	18	19	20	*	2	3	4	5	6	*	8	9	10
	*	13	14	15	16	17	18	19	20	*	2	3	4	5	6	*	8	9	10	*
	13	14	15	16	17	18	19	20	*	2	3	4	5	6	*	8	9	10	*	*
	14	15	16	17	18	19	20	*	2	3	4	5	6	*	8	9	10	*	*	13
	15	16	17	18	19	20	*	2	3	4	5	6	*	8	9	10	*	*	13	14
	16	17	18	19	20	*	2	3	4	5	6	*	8	9	10	*	*	13	14	15
	17	18	19	20	*	2	3	4	5	6	*	8	9	10	*	*	13	14	15	16
	18	19	20	*	2	3	4	5	6	*	8	9	10	*	*	13	14	15	16	17
	19	20	*	2	3	4	5	6	*	8	9	10	*	*	13	14	15	16	17	18
	20	*	2	3	4	5	6	*	8	9	10	*	*	13	14	15	16	17	18	19

*Note: Ss whose scores were not used in analysis

collected the data for the remaining days.

Data were collected for analysis on 20 days from December 12, 1972, to January 29, 1973, with seven days for make up in February. When the daily schedule could not be followed due to circumstances which prevented it, RTs were not taken. For example, there were five days when data could not be collected due to Christmas festivities, apparatus failure or assembly programs.

On the seven days in February, data were collected from children who had been absent within the twenty day period. The procedure used was the same as that used on the day on which the child was not in school. For example, each child was placed in the position within the Latin Square Design which he would have occupied on the day he was absent.

A definite schedule was followed by each class during the time that the data were being collected (see Appendix). The schedule was arranged so Ss, with the exception of S being tested, would be engaged in a quiet table activity during the three testing periods each day. Table activities included books, puzzles, games, worksheets, art and snack.

Each morning at 8:40, the E went to Class One to obtain a S. Each child's RT was recorded five times while the other Ss were engaged in their table activity. Approximately 45 seconds were required to test each child.

At 9:00, E went to Class Two in which the remaining children were enrolled and carried out the same procedure.

The school day then progressed as normal until 1:00 when E returned to Class One immediately following lunch and recorded RTs as during the morning schedule. At 1:15, this class began their rest period. The E then tested Class Two and they began their rest period at 1:35.

During the rest period, each S was observed at four 15 minute intervals. At the end of 15 minutes, 30 minutes and 45 minutes of the rest period and at the conclusion of one hour when rest period ended, E recorded the level of activity of each child according to these categories: sleep, inactive and active. If S had his eyes closed, was inactive and appeared unaware of what was going on around him, he was considered asleep. Inactive was defined as rest and relaxation with little activity taking place. The S had his eyes open and appeared to be aware of his surroundings. If S was moving around on his resting towel, whispering to another child, playing with his shoe or towel, etc., he was considered active.

At 2:30, Class One was retested after resting for one hour and after having 15 minutes to awaken. Class Two also had a 15 minute awakening time and testing began at 2:50. The children used the 15 minute period to awaken, to fold and put away their resting towels and to prepare for their table activity.

In each testing period, E said a few words of motivation to each child such as, "Oh, you were so fast last time. Let's try to be that fast again." The child was also asked to show

the hand and finger he would use. This was usually the index finger of the left hand. If he did not indicate this, he was reminded to use his index finger of his left hand. He then put his other hand in his lap or sat on it. There was no further discussion between E and S during the five RTs. RT in milliseconds was recorded by E following each response.

Kindergarten teachers who were involved in the study prepared table activities for use during the testing periods. By following daily schedules, they made sure that Ss went to E in the appropriate order. Each kindergarten teacher recorded the observations during rest time and made sure that the rest time was one hour in length.

CHAPTER IV

RESULTS AND DISCUSSION

Results

The data used in the analysis of variance were means calculated over 20 days for each subject by trials (5) within each measurement period (3). Figure 2 (Class One) and Figure 3 (Class Two) are graphs of mean RTs by trials for each measurement period for both sexes. The figures show RTs to generally increase as a function of the three measurement periods. Table 3 (Class One) and Table 4 (Class Two) show mean RTs by trials in milliseconds for each measurement period for both sexes. For Class Two, the RTs of females are prominently longer than those of males, but for Class One, the RTs of females are slightly shorter than those of males. The RTs within the measurement periods of Class One tended to be shorter at the beginning and end of each measurement period while for Class Two the RTs increased rather consistently as a function of trials within each period.

The overall analysis of variance was a factorial of 2(Classes) X 2(Sexes) X 3(Periods) X 5(Trials). This analysis demonstrated significant main effects of measurement period, $F(2,56) = 12.07$, $p < .01$; and trial, $F(4,112) = 7.44$, $p < .01$. Of the interactions, only two reached significance. Class X Sex, and Class X Trials, $F(1,28) = 6.27$, $p < .05$ and $F(4,112) = 3.48$, $p < .05$, respectively.

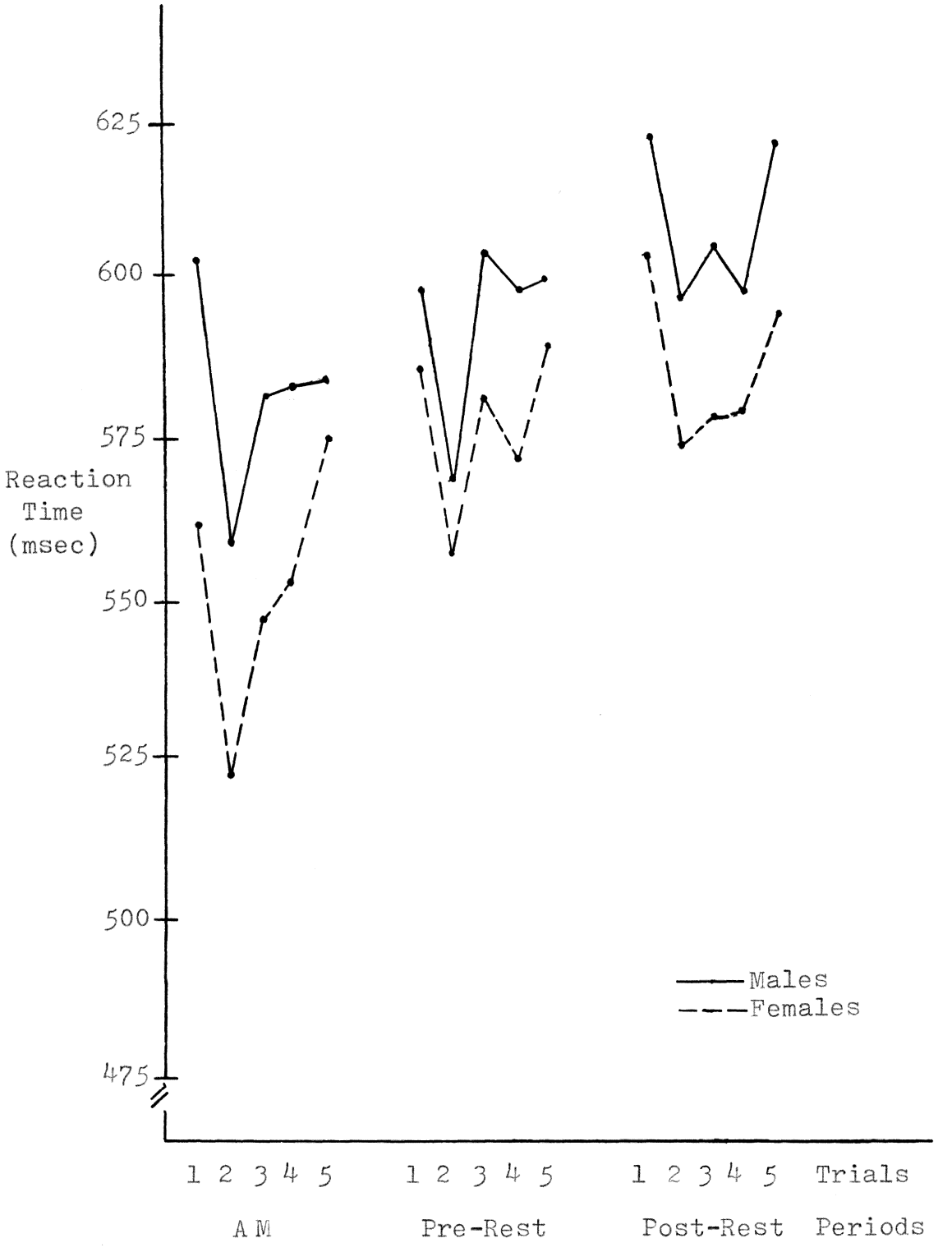

FIGURE 2. Class One Mean Reaction Times by Trials for Each Period

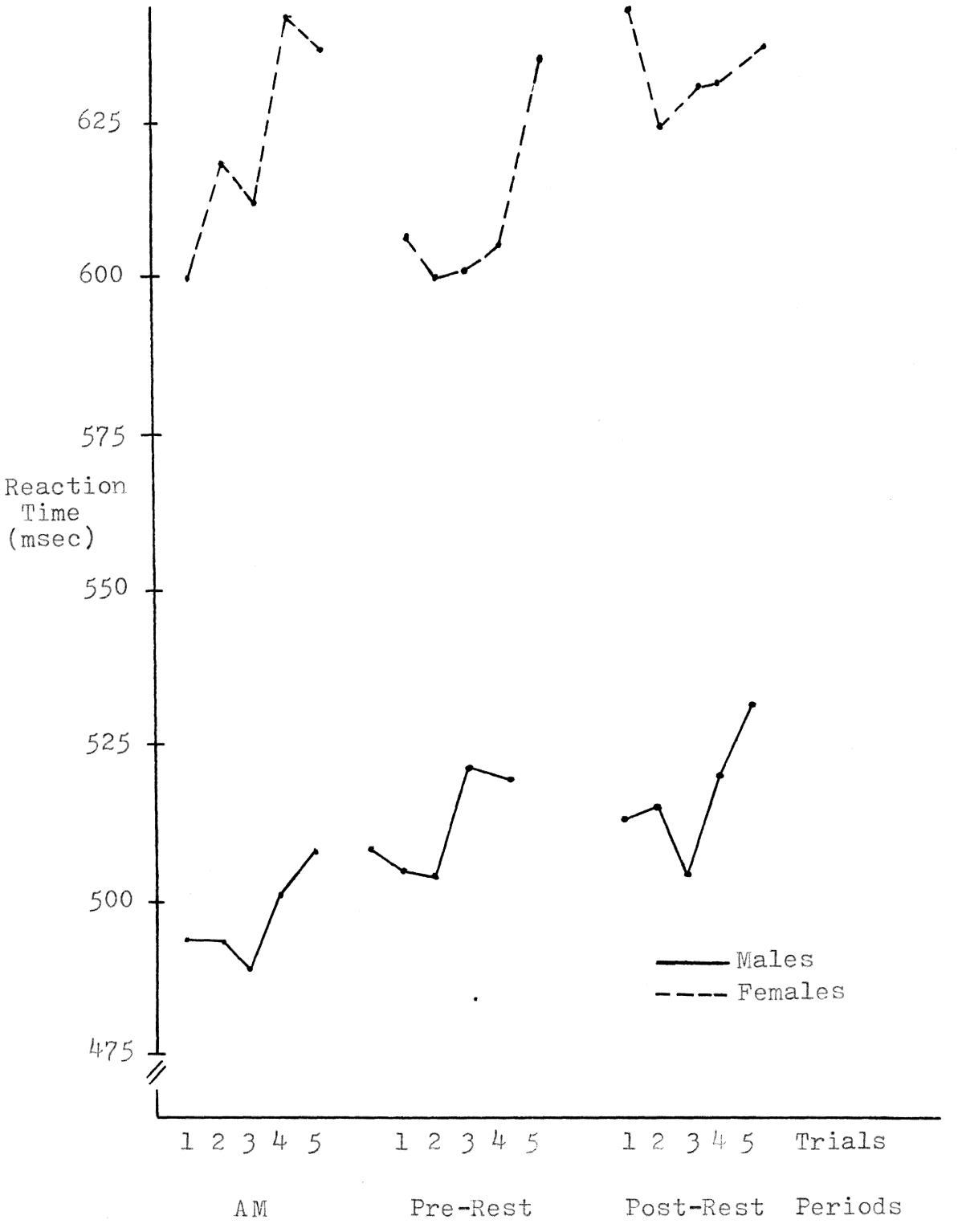

FIGURE 3. Class Two Mean Reaction Times by Trials for Each Period

TABLE 3

Class One Mean Reaction Times by Trial in Milliseconds

	Male			Female		
Trial	A.M.	Pre-Rest	Post-Rest	A.M.	Pre-Rest	Post-Rest
1	604	599	622	561	587	604
2	557	567	596	523	558	573
3	581	605	605	547	583	578
4	583	599	598	553	573	578
5	584	600	621	575	589	593
Means	581.8	594.0	608.4	551.8	578.00	585.2

TABLE 4

Class Two Mean Reaction Times by Trial in Milliseconds

	Male			Female		
Trial	A.M.	Pre-Rest	Post-Rest	A.M.	Pre-Rest	Post-Rest
1	494	508	513	600	607	645
2	494	505	515	618	600	624
3	488	504	504	612	602	630
4	502	521	519	647	605	632
5	508	520	532	636	635	635
Means	497.2	511.6	516.6	622.6	609.8	633.2

A separate analysis of variance was performed for each class with the error estimates obtained from the overall analysis. These separate analyses demonstrated significant main effects of measurement period and trial for each class: for Class One, $F(2,56) = 10.95$, $p < .01$ and $F(4,112) = 7.55$, $p < .01$, and for Class Two, $F(2,56) = 3.45$, $p < .05$ and $F(4,112) = 3.37$, $p < .05$ respectively. A main effect of sex was obtained for Class Two, $F(1,28) = 8.65$, $p < .01$, but not for Class One. None of the interactions reached significance at the .05 level.

Between group analysis of variance, which excluded the morning trials, showed significant effects of measurement period $F(1,56) = 7.67$, $p < .01$; and trial, $F(4,112) = 5.12$, $p < .01$. Of the interactions, only one was significant with Class X Sex $F(1,28) = 5.56$, $p < .05$.

Between group analysis of variance, which excluded the post-rest trials, showed significant effects of measurement period $F(1,56) = 4.54$, $p < .05$. Of the interactions, three were significant, Class X Sex $F(1,28) = 6.05$, $p < .05$, Class X Period $F(1.56) = 4.15$, $p < .05$ and Class X Sex X Period $F(1,56) = 5.13$, $p < .05$.

A separate analysis of variance which excluded the post-rest trials was performed for each class with the error estimates obtained from the overall analysis of variance. Class One showed a significant difference between measurement periods, $F(1,56) = 8.70$, $p < .01$. No significant differ-

ence between measurement periods was observed for Class Two, $ps < .05$.

A correlation analysis was calculated between each of the following six variables: the sleep index observations (4) for each 15 minute interval of the rest period, the total sleep index and the RT differences between the post-rest and the pre-rest periods (see Table 5 for the correlation matrix). High positive correlations were obtained between the individual sleep index observations and the total sleep index, with the 45 minute sleep observation interval having the highest correlation with the total index. The RT differences between pre- and post-rest were not highly correlated with the sleep indexes but at least each is a negative relationship. To a slight degree, this indicated inhibition of RT following rest to be a direct function of the degree of inactivity during rest.

Discussion

One reason for the significant difference between RT of males and females in Class Two could be due to the fact that boys usually enjoy playing with mechanical toys and are usually fascinated with machines. Thus, the male and female roles could have differentially determined S's motivation to react fast. Expectations of society seem to indicate that little boys are more mechanical than little girls. According to the results of Mussen, Conger and Kagan (1969), children are aware of sex-appropriate interests and behavior by age

TABLE 5

Correlation Coefficient Matrix

		Sleep Index Observations				
	Post-Pre Rest	R1	R2	R3	R4	Total
Post-Pre Rest	1.000	-0.018	-0.012	-0.008	-0.015	-0.0155
R1	-0.018	1.000	0.579	0.527	0.460	0.738
R2	-0.012	0.579	1.000	0.717	0.625	0.864
R3	-0.008	0.527	0.717	1.000	0.800	0.909
R4	-0.015	0.460	0.625	0.800	1.000	0.865
Total	-0.015	0.738	0.864	0.909	0.865	1.000

five. When presented with pictures illustrating sex-typed toys, objects, and activities most 3-, 4-, and 5-year-olds preferred those appropriate for their sex. Thus, the sex effect in the present study could be an example of task differentiation at a young age.

Moreover, the significant sex difference for Class Two could be partially accounted for by examining the RTs of two particular male subjects. These males seemed to create competition between each other by always trying to react faster than the other. The E played no part in this, and it was only through the Ss' comments to each other that E knew this situation existed. For example, the E heard one child say to the other, "I was faster than you this time."

The main effect of period implies that the children became significantly slower as the day progressed. The difference between the morning and the pre-rest period in one class and not in the other could have resulted from a long morning filled with activities. Since more than two-thirds of the school day had passed, the children could have been tired. Consideration should be given to the fact that Es were more familiar with the children in Class Two than in Class One, for the Es were the teacher and the teacher's aide who normally worked with this group. Due to this, it is possible that Ss in Class Two were more motivated than Ss in Class One. Class One Ss could have become bored with the procedure. Another possible consideration to explain the

class differences might be to consider the activity level of each class. The data indicated that Class Two was more active than Class One.

It is noteworthy that each day more children slept in Class One than in Class Two. Differences in classrooms, teachers and daily schedules could have also influenced the differences in RTs. Every classroom has its own atmosphere which is largely created by the attitudes of the students and teacher. The teacher's planning and initiating of activities were different in each class. The children in Class One were very often rewarded for going to sleep. They were rewarded with candy, with a longer play period or by having their names placed on the chalkboard. The children in Class Two received no reward. The teacher in Class One felt that going to sleep during the rest period became a habit and once the children were accustomed to going to sleep, they would sleep each day.

Perhaps some yet unidentified factor in Class One influenced the children to react slower between the morning and the pre-rest measurement periods. Since the difference was significant in one class and not in the other, this suggests that the two classes were not the same. The teacher's methods and choice of activities may influence the difference. This might also be true of the overall classroom atmosphere. Among the other possible factors could be the fact that some children travelled longer distances to school.

The differences between pre-rest and post-rest could have resulted because the rest period did not compare in length to the child's night time sleep. Perhaps the rest time was not long enough so that the child could profit from it. Although 15 minutes were allowed for awakening before the first child was tested each day, it is possible that this length of time was not sufficient for the child to fully awaken. A longer time could possibly have resulted in a decrease in RT. However, if only a short time can be allowed for awakening, teachers should be aware of this when planning their daily schedule. For example, teachers should present more complex activities in the morning when the children are evidently most alert. Thus, rest time was not shown to increase alertness as measured by RT, rather Ss were significantly slower after a nap than before a nap.

The results of the current study lend support to statements by Gardner (1964) that it is not possible to state a precise number of hours of sleep that all children of a given age need, or to give a precise age at which all children may be allowed to give up an afternoon nap or rest period. Fromme (1956) investigated variation in sleep habits and indicated that it is a mistake to believe that children must nap for a certain length of time each day.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of the present study was to investigate the effects of a rest period on kindergartners' performance in a simple reaction time situation. Additional factors studied in the present experiment were sex, class, time of measurement and practice. The sample consisted of 32 children ranging in chronological age from 62 months to 74 months. The children were enrolled in the two kindergarten classes at Pembroke Elementary School, Giles County, Virginia. Data were collected on 20 days with seven additional days used for make-up.

An overall analysis of variance was performed to determine any significant differences in reaction time. A Class X Sex interaction showed that males were significantly faster than female subjects in one class but not in the other. The subjects reacted slower in both classes as the day progressed. There was a significant difference in reaction times in Class One between the morning and pre-rest measurement periods.

There was a high correlation between 15 minute rest time observations and a total sleep index. For both classes, Ss reacted significantly slower after rest than before rest. There was a non-significant negative correlations between the

sleep indexes and the difference between pre- and post-rest reaction time.

Conclusions

The results of the present study indicate that a rest period does not increase the alertness of kindergarten children. The data are relevant for parents and teachers of pre-school children who plan the daily activities of a child. It appears to be very important that a teacher present the complex activities in the beginning of the school day. Some of the advice regarding rest and sleep which is given in textbooks and child care guides may be questioned. Quiet activities might accomplish much the same purpose as the scheduled rest period.

Recommendations

Recommendations for further study seem appropriate in view of the lack of related research and the potential for practical application of the findings of the investigation.

1. Scheduling implications may be derived from the slower reaction times across the measurement periods. In planning a daily schedule for young children, consideration should be given to presentation of the more complex activities at the beginning of the day and also to the need for a sufficient "wake-up" period following a rest period.

2. In the present study, there was a 15 minute awakening time following rest. Perhaps 15 minutes was not long enough to allow each child to re-gain complete alertness.

Further research should determine changes in reaction time as a function of the awakening time following a nap.

3. It might be interesting to conduct a similar study comparing two one-half day programs, a morning and an afternoon program. If the reaction time of children increases as the day progresses, it may be that children who attend the afternoon session are at a disadvantage.

4. In the present study, the examiners were more familiar with the subjects in Class Two than in Class One. Another study might be conducted with the examiner being a stranger to both groups. It might also be advisable for this person to observe for a week and make specific observations about the groups and children before collecting data.

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APPENDIX

Class One Schedule

Arrival	8:30 - 8:40
Testing and quiet table activity (worksheets)	8:40 - 8:55
Circle-time	8:55 - 9:10
Free play	9:10 - 9:45
Unit study	9:50 - 10:15
Bathroom and snack-time	10:15 - 10:45
Reading/number readiness	10:45 - 11:10
Physical education	11:10 - 11:40
Art	11:40 - 12:00
Music	12:00 - 12:10
Prepare for lunch	12:10 - 12:30
Lunch	12:30 - 1:00
Testing and quiet table activities (books, puzzles and games)	1:00 - 1:15
Rest-time	1:15 - 2:15
Awakening-time	2:15 - 2:30
Testing and quiet table activities (snack or books)	2:30 - 2:45
Language Development	2:45 - 3:05
Dismissal preparation	3:05 - 3:15

Class Two Schedule

Arrival	8:30 - 8:40
Lunch and snack money collected	8:40 - 9:00
Testing and quiet table activity (worksheets)	9:00 - 9:15
Free play	9:15 - 9:55
Clean-up	9:55 - 10:05
Circle-time	10:05 - 10:20
Snack	10:20 - 10:40
Reading/number readiness	10:40 - 11:00
Physical education	11:00 - 11:30
Unit study	11:30 - 11:45
Music	11:45 - 12:00
Language arts	12:00 - 12:15
Prepare for lunch	12:15 - 12:30
Lunch	12:30 - 1:00
Bathroom and prepare for art	1:00 - 1:20
Testing and quiet table activity (art)	1:20 - 1:35
Rest-time	1:35 - 2:35
Awakening-time	2:35 - 2:50
Testing and quiet table activity (complete art activity)	2:50 - 3:05
Dismissal preparation	3:05 - 3:15

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AN INVESTIGATION OF THE EFFECTS OF A REST PERIOD ON SIMPLE REACTION TIMES OF KINDERGARTEN CHILDREN

by

Diann R. Conlin

ABSTRACT

The purpose of the present study was to investigate the effects of a rest period on kindergartners' performance in a simple reaction time situation. Effects of sex, class, time of measurement and practice on simple reaction time were also factors investigated in the present study. The sample consisted of 32 children ranging in chronological age from 62 months to 74 months. The children were enrolled in kindergarten at Pembroke Elementary School, Giles County, Virginia. Data were collected over 20 days with seven additional days for make-up.

An overall analysis of variance was performed to determine any significant differences in reaction time. Males were significantly faster than female subjects in one class but not in the other. The subjects reacted slower in both classes as the day progressed. The subjects in Class One reacted slower between the morning and pre-rest periods. For both classes, subjects reacted slower after a rest than before a rest. Results were discussed in relation to the findings of the study.