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The Effect of Budgeting Study Time on the Achievement Ratio of High School Pupils

Rex Braska Trafton

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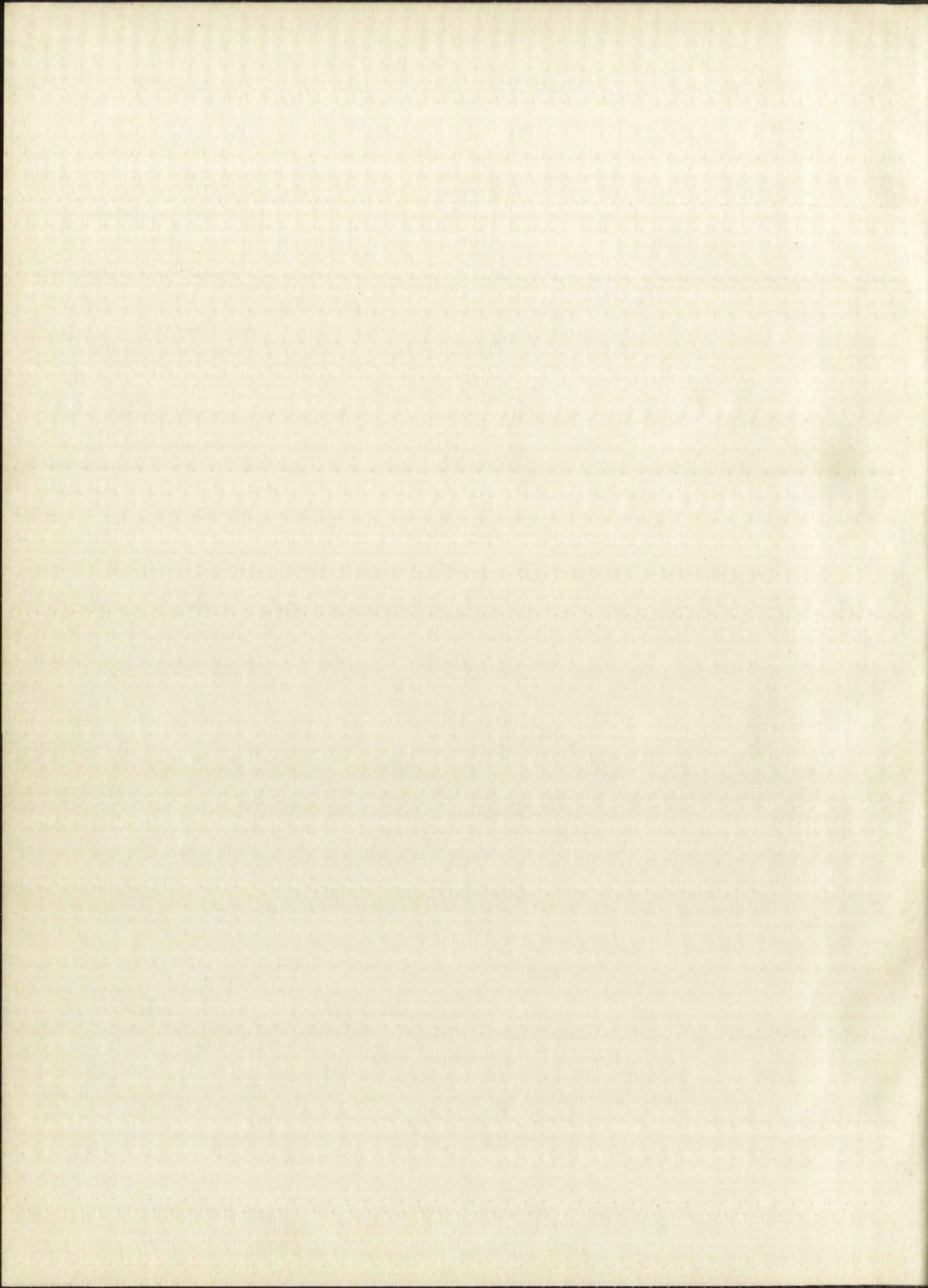
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THE EFFECT OF BUDGETING STUDY TIME ON THE
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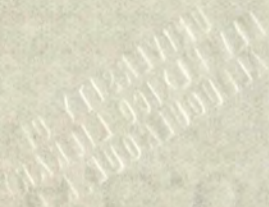
By

Rex Braska Trafton

A Thesis Submitted for the Degree of
Master of Arts in Education

The University of New Mexico

1936



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Thesis accepted;

J. E. Seyfried.
Major Professor

J. W. Diependorf
B. F. Haight

The author is indebted to Dr.
J. E. Seyfried for his assistance in
organizing and editing this study.

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THE EFFECT OF BUDGETING STUDY TIME ON THE ACHIEVEMENT RATIO OF HIGH SCHOOL PUPILS

CHAPTER I INTRODUCTION

Importance of the Study

In recent years much has been done in an attempt to raise the level of scholastic achievement of pupils, especially achievement in comparison to intelligence. Many of these efforts have been directed toward improvement of pupils' study methods. Whipple,¹ in his popular book on study, calls attention to the proper use of study time. Numerous others mention the value of efficient use of study time. For example, one author² writes:

Time is the one thing of which each student worker has an equal supply. 'It is the only commodity that slips away in a steady stream, regardless of what you do with it. It cannot be halted in its flight, nor coaxed or forced to return. A billion dollar corporation, with all its wealth and credits, cannot buy back one second of yesterday's time.

¹Whipple, Guy Montrose. How to Study Effectively. Bloomington, Ill.: Public School Publishing Co., 1932, pp. 16-21.

²Book, William F. Learning How to Study and Work Effectively. Boston: Ginn and Co., 1926, pp. 32-39.

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What you do with today's supply of time, therefore, becomes a fixed, unchangeable and unchanging fact.¹ Harrington Emerson has said that the only difference between a world master like Edison and an aged pauper is the difference in the use each has made of his 168 hours of available time each week.

Although this last statement is undoubtedly far from the truth, few would deny that the proper use of time is important in the plans of an efficient and successful individual. Teachers have seen, in many instances, bright minds do mediocre work through "wool gathering" and aimless frittering away of study time.

In recognition of the values that may be derived from the proper use of study time, some attempt has been made to help pupils plan their work so that they might gain the most from the time available. Reavis¹ found a study program helpful. One side of his program was a blank study schedule, with the hours of the school day divided into periods and with space provided for the pupil to write in his study plans. A list of helpful study directions was printed on the other side. A duplicate copy of the pupil's completed study schedule was given to the teacher in charge of the study hall so that she might keep a check on the pupil's use of his program. Reavis claims that his plan (1) solves

¹Reavis, W. C. "The Importance of Study Programs for High School Pupils." School Review, Vol. 19, June, 1911, pp. 398-405.

the problem of discipline, (2) improves scholarship considerably, and (3) provides regular hours of home study for a large majority of pupils.

The writer has been favorably inclined toward the use of study time budget cards for a number of years and has felt that their use has had a beneficial effect upon the pupils that used them. It was this favorable attitude toward the use of time budgets that prompted this study.

Statement of the Problem

It is the purpose of this investigation to present an answer to the following question: What effect does budgeting of study time have on the achievement ratio of high school pupils?

Delimitations

In this study the term "achievement ratio" means the ratio between achievement T-scores and intelligence T-scores. The T-scores are determined by the method described by McCall,¹ but with this difference: McCall based his T-scores upon the standard deviation of the distribution of scores made by unselected twelve-year-old pupils, whereas the T-scores in this study are based upon the standard deviation of scores of a limited number of pupils of the Marathon, Iowa, High School.

¹McCall, W. A. How to Measure in Education. New York: The Macmillan Co., 1922, Chap. V.

The purpose of this study is to determine the effect of the following factors on the

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study, and (y) to determine the effect of the following factors on the

study, and (z) to determine the effect of the following factors on the

study, and (aa) to determine the effect of the following factors on the

Sources of the Data

Data for this study were secured from an experiment extending over a period of two school years, 1933-34 and 1934-35. Thirty-two pupils of the ninth grade of the Marathon High School were selected for the first year's work and forty-nine pupils of the eleventh and twelfth grades from the same school for the second year's work.

Procedure

The first step in the procedure proper was to secure two groups comparable in ability and achievement ratio, one to be designated as the experimental group and one as the control group. For the purpose in mind it was deemed necessary to equate the groups on the bases of intelligence and achievement ratio. This was done in the manner indicated in the succeeding paragraphs.

At the beginning of the first semester of the school year 1933-34 all pupils used in the experiment were given Form A of the Terman Group Test of Mental Ability. The scores made on this test were tabulated, the arithmetic mean and standard deviation determined, and the intelligence T-score for each individual computed. The following formula was used for computing the T-scores:

$$\text{T-score} = \frac{(\text{Score} - \text{Mean of scores}) 10}{\text{Sigma of scores}} + 50$$

In order to increase the reliability of the intelligence

Based on this report, it was found that the school was in need of a complete renovation of the building and the grounds. The school was founded in 1880 and had been in operation for over 40 years. The building was in a state of disrepair and the grounds were overgrown. The school was also in need of new equipment and supplies. The report recommended that the school be closed for a year to allow for the necessary renovations and the purchase of new equipment. The report also recommended that the school be placed under the supervision of the State Board of Education. The report was approved by the State Board of Education and the school was closed for a year. The renovations were completed and the school was reopened in 1920. The school has since been a success and has produced many graduates who have gone on to become leaders in their fields.

measure the Terman test was repeated at the close of the first semester, using Form B, and another set of T-scores was computed. The arithmetic mean of the two T-scores for each pupil was used as the measure of intelligence in the calculation of the achievement ratio.

Except for the administration of the intelligence tests, nothing was done with the pupils during the first semester. The fact that the measure of achievement to be used was to be based upon semester marks, made it impossible to proceed with the equation of groups until these marks were available.

The next step was to tabulate all the final marks given by each teacher for the first semester and to determine arithmetic means and standard deviations of these marks. T-scores in each subject for the pupils participating in the experiment were computed from these data. The arithmetic mean of the T-scores for the various subjects was used as a measure of achievement for each pupil. The achievement ratio was then calculated for each pupil in the group by this formula:

$$\text{Achievement ratio} = \frac{\text{Mean achievement T-score}}{\text{Mean intelligence T-score}} \times 100$$

Incidentally, the achievement ratio was decided upon as a measure of achievement in preference to the studious-

because the other... first... was observed... each... of the... excess for the... nothing was done... The fact that the... based upon... the... the... by each... extrinsic... factors in each... the experiment was... built upon... as a measure of... ratio was... This... appropriate... identical... as a measure of...

the... The... by each... extrinsic... factors in each... the experiment was... built upon... as a measure of... ratio was... This...

appropriate... identical... as a measure of...

ness index, as used by Butterweck.¹ The former conveys the same information as the latter and avoids the use of negative numbers.²

Both of these measures show a regressive effect, that is, they make it increasingly difficult for an individual with a high intelligence T-score to make an achievement ratio greater than one hundred. Theoretically, it would seem impossible for an individual to make an achievement ratio greater than one hundred, for to do so would indicate that his achievement is greater than his capacity to achieve; in practice, however, such ratios are common.³

As previously stated, the measure of achievement used in this study is based upon teachers' semester marks. Although marks based on a standardized achievement test are more reliable than marks based on a single teacher-made test, the author accepts Butterweck's contention that achievement

¹Butterweck, Joseph Seibert. The Problem of Teaching High School Pupils How to Study. New York: Bureau of Publications, Teachers College, Columbia University, 1926, pp. 12 and 116.

²Using a method suggested by Symonds (Measurement in Secondary Education, pp. 521-525), Butterweck measured relative achievement by means of a studiousness index. He defined the index as the sigma difference between achievement and intelligence. It was found by subtracting the derived score for intelligence from that for achievement. This index might be either positive or negative.

³No attempt will be made here to explain this fact. Information may be found in the reference immediately above on pages 323-27.

scores, based on teachers' marks for a whole semester, will be as reliable as scores from a standardized achievement test. One reason for using teacher marks as a basis for determining achievement is that standardized tests in all subjects for mid-year examinations are not available. Of course the foregoing statement is based upon the assumption that the marks teachers give are derived from carefully and well planned tests. Even then, there is no certainty that teacher marks are highly reliable. However, they seem to be the most reliable measure of achievement available for a study of this type.

At the close of the first semester two groups were selected from the entire list of pupils, as nearly equal as possible in intelligence and achievement ratio. This was accomplished by locating each pupil on a graphic chart, one axis of which represented mean intelligence T-scores and the other achievement ratios. Two charts of this type are presented in succeeding chapters. Lines were drawn through the chart at the median, the 25th percentile, and the 75th percentile, respectively, on each axis, dividing the whole chart into sixteen cells. Pupils were selected in pairs from the same cell for the control and experimental groups.

During the second semester nothing was done about the control group's use of time. Members thereof continued just as they had during the first semester. They were allowed to

positive, based on the fact that the subject was not
to be regarded as a normal individual. The reason for this
last. The reason for this was that the subject was not
determining whether or not the subject was a normal individual
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into a single cell. The reason for this was that the subject was not a normal individual.
same cell. The reason for this was that the subject was not a normal individual.
During the test, the subject was not a normal individual.
control group. The reason for this was that the subject was not a normal individual.
as but the subject was not a normal individual.

make whatever plans for study that they wished. At no time was any idea of competition between groups allowed to enter into the experiment. Members of the control group and of the experimental group were seated in different parts of the study hall. This was done to remove the possibility of the control group copying the procedure of the experimental group.

Members of the experimental group were supplied with time budget cards and their desks were equipped with frames for holding them, as explained in detail in the next paragraph.

A time budget card is a form upon which a pupil writes his study schedule. A specimen of the form is presented in Figure 1 of the appendix. The cards used were two inches high and twenty inches long. At the extreme left of the card the days of the week were arranged vertically. Along the top of the card the regular periods of the school day were written, with a space allowed for home study at the extreme right. Metal frames were attached to the desks of the pupils employing these time budgets. The cards could be inserted into these frames. Figure 2 in the appendix is illustrative of the arrangement of the time cards on the desks.

Until the plan became well established, the experimental group met for a few minutes conference each Monday morning. The aim at the first meeting was to point out to the pupils the value of properly budgeting their time and to stimulate

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them to acquire these values. At the meetings the week's activity schedule, which varied from week to week, was placed before the group. Each individual then made written plans for the week, in duplicate, one copy for the pupil's use and one for his supervisor. Although the pupils were encouraged to make their plans in a manner that changing would be unnecessary, they were privileged to make alterations if it was found that they could not follow the plans devised. Frequent checks were made to determine how closely pupils followed their plans. While radical changes from week to week were seldom necessary, frequent changes in the activities of the pupils engaged in this work made necessary numerous minor changes. This was especially true of juniors and seniors, the subjects for the second year of the experiment. The increasing number of activities in which they engaged led to a great variety of plans and to frequent changes.

At no time were members of the experimental group informed that comparisons would be made at the end of the year.

At the close of the second semester the final marks for the semester were tabulated, means and standard deviations determined, and T-scores computed for each individual in each subject taken. The achievement ratio was calculated and comparisons made. The conclusions were drawn from these comparisons.

CHAPTER II

RESULTS WITH NINTH GRADE PUPILS

Introduction

The data gathered in the course of this study are treated herein under two divisions, namely, (1) ninth grade pupils and (2) eleventh grade and twelfth grade pupils. In this chapter are presented the data pertaining to the former, which data were collected during the first year of the experiment.

Ninth grade pupils were selected for the first year's work mainly because they were entering high school from the grades and were assuming greater responsibility for the use of their study time than they previously had. It was believed that if budgeting of time was to affect achievement, that the effects should be most evident at this level.

Equation of Groups

Table I shows the results from administration of the Terman Group Tests of Mental Ability, Forms A and B. Although there was considerable variation between the scores made by certain individuals on one form with those made on the other form, as a whole there was a close relationship between the two sets of scores. The mean score on Form A

Introduction

The data presented in this report are the result of a study conducted over a period of six months. The study was designed to investigate the relationship between the variables of interest and to determine the extent to which the hypotheses were supported. The results of the study are presented in the following chapters.

This chapter is devoted to a description of the data which were collected for the study. It includes a discussion of the sources of the data, the methods of data collection, and the characteristics of the data.

Chapter II describes the methods used in the study. It includes a discussion of the experimental design, the procedures used for data collection, and the methods used for data analysis. Chapter III presents the results of the study. It includes a discussion of the findings of the study and a comparison of the findings with the hypotheses. Chapter IV discusses the implications of the findings and suggests directions for future research.

References

Table 1 shows the results of the study. It includes a discussion of the findings of the study and a comparison of the findings with the hypotheses. The data presented in this table are the result of a study conducted over a period of six months. The study was designed to investigate the relationship between the variables of interest and to determine the extent to which the hypotheses were supported. The results of the study are presented in the following chapters.

TABLE I

INTELLIGENCE TEST SCORES, INTELLIGENCE T-SCORES, AND
 MEAN INTELLIGENCE T-SCORES OF THIRTY-TWO
 NINTH GRADE PUPILS OF THE MARATHON,
 IOWA, HIGH SCHOOL

Pupil No.	Form A*		Form B*		Mean T-score
	Raw Score	T-score	Raw Score	T-score	
1	154	68.9	169	71.9	70.4
2	149	66.7	156	66.8	66.8
3	147	65.9	---	---	65.9
4	---	---	149	64.1	64.1
5	137	61.6	153	65.7	63.7
6	131	59.0	124	54.4	56.7
7	118	53.4	136	59.5	56.5
8	120	54.2	130	56.7	56.0
9	121	54.7	131	57.1	55.9
10	119	53.8	113	54.4	54.1
11	117	52.9	123	54.0	53.5
12	115	52.1	123	54.0	53.1
13	118	53.4	119	52.5	53.0
14	115	52.1	119	52.5	52.3
15	106	48.2	126	55.2	51.7
16	---	---	113	50.1	50.1
17	110	49.3	109	48.6	49.0
18	113	51.2	103	46.2	48.7
19	102	46.5	108	48.2	47.4
20	103	46.9	106	47.4	47.2
21	97	44.3	107	47.8	46.1
22	106	48.2	95	43.1	45.7
23	100	45.6	---	---	45.6
24	97	44.3	---	---	44.3
25	86	39.6	101	45.5	42.6
26	87	40.0	95	43.1	41.6
27	78	36.1	87	40.0	38.1
28	76	35.3	88	40.4	37.9
29	84	38.7	73	34.6	36.7
30	74	34.4	76	35.8	35.1
31	78	36.1	68	32.7	34.4
32	72	33.5	62	30.3	31.9

* Terman Group Tests of Mental Ability

of the test was 110.17 and the standard deviation was 23.20. On Form B the mean was 112.67 and the standard deviation 25.75. Examination of the table will show that the pupils participating are scattered over a wide range of intelligence.

The mean of all semester marks given by each teacher and the standard deviation of these marks are shown in Table II. These mean marks, based upon all the marks given by the teacher of the particular subject and not merely upon those given to the pupils in this study, are practically

TABLE II

MEANS AND STANDARD DEVIATIONS OF ALL FIRST SEMESTER MARKS GIVEN BY TEACHERS OF MARATHON HIGH SCHOOL

Subject	Mean Marks	S. D. of Distribution of Marks
English	84.69	6.30
Home Economics	85.76	6.80
Manual Training	85.45	6.50
General Science	85.92	5.70
Algebra	85.45	6.46

the same for the several subjects. This may be explained largely on the ground that marks in the Marathon High School are distributed approximately on the basis of a normal curve. Obviously, the variability in marks would be about the same among the several subjects. The mean marks range from 84.69 to 85.92 and the standard deviations of the distribution of marks from 5.90 to 6.80.

TABLE III

T-SCORES EARNED IN THE FIRST SEMESTER BY THIRTY-TWO
NINTH GRADE PUPILS OF MARATHON HIGH SCHOOL

Pupil No.	English	HomeEc.	Man.Tr.	Gen.Sci.	Algebra	Mean
1	66.4		64.7	72.9	64.8	67.2
2	50.5		49.3	57.2	52.4	52.4
3	50.5		44.7	60.7	52.4	52.1
4	50.5	49.9		43.1	52.4	49.0
5	58.4		64.7	65.9	67.9	64.2
6	66.4		49.3	64.2	64.8	61.2
7	58.4	66.5		57.2	57.0	59.8
8	53.4	49.9		57.2	52.4	54.9
9	61.6	66.5		57.2	60.1	61.4
10	53.7		44.7	51.9	52.4	50.7
11	53.7		52.4	60.7	57.0	56.0
12	50.5	37.1		43.1	52.4	45.8
13	45.7		56.9	51.9	57.0	52.9
14	41.0		63.2	43.1	44.7	48.0
15	45.7		52.4	43.1	52.4	48.4
16	53.7	56.2		51.9	52.4	53.6
17	61.6	51.8		43.1	40.0	49.1
18	50.5		52.4	43.1	36.9	45.7
19	41.0		40.1	43.1	49.3	43.4
20	41.0	59.2		43.1	40.0	45.8
21	50.5	51.8		48.4	40.0	47.7
22	58.4		56.9	57.2	63.2	58.9
23	31.2		40.1	43.1	36.9	37.8
24	41.0		44.7	43.1	49.3	44.5
25	41.0		40.1	51.9	44.7	44.4
26	41.0		52.4	48.4	44.7	46.6
27	37.8	26.8		34.4	33.8	33.2
28	45.7	49.9		37.9	49.3	45.7
29	28.2		40.1	37.9	40.0	36.6
30	37.8		44.7	34.4	22.6	34.9
31	45.7		49.3	43.1	44.7	45.7
32	50.5	37.1		37.9	44.7	42.6

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The T-scores derived from the data in Table II are presented in Table III. The means of the T-scores made by each pupil in the several subjects range from 33.2 to 67.2. It is interesting to note that most of the pupils tend to make about the same T-scores in each of the several subjects. In few instances do pupils tend to be high in one subject and low in others.

Table IV contains the data which were used for selecting two equal groups, one designated as the experimental group and one as the control group. The method of selecting the groups is described in the introductory chapter. The equation of the two groups on the basis of intelligence T-scores and achievement ratios is shown in Figure 1 and in Table V. In the original equation there were fourteen pairs of pupils. Subjects 23, 19, 17, 24, and 30 dropped out of school, leaving ten pairs for comparison at the end of the second semester.

Achievement of the Groups

During the second semester the control group and the experimental group followed the procedure heretofore described. The final comparisons were based upon the data which follow.

The mean of all the semester marks given during the second semester by each teacher and the standard deviation of these marks are to be found in Table VI. These mean marks show the same uniformity that was noted at the end of the

TABLE IV

FIRST SEMESTER MEAN INTELLIGENCE T-SCORES, MEAN
ACHIEVEMENT T-SCORES, AND ACHIEVEMENT RA-
TIOS OF THIRTY-TWO PUPILS OF THE NINTH
GRADE OF MARATHON HIGH SCHOOL

Pupil No.	Mean Intelligence T-score	Mean Achievement T-score	Achievement Ratio
1	70.4	67.2	95
2	66.8	52.4	78
3	65.9	52.1	79
4	64.1	49.0	76
5	63.7	64.2	101
6	56.7	61.2	108
7	56.5	59.8	106
8	56.0	54.5	97
9	55.9	61.4	110
10	54.1	50.7	94
11	53.5	56.0	105
12	53.1	45.8	86
13	53.0	52.9	100
14	52.3	48.0	92
15	51.7	48.4	94
16	50.1	53.6	107
17	49.0	49.1	100
18	48.7	45.7	94
19	47.4	43.4	92
20	47.2	45.8	97
21	46.1	47.7	103
22	45.7	58.9	126
23	45.6	37.8	83
24	44.3	44.5	100
25	42.6	44.4	104
26	41.6	46.6	112
27	38.1	33.2	87
28	37.9	45.7	121
29	36.7	36.6	100
30	35.1	34.9	99
31	34.4	45.7	133
32	31.9	42.6	134

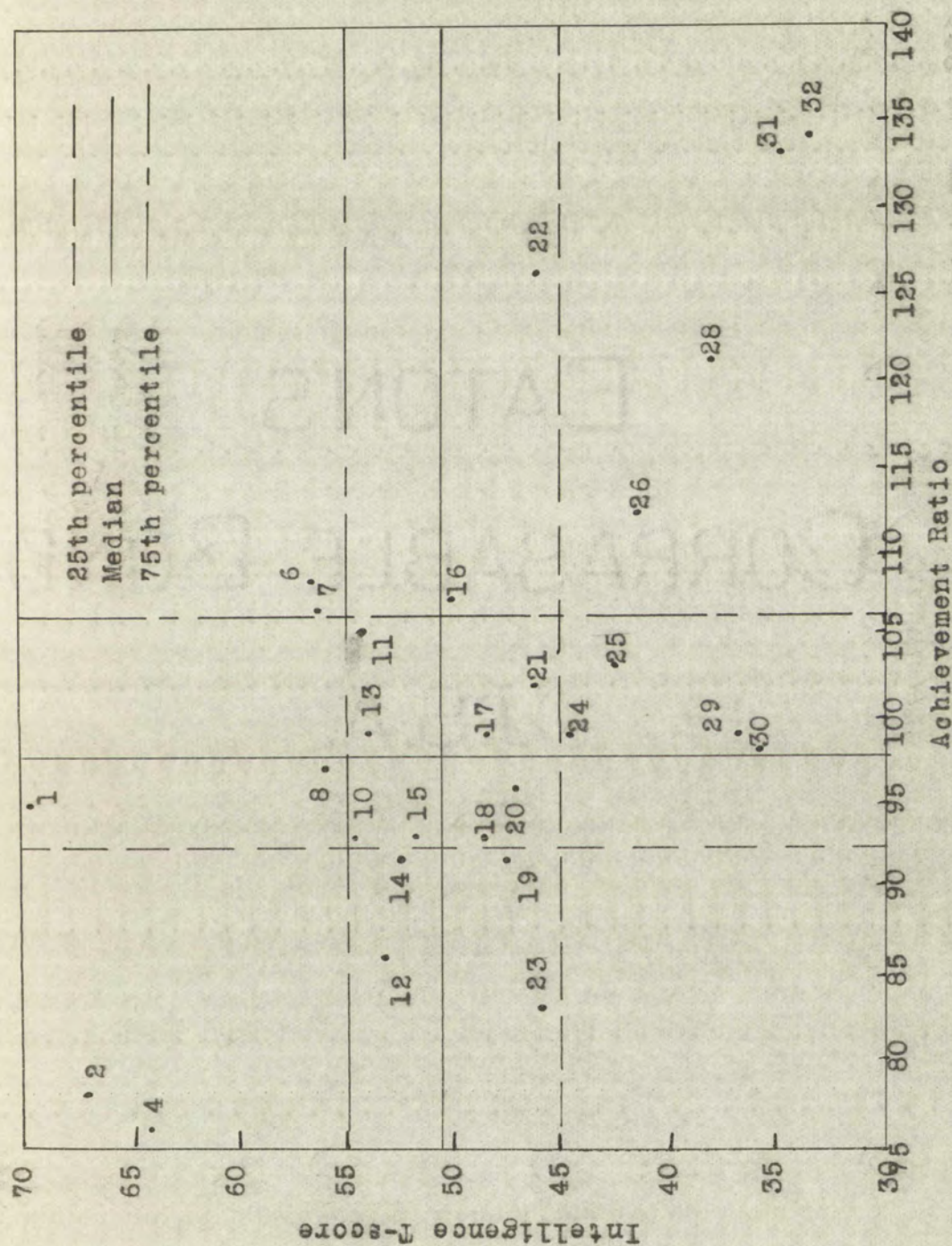


Figure 1. Distribution of Twenty-eight Ninth Grade Pupils of Marathon High School on the Basis of Intelligence and Achievement Ratio.

TABLE V

COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP
ON BASIS OF MEAN INTELLIGENCE AND
ACHIEVEMENT RATIO

Experimental			Control		
Pupil No.	Mean Int. T-score	Achiev. Ratio	Pupil No.	Mean Int. T-score	Achiev. Ratio
2	66.8	78	4	64.1	76
8	56.0	97	1	70.4	95
7	56.5	106	6	56.7	108
12	53.1	86	14	52.3	92
10	54.1	94	15	51.7	94
11	53.5	105	13	53.0	100
23	45.6	83	19	47.4	92
20	47.2	97	18	48.7	94
21	46.1	103	17	49.0	100
22	45.7	126	16	50.1	107
25	42.6	104	24	44.3	100
30	35.1	99	29	36.7	100
28	37.9	121	26	41.6	112
32	31.9	134	31	34.4	133

TABLE VI

MEANS AND STANDARD DEVIATIONS OF ALL SECOND SEMESTER
MARKS GIVEN BY TEACHERS OF MARATHON HIGH SCHOOL

Subject	Mean Marks	S. D. of Distribution of Marks
English	84.14	7.42
Home Economics	85.16	7.18
Manual Training	84.97	7.34
General Science	85.84	5.82
Algebra	85.60	6.64

DATE		TIME	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31

DATE		TIME	
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31

first semester. The means range from 84.14 to 85.84. There is not a great range in variability, standard deviations of the distributions of marks ranging from 5.82 to 7.42.

The T-scores at the end of the second semester for the

TABLE VII

T-SCORES EARNED IN THE SECOND SEMESTER BY TWENTY
NINTH GRADE PUPILS OF MARATHON HIGH SCHOOL

Pupil No.	T-scores					Mean
	English	HomeEc.	Man.Tr.	Gen.Sci.	Algebra	
1	64.6		59.5	69.2	62.7	64.0
2	57.9		46.0	60.6	52.1	54.2
4	60.6	52.6		60.6	59.6	58.4
6	63.3		46.0	64.0	59.6	58.2
7	53.9	56.5		52.0	62.7	58.8
8	53.9	35.8		49.9	49.1	47.2
10	51.1		56.8	52.0	59.6	54.9
11	53.9		50.0	57.1	56.6	54.4
12	51.1	49.8		43.4	44.6	47.2
13	43.1		52.7	52.0	49.1	49.2
14	40.4		50.0	43.4	34.0	42.0
15	51.1		59.5	43.4	49.1	50.8
16	53.9	56.7		49.9	62.7	55.8
18	51.1		50.0	43.4	40.1	46.2
20	51.1	59.5		43.4	49.1	50.8
22	51.1		56.8	52.0	59.6	54.9
26	40.4		52.7	34.8	37.0	41.2
28	43.1	56.7		43.4	40.1	45.8
31	40.4		39.1	43.4	44.6	41.9
32	43.1	49.8		34.8	37.0	41.2

subjects taken, with the mean T-score, are shown in Table VII. The range of the mean T-scores is from 41.2 to 64.0. This range is somewhat less than that for the first semester. The decrease in range can be partially accounted for by the dropping of some subjects from the groups.

It is suggested that the following be included in the report of the committee on the subject of the proposed changes in the organization of the Department of the Interior.

Table VII

TABLE VII
 SUMMARY OF THE RESULTS OF THE SURVEY OF THE DEPARTMENT OF THE INTERIOR, 1900-1901

Item	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	2990	2991	2992	2993	2994	2995	2996	2997	2998	2999	3000	3001	3002	3003	3004	3005	3006	3007	3008	3009	3010	3011	3012	3013	3014	3015	3016	3017	3018	3019	3020	3021	3022	3023	3024	3025	3026	3027	3028	3029	3030	3031	3032	3033	3034	3035	3036	3037	3038	3039	3040	3041	3042	3043	3044	3045	3046	3047	3048	3049	3050	3051	3052	3053	3054	3055	3056	3057	3058	3059	3060	3061	3062	3063	3064	3065	3066	3067	3068	3069	3070	3071	3072	3073	3074	3075	3076	3077	3078	3079	3080	3081	3082	3083	3084	3085	3086	3087	3088	3089	3090	3091	3092	3093	3094	3095	3096	3097	3098	3099	3100	3101	3102	3103	3104	3105	3106	3107	3108	3109	3110	3111	3112	3113	3114	3115	3116	3117	3118	3119	3120	3121	3122	3123	3124	3125	3126	3127	3128	3129	3130	3131	3132	3133	3134	3135	3136	3137	3138	3139	3140	3141	3142	3143	3144	3145	3146	3147	3148	3149	3150	3151	3152	3153	3154	3155	3156	3157	3158	3159	3160	3161	3162	3163	3164	3165	3166	3167	3168	3169	3170	3171	3172	3173	3174	3175	3176	3177	3178	3179	3180	3181	3182	3183	3184	3185	3186	3187	3188	3189	3190	3191	3192	3193	3194	3195	3196	3197	3198	3199	3200	3201	3202	3203	3204	3205	3206	3207	3208	3209	3210	3211	3212	3213	3214	3215	3216	3217	3218	3219	3220	3221	3222	3223	3224	3225	3226	3227	3228	3229	3230	3231	3232	3233	3234	3235	3236	3237	3238	3239	3240	3241	3242	3243	3244	3245	3246	3247	3248	3249	3250</
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Table VIII is a comparison of the achievement ratio for each pupil at the end of the second semester with that for the first semester.

TABLE VIII

COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP
ON BASIS OF ACHIEVEMENT RATIOS AT BEGIN-
NING AND END OF SECOND SEMESTER

Experimental			Control		
Pupil No.	Achievement Ratio		Pupil No.	Achievement Ratio	
	1st Sem.	2nd Sem.		1st Sem.	2nd Sem.
2	78	81	4	76	91
8	97	84	1	95	91
7	106	104	6	108	103
12	86	89	14	92	80
10	94	101	15	94	98
11	105	102	13	100	93
20	97	108	18	94	95
22	126	120	16	107	111
28	121	121	26	112	99
32	134	129	31	133	122

From data in Table VIII it is apparent that there was no gain as a result of the use of written study time budgets by ninth grade pupils. The experimental group began the semester with a mean achievement ratio of 105.2 and finished with 103.4, a loss of 1.8 points in achievement ratio. The control group began with an achievement ratio of 101.2 and finished with 99.2, a loss of 2 points.

Examination of the class schedule of these ninth grade pupils yielded a partial explanation of the failure of the study time budget to produce any favorable results. The schedule follows.

First and Second Semester Ninth Grade Schedule

9:00-10:00	Activity period
10:00-10:40	English
10:40-11:20	Study
11:20-12:00	Algebra
1:00- 2:20	Manual Training and Home Economics
2:20- 3:00	Study
3:00- 3:40	General Science

This schedule is so arranged that class periods and study periods alternate. The common procedure on the part of all pupils, both experimental and control, was to use the period before a class for the study of the particular subject of concern in the recitation period. With the exception of the individual who was engaged in many activities, and few freshmen were, the only work that needed any planning was home work. Those who used study budgets usually planned home work in the subject in which they were doing the poorest work, or the one which followed the activity period. The results indicate that members of the control group made just as efficient use of their time as those of the experimental group.

CHAPTER III

RESULTS WITH ELEVENTH AND TWELFTH GRADE PUPILS

Introduction

On account of failure to find improvement in the achievement ratio from the use of study time budgets in the ninth grade, the next year the experiment was shifted to the eleventh and twelfth grades. In planning the schedule of classes for the ninth and tenth grades it is the practice to arrange a schedule that is as ideal as possible. The eleventh and twelfth grade classes are fitted into the plan in whatever way seems best and most practical. Even when considerable care is exercised in making the schedule, many of the upper classmen have poor time arrangements. Elective subjects open to pupils in both of these grades make for a lack of uniformity in time schedules.

Table IX shows the variety of programs of time schedules that resulted from the situation described and the number of pupils that followed each particular schedule. In the extra-curricular activity period the pupils are occupied in various ways. The majority of them are unable to use this period for study oftener than twice a week, and some not at all. These schedules, being poorly arranged as a whole, in-

TABLE IX

A COMPARISON OF SCHEDULES FOLLOWED BY THIRTY-FOUR
ELEVENTH AND TWELFTH GRADE PUPILS OF
MARATHON HIGH SCHOOL

No. Pupils on Schedule	Pupil Schedules or Programs							
	9:00 10:00	10:00 10:40	10:40 11:20	11:20 12:00	1:00 1:40	1:40 2:20	2:20 3:00	3:00 3:40
9	*	Class	Class	Class	Study	Class	Study	Class
8		Class	Study	Class	Class	Class	Study	Class
3		Class	Study	Class	Class	Class	Class	Study
3		Study	Class	Class	Study	Class	Class	Class
3		Class	Study	Class	Study	Class	Class	Class
2		Class	Class	Class	Study	Study	Study	Class
2		Class	Class	Class	Study	Class	Class	Class
2		Study	Class	Class	Study	Class	Class	Class
1		Class	Class	Class	Class	Class	Study	Study
1		Class	Class	Class	Study	Study	Class	Study

*This period is devoted to extracurricular activities;
it is used in various ways.

dicate a need for proper budgeting of study time. If beneficial results were not obtained during the first year of the experiment on account of schedules being too nearly ideal from the point of view of arrangement of classes and study periods, improvement should result during the present year.

The experiment was conducted during the second year in the same way as during the first.

Equation of Groups

The data used for equating the groups follows. Table X shows the scores and T-scores which resulted from the administration of the Terman Group Test of Mental Ability, Forms A and B, also the mean T-score for these tests. The mean T-score was used in the calculation of the achievement ra-

A COMPARISON OF THE
 RESULTS OF THE
 STUDY OF THE
 EFFECTS OF THE
 TREATMENT OF THE
 DISEASES OF THE
 NERVOUS SYSTEM
 IN THE
 HUMAN BEING

No.	Name of Patient	Age	Sex	Date of Admission	Date of Discharge	Duration of Illness	Nature of Illness	Treatment	Result
1	John Doe	35	M	1/1/1910	1/15/1910	14 days	Acute inflammation of the brain	Rest, cold compresses, and opiates	Recovered
2	Jane Smith	42	F	2/1/1910	2/15/1910	14 days	Chronic inflammation of the brain	Rest, cold compresses, and opiates	Recovered
3	Robert Brown	28	M	3/1/1910	3/15/1910	14 days	Acute inflammation of the brain	Rest, cold compresses, and opiates	Recovered
4	Mary White	38	F	4/1/1910	4/15/1910	14 days	Chronic inflammation of the brain	Rest, cold compresses, and opiates	Recovered
5	William Black	45	M	5/1/1910	5/15/1910	14 days	Acute inflammation of the brain	Rest, cold compresses, and opiates	Recovered
6	Elizabeth Green	32	F	6/1/1910	6/15/1910	14 days	Chronic inflammation of the brain	Rest, cold compresses, and opiates	Recovered
7	Thomas Grey	25	M	7/1/1910	7/15/1910	14 days	Acute inflammation of the brain	Rest, cold compresses, and opiates	Recovered
8	Anna Hall	40	F	8/1/1910	8/15/1910	14 days	Chronic inflammation of the brain	Rest, cold compresses, and opiates	Recovered
9	Charles King	30	M	9/1/1910	9/15/1910	14 days	Acute inflammation of the brain	Rest, cold compresses, and opiates	Recovered
10	Frances Lee	35	F	10/1/1910	10/15/1910	14 days	Chronic inflammation of the brain	Rest, cold compresses, and opiates	Recovered

The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

1. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

2. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

3. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

4. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

5. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

6. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

7. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

8. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

9. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

10. The results of the study of the effects of the treatment of the diseases of the nervous system in the human being are as follows:

TABLE X

INTELLIGENCE TEST SCORES, INTELLIGENCE T-SCORES, AND
 MEAN INTELLIGENCE T-SCORES OF FORTY-NINE
 NINTH GRADE PUPILS OF THE MARATHON,
 IOWA, HIGH SCHOOL

Pupil No.	Form A*		Form B*		Mean T-score
	Raw Score	T-score	Raw Score	T-score	
1	202	72.8	201	73.7	73.3
2	197	71.0	186	67.6	69.3
3	178	64.4	193	70.4	67.4
4	172	62.2	176	63.5	62.9
5	179	64.7	167	60.3	62.5
6	170	61.5	175	63.1	62.3
7	174	62.9	161	57.4	60.2
8	162	58.7	168	60.7	59.7
9	170	61.5	160	57.0	59.3
10	165	59.8	164	58.7	59.3
11	173	62.6	154	54.6	58.6
12	152	55.2	163	58.2	57.7
13	166	60.1	153	54.2	57.2
14	150	54.1	159	56.6	55.6
15	145	52.7	160	57.0	54.9
16	142	51.7	157	55.8	53.8
17	160	58.0	140	48.9	53.5
18	149	54.1	146	51.4	52.8
19	146	53.1	147	51.8	52.5
20	133	48.5	157	55.8	52.2
21	133	48.5	154	54.6	51.6
22	128	46.8	156	55.4	51.1
23	140	51.0	145	51.0	51.0
24	126	46.1	157	55.8	51.0
25	135	49.2	149	52.6	50.9
26	143	52.0	141	49.3	50.7
27	140	51.0	138	48.1	49.6
28	138	50.3	137	47.7	49.0
29	128	46.8	143	50.1	48.5
30	130	47.5	129	44.5	46.0
31	125	45.7	132	45.7	45.7
32	136	49.6	120	40.8	45.2
33	117	42.9	133	46.1	44.5
34	111	40.8	131	45.3	43.1
35	119	43.6	123	42.0	42.8
36	102	37.6	137	47.7	42.7
37	134	48.9	108	35.9	42.4
38	113	41.5	126	43.2	42.2
39	112	41.1	125	42.8	42.0

(Cont.)

TABLE X (Concluded)

INTELLIGENCE TEST SCORES, INTELLIGENCE T-SCORES, AND
MEAN INTELLIGENCE T-SCORES OF FORTY-NINE
NINTH GRADE PUPILS OF THE MARATHON,
IOWA, HIGH SCHOOL

Pupil No.	Form A*		Form B*		Mean T-score
	Raw Score	T-score	Raw Score	T-score	
40	120	43.9	114	38.4	41.2
41	112	41.1	118	40.0	40.6
42	102	37.6	124	42.4	40.0
43	118	43.2	108	35.9	39.6
44	99	36.6	116	39.2	37.9
45	97	35.9	108	35.9	35.9
46	81	30.2	117	39.6	34.9
47	84	31.3	108	35.9	33.6
48	99	36.6	92	29.4	33.0
49	88	32.7	93	29.9	31.3

*Terman Group Test of Mental Ability

tios. The pupils are arranged in this table in the order of their mean T-scores for intelligence. Each subject is given the same number throughout the study. There is a wider range of intelligence in this group than in the ninth grade group used the previous year. The mean score on Form A of the test was 137.21 and the standard deviation was 28.42. The mean score on Form B was 142.64 and the standard deviation 24.64. Comparatively, the means of the two sets of scores are in close agreement, as are the standard deviations.

The mean of all the semester marks given by each teacher and the standard deviation of these marks are shown in Table XI. The means of teachers' marks show the same uniformity as those for the previous year, ranging from 84.71 to 86.87. The standard deviations of the distributions of teachers'

marks ranged from 5.78 to 7.40.

TABLE XI

MEANS AND STANDARD DEVIATIONS OF ALL FIRST SEMESTER
MARKS GIVEN BY TEACHERS OF MARATHON HIGH SCHOOL

Subject	Mean Marks	S. D. of Distribution of Marks
English 11	86.42	7.08
Eng. 12, French	86.13	7.40
Bkpng., Typ., C.Law, Shorthand	85.61	6.92
History 11	84.71	7.12
Physics, Adv. Alg.	86.87	5.78

The T-scores derived from the data in Table XI are shown in Table XII. In spite of the variety of subject matter presented in these grades the tendency for an individual to earn about the same T-score in every subject is evident. It will be recalled that this tendency marked the performance of the ninth grade group also.

TABLE XII

T-SCORES EARNED IN THE FIRST SEMESTER BY FORTY-NINE
ELEVENTH AND TWELFTH GRADE PUPILS OF
MARATHON HIGH SCHOOL

Pupil No.	Eng. 12	Eng. 11	Fre- nch	Bkpg 11	Typ. 12	Com. Law	Sht. Hnd.	Hist 11	Phys 12	Ad. Alg.	Mean
1		59.3			59.2	57.8		64.5		62.3	61.0
2	52.5		57.9						46.8		55.1
3		64.9	63.3	62.1				65.9			64.1
4	60.6				52.0				65.8	57.1	58.9
5	43.1		43.1		44.8				45.1		44.0
6	44.4				49.1	47.7			53.7		48.7
7	57.9				57.8	62.1			48.6		56.6
8	59.3				46.2	62.1			67.5		58.8
9	36.3				43.3				48.6	60.6	47.2
10		46.6		44.8				43.3		46.8	45.4
11	63.3				47.7		62.1		58.9		58.0

(Cont.)

TABLE XII (Concluded)

T-SCORES EARNED IN THE FIRST SEMESTER BY FORTY-NINE
ELEVENTH AND TWELFTH GRADE PUPILS OF
MARATHON HIGH SCHOOL

Pupil No.	Eng. 12	Eng. 11	Fre- neh	Bkpg 11	Typ. 12	Com. Law	Sht. Hnd.	Hist 11	Phys 12	Ad. Alg.	Mean
12	59.3				56.3				60.6	55.4	57.9
13	60.6				37.6		52.0		46.8		49.3
14		48.0		47.7		47.7		50.4			48.5
15		63.5		66.5		66.5		67.3			66.0
16	35.0				34.7	43.3			39.9		38.2
17	44.4				37.6		49.1		41.6		43.2
18	49.8				34.7		37.6		41.1		40.9
19	48.5				54.9		46.2		38.2		47.0
20		62.1		57.8		54.9		51.8			56.7
21	52.5					57.8			55.4		55.2
22		60.7		65.0				63.0		58.9	61.9
23		53.6		57.8		59.2		53.2			56.0
24	52.2					49.1		61.6		55.4	54.6
25	60.6				66.5		66.5		50.2		61.0
26	44.4		49.8		63.6				46.8		51.2
27		33.9		43.3		37.6		36.4			37.8
28		59.3	60.6	56.3				54.6			57.7
29		49.4		46.2		52.0		56.0			50.9
30		26.8		34.7		34.7		36.4			33.2
31		45.2		49.1		50.6		53.2			49.5
32	59.3				56.3		60.7		57.1		58.5
33		60.7	57.9		52.0			49.0			54.9
34		31.0	30.9			31.8		33.6			31.8
35	53.9				57.8		40.4		41.6		48.4
36		36.7		39.0		34.7		42.0			38.1
37	52.5				60.7		57.8		36.4		51.9
38		28.2		31.8				35.0			31.7
39		46.6		50.6		37.6		40.6			43.9
40		43.8		37.6		34.7		40.6			39.2
41		39.5		40.4		37.6		39.2			39.2
42	37.7				56.3		43.3		34.7		43.0
43		49.4		59.2		57.8		43.4			52.5
44	37.7				44.8		37.6		29.5		37.4
45			30.9			34.7		37.8	31.3		33.7
46	37.5		48.5	49.1					39.9		43.8
47		43.8	48.5	41.9				51.8			46.5
48		42.3		47.7		43.3		44.8			44.5
49		38.1		50.6		40.4		40.6			42.2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	1428	1429	1430	1431	1432	1433	1434	1435	1436	1437	1438	1439	1440	1441	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1
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Table XIII contains all the data used in equating the groups. These data were placed in Figure 2, as described in the procedure, on the basis of intelligence T-scores and achievement ratios. The pairs of pupils selected from the cells of Figure 2 were placed, one pupil directly opposite his chosen cell mate, in Table XIV. Of the twenty-one pairs shown in this table, four pairs were eliminated, as subjects 30, 38, 40, and 49 dropped out of school. This left seventeen pairs for comparison at the end of the second semester.

TABLE XIII

FIRST SEMESTER MEAN INTELLIGENCE T-SCORES, MEAN ACHIEVEMENT T-SCORES, AND ACHIEVEMENT RATIOS OF FORTY-NINE PUPILS OF THE ELEVENTH AND TWELFTH GRADES OF MARATHON HIGH SCHOOL

Pupil No.	Mean Intelligence T-score	Mean Achievement T-score	Achievement Ratio
1	73.3	61.0	83
2	69.3	55.1	80
3	67.4	64.1	95
4	62.9	58.9	94
5	62.5	44.0	70
6	62.3	48.7	78
7	60.2	56.6	94
8	59.7	58.8	98
9	59.3	47.2	80
10	59.3	45.4	77
11	58.6	58.0	99
12	57.7	57.9	100
13	57.2	49.3	86
14	55.6	48.5	87
15	54.9	66.0	120
16	53.8	38.2	62
17	53.5	43.2	81
18	52.8	40.9	77
19	52.5	47.0	90
20	52.2	56.7	109

(Cont.)

TABLE XIII (Concluded)

FIRST SEMESTER MEAN INTELLIGENCE T-SCORES, MEAN
ACHIEVEMENT T-SCORES, AND ACHIEVEMENT RATIOS
OF FORTY-NINE PUPILS OF THE ELEVENTH AND
TWELFTH GRADES OF MARATHON HIGH SCHOOL

Pupil No.	Mean Intelligence T-score	Mean Achievement T-score	Achievement Ratio
21	51.6	55.2	105
22	51.1	61.9	121
23	51.0	56.0	110
24	51.0	54.6	107
25	50.9	61.0	120
26	50.7	51.2	101
27	49.6	37.8	76
28	49.0	57.7	118
29	48.5	50.9	105
30	46.0	33.2	72
31	45.7	49.5	108
32	45.2	58.5	129
33	44.5	54.9	123
34	43.1	31.8	74
35	42.8	48.4	113
36	42.7	38.1	89
37	42.4	51.9	122
38	42.4	31.7	75
39	42.0	43.9	105
40	41.2	39.2	95
41	40.6	39.2	97
42	40.0	43.0	108
43	39.6	52.5	133
44	37.9	37.4	99
45	35.9	33.7	93
46	34.9	43.8	126
47	33.6	46.5	138
48	33.0	44.5	135
49	31.3	42.4	135

Achievement of Groups

The procedure used during the second semester has been described in the opening chapter. It is the same as that employed in the first part of the experiment.

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 WASHINGTON, D.C. 20535

NAME	ADDRESS	CITY	STATE
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95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100

124
 SURVIVOR BOARD
 EVIDENCE

The following is a list of the names of the persons who were on board the ship on the day of the disaster. The names are listed in alphabetical order. The names of the persons who were on board the ship on the day of the disaster are listed in alphabetical order.

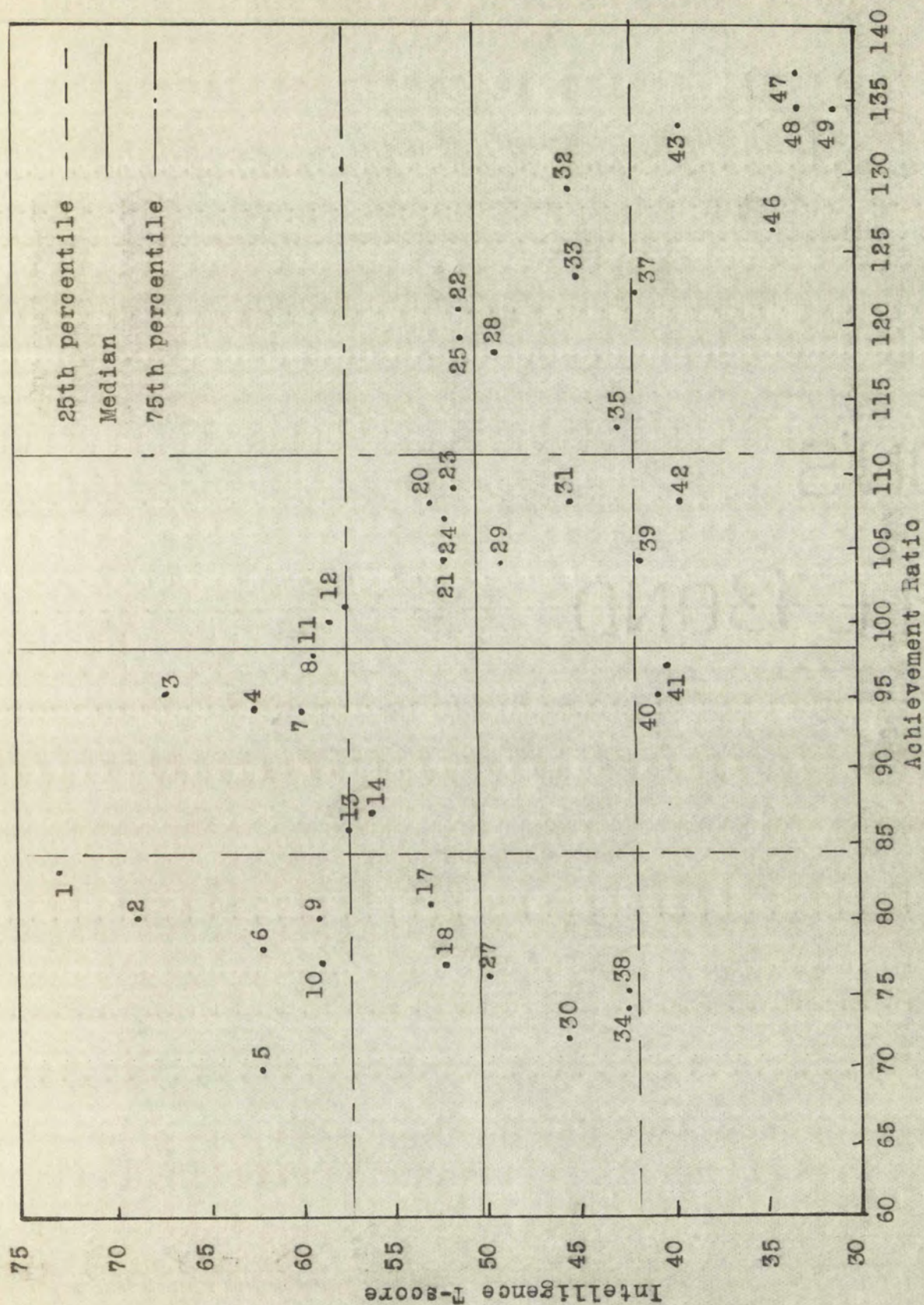


Figure 2. Distribution of Forty-two Eleventh and Twelfth Grade Pupils of Marathon High School on the Basis of Intelligence and Achievement Ratio.

TABLE XIV

COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP
ON BASIS OF MEAN INTELLIGENCE AND
ACHIEVEMENT RATIO

Experimental			Control		
Pupil No.	Mean Int. T-score	Achiev. Ratio	Pupil No.	Mean Int. T-score	Achiev. Ratio
2	69.3	80	1	73.3	83
6	62.3	78	5	62.5	70
10	59.3	77	9	59.3	80
4	62.9	94	3	67.4	95
8	59.7	98	7	60.2	94
12	57.7	100	11	58.6	99
17	53.5	81	18	52.8	77
13	57.2	86	14	55.6	87
23	51.0	110	24	51.0	107
20	52.2	109	21	51.6	105
25	50.9	120	22	51.1	121
30	46.0	72	34	43.1	74
38	42.4	75	27	49.6	76
29	48.5	105	31	45.7	108
35	42.8	113	28	49.0	118
32	45.2	129	33	44.5	123
40	41.2	95	41	40.6	97
39	42.0	105	42	40.0	108
43	39.6	133	37	42.4	122
46	34.9	126	47	33.6	138
49	31.3	135	48	33.0	135

TABLE XV

MEANS AND STANDARD DEVIATIONS OF ALL SECOND SEMESTER
MARKS GIVEN BY TEACHERS OF MARATHON HIGH SCHOOL

Subject	Mean Marks	S. D. of Distribution of Marks
English 11	85.76	7.36
English 12, French	85.87	6.68
Bkpng., Typ., C.Law, Arith.	86.36	6.56
Civics, Psychology	85.30	7.34
Physics, S. Geom.	86.68	6.22

The present study was designed to determine the effect of the amount of time spent in the laboratory on the learning of the material. The subjects were divided into two groups, one of which spent more time in the laboratory than the other. The results of the study are presented in the following table.

Table 1. Results of the study. The table shows the mean scores for each group on the two tests. The first test was given at the end of the first session, and the second test was given at the end of the second session. The results show that the group which spent more time in the laboratory scored significantly higher on both tests than the group which spent less time. This suggests that the amount of time spent in the laboratory has a significant effect on the learning of the material.

Analysis of variance was used to determine the significance of the differences between the two groups. The results of the analysis are presented in the following table.

Table 2. Results of the analysis of variance. The table shows the F-ratios and the corresponding p-values for the two tests. The results show that the differences between the two groups are significant for both tests.

The results of the study suggest that the amount of time spent in the laboratory has a significant effect on the learning of the material. This suggests that the amount of time spent in the laboratory should be increased in order to improve the learning of the material.

TABLE XVI

T-SCORES EARNED IN THE SECOND SEMESTER BY THIRTY-FOUR ELEVENTH AND TWELFTH GRADE PUPILS OF MARATHON HIGH SCHOOL

Pupil No.	Eng. 12	Eng. 11	French	Bkpg 11	Typ. 12	Ari.	Sht. Hnd.	Civ-	Psch	Phys	Geom	Mean
1		57.1						57.8	51.0		56.9	55.7
2	54.7		50.2		61.6	60.1				47.3		54.8
3		63.9	57.7	57.1				63.2				60.5
4	66.7				47.9					66.6	58.6	60.0
5	48.7		35.2		40.3					42.5		41.7
6	51.7				52.5				61.9	53.7		55.0
7	47.2				49.5				63.2	48.9		52.2
8	50.2				47.9	57.1				66.6		55.5
9	50.2				46.4					47.3	56.9	50.2
10		46.2		40.3				40.1			53.7	45.1
11	63.7				35.7		57.1			56.9		53.4
12	62.2				60.1					60.2	58.6	60.3
13	59.2				38.8		44.9			47.3		47.6
14		43.5		41.8		40.3		46.9				43.1
17	60.7				37.3		47.9			44.1		47.5
18	33.7				32.7		32.7			45.7		36.2
20		62.0		61.6		66.2		61.9				62.9
21	56.2					63.2	57.1		63.2	55.3		59.0
22		58.5		64.7				63.2			65.0	62.9
23		54.4		54.0		52.5		53.7				53.7
24		49.0						59.1	57.3		55.3	55.3
25	60.7				67.7		66.2			53.7		62.1
28		55.8	57.7	57.1				41.4				53.0
29		49.0		46.4		49.5		45.5				47.6
31		43.5		47.9				49.6	56.4			49.4
32	60.7				60.1		58.6			52.1		57.9
33		55.8	56.2					42.8	51.0			51.5
35	38.2				60.1				67.3	37.6		50.8
37	48.7				55.5		51.0		56.4	32.8		48.9
39		53.0		54.0		58.6		55.0				55.2
42	35.2				49.5		34.2			34.4		38.6
43		54.4		61.6		51.0		53.7				55.2
46	53.2		48.7		49.5					44.1		48.9
47		50.3	41.2	47.9				52.3				47.9

TABLE XVII

COMPARISON OF EXPERIMENTAL GROUP AND CONTROL GROUP
ON BASIS OF ACHIEVEMENT RATIOS AT BEGIN-
NING AND END OF SECOND SEMESTER

Experimental			Control		
Pupil No.	Achievement Ratio		Pupil No.	Achievement Ratio	
	1st Sem.	2nd Sem.		1st Sem.	2nd Sem.
2	80	79	1	83	76
6	78	88	5	70	67
10	77	76	9	80	85
4	94	95	3	95	90
8	98	93	7	94	87
12	100	105	11	99	91
17	81	89	18	77	69
13	86	83	14	87	78
23	110	105	24	107	108
20	109	121	21	105	114
25	120	122	22	121	123
29	105	98	31	108	108
35	113	119	28	118	108
32	129	128	33	123	116
39	105	131	42	108	97
43	133	139	37	122	115
46	126	140	47	138	143

achievement ratio from 87.8 to 89.3, based on ungrouped data, as compared to a loss in the control group of from 86.8 to 82.7. This is a net change of 5.6 points in favor of the experimental group. Below the 25th percentile of intelligence, members of the experimental group raised their mean achievement ratios from 121.3 to 136.7, as compared to a loss from 122.6 to 118.3 on the part of the control group. The net gain for the experimental group was 16.7 points. Probably most of this difference can be accounted for by the regressive effect in the achievement ratio as the higher levels of intelligence are approached.

CHAPTER IV

CONCLUSIONS AND LIMITATIONS

Conclusions

On the basis of the data presented in this study the following conclusions are drawn.

(a) The use of form cards for the budgeting of study time, as described herein, is of little or no value when the pupils using them are working on a schedule of classes that allows for study time immediately before or after each class.

(b) The use of cards for budgeting study time is of slight value to pupils working on a schedule of classes that are poorly adjusted from the time point of view, that is, in schedules where two or more classes or study periods come together.

(c) There is a slight indication that pupils of lower intelligence profit more from the use of study time budget cards than do those of higher intelligence.

According to the findings of this investigation, it is reasonable to conclude that the values claimed by some writers for the use of time budget cards are overestimated.

Limitations

Probably the outstanding limitation of this study is the fact that teachers' marks are used as a measure of achievement. The reliability of such marks as a measure of achievement is undoubtedly open to question. Another weakness is in the number of pupils used. A larger, as well as a different, sampling of subjects might materially alter findings.

There is the possibility in a study of this type that factors other than the experimental factor operate to produce change. While every effort was made to insure comparable situations during the two successive semesters, it is not certain that the objective was attained.

Although this study does not prove that the pupil who budgets his time is likely to profit greatly therefrom, as measured by teachers' marks, it does indicate that some advantage may be derived from their use. Moreover, the effect measured in this study may be only one of the benefits to be gained. Perhaps patterns of conduct and attitudes toward work, attainments which some persons consider to be much more valuable than subject matter, may be derived from the practice of employing study time budgeting plans. And even though the use of budget cards may not produce great changes in pupil achievement, as measured by teachers' marks, the evidence produced here is not sufficient to warrant the statement that use of them is a waste of time and that they

should, therefore, be abandoned. Budgeting study time may be worth while, especially for pupils whose programs are not planned in such manner that recitation periods and study periods will alternate. One who plans to use them should keep their limitations in mind, and strive to make them yield as many values as possible, especially values not regularly classed as achievement or measured by the usual types of tests.

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APPENDIX

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Mon.				
Tues.				
Wed.				
Thu.				
Fri.				

	1:00-1:40	1:40-2:20	2:20-3:00	Home Study
11:20-12:00				

Figure 3. Specimen Time Budget Cards Used by Pupils of
Marathon High School.

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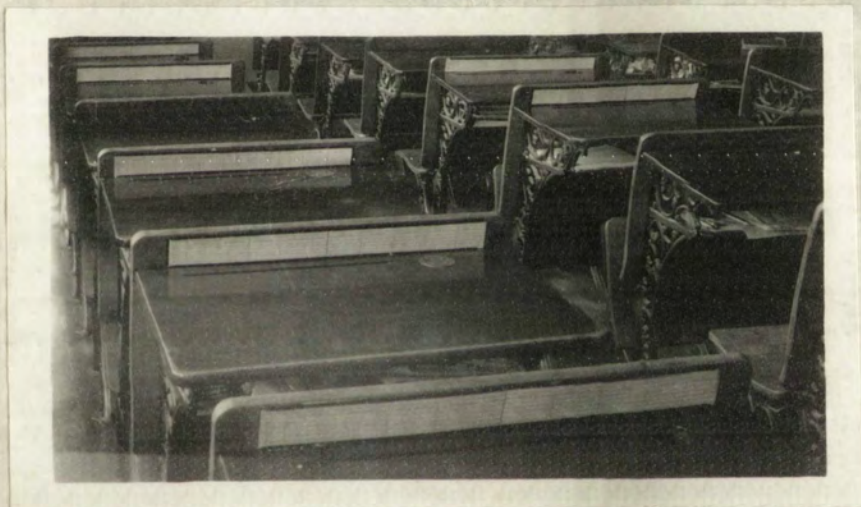
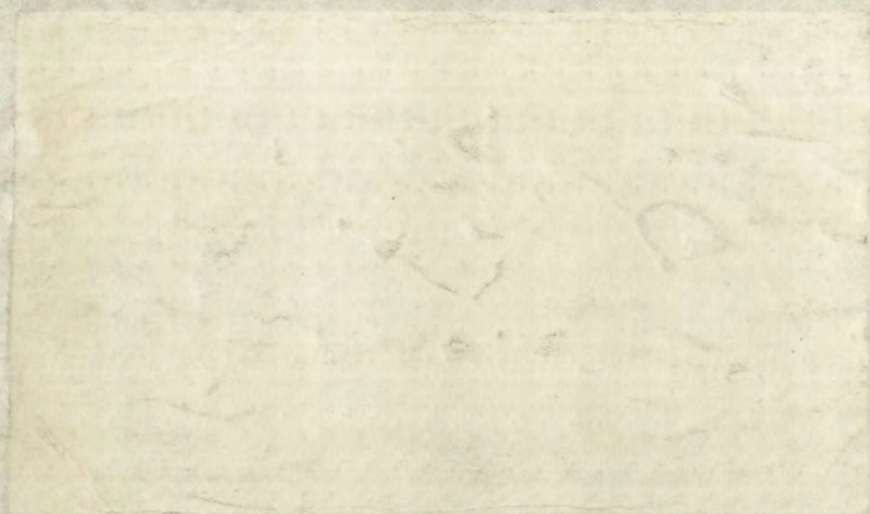


Figure 4. Arrangement of Time Budget Cards on Desks in Marathon High School.



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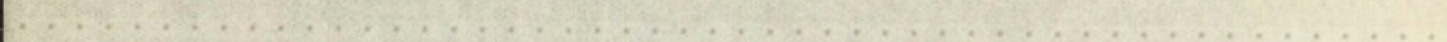
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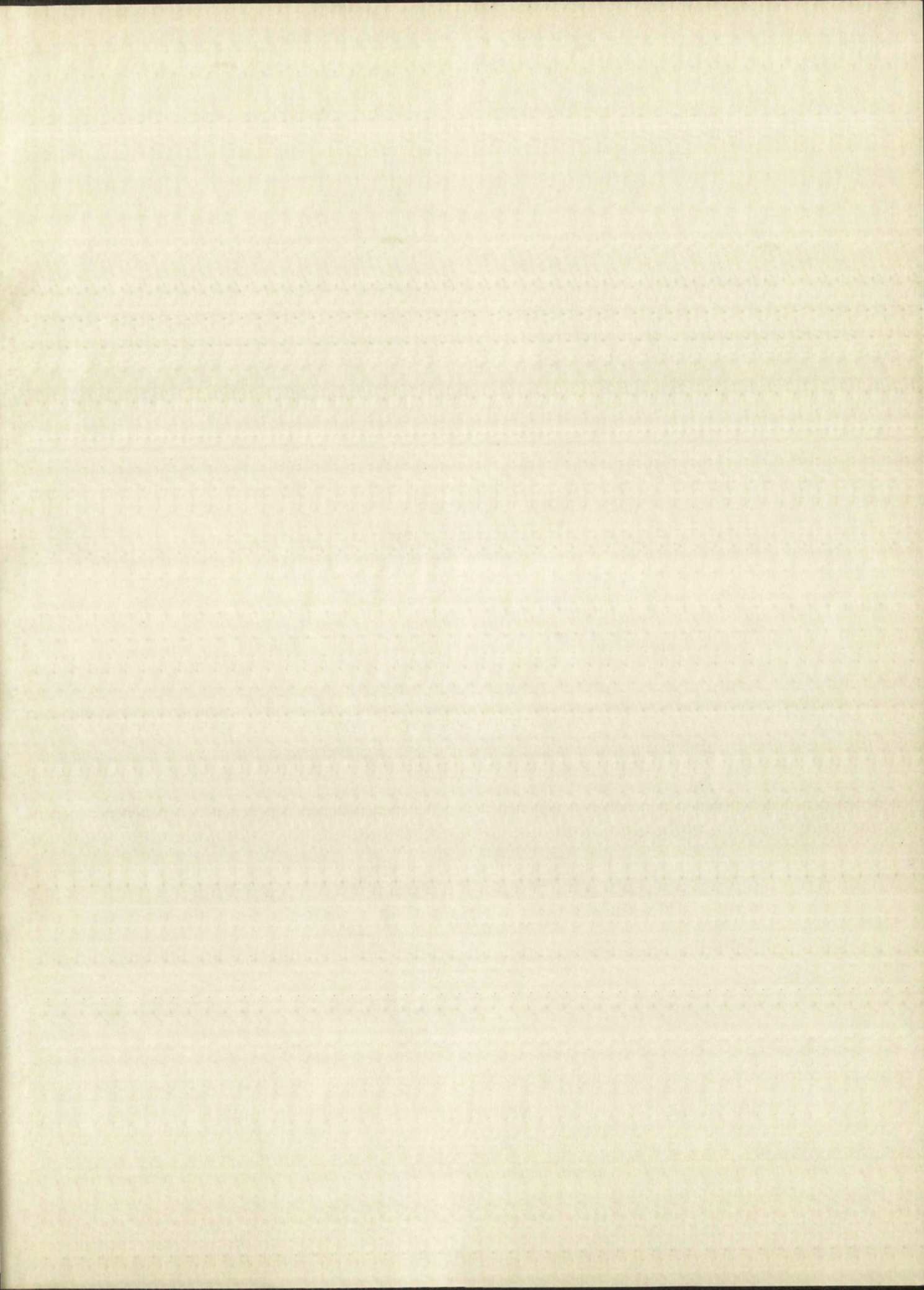
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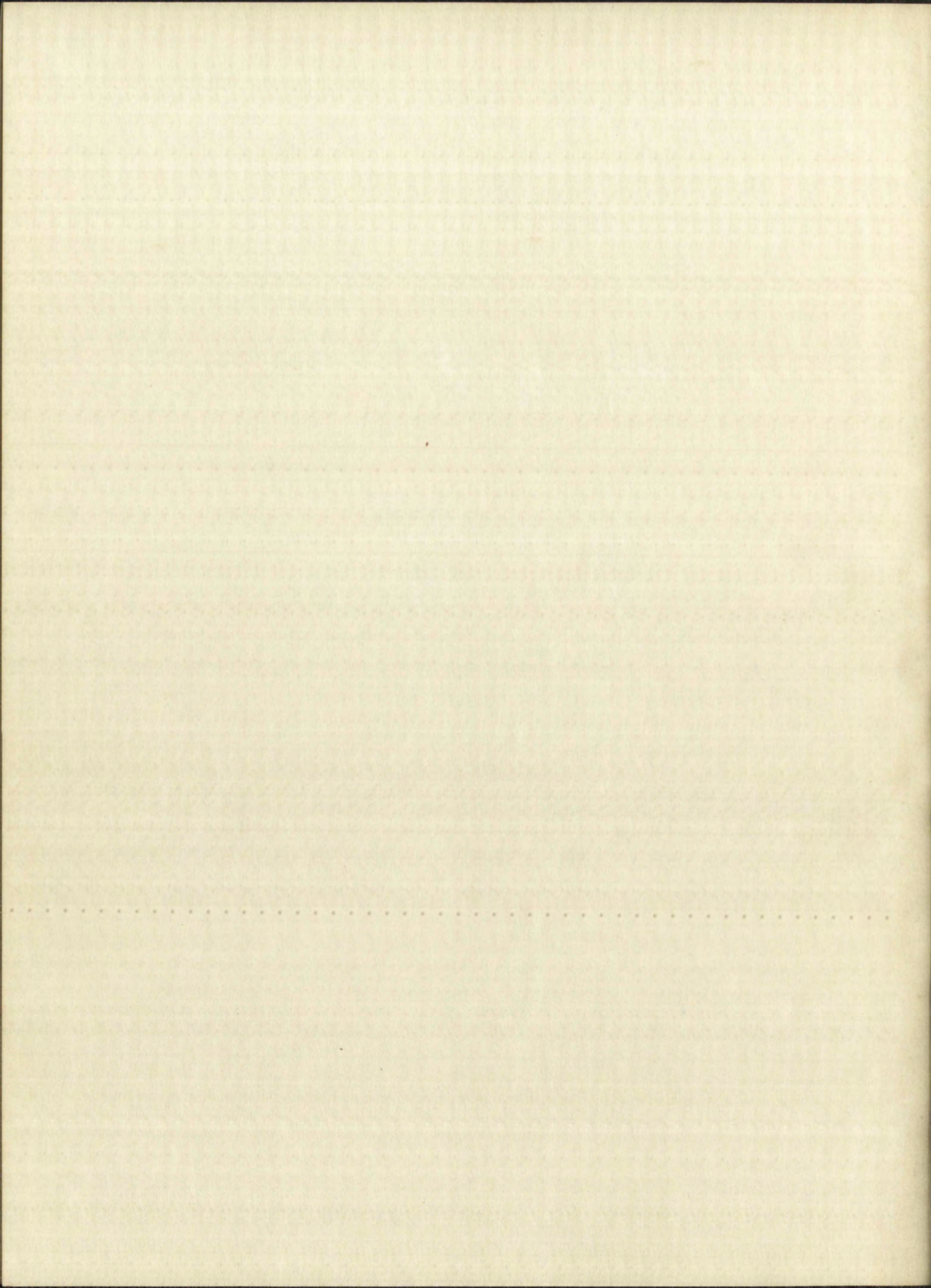
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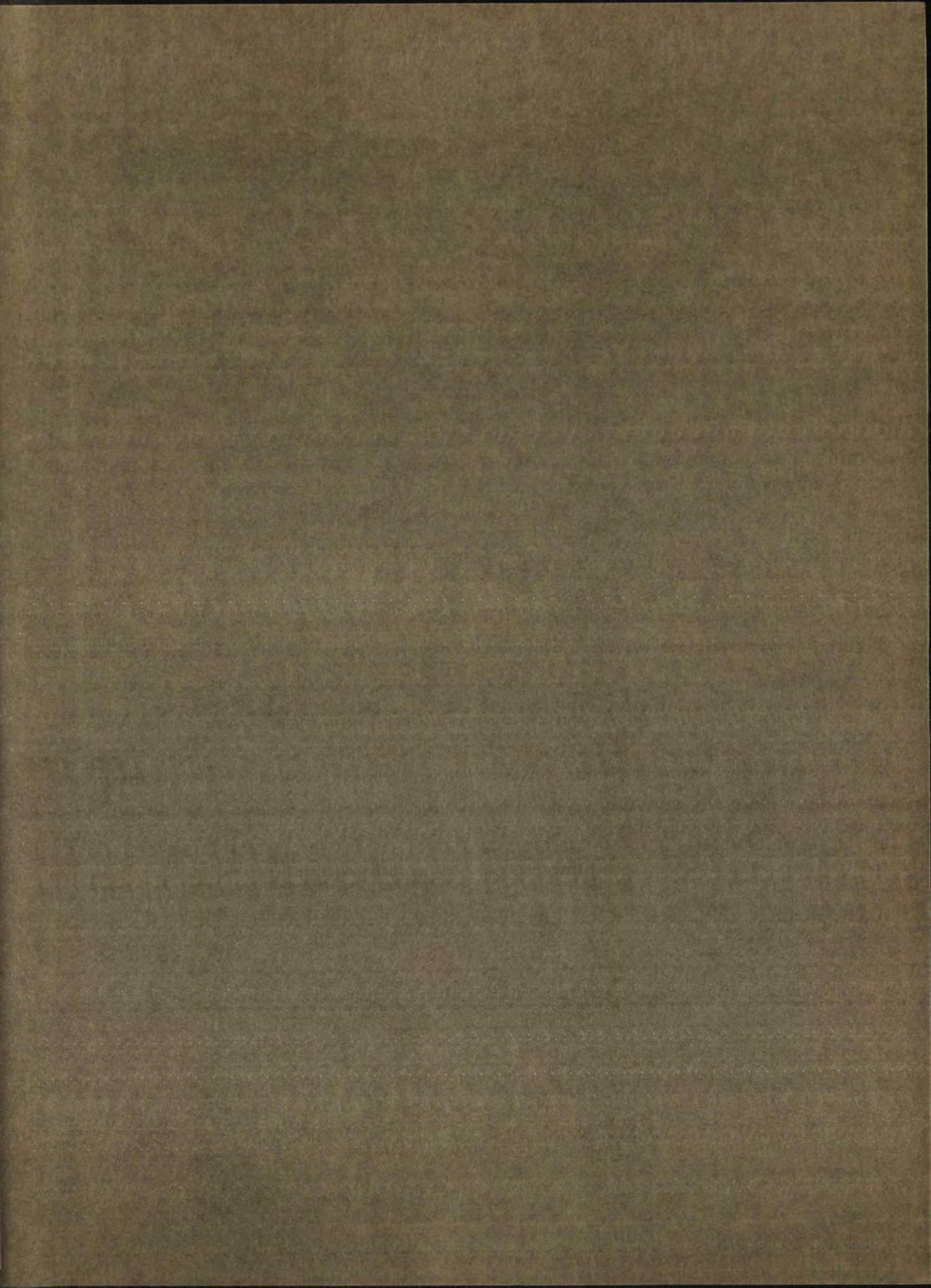
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JUL 5	RECD	
JAN 27	1962	
JAN 17	RECD	
JAN 25	1964	
JAN 2	RECD	
JUN - 2	1964	
MAY 14	RECD	
JAN 13	1966	
JAN 10	RECD	

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