
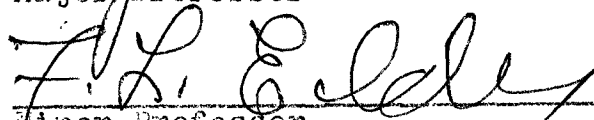



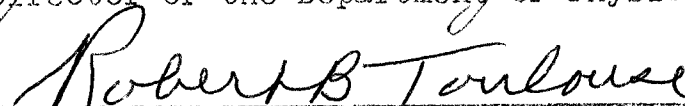
THE EFFECT OF THREE CONDITIONS OF PRACTICE ON THE
PERFORMANCE OF THE FOOTBALL CENTER
SNAP BY COLLEGE STUDENTS

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THESIS

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TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
Chapter	
I. INTRODUCTION	1
Statement of the Problem	
Hypotheses of the Study	
Definition of Terms	
Purpose of the Study	
Limitation of the Study	
Basic Assumptions	
Sources of Data	
Survey of Previous Studies	
II. PROCEDURES FOR THE DEVELOPMENT OF THE STUDY	8
Selection of Subjects and Grouping	
Experimental Design	
Administration of the Pre-test	
Procedures for Group Practice	
Administration of the Post-test	
Instrument	
Treatment of the Data	
III. PRESENTATION AND ANALYSIS OF DATA	13
Summary of the Findings	
IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	19
Summary	
Conclusions	
Recommendations	
APPENDIX	22
BIBLIOGRAPHY	26

LIST OF TABLES

Table	Page
I. Significance of Differences Between Means for Each Group for the Pre-Training and Post-training Football Centering Accuracy Test	14
II. Analysis of Covariance of Scores on the Football Centering Accuracy Test	15

CHAPTER I

INTRODUCTION

Physical educators and athletic coaches have searched for more efficient methods of teaching and training students of physical education and athletic sports. There appears to be a special need for techniques of practice which will require a minimum in terms of equipment and facilities.

Some concern has been directed to the use of mental practice either as the method of practice or as a supplement for actual physical practice. There have been some studies which have utilized mental practice of a novel or impractical nature. However, there have been few studies which have found valid results which may be used in practical situations. Apparently, there is a need for experimentation in the area of mental practice in activities which are more frequently utilized in physical education classes and in athletic sports.

Statement of the Problem

The problem of this study was to determine the effect mental practice, physical practice, and a combination of physical and mental practice had upon the accuracy of the football center snap for field goals and extra points after a touchdown.

Hypotheses of the Study

The hypotheses of the study are as follows:

1. There will be no significant difference in mean scores between pre-test scores and post-test scores for the Football Center Snap Test within Groups I, II, III, and IV respectively.

2. There will be no significant differences between the means of the groups for the Football Center Snap Test.

Definition of Terms

For the purpose of clarity, the following terms have been defined:

Center.--The player on a football team who is responsible for passing the ball from the line of scrimmage to the place kick holder.

Center Snap.--The passing of the football to a designated spot behind the line of scrimmage.

Physical Practice.--Performing the act of centering the ball to a designated spot a given number of times.

Mental Practice.--Focusing one's concentration upon the introspective rehearsal of the skill of centering a football to a designated spot behind the line of scrimmage.

Purpose of the Study

The study was undertaken to compare three conditions of practice on the performance of the football center snap by college male physical education students at North Texas State University.

Limitations of the Study

1. This study was limited to seventy-five freshman through senior college male students at North Texas State University.

2. The findings of this study were limited to the results obtained from the data collected by use of a Football Center Snap Test for accuracy.

Basic Assumptions

For this study the following assumptions were made:

1. The subjects were asked to cooperate and to provide honest, maximum effort on the pre-test and post-test administrations of the instrument, and it was assumed they did.

2. The subjects were asked not to practice snapping the football outside of class, and it was assumed they did not.

Sources of Data

Data for this study were collected by use of a Football Center Snap Test. The test was administered by the author to seventy-five physical education students at North Texas State University.

Survey of Previous Studies

An extensive search of literature revealed no previous study to which the present study is directly related.

The primary purpose of this section is to provide a review of the literature available in the area of mental practice as it applies to motor learning.

According to Singer (4), "mental practice refers to task rehearsal in which there are no observable movements". Studies have been conducted which compared the effectiveness of learning motor tasks through actual physical practice with mental practice or a combination of physical-mental practice.

In a study by Vandell and others (7), an attempt was made to determine the function of mental practice in the learning of motor skills. The experiment involved junior high and college groups learning dart throwing and basketball free throws. Three groups of junior high students were used in the dart throwing. Group I participated in actual physical practice trials on the first and last day of the experiment with no directed practice of any kind between those days; Group II participated in physical practice each day of the study; Group III experienced physical practice the first and last day of the experiment and mental practice periods on the remaining days. Similar conditions were used in the groups performing the basketball free throws. This study concluded that mental practice appeared to be almost as effective as physical practice.

A similar study involving a ring-toss was conducted by Twining (6). In this study a group of randomly selected college males practiced a ring-toss experiment under one of

three conditions: No practice for one group for twenty-one days after the initial test; another group had physical practice tossing rings for twenty-one days; a third group mentally rehearsed ring tossing for twenty-one days. Both the physical and mental practice groups made a significant improvement.

Clark (1) made a comprehensive study on basketball free throw shooting as affected by mental practice and other selected variables including arm strength and intelligence. It was concluded that both physical and mental practice methods improved performance in all groups tested. It was also noted that the novice groups were the most successful in utilizing physical practice.

In 1960, Start (5) attempted to determine the effect of mental practice on the performance of a motor skill. Thirty-five boys participated in nine periods of mental practice at the underarm basketball free throw. Each practice session lasted five minutes. Tests were given before and after the mental practice. A significant improvement in the scores was evident after mental practice.

Egstrom (3) studied six groups of twenty male university students. Each group was given physical performance tests on the first, seventh, and thirteenth day. The pattern of practice on the remaining days varied from all physical practice, all mental practice, or no practice at all. A fourth group alternated mental practice with physical practice; a fifth group received physical practice on the first five

practice days and mental practice on the last five; a sixth group received mental practice on the first five days and physical practice on the last five days. The group which alternated mental practice and physical practice improved the most, but was not significantly better than the all physical practice group which came second in improvement.

In a study conducted by Corbin (2) the subjects were tested to determine the effect of mental practice on skill performance after exposure of the subjects to real performance of a novel motor skill. The subjects were allowed to physically practice the skill for one week prior to being divided into control group, mental practice group, and physical practice group. Practice was then conducted for the subjects in these groups. According to the collected data, results indicated mental practice to be effective in facilitating juggling performance in subjects having experienced controlled actual practice.

CHAPTER BIBLIOGRAPHY

1. Clark, L. Verdelle, "Effect of Mental Practice on the Development of a Certain Motor Skill." Research Quarterly, XXXI (December, 1960), 560-69.
2. Corbin, Charles B., "Effect of Mental Practice on Skill Development After Controlled Practice," Research Quarterly, XXXVIII (December, 1967), 534-38.
3. Egstrom, Glen H., "Effects of an Emphasis on Conceptualizing Techniques During Early Learning of a Gross Motor Skill," Research Quarterly, XXXV (December, 1964), 472-81.
4. Singer, Robert N., Motor Learning and Human Performance (New York: The Macmillan Company), 1968.
5. Start, K. B., "Relationship Between Intelligence and the Effect of Mental Practice on the Performance of a Motor Skill," Research Quarterly, XXXI (December, 1960), 643-48.
6. Twining, Wilbur E., "Mental Practice and Physical Practice in Learning a Motor Skill," Research Quarterly, XX (December, 1949), 431-36.
7. Vandell, Roland A., and others, "The Function of Mental Practice in the Acquisition of Motor Skills," Journal of General Psychology, XXIX (October, 1943) 243-50.

CHAPTER II

PROCEDURES FOR THE DEVELOPMENT OF THE STUDY

Procedures which were used for the development of the study are presented in this chapter.

Selection of Subjects and Grouping

The subjects for this study were seventy-five freshman through senior male students at North Texas State University who had enrolled during the spring semester, 1969, in four physical education activity classes that met for one hour on Monday, Wednesday, and Friday each week. All students who had previous high school or college varsity experience as a football center were excluded from the study. Each class as a unit was assigned by sampling without replacement to one of four groups. Group I was assigned to physical practice. Group II was the mental practice group. Group III was the control group, and Group IV was a combined physical and mental practice class.

Experimental Design

A Football Center Snap Test was given to all subjects in the control group and in the three experimental groups immediately prior to a five-week training period. The control group was then released while the experimental groups physically, mentally, and physically and mentally practiced

snapping a football. At the end of the five-week period the four groups were tested again for football centering accuracy.

Administration of the Pre-test

The Football Center Snap Test was administered in a large weight-lifting room by the investigator to all subjects. Each subject performed five practice snaps followed by ten scoring trials after the investigator had demonstrated the proper procedure to follow in correctly executing the test.

Scoring of the test was as follows:

1. Ball passed through the hoop without making any contact with the rim: scored as three points.
2. Ball hit the rim of the hoop but still passed through: received two points.
3. Ball hit the rim of the hoop but fell outside: scored as one point.
4. Ball completely missed the rim of the hoop and passed outside or made contact with the floor before reaching the instrument: scored as zero points.

A total score was calculated for each subject based on the scores made on the ten test trials. The higher the score the more accurate the subject was at snapping the football.

Procedures for Group Practice

Group I practiced centering the ball to the target six times each class day for a period of fifteen class days. Group II, the mental practice group, received a set of printed

instructions to read and memorize prior to each mental practice period, which took place at the beginning of each class period in a quiet room. These instructions were removed from the subjects after they had had time to memorize them. These directions enumerated a step-by-step procedure to follow in properly executing the football center snap for accuracy, and the subject was instructed to go through this step-by-step procedure six times with his eyes closed. Each subject was to simulate snapping the football mentally on each occasion. The steps were as follows:

1. Examine the placement of the hoop from a standing position.
2. Assume the centering position.
3. Visualize the path the ball will follow if it is to pass through the hoop without touching any portion of it.
4. Place the dominant hand on the upper portion of the ball and the other hand on the lower part of the ball.
5. Push the ball simultaneously with both hands from the ground through the legs toward the hoop.
6. Visualize the ball passing through the air and through the hoop without making any contact.

The mental practice group followed this procedure throughout the fifteen-class-day experimental study. Group III, the control group, participated in a track and field program during the experimental study. Group IV physically snapped the football six times per class period, and mentally centered

the ball one time immediately prior to each physical practice trial for fifteen class days. At the onset of each class, this group was given the same mimeographed sheets with the step-by-step procedure on how to hike the football correctly as the mental practice unit, Group II, was given. Furthermore, the printed instructions were removed from each subject before the practice sessions began.

Administration of the Post-test

The Football Center Snap Test was administered to each group at the end of the fifteen class day practice period in identical fashion as the pre-test.

Instrument

The gross motor skill to be performed in this study required the subjects, while assuming the stance of a football center, to pass the ball through a regulation basketball hoop.

The basketball rim was mounted vertically on a wooden platform and positioned seven yards directly behind the subjects performing the skill. The center of the basketball rim was placed at a height and in a position so as to imitate the placement of the holder's hands in the actual performance of duties on field goal attempts and points after touchdowns.

Treatment of the Data

Hypotheses were stated and tested in the null form. A t-test for small independent groups was employed to determine

whether a significant mean gain was made from the pre-test to the post-test for each group. The analysis of covariance was used to determine whether there was a significant difference between the groups at the conclusion of the study.

Hypotheses was tested at the five per cent level of significance. Raw score data were transferred to I.B.M. cards for computation at the North Texas State University Computer Center, Denton, Texas.

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

A Football Center Snap Test for accuracy was administered to seventy-five college men enrolled in physical education classes at North Texas State University prior to and following a five-week training period. The data from the pre-training test and post-training test were collected and treated statistically to determine the effectiveness of three conditions of practice utilized during the training period on the accuracy of the football center's snap for field goals and for extra points after a touchdown.

A t test for correlated samples (1, p. 226-232) was made to examine the difference between the means for each group. Also, the analysis of covariance (1, p. 295-303) was used to discover if the difference between the means for the groups were statistically significant. The F value for this analysis is reported.

For all analyses, the .05 level of significance was selected for the rejection of the null hypothesis.

The following data are presented to assist in determining the value of the different methods of practice. Data comparing the differences between the mean on the pre-test and post-test performance within Groups I, II, III, and IV, respectively, are presented in Table I.

TABLE I
SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS FOR EACH
GROUP FOR THE PRE-TRAINING AND POST-TRAINING
FOOTBALL CENTERING ACCURACY TEST

Groups	Pre-Test Mean	Post-Test Mean	Fisher t	Critical t
Group I (N = 18)	7.28	8.39	-.97	2.11
Group II (N = 18)	8.78	7.72	1.25	2.11
Group III (N = 17)	9.24	9.24	0.00	2.12
Group IV (N = 22)	7.32	9.64	-2.24	2.08

An examination of Table I will show the physical practice group, Group I, the mental practice group, Group II, and the control group, Group III, did not produce significant gains at the .05 level between the pre-test and the post-test. Therefore, the null hypothesis that the training procedure would not produce a difference between the pre-test and post-test means is accepted for Groups I, II, and III. Group I produced a mean gain of 1.11. Group II had a 1.06 decrease in the means between the pre-test and the post-test. There was no change in the means in Group III between the pre-test and the post-test. The combination physical and mental practice group, Group IV, produced a significant gain at the .05 level, with a mean gain of 2.32 between the pre-test and the

post-test. The null hypothesis that the training procedure for Group IV would not produce a significant difference between the pre-test and post-test means is rejected.

The scores in the football center's accuracy test were also analyzed by use of the analysis of covariance to determine whether a statistically significant difference existed among the four groups of subjects. The summary of the F 's obtained is presented in Table II.

TABLE II
ANALYSIS OF COVARIANCE OF SCORES
ON THE FOOTBALL CENTER'S ACCURACY TEST

Source of Variance	Degrees of Freedom	Sum of Squares	Variance Estimate	F^*
Between	3	63.3331	21.1110	1.2348
Within	71	1213.8224	17.0960	. . .
Total	74	1277.1555

* F value of 2.74 is required to denote significance at the .05 level.

An examination of Table II will reveal that the mean for any one of the groups is not significantly different from the mean for any of the other groups.

Summary of the Findings

The data reported in Tables I and II reveal the following findings in regard to the mean scores obtained for the

groups prior to and following their specific training procedures:

1. For Groups I, II, and III, the difference between the pre-training means and the post-training means is not statistically significant at the .05 level. Group IV reveals a significant difference between the two means at the .05 level.

2. The differences between the means between the groups are not statistically significant at the .05 level.

CHAPTER BIBLIOGRAPHY

1. Garrett, Henry E., Statistics in Psychology and Education, New York, David McKay Company, Inc., 1966.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was designed to determine the effects a five-week program of three conditions of practice--mental practice, physical practice, and a combination of mental and physical practice--would have upon the accuracy of the football center snap for field goals and for extra points after a touchdown.

Subjects for the study were seventy-five freshman through senior male students at North Texas State University who had enrolled during the spring semester of 1969 in four physical education activity classes. Each class as a unit was assigned to one of the four groups--Group I, physical practice; Group II, mental practice; Group III, control group; Group IV, combination physical and mental practice.

The three experimental groups I, II, and IV practiced snapping the football six times physically, mentally, and physically and mentally respectively for each of the fifteen class sessions that met Monday, Wednesday, and Friday while participating in a five-week training program. No training program was assigned to the control group, Group III.

A Center Snap Accuracy Test was administered and scores were obtained for all subjects of each group prior

to the beginning of the five-week training period. At the conclusion of the five-week training period all subjects were again tested and their scores recorded. The final test was administered in precisely the same manner as the initial one.

The instrument used to test football centering accuracy was constructed by mounting a regulation basketball rim vertically on a platform and at a height so as to imitate the placement of the holder's hands in the actual performance of field goal attempts and points after touchdowns. The instrument served as a target by placing it seven yards directly behind the subject performing the skill.

The following scoring method was used. A ball that passed through the hoop without making any contact with the rim was scored as three points. A ball that hit the rim of the hoop but still passed through scored two points. A ball that hit the rim of the hoop but fell outside the rim was scored as one point. No points were given for a ball that completely missed the rim of the hoop and passed outside, or for any ball that made contact with the floor before reaching the instrument. Each subject received ten scoring trials on the pre-test and on the post-test.

The raw scores of the subjects were organized in their respective groups and statistically analyzed in order to determine if a significant change in the means occurred within the respective groups and to determine if a statistically significant difference between the means of the groups existed at the conclusion of the study.

To determine whether the difference in the mean by each of the groups between the pre-training test and the post-training test was statistically significant, the t for the difference between the means was computed. The analysis of covariance was the statistical technique selected to determine the significance of the differences between the means of the groups. The .05 level of significance was selected for all statistical treatments.

Conclusions

The findings would seem to warrant the following conclusions concerning the effects of a five-week training program upon the groups tested for football centering accuracy.

1. A combination of physical and mental practice proved effective as a means of improving the performance of college men on the football centering accuracy test.
2. None of the training procedures are superior to the others as a means for improving performance of the football snap accuracy test by college men.

The hypothesis that none of the training procedures will show a significant differences between the pre-test and post-test means is therefore accepted for Group I, mental practice; Group II, physical practice; and Group III, the control group. The same hypothesis is rejected for Group IV, combination of physical and mental practice. The hypothesis that there will be no significant difference between the means of the groups for the Football Center Snap Test for accuracy is accepted.

Recommendations

The following recommendations for future studies are made.

1. It would seem desirable to conduct a similar study with thirty or more subjects in each group.
2. The use of high-school age boys as subjects to determine the effect of different training procedures on their ability to snap a football accurately would be desirable.
3. It would be desirable to conduct a similar study with only subjects who had high school varsity centering experience.
4. It would seem desirable to conduct a study using a combination of physical and mental practice with two groups of thirty unskilled subjects each, and placing the thirty subjects that scored highest on the pre-test in one group.

APPENDIX

RAW SCORES

Group I (Physical Practice)

Subject	Pre-Training	Post-Training
J.F.	14	10
R.K.	12	9
J.B.	11	8
D.E.	11	4
J.M.	10	18
J.K.	9	17
D.L.	9	8
J.T.	9	7
J.B.	7	11
R.A.	5	2
C.B.	5	15
A.B.	5	2
L.C.	5	5
D.C.	5	8
G.F.	5	12
L.B.	4	5
K.K.	4	7
D.B.	1	3

RAW SCORES
Group II (Mental Practice)

Subject	Pre-Training	Post-Training
R.H.	18	13
J.C.	15	7
D.B.	13	8
T.C.	11	15
J.B.	11	10
B.K.	11	11
J.G.	11	4
W.L.	9	12
B.T.	9	7
L.K.	8	8
G.F.	8	6
S.E.	7	4
B.S.	7	4
T.F.	6	8
R.D.	6	7
B.P.	3	6
J.O.	3	4
P.D.	2	5

RAW SCORES
Group III (Control Group)

Subject	Pre-Training	Post-Training
J.H.	18	5
W.K.	17	18
S.B.	15	8
J.B.	14	21
J.G.	12	20
R.R.	10	9
J.L.	9	10
T.S.	8	13
M.F.	8	13
T.B.	8	5
R.C.	8	4
J.S.	6	10
M.S.	6	7
G.J.	6	5
A.M.	5	3
R.P.	4	3
R.N.	3	3

RAW SCORES

Group IV (Physical and Mental Practice)

Subject	Pre-Training	Post-Training
M.S.	16	8
C.H.	12	14
J.D.	12	13
J.M.	11	10
J.W.	10	10
T.C.	10	8
M.V.	10	7
G.S.	10	5
G.M.	8	13
J.F.	8	11
P.G.	7	16
R.A.	7	13
D.H.	6	11
T.B.	5	10
G.C.	5	7
J.M.	5	6
R.T.	4	11
B.M.	4	10
M.D.	3	17
J.H.	3	4
W.R.	3	4
K.M.	2	5

BIBLIOGRAPHY

Books

- Garrett, Henry E., Statistics in Psychology and Education, New York, David McKay Company, Inc., 1966.
- Singer, Robert N., Motor Learning and Human Performance, New York, The Macmillan Company, 1968.

Articles

- Clark, L. Verdelle, "Effect of Mental Practice on the Development of a Certain Motor Skill," Research Quarterly, XXXI (December, 1960), 560-69.
- Corbin, Charles B., "Effect of Mental Practice on Skill Development After Controlled Practice," Research Quarterly, XXXVIII (December, 1967), 534-38.
- Egstrom, Glen H., "Effects of an Emphasis on Conceptualizing Techniques During Early Learning of a Gross Motor Skill," Research Quarterly, XXXV (December, 1964), 472-81.
- Start, K. B., "Relationship Between Intelligence and the Effect of Mental Practice on the Performance of a Motor Skill," Research Quarterly, XXXI (December, 1960), 643-48.
- Twining, Wilbur E., "Mental Practice and Physical Practice in Learning a Motor Skill," Research Quarterly, XX (December, 1949), 431-36.
- Vandell, Roland A., and others, "The Function of Mental Practice in the Acquisition of Motor Skills," Journal of General Psychology, XXIX (October, 1943), 243-50).