



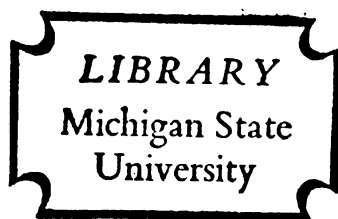
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DETERMINATION OF THE EFFECT OF
GREATER CONCENTRATION UPON
BASKETBALL SHOOTING ACCURACY

Thesis for the Degree of M. A.
MICHIGAN STATE UNIVERSITY
James A. White
1963



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DETERMINATION OF THE EFFECT OF GREATER
CONCENTRATION UPON BASKETBALL
SHOOTING ACCURACY

By

James A. White

AN ABSTRACT OF A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

College of Education

Department of Health, Physical Education, and Recreation

1963

APPROVED: _____

ABSTRACT

DETERMINATION OF THE EFFECT OF GREATER CONCENTRATION UPON BASKETBALL SHOOTING ACCURACY

by James A. White

STATEMENT OF PROBLEM

To Determine the Effect of the Use of a Smaller Target
in Improving Concentration and Basketball Shooting Accuracy.

METHODOLOGY

Three different levels of basketball ability were tested. Three groups of ten subjects each were picked by random sample. Group 1 was selected from the developmental classes in physical education at Michigan State University. Group 2 was comprised of freshmen players from the basketball team at Michigan State University. Group 3 was selected from members of the East Lansing high school basketball team.

In the first three testing periods each subject was permitted a total of one hundred fifty shots at the official size basket. The scores were recorded. Scores which were the same, or nearly so, were placed in a hat. The first score drawn was assigned to the control group. The second drawn number was relegated to the experimental group. This

provided five evenly paired subjects in the control and experimental sections of each of the three main groups.

Practice sessions began January 9, 1962. The subjects practiced from an area directly behind the foul shooting circle, twenty four feet from the basket. The control group practiced with the official size basket while the experimental group practiced with a smaller basket. The smaller basket consisted of a device placed inside the regulation rim which reduced the diameter of the rim by three inches. Sixty practice shots were taken by each subject at each session.

A testing period was held after every second practice period. The small rim was removed and each subject shot fifty times. The experimental subjects' score and their partners', who always practiced with a normal sized rim, were recorded on a graph. There were six testing periods and twelve practice sessions.

The groups practiced at their respective baskets for six weeks. Each subject was instructed not to practice at any other time. Subjects were allowed to shoot using any style, on the condition that the style be continued throughout the experiment. Shooting instruction was not given.

At the conclusion of six weeks, each subject had attempted 150 pre-test shots, 720 practice shots, and 300 test shots. This was a total of 1170 controlled shots.

Conclusions

1. Success in shooting at small baskets (diameter 15 inches) requires more concentration than does practice in shooting at official size baskets.
2. Beginning basketball players, according to this study, did improve their shooting accuracy, by use of a smaller rim. This improvement could be due to chance.
3. The ability to concentrate while shooting at a smaller basket, varies among individual subjects.

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- under whose helpful guidance and assistance this study was
undertaken. The writer is also grateful for the assistance
given him by Dr. Wayne Van Huss and Michigan State Basket-
ball Coaches, Mr. Bruce Fossum and Mr. Forddy Anderson.

J.A.W.

DEDICATION

This thesis is respectfully dedicated
to my Mother

Mrs. Louise H. White

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION TO THE PROBLEM	1
The Problem	1
Statement of the Problem	1
Importance of the Study	1
Limitations of the Study	2
Definitions of Terms Used.	3
Purpose of the Study	4
Need for the Study	4
II. REVIEW OF THE LITERATURE	6
III. METHODOLOGY	13
Developmental Section	13
High School Section.	13
Freshmen Basketball Team (College).	14
Routine.	14
Results.	15
IV. ANALYSIS AND PRESENTATION OF DATA	19
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	26
Summary.	26
Conclusions	27
Recommendations	27
BIBLIOGRAPHY	28

CHAPTER	PAGE
APPENDICES	31
Appendix A.	32
Appendix B.	46
Questionnaire	47
Tally Chart.	48
Individual Graph	49
Appendix C.	50
Official Size Basket.	51
Official Size Baket with Small Rim	52
Small Rim in Relation to Official Basketball	53
Appendix D.	54
Developmental Computations.	55
High School Computations	56
Michigan State University Basketball Team Computations	57

LIST OF TABLES

TABLE		PAGE
I.	The Individual Shooting Difference Between the Pairs of the Developmental Section	20
II.	The Individual Shooting Difference Between the Pairs of the High School Section	20
III.	The Individual Shooting Difference Between the Pairs of the Freshman Basketball Team	21

LIST OF FIGURES

FIGURE		PAGE
1.	Pair A--Developmental Section	33
2.	Pair B--Developmental Section	34
3.	Pair C--Developmental Section	35
4.	Pair D--Developmental Section	36
5.	Pair E--Developmental Section	37
6.	Pair A--High School Section. . . .	38
7.	Pair B--High School Section. . . .	39
8.	Pair C--High School Section. . . .	40
9.	Pair D--High School Section. . . .	41
10.	Pair A--Freshman Basketball Team . . .	42
11.	Pair B--Freshman Basketball Team . . .	43
12.	Pair C--Freshman Basketball Team . . .	44
13.	Pair D--Freshman Basketball Team . . .	45
14.	The Percentage of Total Group Shots Made for All Six Tests (Developmental Section)	23
15.	The Percentage of Total Group Shots Made for All Six Tests (High School Section)	24
16.	The Percentage of Total Group Shots Made for All Six Tests (Freshmen Basket- ball Team)	25

CHAPTER I

INTRODUCTION

The basket which is used today in the game of basketball is big.¹ The rim is almost large enough for two basketballs to go through it simultaneously since the diameter of the rim is eighteen inches. The diameter of the ball is nine and one-half inches. This leaves eight and one-half inches of leeway between the ball and the rim.

(It is the hope in this study to be able to test a method by which players might improve their concentration while shooting, thereby improving the perfection of the shot.)

This would in turn result in a higher degree of shooting accuracy.

I. THE PROBLEM

Statement of the Problem

To Determine the Effect of the Use of a Smaller Target in Improving Concentration and Basketball Shooting Accuracy.

¹Gaylord Curtiss, "The Basket Is Big," Athletic Journal, 32:50, October, 1951.

Importance of the Study

Improving skills, such as shooting, should be one of the aims of every basketball coach. The methods of self-improvement should be recognized and evaluated by each coach.

Confidence and determination are gained through the improvement of skill. These attributes are vital to any competitor. Improvement leads to new and higher goals. The goals that are set should be attainable, challenging, and adapted to the capacities of the subjects involved.² The participants who are aiming at goals usually acquire achievement. Setting goals is one of our most important responsibilities in the field of Physical Education.

Limitations of the Study

1. During practice periods, it was impossible to establish the proper "atmostphere" or game situation.
2. Only one shooting area for practice and testing was permitted.
3. It was difficult to determine when shooting fatigue resulted.
4. It was difficult to motivate subjects equally.
5. Shooting instruction was not given.

²C. Bucher, Administration of School Health and Physical Education Programs (St. Louis: The C. V. Mosby Co., 1955), p. 63.

6. It was impossible to use the same basketballs each day.
7. The groups were small.
8. The "expert" group was comprised of university freshmen basketball team members.

II. DEFINITIONS OF TERMS USED

Random sampling. Giving every male student who was enrolled in the developmental activities course at Michigan State University during the 1962 winter term an equal chance to be chosen.

Incentivized. A technique used to bring about a desire for improvement.

Concentration. The focusing of all possible attention to the improvement of basketball shooting.

Small rim. Device used to make the regulation basket smaller; the diameter of this rim was three inches smaller in diameter than the regulation rim. This device was painted orange.

Normal rim. The standard device, eighteen inches in diameter, situated on a backboard through which one attempts to shoot the ball.

Developmental activities. An activity course offered to students at Michigan State University for the primary purpose of developing the musculature of the human body.

III. PURPOSE AND NEED

Purpose of the study

The purpose of this study was to determine to what extent concentration on and practice with a smaller target would improve basketball shooting accuracy. The specific objectives of this study were as follows:

1. To determine if a smaller visual cue would improve shooting accuracy.
2. To present statistical data indicating the probability that the skill of basketball shooting could be improved by this method.

This study encompassed a total of twenty college students and ten high school students. Ten boys were chosen from the developmental sections of the Michigan State University physical education program, ten from the freshmen basketball team, and ten from the East Lansing High School basketball team. The results of the study and the conclusions derived from it may be applied to the coaching of basketball at either the high school level or the college level. (see page 31)

Need For The Study

Mental practice probably improves the performance of motor skills.³ The improvement of these skills should be of

³W. E. Twining, "Mental Practice and Physical Practice on Learning a Motor Skill," Research Quarterly, 20:432-435, December, 1949.

vital interest to all physical educators and coaches. There may be some combination of mental and physical practice periods that are superior to methods generally employed today to develop motor skill.⁴

Many authorities feel there is no limit to motor skill improvement. There is evidence of this in most phases of athletics.

Basketball shooting accuracy in the professional ranks has been progressively improving. Desired improvement by high school and college players has therefore resulted.

Presently at these levels, a shooting percentage of 40% is considered high. The investigator would hope that a shooting percentage of 50% to 60% could be attained. Some device is needed to develop greater concentration which would improve accuracy. The use of the small rim as a coaching technique may be such a device.

⁴C. Verdella, "Effect of Mental Practice on the Development of a Certain Motor Skill," Research Quarterly, 31:568, 1960.

CHAPTER II

REVIEW OF THE LITERATURE

Recent related literature on the subject of improving basketball accuracy by making the basket smaller is limited. Therefore, most of the literature reviewed was concerned with the "concentration" and "attention" factors.

Alley⁵ and Maaske state that practice in shooting at small baskets (diameter 15 inches) improves accuracy in shooting at official baskets more than does practice in shooting at official baskets. The small baskets used were, except for the diameter, exact replicas of the official baskets. Targets that consist of inner rings superimposed on the official basket present visual cues to the shooter which differ from the cues presented by official baskets. In this study advanced basketball players from the University of Iowa were used. The results were significant at the 5% level.

Moreland⁶ says that it is the mental state of the player which determines whether his shot will be made or

⁵L.E. Alley and P. Maaske, "To Improve Shooting Accuracy, Practice at Small Baskets," Athletic Journal, 52:34-35, September, 1961.

⁶Richard B. Moreland, "The Free Throw," Athletic Journal, 31:16-17, December, 1950.

missed. The inability of the player to concentrate, Moreland relates, is the primary cause for missed shots--concentration is the passport to proficiency; unless mastered, it is the reason why potentially good players fail to measure up to expectations.

Pfitsch⁷ believes that a boy must think that every time he shoots he is going to "hit." He must have confidence. He must also have an attitude which is developed and not brought about by fate alone. Concentration is stressed as a basis for the development of this attitude, and in Pfitsch's opinion, any shooter, regardless of his innate ability, can improve his basket shooting immeasurably by increasing his power of concentration upon the target. The ability to concentrate and the ensuing attitude make the difference between a mediocre and an excellent shooter. Many players depend more upon the element of chance than upon the element of skill.

Betts⁸ states that while attention is no doubt partly a natural gift, there is probably no power of the mind more susceptible to training than is attention, and with attention, as with every other power of the body and mind, the secret of

⁷J.A. Pfitsch, "Concentration in Shooting," Athletic Journal, 34:22, December, 1953.

⁸G. Betts, The Mind and It's Education, (New York: D. Appleton and Company, 1960), p. 18.

its development lies in its use. The only way to develop attentiveness is by practice.

The zeroing in of the eyes, Baker⁹ says, is most violated in shooting. In moving quickly into shooting position, the player often shoots hurriedly. Even though the movements are second nature, he doesn't actually eye the basket until the ball is on the edge of his fingers ready for release. The result is shots missing by a fraction off the front and back rim.

Anderson¹⁰ says that during practice sessions his players failed to concentrate enough on actually making the shot. Their form was sloppy and it seemed their only concern was to throw the ball at the hoop.

Douglas¹¹ has written that forced, active, or voluntary attention is a state of consciousness sustained toward a particular stimulus that does not inherently attract the organism. This type of attention depends on factors such as sense of value, some purpose, or an ultimate goal.

Motor activity of the instinctive variety does not require attentive adjustments as a preparation for its performance but motor activity of a complex, acquired type

⁹P. M. Baker, "Mechanics of Shooting," Scholastic Coach, 30:8 & 28, November, 1960.

¹⁰C. A. Anderson, "Raise Those Shooting Percentages," Athletic Journal, 37:26, November, 1951.

¹¹O. B. Douglas, Fundamentals of Educational Psychology (New York: The Macmillan Company, 1938), p. 132.

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is initiated and continued by a high degree of attention. In fact, the first step in the process of acquiring motor activity and in all mental activity, is always attention.

Fulton¹² states that if we are to improve accuracy, we must emphasize accuracy. However, if the learner is permitted to arrive at an optimal level of accuracy in doing a task then different types of practice should reveal how accuracy is affected by said practice.

Burgoyne¹³ believes that the answer lies in incentivized shooting. This will go a long way toward perfecting accuracy.

Cronbach¹⁴ reports that personality is a factor in concentration. The constructive use of emotion requires a problem centered attitude rather than a self-centered one.

He says that fantasy serves the useful purpose of helping the person visualize his program of goals and imagine his future. Anticipating future pleasures gives one determination to strive toward such remote ends.

¹²R. E. Fulton, "Speed and Accuracy in Learning a Ballistic Movement," Research Quarterly, 13:30-36, March, 1942.

¹³L. Burgoyne, "Incentivized Foul Shooting," Scholastic Coach, 21:18, October, 1952.

¹⁴L. Cronbach, Educational Psychology (New York: Harcourt, Brace and Company, 1954), p. 542.

Barbara¹⁵ indicates that lack of concentration results in situations which are uninteresting and dull to begin with and have been encountered so often that there is no point in being concerned.

Steel¹⁶ concludes that daily mental practice of a motor skill produces a substantial increase in that skill.

Bucher¹⁷ reports that physical activities must be learned. This type of knowledge is acquired through trial and error. Then, as a result of experience, there is a changed meaning in the situation. Coordinations are learned, with the result that an act once difficult and awkward to perform becomes easy to execute.

Munn¹⁸ says that attention refers to an act, a process, a function not to a power or faculty. You respond in terms of your interests and attitudes.

Tredgold¹⁹ suggests that active attention consists in the focusing of consciousness upon an object or thought

¹⁵D. Barbara, The Art of Listening (Springfield: Charles C. Thomas, 1958), p. 2.

¹⁶W. L. Steel, "Effects of Mental Practice on the Acquisition of a Motor Skill," Journal of Physical Education, 44:101-108, November, 1952.

¹⁷Bucher, op.cit. p. 128.

¹⁸N. Munn, Introduction to Psychology (Boston: Houghton Mifflin Co., 1962), p. 391.

¹⁹A. Tredgold, Manual of Psychological Medicine, (Baltimore: The Williams and Wilkins Co., 1943), p. 25.

which may have no compelling power of its own. It necessitates a mental effort, and the intensity of this effort is termed concentration.

Morgan²⁰ believes persistence is a mental attitude which arises as a result of a definite environmental situation. It might be defined as that attitude which drives a person once he has undertaken a task, to complete it to his satisfaction.

Davis²¹ states that the more monotonous the stimulus becomes, the more attention wanders, while any change from the habitual tends to attract and hold attention.

Prolonged attention is usually reaction to a meaningful or changing stimulus. They may be produced by varying the method of presentation. During periods of concentration the individual is performing at capacity rate and any deviation in performance caused by distractors marks the degree of attention.

McComas²² relates that necessary feature of attention measurement is the interest the task arouses. If one becomes bored and indifferent obviously the record is vitiated.

²⁰J.B. Morgan and H. Hull, "The Measurement of Persistence," Journal of Applied Psychology 180, 1926.

²¹R. Davis, Psychology of Learning (New York: McGraw-Book Co. Inc., 1935), pp. 328-337.

²²H.C. McComas, "A Measure of the Attention," Journal of Experimental Psychology, 5:2, 1922.

Thorndike²³ reports that mental work (achievement) is the behavior of an organism whereby certain products are produced. Continuous mental work means behavior of an individual who is producing as incessantly as he can.

Box²⁴ mentions that the only way he has been able to correct the feeling of "lack of confidence," is to have long shooting practices. Shooting must be a habit. To acquire this habit one must practice from the same position.

Smith²⁵ believes that practicing a task with the knowledge of the principles involved is more effective than practicing without such knowledge.

Barlow²⁶ indicates that a good pianist, if he endeavors to think out the various processes as he goes along, will become confused. On the other hand a creator whether it be in music, poetry or science--must of necessity concentrate his whole attention on the occupation on which he is engaged.

²³E. Thorndike, Mental Work and Fatigue and Individual Differences and Their Causes (New York: Teachers College--Columbia University, 1923), p. 112.

²⁴J.P. Box, "Position Shooting Wins Games," Athletic Journal, 31:38, November, 1950.

²⁵H. Smith, Psychology of Industrial Behavior (New York: McGraw-Hill Book Co. Inc., 1955), p. 391.

²⁶F. Barlow, Mental Prodigies (New York: Philosophical Library, 1952), p. 153.

CHAPTER III

METHODOLOGY

The study began in the Winter of 1962 and continued through the school year. All necessary data was collected by May 22, 1963.

Subjects representing three different levels of basketball ability were tested. Groups of ten subjects each were picked by random sample from the developmental classes at Michigan State University, freshman players from the basketball team at Michigan State University and members of the East Lansing High School basketball team.

Developmental Section

The different developmental sections were numbered and the numbers were placed in a hat. One number was drawn from the hat which represented the section to be used in the study. A questionnaire was given to each boy in that section. In this manner, the boys who had no varsity basketball experience were located. From this group the investigator picked from the hat ten boys who would represent the developmental classes for this experiment.

High School Team

This group was chosen by random sample from the high school teams in the area. Each team was given a number and

the number placed in a hat. The one drawn represented the team which would be used. East Lansing High School was chosen by lot.

Freshmen Members of Michigan State University Varsity Basketball Team

Twelve members of the freshmen basketball team participated in the experiment.

Routine

For purposes of establishing shooting ability, subjects in each of the three groups were first permitted a total of one hundred fifty shots at the official size basket. The scores were recorded. Scores which were the same, or nearly so, were placed in a hat. Scores could vary by one or two points and still be considered as possible pairs. The first score drawn was assigned to the control group. This gave the investigator five evenly paired subjects in both the control and experimental groups. This process was repeated in each of the three main groups.

Practice sessions began January 9, 1962. Each session was directed by the investigator. All subjects practiced from one area, directly behind the foul shooting circle, twenty-four feet from the basket. The control group practiced with the official size basket while the experimental group practiced with the smaller basket. Sixty practice shots every session were taken by each subject. (See Appendix C for photographs of official and small rim).

After every second practice session, all subjects were tested in shooting accuracy. The small rim was removed and all subjects in both groups shot fifty times. Scores of each matched pair were recorded on a graph. There was a total of six testing periods and twelve practice sessions.

The groups practiced at their respective baskets for six weeks. Each subject was instructed not to practice at any other time. They were allowed to shoot using any style, on the condition that this style be continued throughout the experiment. Shooting instruction was not given. At the conclusion of the six week session, each subject had attempted 150 pre-test shots, 720 practice shots, and 300 test shots. This was a total of 1170 controlled shots.

T scores were computed. There proved to be no significant difference in the three groups at the 5% level. Therefore, additional statistics was not applicable.

Results

To attempt to hypothesize the reasons for the results obtained from these data is very difficult because of the many factors that can enter into a study of this type.

The developmental subjects improved their shooting accuracy the most, with a (t) score of $-.4497$. The freshmen basketball team followed with a (t) score of $-.3817$. The high school subjects improved the least, with a (t) score of $-.0587$. In the three tested groups representing different levels of basketball ability, no significant change resulted.

One might profit by considering the relative position of the investigator and the influence he had on the subjects. A coach utilizing such a technique on his own group of players would, no doubt, establish closer rapport and thereby be in a position to more closely control the study. The interest factor of the subjects was lacking on different occasions. If this factor could have been better controlled, possibly the results of this study would have been positive.

Although this study has no predictive value, shooting accuracy among certain subjects was improved considerably.

The investigator noticed marked improvement in the following areas.

MOTIVATION Any change from the habitual tends to attract and hold attention.

INTEREST Due to the challenge presented by the small rim, a positive change was noticeable.

The high school subjects (experimental group) reached their best performance after three weeks of practice. The control subjects reached their best performance after the fourth week of practice. In both cases, after reaching their peak, a decline resulted. The interest period among the high school subjects was shorter than were the other two groups. This may be the reason for the poorer shooting performance during the last three weeks of the study.

The subjects of the freshman basketball team performed with a more consistent pattern than did the other groups.

There was no sharp increase or decrease in shooting accuracy during any of the test periods. The control subjects performed with higher proficiency than did the experimental subjects. This higher performance continued from the second week to the sixth week and is unexplainable. The investigator wasn't disturbed at the results of this group. These subjects had apparently reached their maximum shooting proficiency previous to this study.

The shooting percentages of the three groups at the sixth test period were as follows:

Developmental Section

Control 28%

Experimental. . . 33%

High School Section

Control 45%

Experimental. . . 45%

Freshmen Basketball Team

Control 47%

Experimental. . . 44%

These figures show the percentage of shots made for the last test period only.

An analysis of the percentage charts reveal that the fluctuation of the subjects in the developmental and high school sections was high. This could be attributed to the age of the subjects or possibly to the unpredictable nature which this age group possesses. The freshmen basketball

team was not as erratic. Improvement in the experimental group was noted at the first test period. The small rim had no effect on accuracy at any of the remaining test periods. The control group continually performed with higher accuracy. The investigator feels that motivation at the college level was lacking during this study. This is the reason given for the control group performing with greater accuracy than the experimental group.

CHAPTER IV

ANALYSIS AND PRESENTATION OF DATA

This study was undertaken in an effort to determine the effect of greater concentration upon basketball shooting accuracy. All subjects were tested over a six week period.

The experimental group practiced at a rim fifteen inches in diameter while the control group practiced at the regulation rim which was eighteen inches in diameter.

Table I represents the individual shooting difference between pairs of the developmental section. This section was composed of beginning basketball players. They had a limited amount of shooting experience. A (t) score of $-.4497$ was calculated at the 5% level. This was the highest (t) score of the three groups but it was not great enough to be significant.

Table II represents the individual shooting difference between the pairs of the high school section. This section was composed of subjects with three to four years of high school basketball experience. A (t) score of $-.0587$ was calculated at the 5% level. The results indicate that the small rim did not bring about a significant change. This group showed the least amount of improvement.

TABLE I

THE SHOOTING DIFFERENCE BETWEEN THE PAIRS
OF THE DEVELOPMENTAL SECTION

Tests							
Pairs	1	2	3	4	5	6	E (sum)
A	-4	-18	-8	-15	-17	-11	-73
B	1	3	7	-11	4	3	7
C	1	-5	0	4	6	-1	5
D	-3	-1	-4	-3	2	-4	-13
E	-2	-3	-3	-4	6	5	-1

$t = -.4497$

TABLE II

THE SHOOTING DIFFERENCE BETWEEN THE PAIRS
OF THE HIGH SCHOOL SECTION

Tests							
Pairs	1	2	3	4	5	6	E (sum)
A	-6	2	-3	18	4	1	16
B	6	-2	-6	-3	-5	-3	-13
C	-2	3	-7	4	3	1	2
D	4	-9	-1	-1	1	-2	-8

$t = -.0587$

Table III represents the individual shooting difference between the pairs of the freshmen basketball team. This section was composed of subjects with the greatest amount of basketball ability. A (t) score of .3817 was calculated at the 5% level. This was not significant. Results did show that this group developed shooting accuracy to a higher degree than did the high school section, but less than the developmental section.

TABLE III
THE SHOOTING DIFFERENCE BETWEEN THE PAIRS
OF THE FRESHMEN BASKETBALL TEAM

Pairs	Tests						E (sum)
	1	2	3	4	5	6	
A	-12	0	0	-3	-3	-1	-19
B	7	-2	6	6	10	5	32
C	3	4	-5	6	-3	-1	4
D	0	0	3	4	5	4	16

$$t = .3817$$

The horizontal figures on tables I, II, and III represent the six test periods which were given during this study. One test was given each week. The vertical figures (A, B, C, D, E) represent the pairs. Directly across from each pair and under each test period are

the differences in shots made between the subjects of every pair for each of the six test periods.

The sum shows the shooting difference between the pairs. This is the total difference for the six test periods.

Included in Appendix A are figures 1 through 13; figures 1 through 5 illustrate shots made per test for each control and experimental subject in the developmental section.

Figures 6 through 9 illustrate the same as the above but in this case for the high school section.

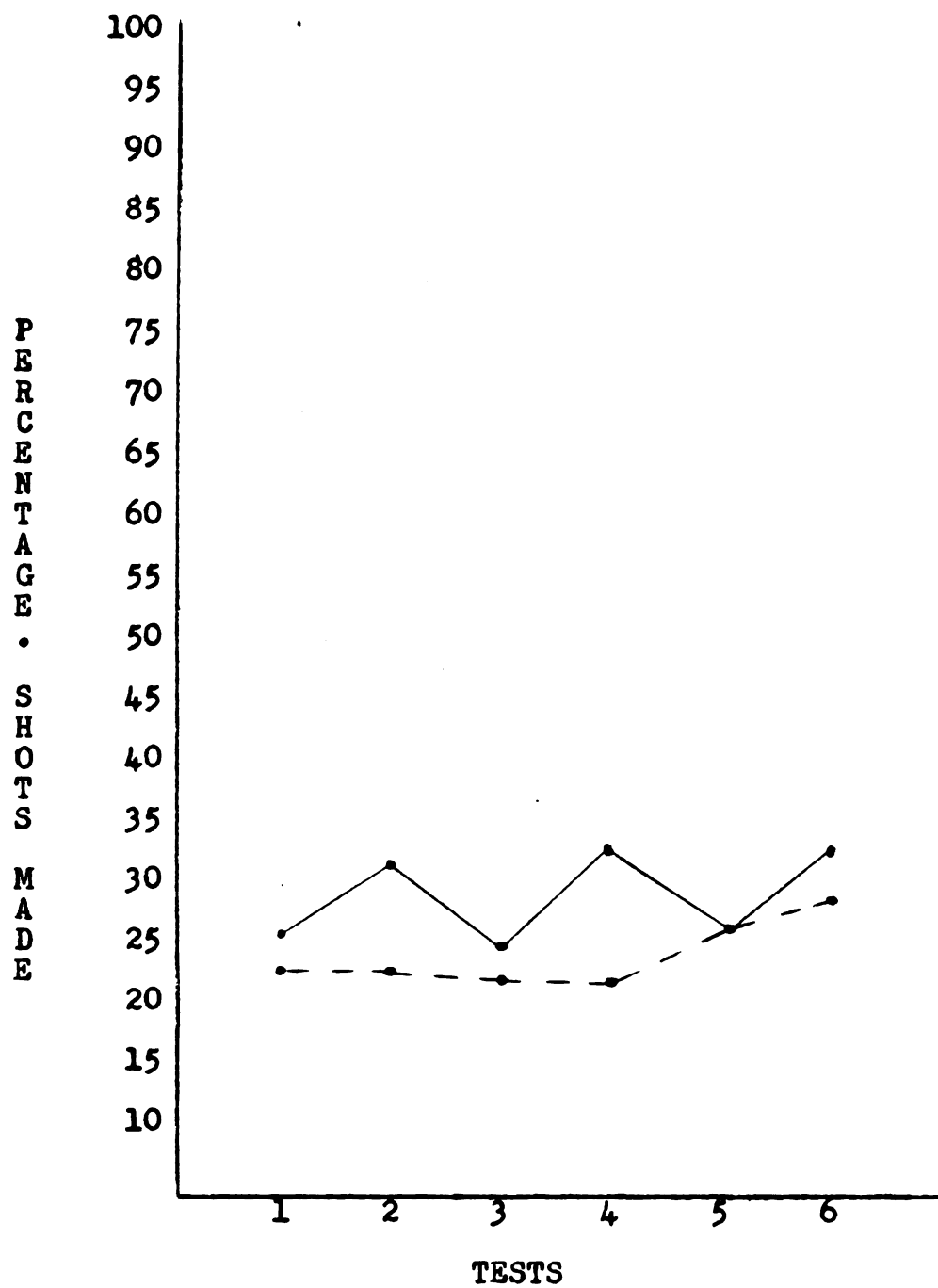
Figures 10 through 13 illustrate the same as the above but in this case for the freshmen basketball team.

Figures 14 through 16 illustrate the percentage of total group shots made for all six tests in the following order: developmental, high school, and college sections (freshmen basketball team).

These figures show that the developmental section improved more than did the high school or college sections. This seems understandable since the developmental section had very little previous shooting experience. This difference was possibly due in part to the normal learning process. Interest was sustained longer in this group than in the other groups.

Fig. 14

Group scores - developmental section



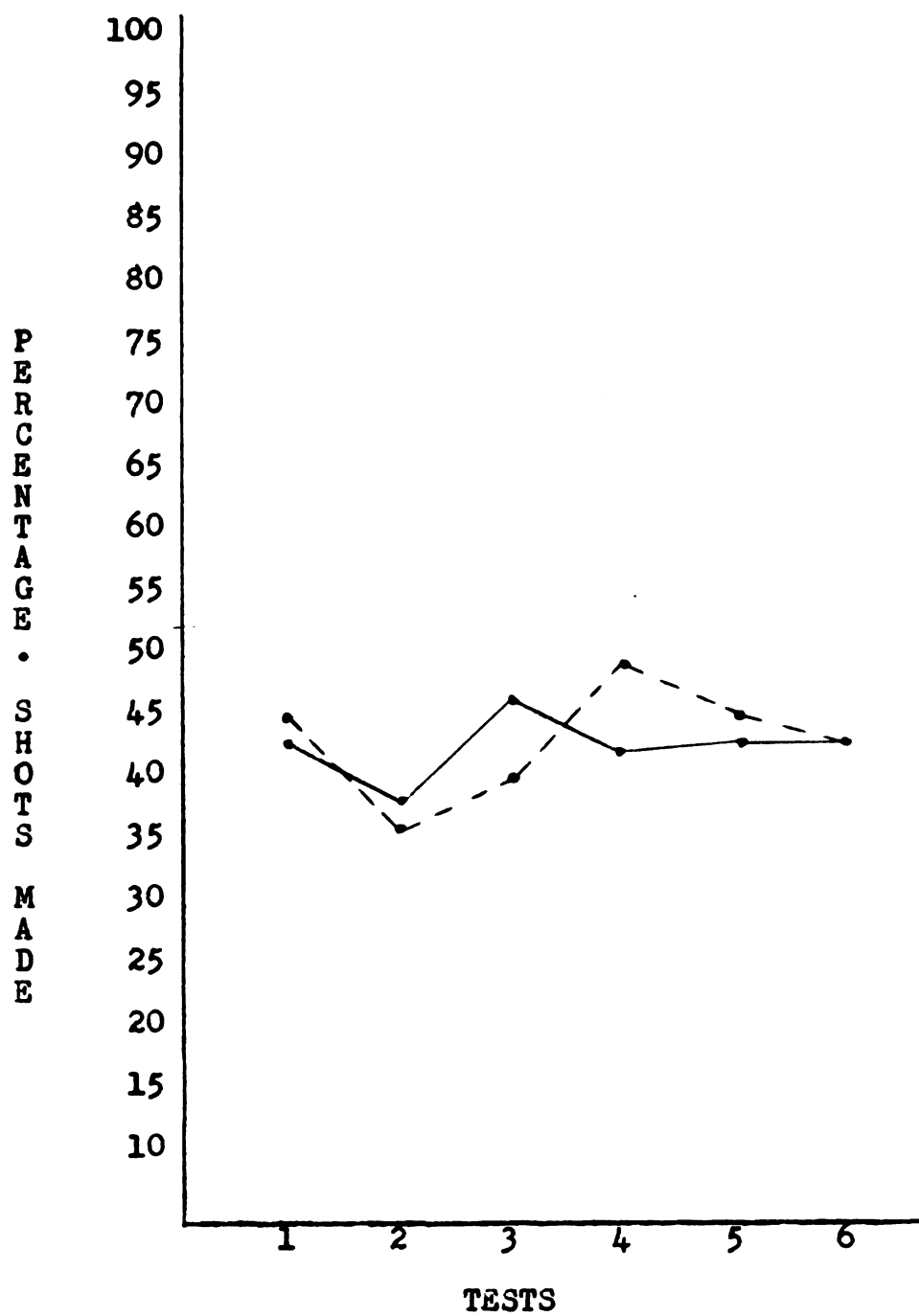
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Experimental —

Control - - - -

Fig. 15

Group scores - high school subjects



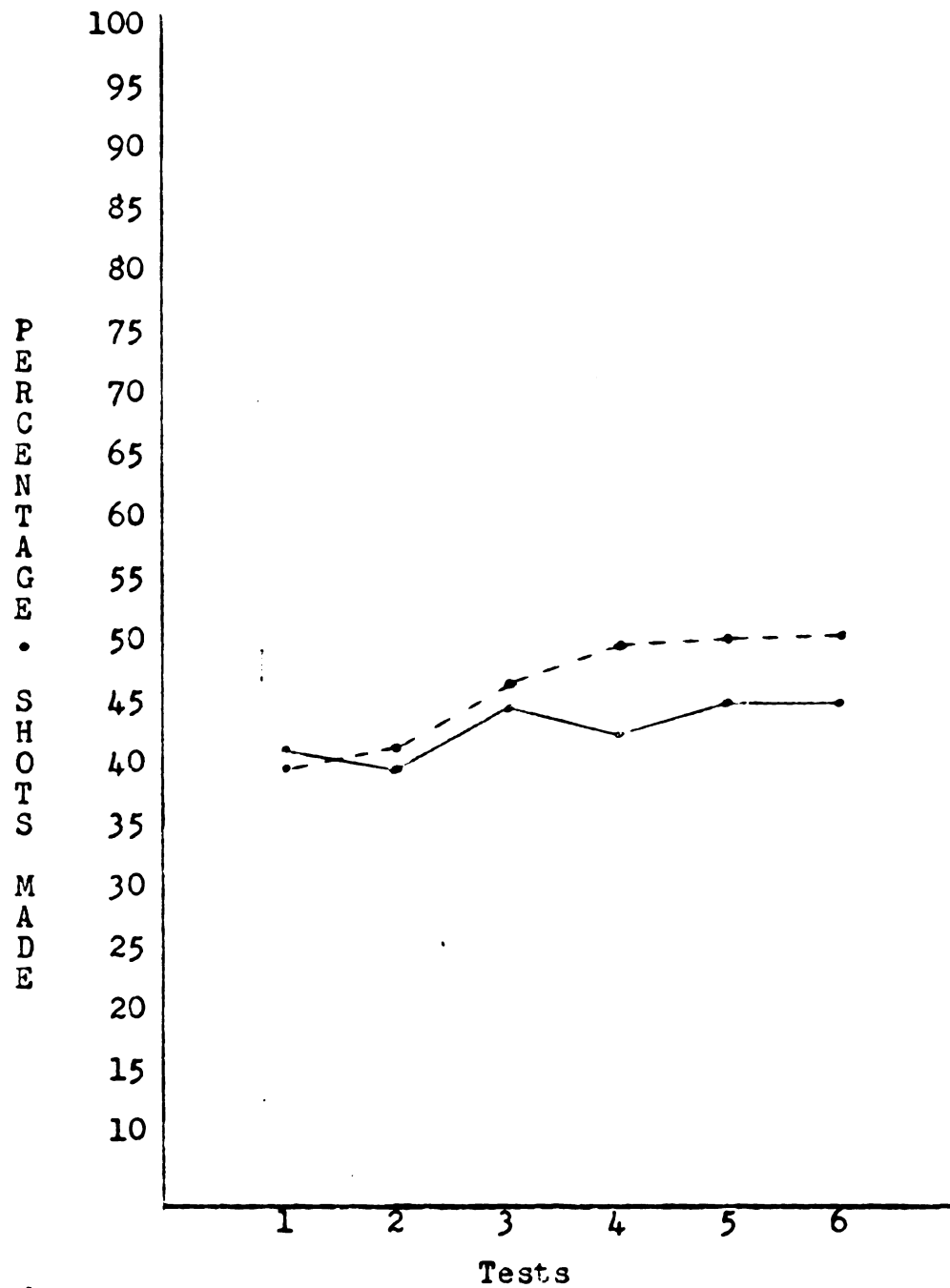
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Experimental —

Control - - - -

Fig. 16

Group scores - freshman basketball team



Legend

Experimental ———

Control - - - - -

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This investigation was undertaken for the purpose of determining the effect of the use of a smaller target in developing concentration and accuracy in basketball shooting.

SUMMARY

Groups of ten subjects were selected from the developmental activity classes at Michigan State University, freshmen members of the basketball team at Michigan State University, and members of the East Lansing High School basketball team.

The subjects practiced from one area which was directly behind the foul shooting circle, twenty four feet from the basket. The control group practiced at the official basket while the experimental group practiced at the smaller basket. Sixty practice shots were taken by each subject during every session.

A testing period was held after every second practice period. The small rim was removed and each subject shot fifty times. There was a total of six testing periods and twelve practice sessions.

The groups practiced at their respective baskets for six weeks. Each subject was instructed not to practice at any other time. They were initially informed to shoot using any style, on the condition that this style be continued throughout the experiment.

At the conclusion of the six weeks, each subject had attempted 150 pre-test shots, 720 practice shots, and 300 test shots. This was a total of 1170 controlled shots.

CONCLUSIONS

The following conclusion seems justified on the basis of the statistical data presented.

1. The use of the small rim during practice sessions does not statistically improve shooting accuracy, although some improvement was evident among the lower skilled subjects.

RECOMMENDATIONS

The following recommendations are made as a result of this study.

1. The small rim might be painted black to give a more visual cue.
2. Shooting should be practiced from five to ten different areas.

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BIBLIOGRAPHY

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APPENDICES

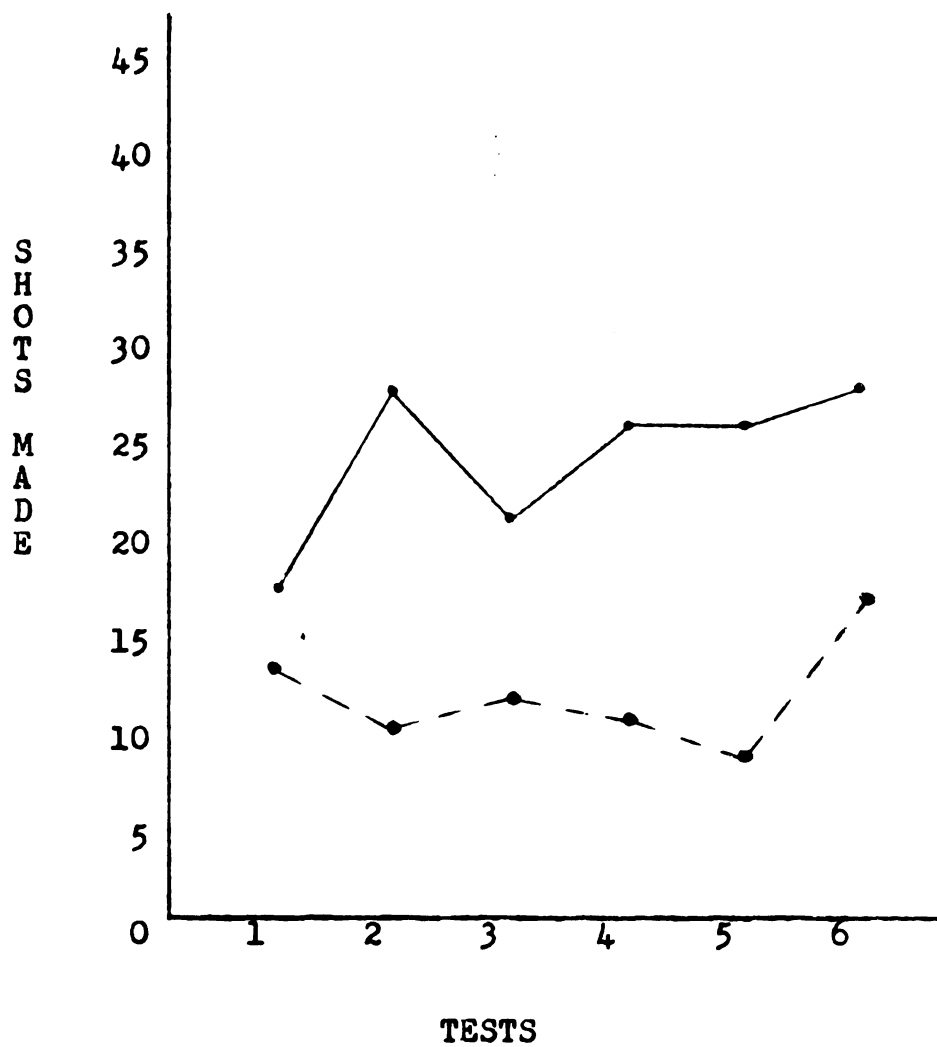
APPENDIX A

Fig. 1-13

Illustrate shots made per test
for each control and experimental
subject in the developmental, high
school, and college sections.

Fig. 1

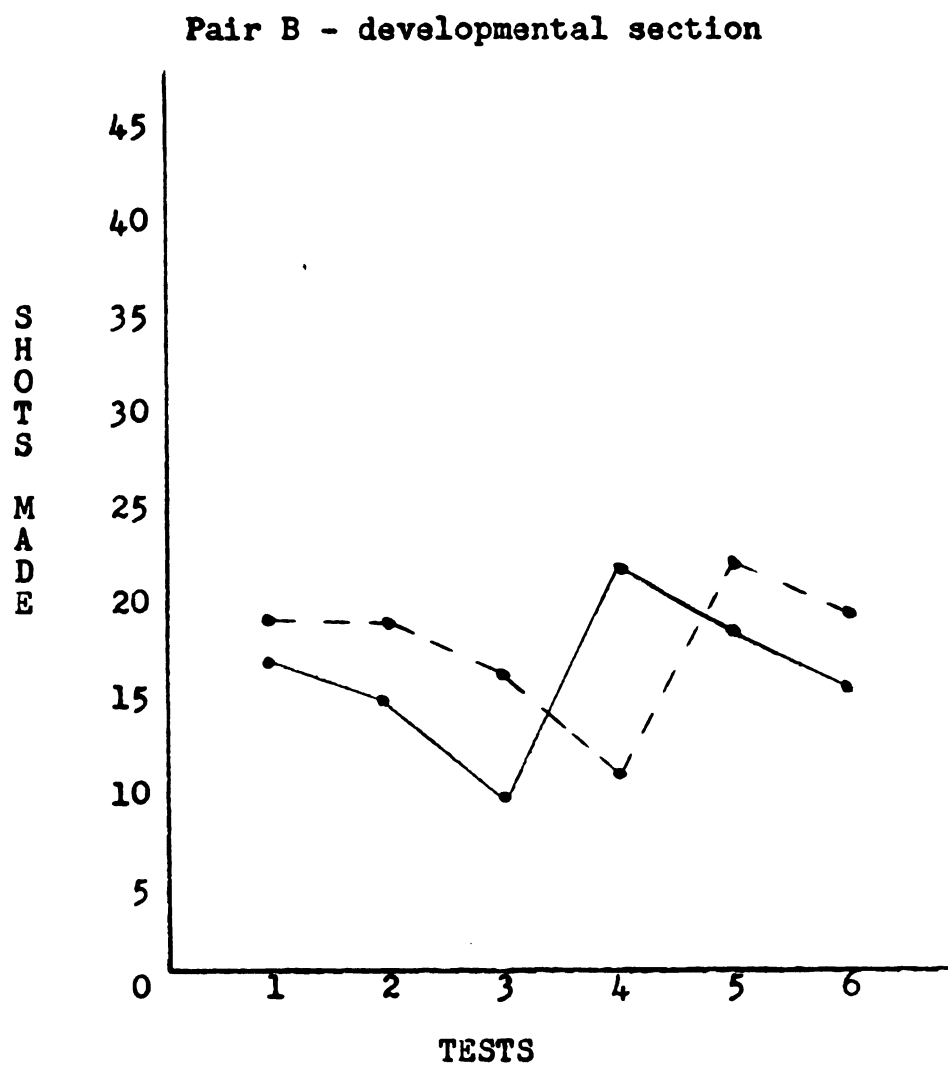
Pair A - developmental section



Legend**Experimental**

Control - - - - -

Fig. 2

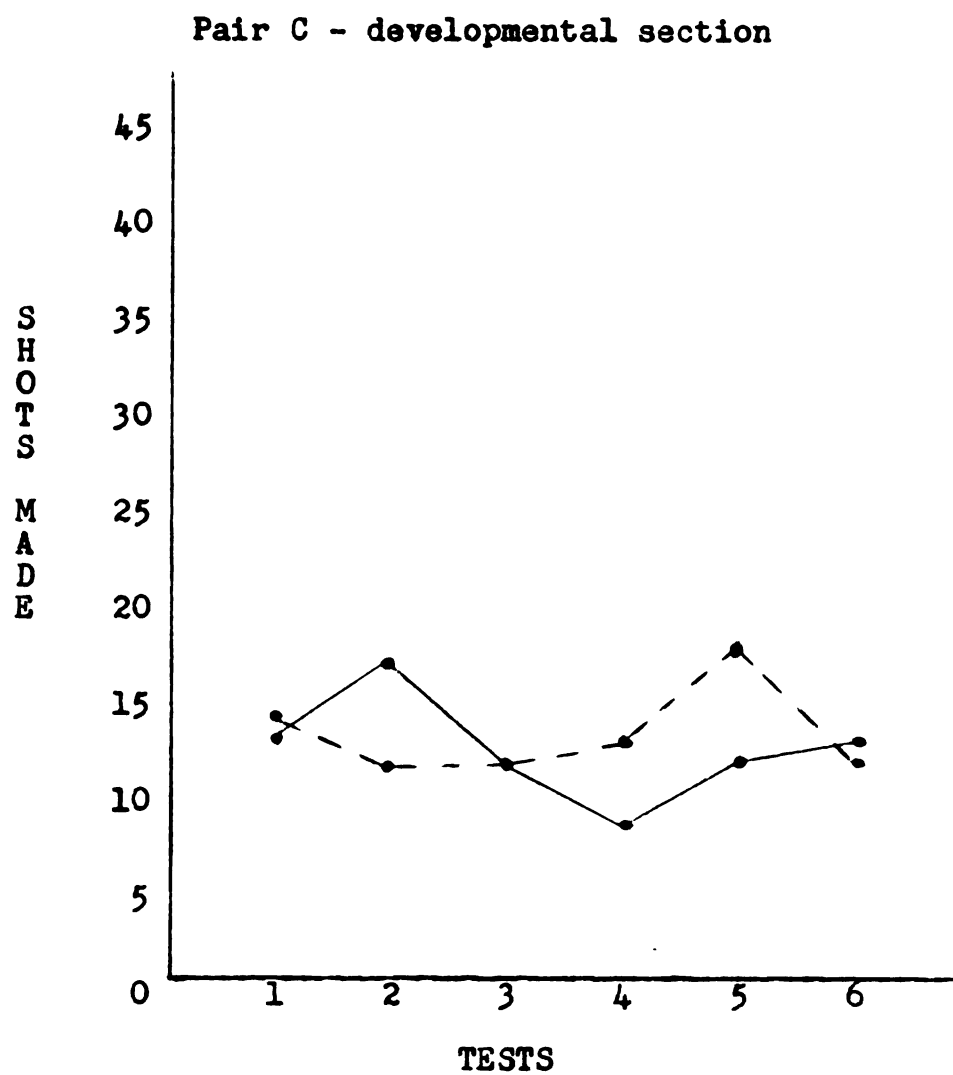


Legend

Experimental —

Control - - - -

Fig. 3

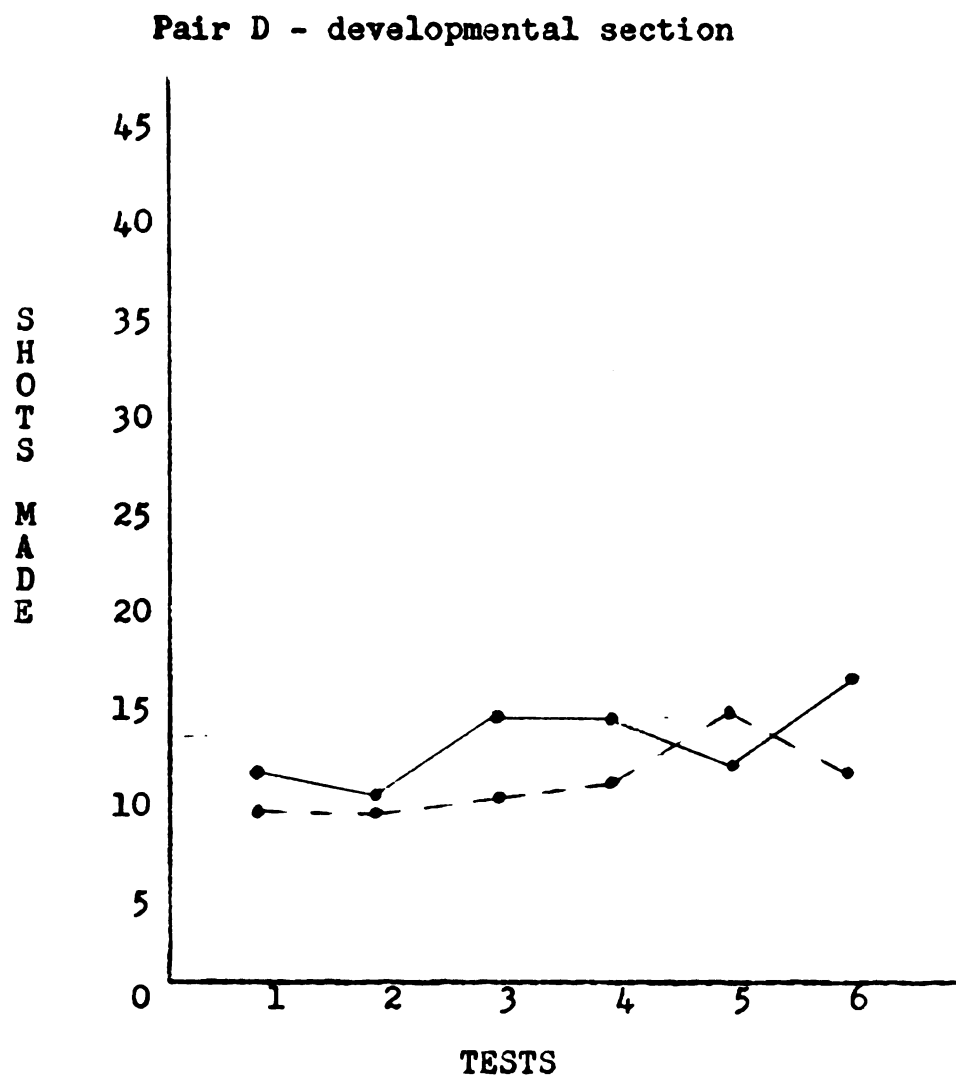


Legend

Experimental _____

Control - - - - -

Fig. 4

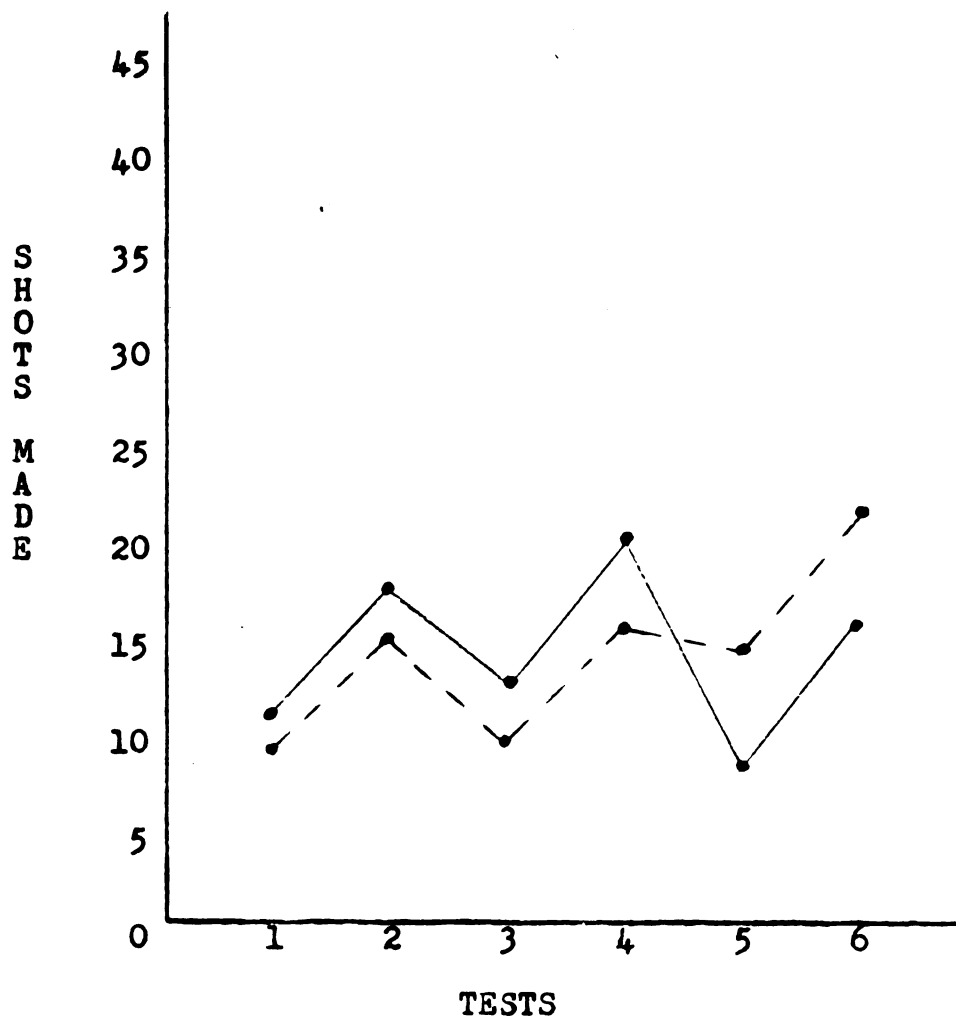


LegendExperimental

Control - - - - -

Fig. 5

Pair E - developmental section



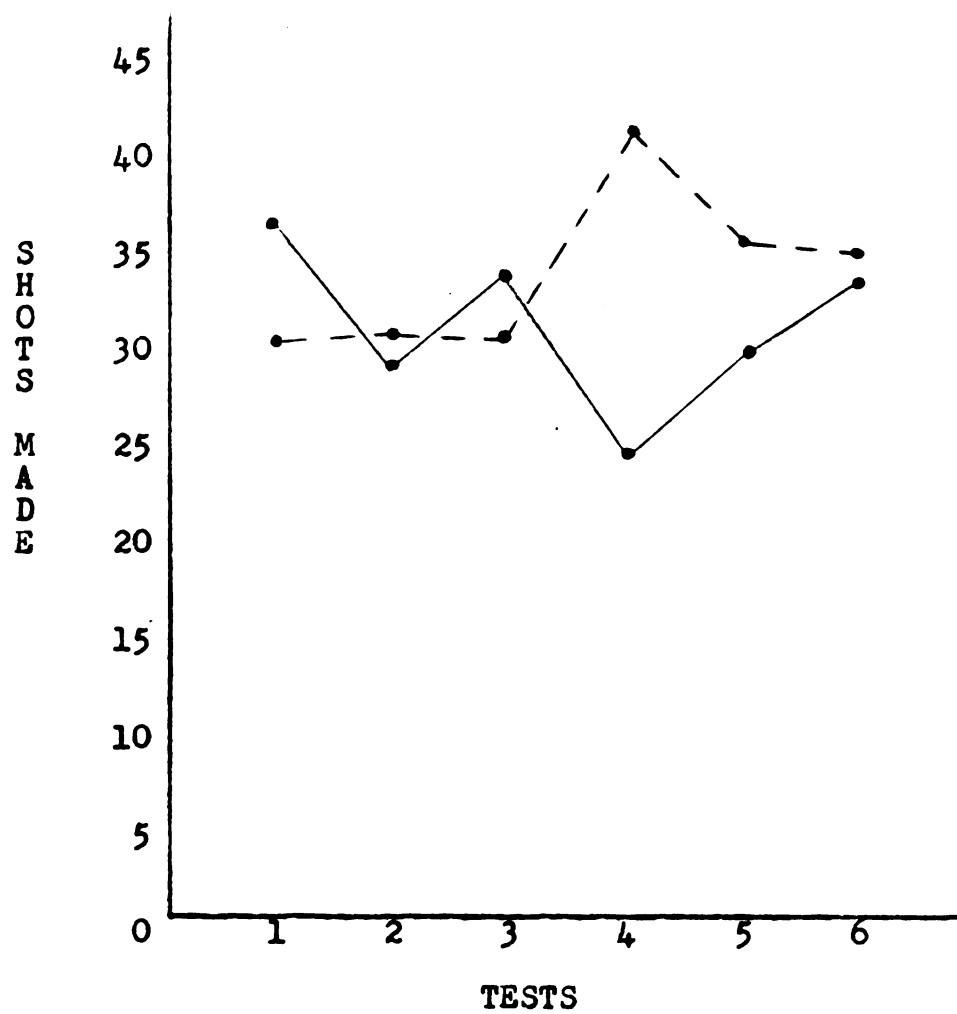
Legend

Experimental _____

Control - - - - -

Fig. 6

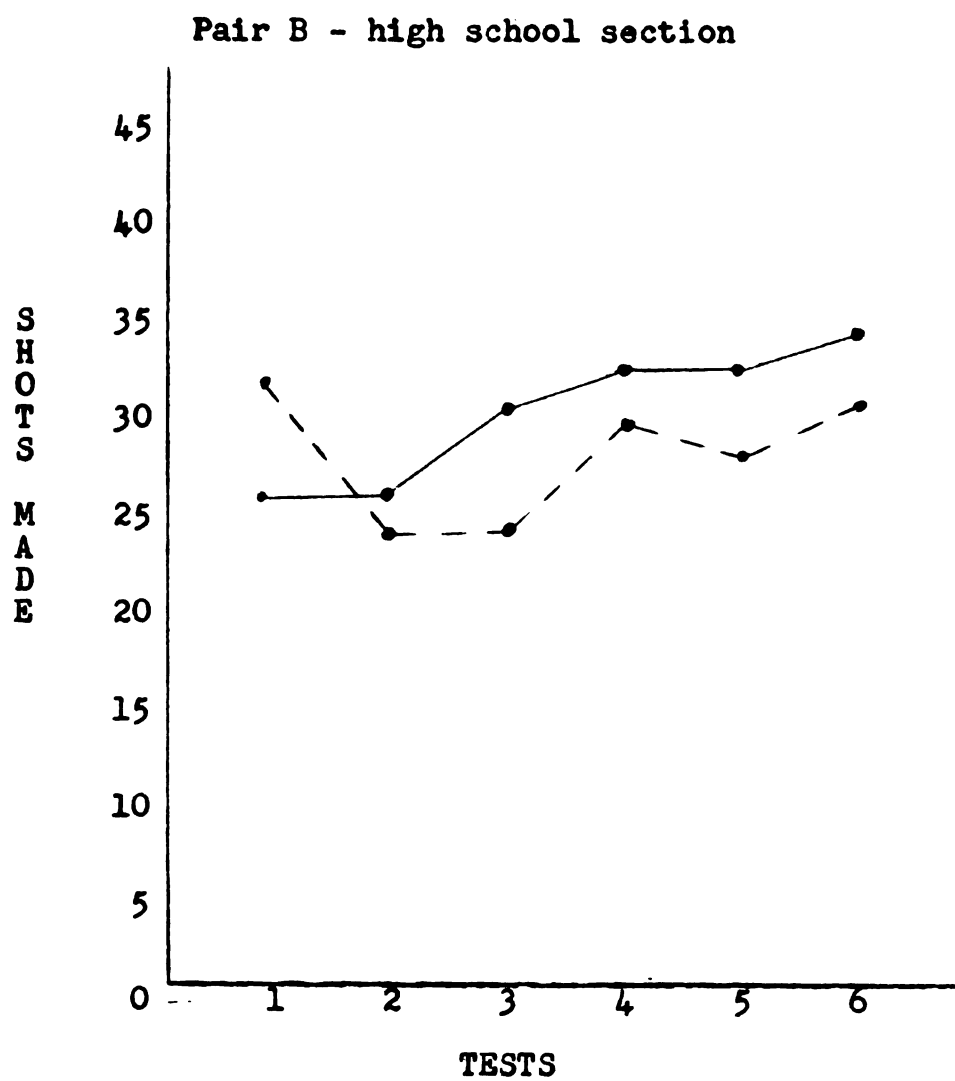
Pair A - high school section

**Legend**

Experimental —

Control - - - -

Fig. 7

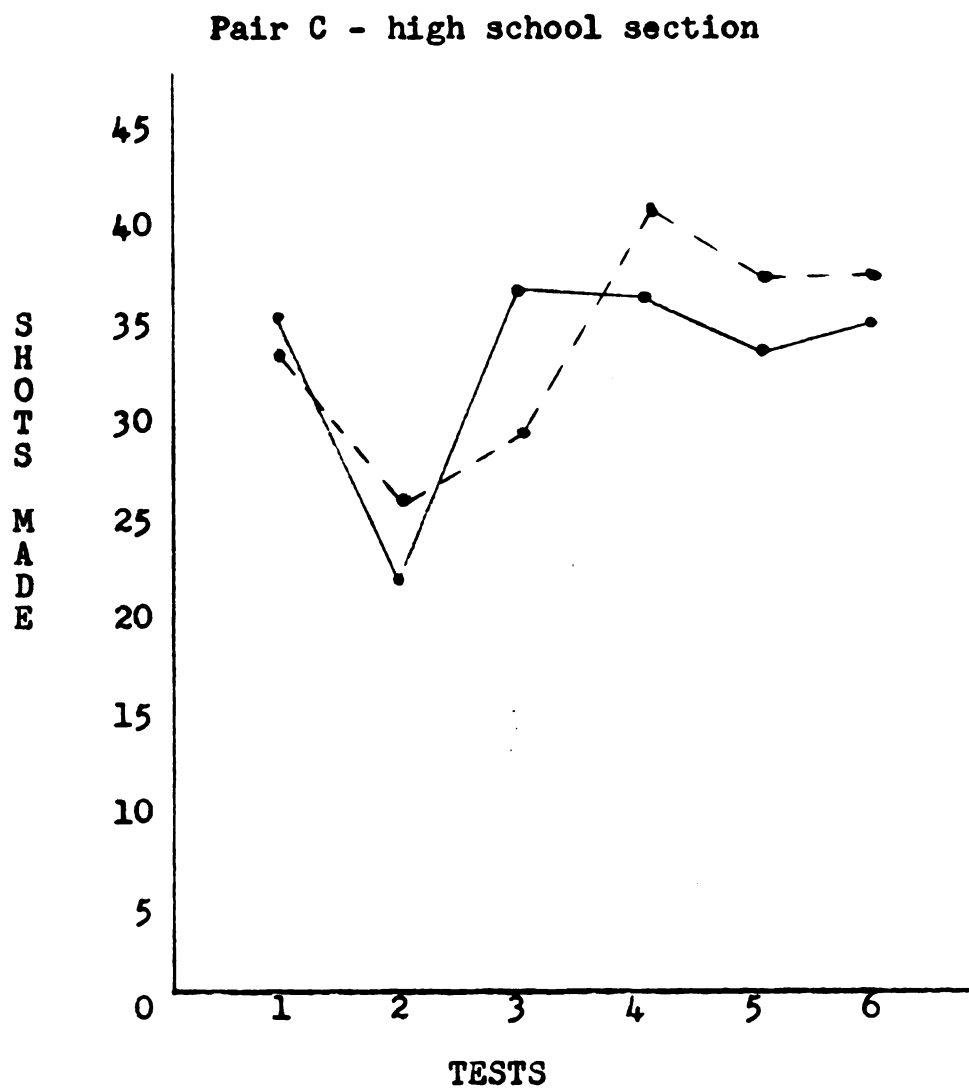


Legend

Experimental _____

Control - - - - -

Fig. 8

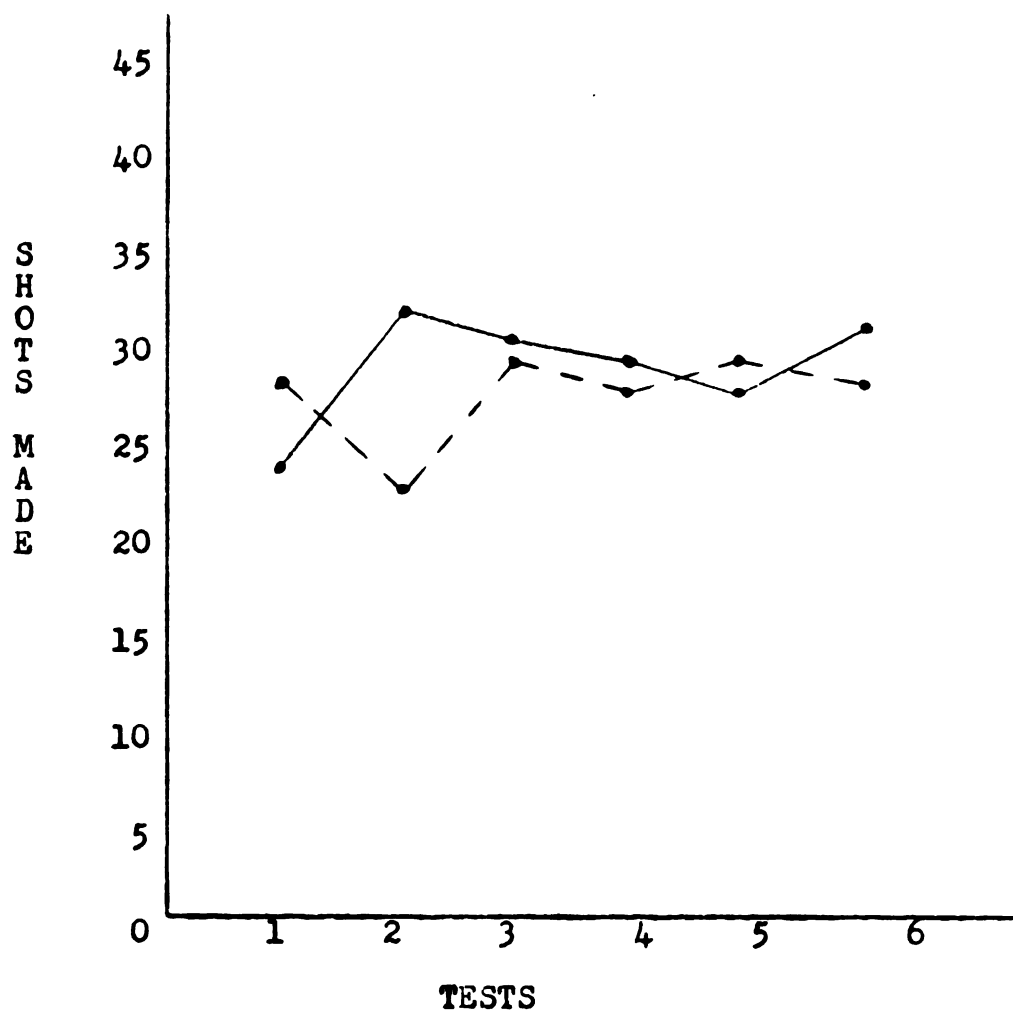


LegendExperimental

Control - - - - -

Fig. 9

Pair D - high school section



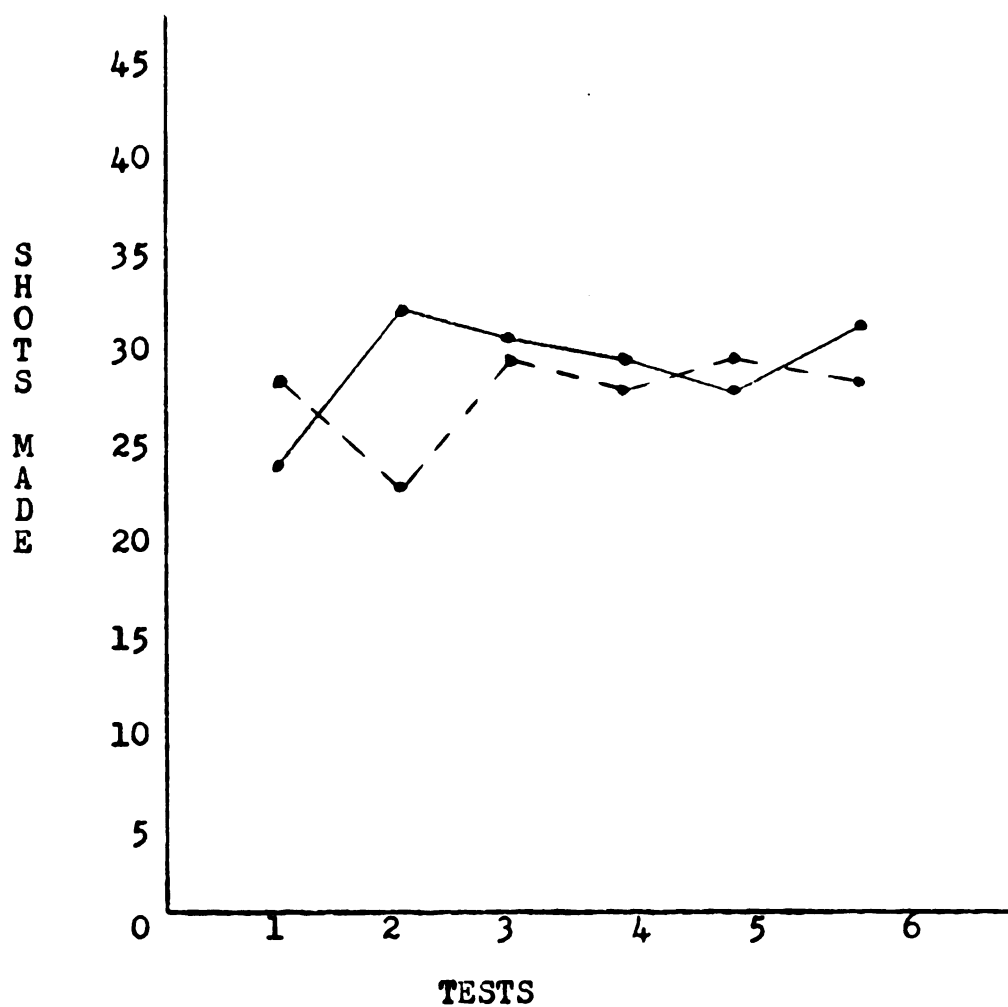
Legend

Experimental _____

Control - - - - -

Fig. 9

Pair D - high school section

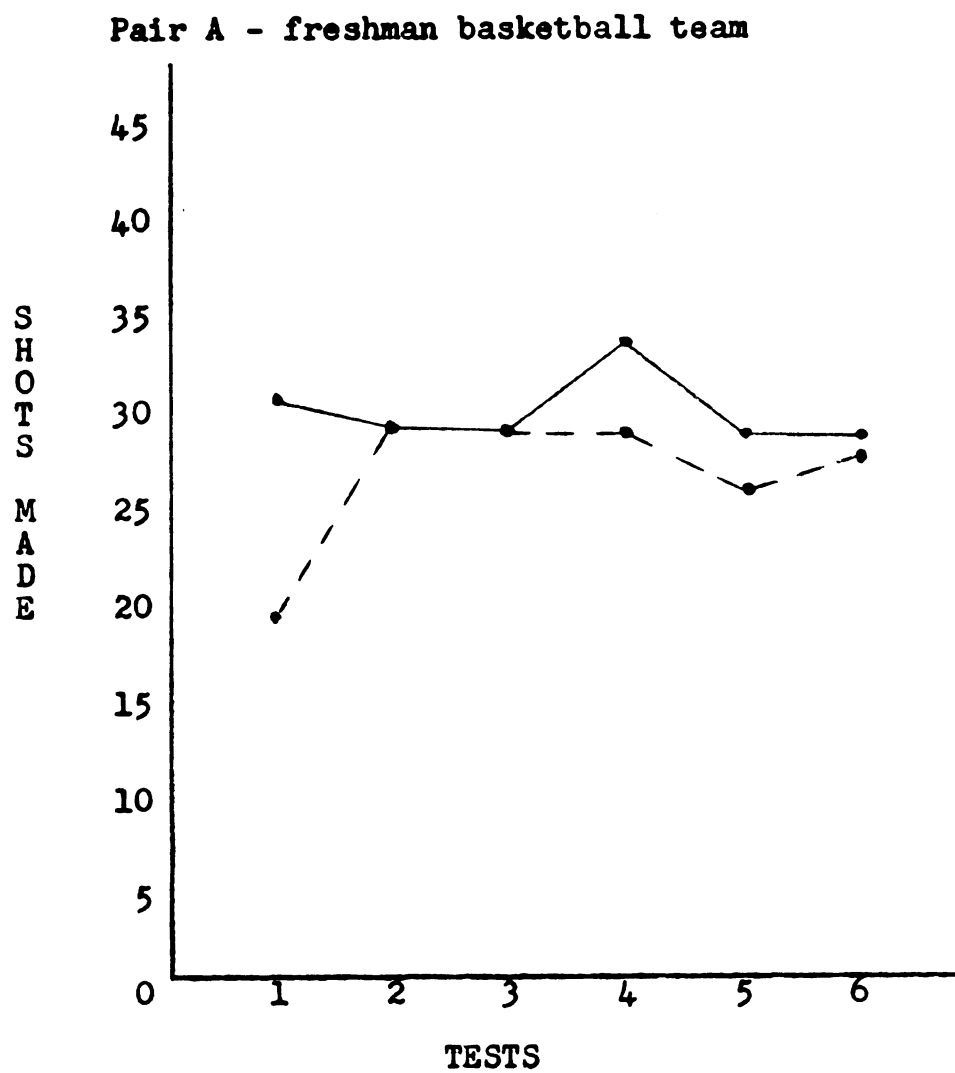


Legend

Experimental —

Control - - - -

Fig. 10



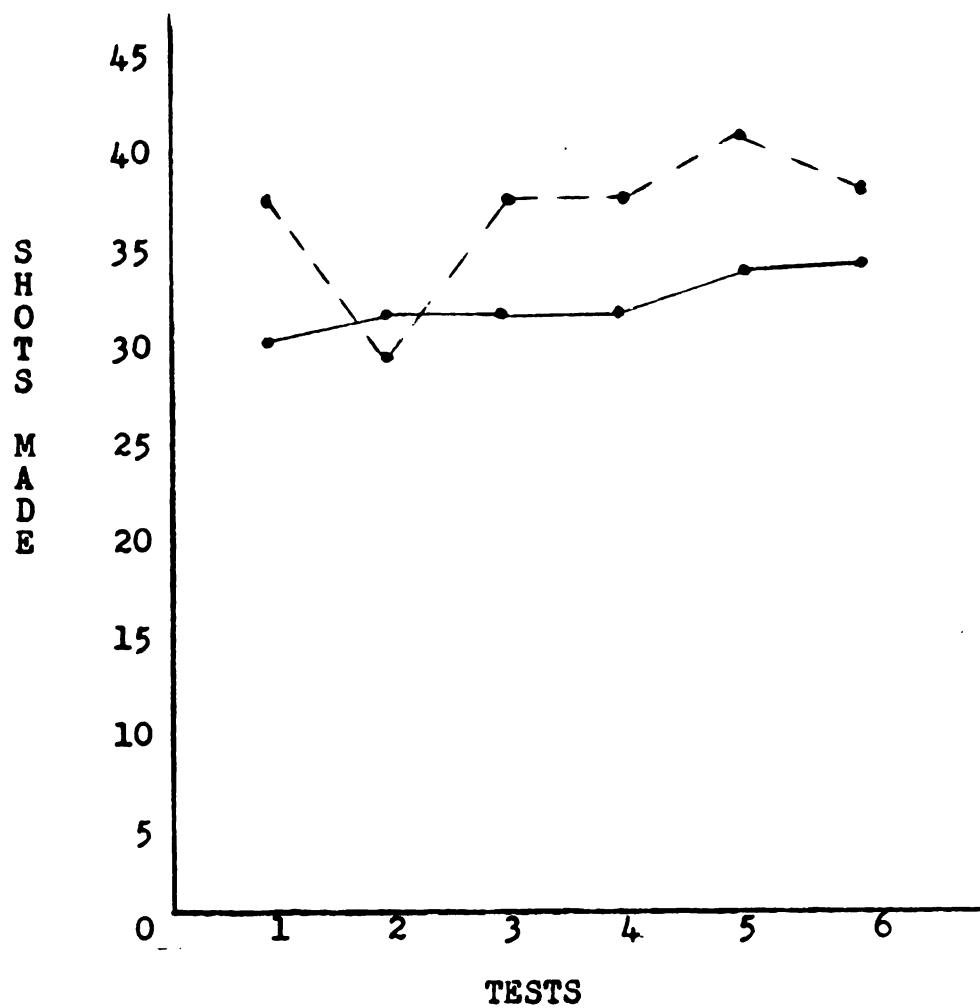
Legend

Experimental _____

Control - - - - -

Fig. 11

Pair B - freshman basketball team

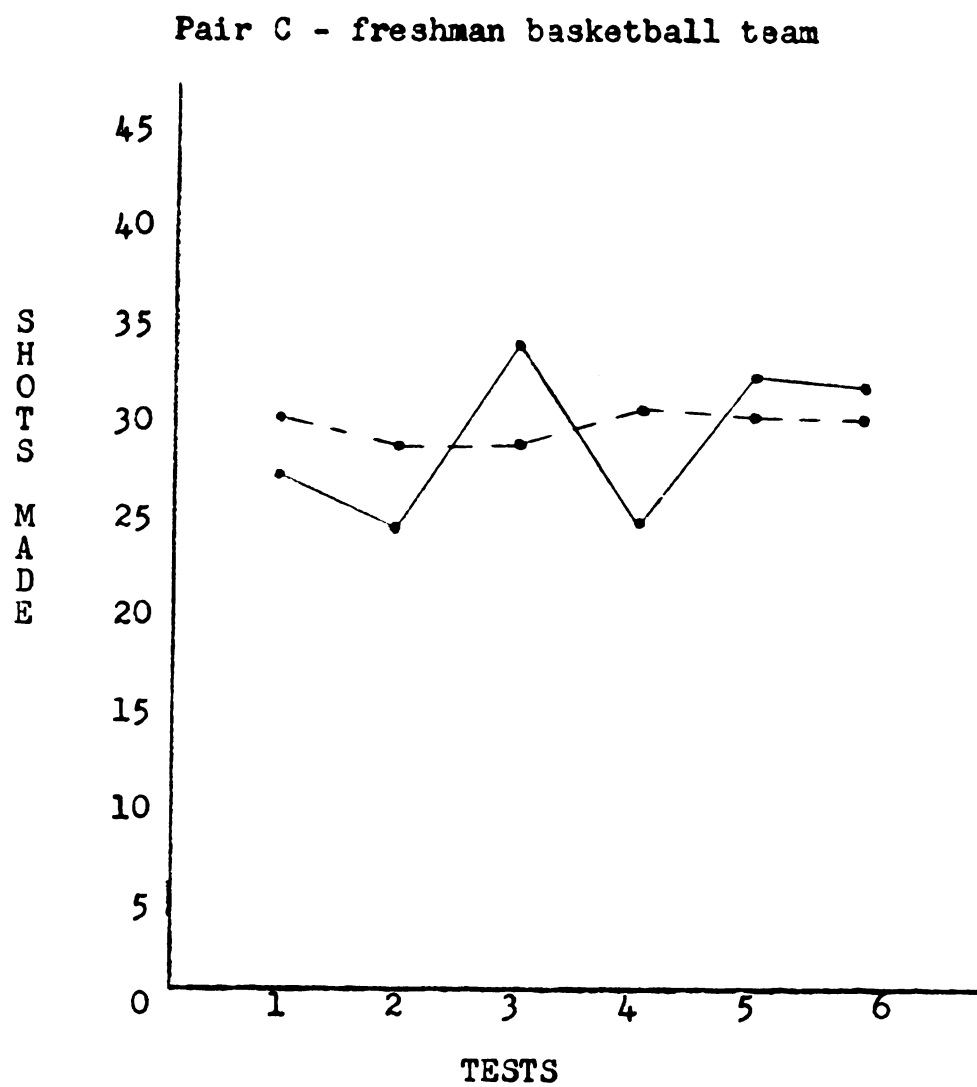


Legend

Experimental _____

Control - - - - -

Fig. 12



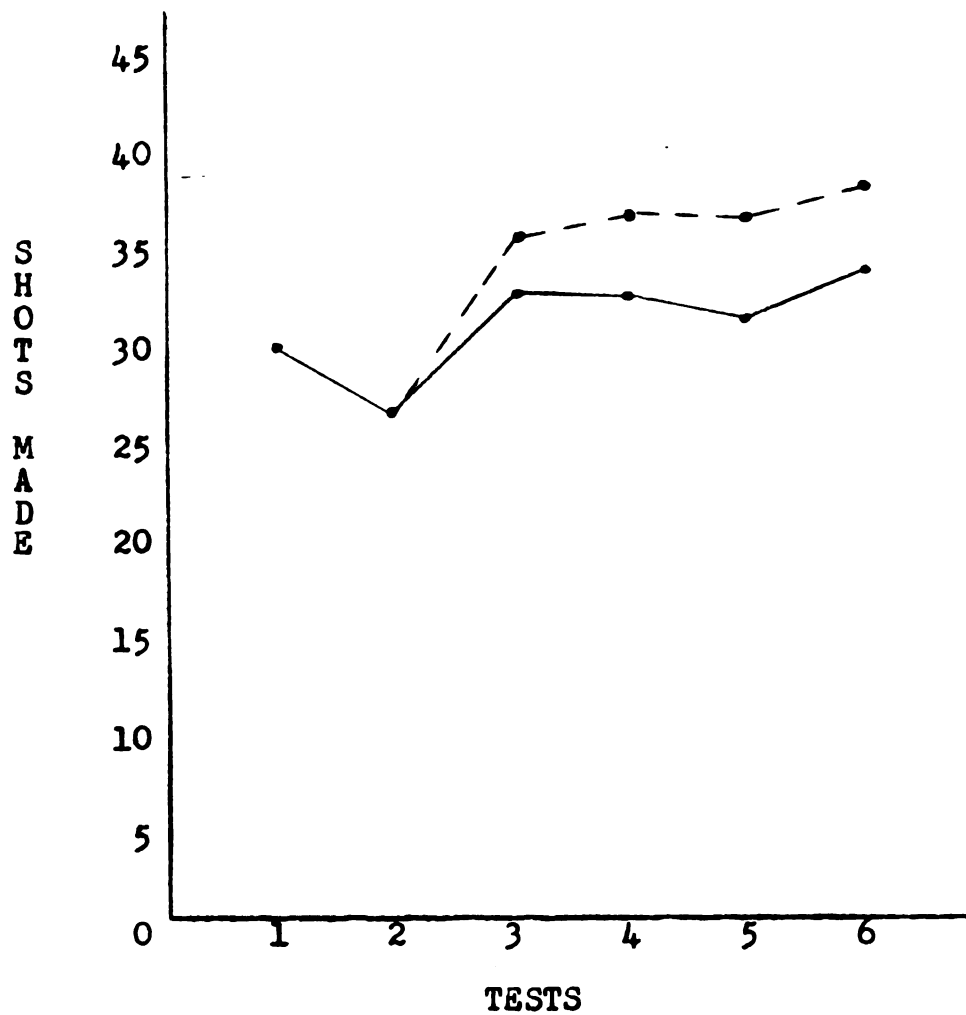
Legend

Experimental _____

Control - - - - -

Fig. 13

Pair D - freshman basketball team



Legend

Experimental —

Control - - - -

APPENDIX B

Questionnaire	Given to each boy in the developmental section.
Tally Chart	Practice shots made and test scores were recorded for each subject. The score was circled.
Experimental and Control graph for each pair	The results of the six test periods were recorded in the following graphs. Experimental subject was indicated by a solid red line. The control subject was indicated by a solid black line.

MICHIGAN STATE UNIVERSITY

QUESTIONNAIRE

NAME _____

PAIR _____

NAME: _____

DATE: _____

- | | |
|---|-----------|
| | YES _____ |
| 1. I played varsity basketball in high school | NO _____ |
| | YES _____ |
| 2. I earned a varsity letter in basketball | NO _____ |

Foundations	☐	THESIS CHART	TEST
Intramural	☐		
Varsity	☐	JAMES A. WHITE	PRACTICE
Experimental	☐		
Control	☐		

NAME		NAME		NAME		NAME	
PAIR		PAIR		PAIR		PAIR	
1	26	1	26	1	26	1	26
2	27	2	27	2	27	2	27
3	28	3	28	3	28	3	28
4	29	4	29	4	29	4	29
5	30	5	30	5	30	5	30
6	31	6	31	6	31	6	31
7	32	7	32	7	32	7	32
8	33	8	33	8	33	8	33
9	34	9	34	9	34	9	34
10	35	10	35	10	35	10	35
11	36	11	36	11	36	11	36
12	37	12	37	12	37	12	37
13	38	13	38	13	38	13	38
14	39	14	39	14	39	14	39
15	40	15	40	15	40	15	40
16	41	16	41	16	41	16	41
17	42	17	42	17	42	17	42
18	43	18	43	18	43	18	43
19	44	19	44	19	44	19	44
20	45	20	45	20	45	20	45
21	46	21	46	21	46	21	46
22	47	22	47	22	47	22	47
23	48	23	48	23	48	23	48
24	49	24	49	24	49	24	49
25	50	25	50	25	50	25	50
26	51	26	51	26	51	26	51
27	52	27	52	27	52	27	52
28	53	28	53	28	53	28	53
29	54	29	54	29	54	29	54
30	55	30	55	30	55	30	55
31	56	31	56	31	56	31	56
32	57	32	57	32	57	32	57
33	58	33	58	33	58	33	58
34	59	34	59	34	59	34	59
35	60	35	60	35	60	35	60
36	61	36	61	36	61	36	61
37	62	37	62	37	62	37	62
38	63	38	63	38	63	38	63
39	64	39	64	39	64	39	64
40	65	40	65	40	65	40	65
41	66	41	66	41	66	41	66
42	67	42	67	42	67	42	67
43	68	43	68	43	68	43	68
44	69	44	69	44	69	44	69
45	70	45	70	45	70	45	70
46	71	46	71	46	71	46	71
47	72	47	72	47	72	47	72
48	73	48	73	48	73	48	73
49	74	49	74	49	74	49	74
50	75	50	75	50	75	50	75
51	76	51	76	51	76	51	76
52	77	52	77	52	77	52	77
53	78	53	78	53	78	53	78
54	79	54	79	54	79	54	79
55	80	55	80	55	80	55	80
56	81	56	81	56	81	56	81
57	82	57	82	57	82	57	82
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59	84	59	84	59	84	59	84
60	85	60	85	60	85	60	85
61	86	61	86	61	86	61	86
62	87	62	87	62	87	62	87
63	88	63	88	63	88	63	88
64	89	64	89	64	89	64	89
65	90	65	90	65	90	65	90
66	91	66	91	66	91	66	91
67	92	67	92	67	92	67	92
68	93	68	93	68	93	68	93
69	94	69	94	69	94	69	94
70	95	70	95	70	95	70	95
71	96	71	96	71	96	71	96
72	97	72	97	72	97	72	97
73	98	73	98	73	98	73	98
74	99	74	99	74	99	74	99
75	100	75	100	75	100	75	100

GRAPH DESIGN

PAIR _____

NAMES _____

O Controlled

X Experimental



APPENDIX C

PHOTOGRAPHS

- Fig. 17 The official size basket.
- Fig. 18 The official size basket with small rim.
- Fig. 19 The small rim in relation to the
 official basketball.

Fig. 17



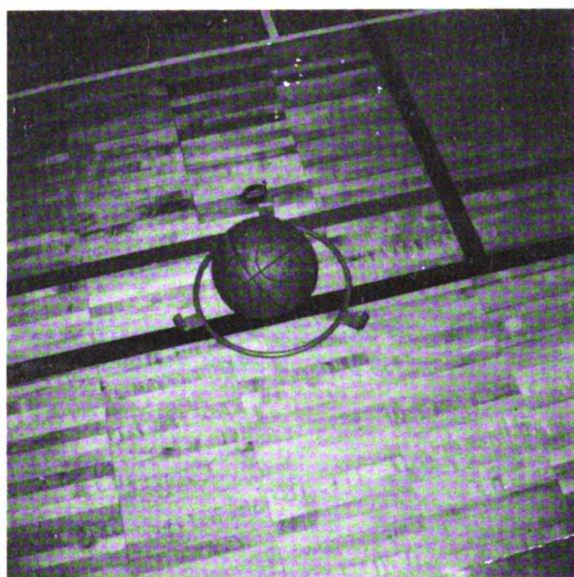
The official size basket

Fig. 18



The official size basket
with small rim

Fig. 19



Relationship between small
rim and official ball

APPENDIX D

Statistical Computations

"T" Scores

1. Developmental
2. High School
3. Michigan State University
basketball team

DEVELOPMENTAL SUBJECTS

		TEST PERIODS						Σ
		1	2	3	4	5	6	
PAIRS	A	-4	-18	-8	-15	-17	-11	-73
	B	+1	+3	+7	-11	+4	+13	+7
	C	+1	-5	0	+4	+6	-1	+5
	D	-3	-1	-4	-3	+2	-4	-13
	E	-2	-3	-3	-4	+6	+5	-1

$$\Sigma (S_i) = -75$$

$$\Sigma (S_i)^2 = 5573$$

$$\bar{d} = \frac{\Sigma (S_i)}{5} = -15$$

$$t = \frac{\bar{d}}{\sqrt{\frac{M \Sigma (d_i^2) - (\Sigma d_i)^2}{M(M-1)}}} = \frac{-15}{\sqrt{\frac{5 \cdot 5573 - (-75)^2}{20}}} = \frac{-15}{\sqrt{\frac{27865 - 5625}{20}}}$$

$$t = \frac{-15}{\sqrt{\frac{22240}{20}}} = \frac{-15}{\sqrt{1112}} = \frac{-15}{33.346} = \frac{-15}{33.35}$$

$$t = -.4497$$

HIGH SCHOOL SUBJECTS

		TEST PERIODS						Σ
		1	2	3	4	5	6	
PAIRS	A	-6	+2	-3	+18	+4	+1	+16
	B	+6	-2	-6	-3	-5	-3	-13
	C	-2	+3	-7	+4	+3	+1	+2
	D	+4	-9	-1	-1	+1	-2	-8

$$\Sigma (s_i) = -3$$

$$\Sigma (s_i)^2 = 493$$

$$\bar{d} = -.75$$

$$t = \frac{-.75}{\sqrt{\frac{4.493 - (-3)^2}{12}}} = \frac{-.75}{\sqrt{\frac{1972 - 9}{12}}} = \frac{-.75}{\sqrt{163.58}}$$

$$= \frac{-.75}{12.78}$$

$$t = -.0587$$

MICHIGAN STATE UNIVERSITY VARSITY SUBJECTS

		TEST PERIODS						
		1	2	3	4	5	6	Σ
PAIRS	A	-12	0	0	-3	-3	-1	-19
	B	+7	-2	+6	+6	+10	+5	+32
	C	+3	+4	-5	+6	-3	-1	+4
	D	0	0	+3	+4	+5	+4	+16

$$\Sigma (X_1) = 33$$

$$\Sigma (X_1^2) = 1657$$

$$\bar{d} = \frac{33}{4} = 8.2$$

$$t = \frac{8.2}{\sqrt{\frac{4.1657 - (33)^2}{12}}} \quad \frac{8.2}{\sqrt{\frac{6628 - 1089}{12}}} \quad \frac{8.2}{\sqrt{461.58}}$$

$$= \frac{8.2}{21.48}$$

$$t = .3817$$

ROOM USE ONLY

~~NOV - 9 1965~~

~~APR 21 1966~~

~~APR 21 1966~~

~~NOV 5 1965~~ 309
~~NOV 11 1971~~ 9
~~NOV 29 1972~~ 325