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THE RELATIVE EFFECTIVENESS OF COMBINATIONS OF MENTAL AND
PHYSICAL PRACTICE ON PERFORMANCE SCORES AND
LEVEL OF ASPIRATION SCORES
FOR AN ACCURACY TASK

by

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This study was primarily concerned with the relative effectiveness of combinations of mental and physical practice on the dependent variables of performance and level of aspiration. A secondary purpose was to investigate the relationships between the level of aspiration and the level of performance in an attempt to evaluate two hypotheses:

1. That the expected or aspiration score is significantly related to the most recent knowledge of performance, and

2. That the verbal expression of an expected score is significantly related to subsequent performance.

Thirty-six women were tested individually on a ball throwing accuracy task at six sessions over a period of two weeks. Procedures for the four groups of subjects were identical except for the treatment combinations which were imposed over nine trials at each of the six sessions. The treatment conditions consisted of the combinations of two levels of the two independent variables, mental practice and physical practice. Initial performance scores, final performance scores, and level of aspiration scores were obtained for each subject at each of the six sessions. The data were analyzed and evaluated through three methods of analysis: (1) 2x2 covariance factorial analysis, (2) 2x2 factorial analysis, and (3) coefficients of correlation.

From the results of the analyses, the following conclusions were made:

1. For the four groups of subjects utilized in this study, there were no significant differences on the dependent variables, the level of performance and the level of aspiration.

2. Evidence was revealed to support the two hypotheses, that the aspiration score is significantly related to the most recent knowledge of the performance level and that the verbal expression of an expected score is significantly related to subsequent performance.

In conclusion, the simultaneous imposition of four combinations of mental and physical practice conditions did not have significantly different effects on either the level of performance or the level of aspiration for an accuracy task.

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CHAPTER I

INTRODUCTION

Only a relatively small amount of research involving mental practice has been done in physical education skill learning. Yet, the concept of action as an entity, separate and isolated from thinking, is no longer plausible. Research has shown that man responds as a unified whole, rather than as an absolute thinking being in one instance and as a purely physical being in some other instance. Indeed, the very act of thinking has its counterpart in neuromuscular function according to the research findings of Bills (6) and Jacobson (15). These and other studies have helped to establish the idea that mind and body are no longer separate entities to be investigated as isolated phenomena.

In the attempt to perfect methods of skill acquisition, much emphasis has been placed on the type of presentation, the length of the practice session, the importance of strength, the need for variety, and the function of fatigue. Possibly, an important facet of skill acquisition has been overlooked, man's capacity to conceptualize his actions into a meaningful pattern that may hasten and complement the act of performing a motor skill. Virginia Harrison (14) has stated that the effects of mental practice on motor learning include an

increased level in the skill of performance, an increase in retention, and an increase in the smoothness of performance. While all of these characteristics seem to be desirable, only a few of the research studies in physical education have attempted to investigate the results of mental practice on skill acquisition.

A comparison of the relationships between an expressed level of aspiration with mental practice and physical practice conditions, apparently has not been attempted. However, the generalization that interest and ego-involvement in the learning situation contribute to the final outcome seems to be an accepted idea. The degree of skill to which a subject will aspire under one combination of mental-physical practice may be different from the degree of skill to which a subject will aspire under another combination of mental-physical practice. If such a difference does exist, the expression of a level of aspiration under varied conditions of practice may be an indication of the subject's confidence in the method of skill acquisition.

Of the studies reviewed in physical education investigating the relative effectiveness of mental and physical practices, apparently no attempt has been made to combine the mental and physical components into an operational definition which can be imposed simultaneously. When combinations of mental and physical practice conditions have been investigated, the general procedure is for one type of practice to precede the other type of practice.

What happens to performance when various combinations of mental-physical practices are employed? Is mental practice more effective in influencing performance when operationally combined with physical practice or is mental practice more effective without actual practice? Is the level of aspiration for a task affected by the type of practice condition that preceded the expression of the expectancy score? How is the performance level related to the expectancy score?

In order to investigate these questions, the objectives of this study were formed: to determine the relative effectiveness of different combinations of mental-physical practice conditions on performance scores and on aspiration scores and to investigate the relationships between performance scores and aspiration scores.

CHAPTER II

STATEMENT OF PROBLEM

The purpose of this study was to determine the effects of combinations of mental and physical practice conditions on the level of performance of a ball throwing accuracy task and on the level of aspiration for the task. The relationships between the level of aspiration and the performance scores were also investigated.

Mental practice involved either repetition of the 2x2 multiplication table or concentration on the ball throwing task.

Physical practice involved either actual practice of the task or absence of actual practice.

The effects of three components were investigated as to their relative effectiveness on the variables of performance and aspiration. The three components investigated were the mental component, the physical component, and the interaction component. The relationships between the level of aspiration and the performance scores were evaluated through appropriate tests of significance of the correlation coefficients.

LIMITATIONS

The author feels that the following limitations may have influenced the results of this study in an indeterminate fashion.

1. The assumption of randomness was not met in the assignment of subjects to specific practice times. It was impossible to meet this assumption because of the variety of times available for testing among the individual subjects.

2. In some cases the subjects were unable to attend the sessions at the times they had indicated. Therefore instead of coming on alternate days, some subjects came daily, and some subjects missed the assigned session by several minutes to several hours.

CHAPTER III

REVIEW OF LITERATURE

Studies relating mental practice conditions to fine and gross motor skill acquisition as well as studies dealing with the level of aspiration are reviewed in this chapter. Although very few of the reviewed studies deal directly with the main objective of this study, the author felt that a knowledge of the material in the area of mental practice was necessary in order to develop this thesis.

The reviewed studies are organized into four main divisions: (1) Mental Practice Studies, (2) Studies Comparing the Relative Effectiveness of Mental and Physical Practice Conditions, (3) Studies Concerned with the Combination of Mental-Physical Practice Conditions, and (4) Level of Aspiration Studies.

MENTAL PRACTICE STUDIES

In an early attempt to investigate whether muscle tension resulting from intense mental activity was merely an overflow phenomena or an influential factor in the efficiency of mental work, Bills (6) devised four experimental situations to investigate the following questions:

1. Did an increase in muscular tension beyond the normal amount of tension result in an increase in the

efficiency of mental work?

2. Would the effect of added muscular tension on the efficiency of mental work be changed with practice and with the onset of fatigue?

3. Would different results be expected for different criteria of mental efficiency?

Spring dynamometers were used as instruments against which the subjects pulled to develop additional muscle tension. Each subject performed under both normal and tension conditions.

Bills found that whether the task was adding columns of figures, learning nonsense syllables, rapidly reading rows of letters, or learning paired associate words, the tension condition was superior to the normal condition in terms of an increase in the efficiency of mental work. The effects of practice and fatigue did not change the ratio of efficiency between the two conditions when the quality of work was the characteristic measured, but when different criteria were used different results were obtained.

Jacobson (15) found that when a relaxed subject engaged in mental activity such as imagination or recollection of muscular acts that muscle contractions occurred in some of the muscle fibers which would have been engaged in the actual performance of the imagined action. Through the use of electrical records and subjective reports, Jacobson found that with general progressive muscular relaxation, the

imagery and thinking processes tended to dwindle and disappear. Exceptions to these results occurred when the subject was told to "visualize" some particular action. Under this condition, voltage changes occurred in the ocular region but were absent from the arm muscles in almost all instances.

Sackett (21) investigated the relationship between the amount of symbolic rehearsal and retention of a finger maze habit on seventy-five female college students. Four groups of subjects were formed, and the number of symbolic rehearsals of the maze habit for each subject varied from zero to five times daily according to the group in which the subject was placed. Sackett found that any of the amounts of symbolic rehearsal used in this experiment were beneficial to the retention of the maze habit after one week, and there was some evidence to indicate that the greater the number of rehearsals the higher the degree of retention. However, he found that the amount of retention was not proportional to the increase in the number of rehearsals, but there was the possibility that the groups may not have rehearsed as frequently as they reported.

Start (24) investigated the relationship between the intelligence quotient and mental practice of the underhand basketball free throw in terms of initial scores, final scores, and the amount of improvement on the skill. He found a significant improvement between the mean final score and the mean initial score after nine daily sessions of

mental practice and that the improvement was not related to either the initial score or to the intelligence quotient.

In a later study, Start (23) failed to find a significant relationship between the Wiebe Test of Kinesthesia and a skill test rating after six daily sessions of mental practice on a gymnastic movement, the single leg upstart on the Olympic high bar.

Jones (31) designed a study to determine whether subjects without previous experience with a specific gross motor skill could learn the skill without any form of physical practice or demonstration. A secondary purpose of this study was to illustrate the effects of guided mental practice as compared to undirected mental practice. Jones found that subjects without previous experience in the skill and without the benefit of physical practice or demonstration could learn the gross motor skill through mental practice. He also found that undirected practice was superior to guided practice and that the amount of knowledge the subject possessed about the mechanics of movement was not related to the ability to demonstrate learning through mental practice.

Summary:

These studies indicate a definite relationship between mental processes and muscular tension and demonstrate the effectiveness of mental practice as a method of skill acquisition. However, there appears to be little correlation

between the measures of skill attainment as a result of mental practice and the factors of the intelligence quotient, measures of kinesthesia, knowledge of the mechanics of movement, initial measures of the skill, the number of symbolic rehearsals.

STUDIES COMPARING THE RELATIVE EFFECTIVENESS OF MENTAL AND PHYSICAL PRACTICE CONDITIONS

In a study attempting to determine the relative effectiveness of mental practice and physical practice upon muscular endurance, Kelsey (18) concluded that both practices were effective in increasing muscular endurance, but that physical practice was much more effective. Over a period of twenty-two days, the physical practice group improved three hundred and twenty-two per cent while the mental practice group improved twenty-nine per cent.

In fine motor skill acquisition of a stylus task, Harrison and Smith (13) compared the relative effectiveness of six methods of practice: motor, mental, guided, visual, reversed visual, and control or no practice. While they found that all groups with the exception of the guided practice group evidenced a significant learning effect between initial and final tests, they did not find that the overall differences were significant in terms of the correct number of hits scored in a specified time interval. However, when accuracy or reduction of errors was used as the criterion measure,

they found significant within-group differences for the visual practice and the mental practice groups resulting in a significant decrease in errors for these practice groups. While the amount of improvement in total number of responses (hits-plus-errors) did not differ among the different groups due to the type of practice, examination of the individual group variances showed that the motor practice group and the control group improved their total productivity scores significantly. The investigators felt that these results warranted the conclusion that visual practice and mental practice improved accuracy on the punchboard learning task, while motor practice and guided practice did not.

Perry (20) investigated the relative effectiveness of three types of practice on the skill acquisition of five selected fine motor tasks. He concluded that imaginary practice was more effective than actual practice in tasks which consisted of learning facts that could be observed without actual movement.

Twining (26) measured the improvement in a ring toss accuracy skill after twenty days of either mental, actual, or no practice. Twelve college men were assigned to each of the three conditions and the improvement measure consisted of the difference in the scores obtained on the first and twenty-second days of the experiment. The subjects of each group threw two hundred and ten rings on the first and twenty-second days for initial and final scores, respectively. The mental practice group mentally rehearsed the first day's

activity for fifteen minutes daily from the second through the twenty-first day, and the actual practice group tossed seventy rings each day for the twenty practice days. The control group met only on the days of testing for initial and final scores.

The results showed that the control group did not experience significant learning as measured by improvement but that both the mental practice and the actual practice groups experienced significant improvement. The mental practice group had a thirty-six per cent improvement, and the actual practice group had a one hundred and thirty-seven per cent improvement. Introspective comments by the subjects indicated that mental practice was most effective for approximately the first five minutes of each practice session.

Clark (8) investigated the effect of mental practice on the development of the Pacific Coast one-hand foul shot on three classifications of high school boys; varsity basketball players, junior varsity basketball players, and novice basketball players. The initial and final testing situations were identical for both the physical practice group and the mental practice group. The intervening practice sessions were different for the two groups in that the physical practice group actually shot fouls for a score while the mental practice group read work sheets and imagined themselves shooting foul shots for a score.

Both groups showed highly significant gains in the basketball skill. The physical practice group had average

gains of sixteen per cent for the varsity players, twenty-four per cent for the junior varsity players, and forty-four per cent for the novice players. The mental practice group had average gains of fifteen per cent for the varsity players, twenty-three per cent for the junior varsity players, and twenty-six per cent for the novice players. From these results, the author noted that since the largest difference between the two practice situations occurred in the novice group, that perhaps a certain amount of motor experience was necessary before mental practice could provide a maximal effect.

Two interesting aspects of this study were: (1) the subjects of each group were motivated to feel that they were in competition with the subjects of the other group, and (2) several subjects in the mental practice group reported hallucinations such as having the ball stick to the floor, inability to stop bouncing the ball, inability to visualize the net, having the ball come from nowhere and strike the subject, and inability to visualize the ball following a normal trajectory to the basket.

Huffman (30) and Duff (10) investigated the effect of mental practice on the underhand basketball free throw of college women and high school girls, respectively. Although the general procedures for these two studies were similar to the procedure in Clark's study (8), Huffman (30) and Duff (10) did not find a significant difference between the means of the mental practice group and the physical practice group. Notable

exceptions to the general procedure include differences in sex of subjects, the use of competition as a motivating device, and the classification of subjects into different skill levels.

Vandell, Davis, and Clugston (27) investigated the role of mental practice on the skill acquisition of dart throwing for junior high school boys and college freshmen males and basketball free throws for senior high school boys. They found that both physical practice and directed mental practice appeared almost as effective as physical practice for the senior high school boys and the college freshmen. In the junior high school mental practice group, one of the four boys failed to show a gain, but when all four boys were given the mental imagery section of the Binet Test the boy who failed to show a gain in skill improvement also failed this test completely while the other three boys passed the test satisfactorily. The junior high school boys showed a seven per cent gain under physical practice conditions and a four per cent gain under mental practice conditions. However, due to insufficient data these results should not be accepted conclusively.

Tufts (34) compared the differences that occurred between mental practice conditions and physical practice conditions on the bowling performance of intermediate bowlers among college women. She found that both types of practice conditions were equally effective in maintaining bowling performance and accuracy for the duration of the study.

Wilson (28) investigated the relative effectiveness of mental practice and physical practice on the proficiency of performance on the Broer-Miller Tennis Test. Seventy-five women college students were rated according to skill level and placed in one of three groups; mental practice group, physical practice group, or control group. Each group repeated the Broer-Miller Tennis Test on alternate days throughout a twelve day period. Each group with the exception of the control group participated in either mental practice or physical practice on the days not designated as test days. The subjects in the mental and physical practice groups took three aptitude tests on space relations, mechanical reasoning, and abstract reasoning.

The results indicated that all of the experimental subjects showed gains in the proficiency of performance on the Broer-Miller Tennis Test, but that the type of practice did not produce significant differences in the comparative performances of the three groups. The selected aptitude tests did not measure those factors which contributed to an increased proficiency of performance under either training condition.

Summary:

In gross motor skill acquisition, two types of results have been reported in the literature: (1) physical practice and mental practice were approximately equal in influencing skill improvement, and (2) both physical practice and mental

practice were effective in skill acquisition, although physical practice was more effective. Twining (26) and Clark (8) have reported results of the second type, and Huffman (30), Duff (10), Clugston, Vandell, and Davis (27), Wilson (28), and Tufts (34) have reported results of the first type. The skills acquired were ring toss (26), dart throwing (27), basketball free throw (27; 8; 30; 10), bowling (34), and tennis (28). Some of the differences in results may be attributed to failure to account for individual differences on the initial skill tests (27; 28), but not all of the differences in results can be placed into this category. Other possible explanations of the differences include differences in procedures, sex differences, differences in motivational techniques, etc. Possibly the most concrete point that can be established from the review of literature in this section is that when physical practice conditions, mental practice conditions, and control conditions were compared, significant differences were found between the experimental conditions and the control condition. It seems that no practice results in very little improvement in skill performance.

STUDIES CONCERNED WITH THE COMBINATION OF MENTAL-PHYSICAL PRACTICE CONDITIONS

Mitchell (32) attempted to determine the relative effectiveness of mental practice, physical practice, and a combination of mental-physical practice in skill acquisition

of the long serve in badminton. Women university students were selected as subjects and were placed into one of three groups on the basis of scores they obtained on a badminton wall volley test.

The mental practice group attempted to develop the "feel" of the serve without overt action; the physical practice group actually performed the skill during the practice sessions; and, the combination mental-physical practice group attempted to obtain the "feel" of the skill through thought processes followed by actual practice of the skill. At each of the eight practice sessions, an instructor demonstrated and explained the mechanics of the service. Initial and final tests of the skill consisted of the long service test of twenty serves with the improvement measure being the difference between the initial and final tests.

Mitchell concluded that all groups showed significant improvement, that the difference between the mental practice group and the combination practice group was not significant, that the difference between the physical practice group and each of the other two types of practices was not significant, and that the mental practice and the combination practice groups showed more improvement than the physical practice group. However, in view of her last conclusion, she did state that since the physical practice group started at a higher skill level than either of the other two groups, that the physical practice group should not be expected to improve as much as the other groups.

Burns (29), in view of the data obtained from adolescent girls on a dart throwing skill, concluded that physical practice and the combination of mental-physical practice conditions tended to improve accuracy in dart throwing when compared to a control group of no practice. Those girls who practiced the skill under the condition of mental practice did not improve in accuracy when compared to the control group. However, in light of the large variability and small mean differences, no significant differences were reported among the three experimental groups.

Summary:

Because of a paucity of studies concerned with the relative effectiveness of mental practice, physical practice, and a combination of mental-physical practice conditions, no general conclusions can be stated at the present time. However, it is worthwhile to note that in the two studies reviewed for this paper, the combination of the mental-physical practice condition consisted of an alternation of mental and physical practices rather than a simultaneous occurrence of mental-physical practice.

LEVEL OF ASPIRATION STUDIES

Kausler (17) investigated the relationship between an expressed level of aspiration and the subsequent levels of performance on a simple arithmetic test. Both sexes of college students were selected as subjects for this study. One group,

the C group, did not express a level of aspiration for the test; a second group, the L group, expressed a level of aspiration for the test; and, the third group, the LR group, expressed a level of aspiration for the test in reference to a specified minimal score that had to be obtained if the subject were to receive credit for the test. Kausler found that the expression of the level of aspiration increased the level of performance on the test, but there was a low correlation between the magnitude of the level of aspiration and the magnitude of the level of performance. In the comparison of the groups L and LR, Kausler did not find a significant difference in the mean performance score although the level of aspiration measure was greater in the LR group.

Price (33) investigated the relationship between the level of aspiration and the level of performance in six selected motor tasks; basketball throw, wall pass, softball throw, vertical pull, jump reach, and penny cup toss. She found evidence to indicate that a definite relationship existed between the level of aspiration and performance of the tasks. The relationship between attempted achievement and actual achievement was significant and positive.

Leshner (19) utilized muscle action potentials as the dependent variable in a level of aspiration experiment designed to investigate the effects of realistic or unrealistic aspiration statements and achievement or nonachievement of

a solution for sets of figure-pattern problems on muscular tensions. The results indicated that the effect of the realism of aspiration on muscular tension depended upon the subject's success or failure and the rate of tension increase was significantly greater in the subjects who stated expectations (realistic) and failed than in the subjects who stated hopeful (unrealistic) aspirations and failed. For the successful subjects, the results were opposite from the above results with the unrealistic aspiration group having higher muscle action potentials than the realistic group. Regardless of the hopefulness or expectancy of the aspiration, the tension levels produced during work decreased in the successful subjects and increased in the unsuccessful subjects.

Strong (25) investigated the effect of six motivating conditions on the performance of sixth-grade children on seven physical fitness tests. The motivating conditions consisted of group competition, competition with classmates of equal ability, competition with classmates of different ability, competition with all classmates in the attempt to establish a class record, competition with self, and a condition involving a stated level of aspiration for the immediate performance. The findings warranted the following conclusions: (1) the level of aspiration and the team competition motivating conditions were more effective than the other motivating conditions; (2) the boys' performances showed greater improvement than the girls' performances; and (3) the validity of the measures of physical fitness tests were dependent upon the motivating conditions employed in the test administration.

Clarke and Clarke (9), in an investigation relating the expressed level of aspiration on a hand dynamometer test and selected physical factors of nine-year old boys, found that those boys who expressed the higher levels of aspiration were physically superior in size and strength to those boys who failed to express either an increase or a decrease in their aspiration discrepancy scores. The authors felt that the selection of the level of aspiration seemed to reflect previous success or failure conditions which the boys associated with the task.

Kaiser and Blake (16) attempted to produce changes in the level of aspiration and to study the consequent effects on performance under the conditions of a simulated group atmosphere. The task consisted of obtaining an accurate count of auditory signals that arose simultaneously from two different sources, one metal, the other wood. After each set of signals, the subject was given the following information: his own performance, the average performance of his group, the individual performances of the other four subjects in his group, and the actual number of signals for the immediately prior series. The information given to the subjects was contrived in such a way that a successful condition or a failure condition incurred.

Subjects in the successful condition were led to believe that their counts were in close agreement with both

the group average and the actual number of sounds. Subjects in the failure condition were led to believe that their counts deviated markedly from both the group average and the actual number of sounds. For the success condition, the level of aspiration was surpassed for all except two sets. For the failure condition the level of aspiration overshot the announced achievement for all sets except two.

The results showed that the level of aspiration increased under the success condition and decreased under the failure condition. The errors in counting signals increased in frequency and magnitude under the failure condition or an impairment in performance resulted from the failure condition. The behavior of the subjects in the post-experimental situation indicated the willingness of the subjects in the success condition to participate in other studies and the displeasure of the unsuccessful subjects with their inefficient performance.

Festinger (11) investigated the effects of reference groups and reference scores on the expressed levels of aspiration under conditions of success and failure. In one experiment the subjects were forced to express a realistic level of aspiration in terms of the score they expected to make. In the second experiment the subjects expressed a level of aspiration in terms of the score they hoped to achieve. In each experiment the subjects were given the average estimate of performance for one of three groups: high school students, college students, or graduate students. One-half of the

subjects in each experiment were made to score above the reference group's score and one-half, below the reference group's score.

Those subjects who behaved realistically (expectation group) raised their discrepancy scores when scoring below a group and lowered their discrepancy scores when scoring above a group. The magnitude of change was directly related to the prestige value of the reference group. Those subjects who behaved unrealistically (hope-to-achieve group) lowered their discrepancy scores when scoring above a comparison group and when placed below the graduate group. For the other two comparisons, this group of subjects raised their discrepancy scores.

Hansche and Gilchrist (12) investigated the effects of the prestige value of the reference group, the absolute value of the reference score, and the difficulty of the sample questions used in the test direction on the expressed level of aspiration for a general knowledge test of psychology. They found that in the situation where the reference stimuli were incongruous, the subjects tended to base their levels of aspiration on the stimulus most bound to the task, the sample question difficulty.

Smith (22) investigated the influence of athletic success and failure on the number of minutes the members of a university freshman football squad thought they would play in the immediate game. He found that this quantitative measure of the level of aspiration varied according to the immediate

accomplishment or that the amount of time the subject played in one game influenced his level of aspiration for the next game. There was the tendency for the successful individuals to raise their levels of aspiration and for the unsuccessful individuals to lower their levels of aspiration.

Child and Whiting (7) developed a questionnaire and administered it to one hundred and fifty-one undergraduate men in the attempt to analyze the determinants of the level of aspiration in three incidents of the subjects' lives. The subjects were required to write a description of the following three incidents in their lives: (1) an incident involving complete frustration in that a goal was never reached, (2) an incident in which a period of frustration was finally followed by attainment of the goal, and (3) an incident in which the subject experienced simple goal attainment without any appreciable frustration.

Through an analysis of the questionnaires, the following generalizations of experimental level of aspiration studies were confirmed:

1. Success results in an increased level of aspiration, and failure results in a decreased level of aspiration.

2. The probability of a rise in the level of aspiration is greatest when the success is strongest, and the probability of a lowering in the level of aspiration is greatest when the failure is strongest.

3. Shifts in the level of aspiration are partly a function of the subject's confidence in his ability to obtain goals.

4. The effects of failure on the level of aspiration are more varied than those of success. This statement was confirmed for ego-involved tasks, but not necessarily confirmed for tasks lacking ego-involvement.

Summary:

These studies have indicated that the level of aspiration may be influenced by such factors as previous success or failure, group expectations, realistic aspects of the expressed goals, or ego-involvement in the task. While some aspects of the influence of certain variables on the level of aspiration have been fairly well established in the literature, the use of the level of aspiration as a motivational technique and its implications for educational practice need to be investigated.

Klausmeier's summary (2:333) of Holme's conclusions of the important implications that the level of aspiration has for education follows:

1. A task can be so easy that success has little meaning to the individual or so difficult that no student could realistically expect to achieve success.

2. Realistic and confident children tend to set more realistic goals and strive more persistently to reach those goals than children characterized by the opposite traits.

3. Low goal-setting is often the protector of self-esteem in the avoidance of failure.

4. Insecure individuals can experience a feeling of success by publicly setting high and unobtainable goals.

5. The group influences the goal-setting of members to the extent that the individual members tend to set their goals toward the average achievement of the group.

CHAPTER IV

PROCEDURE

In order to compare the effects of mental practice and physical practice on the scores obtained on a ball throwing task and on the expressed level of aspiration scores, four groups of subjects met for six sessions over a period of two weeks.

SELECTION OF ACTIVITY

The activity selected was an accuracy throw at a stationary target. The target distance or the distance that the subject had to throw the ball to reach the target was twenty-four feet. The target consisted of three squares bounded by red masking tape. The dimensions of the smallest square was twelve inches, the next largest square was twenty-four inches, and the largest square was thirty-six inches. The squares were inscribed on the wall in such a manner that the boundaries of the largest square were the outermost boundaries of the target. A diagram of the target set up is included in the Appendix. The rubber balls utilized in the task were $9 \frac{1}{4}$ inches in circumference.

Clark (8) investigated the effects of mental practice and physical practice on the development of the Pacific Coast

one-hand foul shot for three different experience level classifications of high school boys. Since the largest difference between the two practice situations occurred in the novice group, the author noted that perhaps a certain amount of motor experience was necessary before mental practice could provide a maximal effect.

Therefore, in selecting an activity for this experiment, the investigator felt that the following criteria should be met:

1. The skill should be a familiar movement experience for the subject.
2. The task should provide a challenge for the subject.
3. The task should lend itself to a convenient way of scoring.

Values were assigned to the areas bounded by the squares. The largest square was worth one point, the second largest square was worth two points, and the smallest square was worth three points. A ball falling on the boundary line was assigned the maximum value of the line. The subjects had no trouble connecting the largest value in points with the most difficult area to hit.

SELECTION OF SUBJECTS

The subjects for this study were selected from the women undergraduate physical education major population enrolled at the University of North Carolina at Greensboro

during the Fall Semester of 1965. Forty subjects were randomly selected from this group by following the procedure described by Ray in Statistics in Psychological Research. (5) The table of random digits utilized in this procedure were taken from A Million Random Digits, published by the Rand Corporation. (3)

Prior to the beginning of the experiment, forty names were arranged into groups of ten and a die was cast to determine which group of subjects were to correspond to each of four treatment conditions. Twenty-two additional subjects were randomly selected for substitution purposes. When one of the original forty subjects expressed an unwillingness to participate in the experiment, a substitution was made on the bases of the time that the subject expressed a desire not to participate and the random order of the substitution list. When it proved impossible to obtain ten subjects for each group, nine subjects were used. Of the thirty-six subjects who expressed a willingness to participate, thirty-five completed the experiment. Since an equal number of subjects in each group is mandatory in the design used, three subjects' scores were randomly dropped prior to the analysis of data.

Each subject was contacted by a letter and a date was set for the first meeting. A copy of the letter appears in the Appendix. At the first meeting, individual times for testing were set up and the general purpose of the experiment was explained. An appointment was given to each subject with a symbol for the treatment condition, the individual's testing

time, and the place for testing. Those subjects who were unable to attend the first meeting received another letter and a schedule to be filled out and returned. Copies of these letters are also included in the Appendix.

GENERAL PROCEDURE FOR ALL GROUPS

The purposes of the second meeting with each subject were the same for all four groups, to enable the subject to become acquainted with the task and to obtain a performance score. Identical instructions were read to each subject regardless of her group classification. A copy of these instructions may be found in the Appendix.

At the six subsequent meetings, the following procedure was employed regardless of the subject's group classification:

1. The subject engaged in five warm up tosses to the investigator. The distance of the warm up tosses was slightly less than the target distance.
2. The subject threw three balls at the target for an initial score. The score was recorded as the X variable on the individual's score card.
3. The subject engaged in nine practice trials according to her group's treatment conditions.
4. The subject was informed of her final score from the previous session. The final score consisted of the total points accumulated for the last three balls that the subject threw at the target.

5. The subject was asked to express what score she expected to obtain with her final three tosses in the immediate session. This score was recorded as the level of aspiration score.

6. The subject threw three balls at the target to obtain the final score of the immediate session. This score was recorded as the Y variable.

7. The subject was reminded of the time of the next session and asked not to discuss the experiment with anyone.

Each subject was requested to wear her gym suit and tennis shoes to the sessions, and in the majority of cases this request was fulfilled. An attempt was made to have each subject participate in the experiment at the same time of day for all six sessions, but on alternate days. This attempt was not completely realized due to conflicts in the subjects' schedules which made the system inconvenient.

SPECIFIC GROUP INSTRUCTIONS

While the general procedure for all groups was similar, different treatment conditions were imposed on each group of nine subjects. Treatment conditions were imposed during the nine trials that elapsed between the initial and final trials for score. A listing of the four treatment conditions and their operational definitions follows:

1. M_1P_1 - the subjects in this group repeated the 2x2 multiplication table to two times twelve equals twenty-four for

nine trials at each of the six experimental sessions. This group served as the control or non-practice group in that the treatment condition consisted of the two lower levels of the two independent variables. The subjects did not actually practice the skill and engaged in the repetition of the multiplication table in an effort to prevent concentration on the skill.

2. M_1P_2 - the subjects in this group repeated the 2x2 multiplication table while actually throwing balls at the target. Again, nine tosses or trials were administered at each experimental session. After each toss the subject started the 2x2 multiplication table from two times zero equals zero.

3. M_2P_1 - the subjects in this group closed their eyes and imagined themselves throwing a ball at the target. The subject told the investigator what score she imagined herself obtaining for each of the nine tosses.

4. M_2P_2 - the subjects in this group closed their eyes and imagined themselves throwing a ball at the target while actually performing the toss. Again, the subject told the investigator what score she imagined herself obtaining for each of the nine tosses.

Instructions were read to each subject at the first experimental session and were reread at subsequent sessions if some question arose as to the procedure the subject was to follow. Copies of the instructions are presented in the Appendix.

Since Jones (31) found that undirected mental practice was superior to guided mental practice in the learning of a specific motor skill, the investigator felt that the instructions presented to the subjects in this experiment should be of a general nature and provide only a framework in which the subject could practice.

The number of treatment trials was placed at nine since Twining (26) has suggested that mental practice was most effective for approximately the first five minutes of each practice session.

TREATMENT OF DATA

In the treatment of data for this study, 2x2 factorial covariance analyses were utilized in the evaluation of the treatment effects on the dependent variable, performance scores. Two main effects and one interaction component were evaluated in terms of appropriate tests of significance. Appropriate tests of nonadditivity were also made. Six 2x2 factorial covariance analyses were made on the data collected on the six days of the experiment.

In the treatment of the data for the dependent variable, the level of aspiration scores, six 2x2 factorial analyses were made and evaluated in terms of appropriate tests of significance. Again, two main effects and one interaction component were analyzed for each of the six days of the experiment. Tests of homogeneity of sample variances were also evaluated for each of the six days.

Coefficients of correlation were obtained and evaluated in terms of appropriate tests of significance for the total group of subjects and for the individual samples. Correlation coefficients were obtained for each of the six days with the following variables:

1. Level of aspiration scores with the initial performance scores; both scores were obtained on the same day of testing.
2. Level of aspiration scores with the final performance scores; both scores were obtained on the same day of testing.
3. Level of aspiration scores of the immediate session with the final performance scores of the previous session.

CHAPTER V

ANALYSIS OF DATA

Presentation of Data

The primary purpose of this study was to determine the relative effectiveness of mental and physical practice conditions on the level of performance of a ball throwing accuracy task and on the level of aspiration for the task. A secondary purpose of the study was to determine the relationships between the level of aspiration scores and the performance scores.

The four conditions of practice were investigated to determine what effects, if any, were evident through the analysis of the dependent variables, the level of performance and the level of aspiration. In general, each practice condition consisted of a level from each of the independent variables. The two levels of physical practice were actual practice and no actual practice of the task. The two levels of mental practice were recitation of the 2x2 multiplication table and mental rehearsal of the task. The specific operational definitions of the practice conditions are outlined in the Procedure chapter.

In order to evaluate the relative effectiveness of the four imposed practice conditions on the level of performance and on the level of aspiration for the task, factorial

analyses were made and evaluated with appropriate tests of significance. The effects of the conditions of practice on the dependent variable, the level of performance, were analyzed through a 2x2 covariance factorial method. Each of the two factors, mental practice and physical practice, contained two levels or conditions of practice so that four conditions of practice were obtained. Initial and final scores of the dependent variable for each subject were obtained on each of the six days of the experiment. The effects of the conditions of practice on the dependent variable, the level of aspiration, were analyzed through a 2x2 factorial method. Again, each of the two factors contained two levels of practice which resulted in the four conditions of practice. Only one measure of the dependent variable, the level of aspiration, was obtained for each subject on each of the six days of the experiment. Subsequently, these data were analyzed through the 2x2 factorial method.

In order to determine the relationships that existed between the level of aspiration scores and the performance measures, three sets of correlation coefficients were obtained and evaluated with appropriate tests of significance. The three sets of correlation coefficients are defined below:

1. Level of aspiration scores of the immediate session were correlated with the initial performance measures of the immediate session.

2. Level of aspiration scores of the immediate session were correlated with the final performance measures of the immediate session.

3. Level of aspiration scores of the immediate session were correlated with the final performance measures of the previous session.

Each of the three sets of correlation coefficients were obtained on the total data and on the data for the four specific practice conditions. Again, the data were analyzed for each of the six days of the experiment so that ninety coefficients of correlation were obtained and evaluated with appropriate tests of significance.

Since in the analyses of data three different methods of analysis were utilized, the presentation of the results is organized according to the type of analysis used. Raw data are presented in the Appendix.

2x2 COVARIANCE FACTORIAL ANALYSIS

The evaluation of data through the 2x2 covariance factorial method consists of three major parts: an analysis of the significance of regression, an analysis of the treatment effects, and an analysis of the homogeneity of the sample regressions and the sample variances.

Two measures of performance were obtained for each subject for each of the six days of the experiment. The X variable or initial score was obtained before the practice

conditions were imposed, and the Y variable or final score was obtained after the practice conditions were imposed. Differences among the observations on Y may have been partially due to differences which existed among the subjects prior to the experiment. The X variable was obtained for the purposes of accounting for some of the differences that existed among the subjects prior to the experiment and for eliminating some of this variability from the Y measures. In order to eliminate some of the initial variability from the final observations on Y, it was necessary that the correlation coefficient between the X and Y variables be significant. Therefore, an analysis of the significance of the regression between the X and Y variables was made for each of the six days of the experiment. The analyses were significant at the 0.05 level of significance for all the days with the exception of the first day.

In the analysis of the treatment effects in a 2x2 covariance factorial design, three components can be analyzed. Two main effects and one interaction effect were analyzed and evaluated for the last five days of the experiment. The main effect A corresponds to the effect of the independent variable, mental practice, on the level of performance obtained. The main effect B corresponds to the effect of the independent variable, physical practice, on the level of performance obtained. The interaction component AB corresponds to the effect that the dependency of mental practice on the presence

or absence of physical practice has on the level of performance obtained. No significant treatment effects were found when the tests of significance were based on the 0.05 level. These data are presented in Table I.

Two tests for nonadditivity of treatment effects were made for each of the last five days of the experiment. One test was concerned with the homogeneity of sample correlations and the other test was concerned with the homogeneity of sample variances. The null hypothesis is that the observed difference between the sample correlations or between the sample variances is due to error and the true difference is zero. Since the sample variances and the sample correlations were not found to be significantly different, the assumption of constant and additive treatment effects was taken to be justified.

TABLE I
ANALYSIS OF COVARIANCE ON THE DEPENDENT
VARIABLE, THE LEVEL OF PERFORMANCE

Second Day

Component	Sum of Squares	df	V	F
Mental Practice (A)	0.07	1	0.07	0.02
Physical Practice (B)	10.25	1	10.25	2.49
Mental Practice X Physical Practice (AB)	0.59	1	0.59	0.14
Error	110.95	27	4.11	

Third Day

Component	Sum of Squares	df	V	F
Mental Practice (A)	5.86	1	5.86	1.41
Physical Practice (B)	4.28	1	4.28	1.03
Mental Practice X Physical Practice (AB)	1.03	1	1.03	0.25
Error	111.95	27	4.15	

Fourth Day

Component	Sum of Squares	df	V	F
Mental Practice (A)	0.003	1	0.003	0.0005
Physical Practice (B)	4.57	1	4.57	0.8
Mental Practice X Physical Practice (AB)	9.96	1	9.96	1.73
Error	154.9	27	5.74	

TABLE I (continued)

Fifth Day

Component	Sum of Squares	df	V	F
Mental Practice (A)	4.99	1	4.99	1.14
Physical Practice (B)	4.18	1	4.18	0.96
Mental Practice X Physical Practice (AB)	0.05	1	0.05	0.01
Error	118.11	27	4.37	

Sixth Day

Component	Sum of Squares	df	V	F
Mental Practice (A)	1.12	1	1.12	0.38
Physical Practice (B)	0.27	1	0.27	0.09
Mental Practice X Physical Practice (AB)	0.001	1	0.001	0.0004
Error	80.33	27	2.98	

F_c at the 0.05 level of significance for 1 and 27 degrees of freedom is 4.21. (1:506)

2x2 FACTORIAL ANALYSIS

The effects of the treatment conditions on the dependent variable, level of aspiration scores, were evaluated through the 2x2 factorial method. Two main effects and one interaction component were evaluated for each of the six days of the experiment. The main effect A corresponds to the mental practice component, the main effect B corresponds to the physical practice component, and the interaction effect AB corresponds to the interaction component between the two independent variables. No significant treatment effects were found when F values were compared to the criterion F at the 0.05 level of significance. These data are presented in Table II.

It is appropriate to test the homogeneity of sample variances as a measure of nonadditivity. Bartlett's test of homogeneity of sample variances was used according to the procedures outlined by Ray in An Introduction to Experimental Design. (4:59) Since the sample variances were not found to be significantly different for any of the six days of the experiment, the assumption of constant and additive treatment effects was taken to be justified.

TABLE II

ANALYSIS OF VARIANCE ON THE DEPENDENT
VARIABLE, THE LEVEL OF ASPIRATION

<u>First Day</u>			
Component	df	V	F
Mental Practice (A)	1	0.03	0.01
Physical Practice (B)	1	3.78	1.39
Mental Practice X Physical Practice (AB)	1	0.78	0.29
Error	28	2.73	
Total	31		
<u>Second Day</u>			
Mental Practice (A)	1	5.28	1.70
Physical Practice (B)	1	9.03	2.90
Mental Practice X Physical Practice (AB)	1	3.87	1.24
Error	28	3.11	
Total	31		

TABLE II (continued)

Third Day

Component	df	V	F
Mental Practice (A)	1	3.78	1.25
Physical Practice (B)	1	0.28	0.09
Mental Practice X Physical Practice (AB)	1	1.53	0.51
Error	28	3.02	
Total	31		

Fourth Day

Component	df	V	F
Mental Practice (A)	1	5.28	1.94
Physical Practice (B)	1	11.28	4.14
Mental Practice X Physical Practice (AB)	1	0.03	0.01
Error	28	2.73	
Total	31		

Fifth Day

Component	df	V	F
Mental Practice (A)	1	2	0.61
Physical Practice (B)	1	2	0.61
Mental Practice X Physical Practice (AB)	1	1.13	0.34
Error	28	3.28	
Total	31		

TABLE II (continued)

Sixth Day			
Component	df	V	F
Mental Practice (A)	1	1.13	0.42
Physical Practice (B)	1	4.5	1.66
Mental Practice X Physical Practice (AB)	1	0.5	0.002
Error	28	2.71	
Total	31		

F_c at the 0.05 level of significance for 1 and 28 degrees of freedom is 4.20. (1:506)

COEFFICIENTS OF CORRELATION

Correlation coefficients were obtained and evaluated by appropriate tests of significance. Scores correlated included the level of aspiration scores of the immediate session with the final performance scores of the immediate session, with the initial performance scores of the immediate session, and with the final performance scores of the previous session. Coefficients of correlation were obtained for the total group scores and for each specific practice group scores for all six days of the experiment. Presentation of these data appears in Table III.

In comparing the t's obtained with the criterion t's at the 0.05 level of significance, the author found that forty-two of the ninety correlation coefficients were significant. Within the three sets of correlation coefficients for the six days of the experiment, the number of significant t's is as follows:

1. Level of aspiration scores with the initial performance scores of the immediate session;
 - a. Total group - six significant t's
 - b. M_1P_1 - four significant t's
 - c. M_1P_2 - one significant t
 - d. M_2P_2 - one significant t
2. Level of aspiration scores with the final performance scores of the immediate session;
 - a. Total group - six significant t's
 - b. M_1P_2 - three significant t's
 - c. M_2P_2 - three significant t's

3. Level of aspiration scores of the immediate session with the final performance scores of the previous session;
- Total group - six significant t's
 - M_1P_1 - four significant t's
 - M_2P_1 - one significant t
 - M_1P_2 - three significant t's
 - M_2P_2 - four significant t's

TABLE III
 CORRELATION COEFFICIENTS
 BETWEEN LEVEL OF ASPIRATION SCORES
 OF THE IMMEDIATE SESSION AND PERFORMANCE SCORES

First Day					
	Total Group	M ₁ P ₁	M ₂ P ₁	M ₁ P ₂	M ₂ P ₂
Initial performance scores of the immediate session	0.67*	0.87*	0.67	0.05	0.28
Final performance scores of the immediate session	0.50*	0.42	0.62	0.28	0.75*
Final performance scores of the previous session	0.68*	0.78*	0.60	0.50	0.83*
Second Day					
	Total Group	M ₁ P ₁	M ₂ P ₁	M ₁ P ₂	M ₂ P ₂
Initial performance scores of the immediate session	0.51*	0.72*	0.29	0.65	0.43
Final performance scores of the immediate session	0.41*	0.17	0.39	0.87*	0.81*
Final performance scores of the previous session	0.84*	0.86*	0.87*	0.93*	0.85*

TABLE III (continued)

Third Day					
	Total Group	M ₁ P ₁	M ₂ P ₁	M ₁ P ₂	M ₂ P ₂
Initial performance scores of the immediate session	0.65*	0.60	0.67	0.50	0.81*
Final performance scores of the immediate session	0.46*	0.70	-0.36	0.63	0.67
Final performance scores of the previous session	0.70*	0.63	0.47	0.93*	0.90*
Fourth Day					
	Total Group	M ₁ P ₁	M ₂ P ₁	M ₁ P ₂	M ₂ P ₂
Initial performance scores of the immediate session	0.77*	0.92*	0.57	0.69	0.65
Final performance scores of the immediate session	0.52*	0.30	0.67	0.85*	0.55
Final performance scores of the previous session	0.66*	0.91*	-0.08	0.50	0.80*

TABLE III (continued)

Fifth Day

	Total Group	M ₁ P ₁	M ₂ P ₁	M ₁ P ₂	M ₂ P ₂
Initial performance scores of the immediate session	0.51*	0.58	0.58	0.48	0.46
Final performance scores of the immediate session	0.46*	0.29	0.27	0.63	0.51
Final performance scores of the previous session	0.59*	0.87*	0.70	0.60	0.29

Sixth Day

	Total Group	M ₁ P ₁	M ₂ P ₁	M ₁ P ₂	M ₂ P ₂
Initial performance scores of the immediate session	0.67*	0.74*	0.48	0.92*	0.48
Final performance scores of the immediate session	0.71*	0.70	0.33	0.72*	0.77*
Final performance scores of the previous session	0.71*	0.69	0.67	0.84*	0.68

*Significant at the 0.05 level

INTERPRETATION OF DATA

Statistical analysis of the effects of the treatment conditions on the dependent variable, the level of performance, revealed no significant findings for either the mental component, the physical component, or the interaction component. Further analysis of the data revealed that the treatment conditions had varied effects on different individuals, but that the differences among the level of performance scores tended to balance within each treatment condition. In each of the treatment conditions, some of the individuals increased their final performance scores over their initial scores while other individuals decreased their scores or showed negative improvement.

Two studies reviewed for this thesis dealt with the relative effectiveness of a combination of mental and physical practice conditions on the improvement of motor tasks. Both Mitchell (32) and Burns (29) found that the subjects who practiced under the combinations of mental and physical practice conditions showed definite improvement. In both of these studies, no attempt was made to have the combinations of mental and physical practice occur simultaneously. The author feels that the simultaneous imposition of the two variables probably accounts for the different results obtained in the present study.

In the analysis of the effects of the treatment conditions on the dependent variable, the level of aspiration, no

significant findings were revealed for either the mental component, the physical component, or the interaction component. It appears that the simultaneous imposition of different levels of the two variables, mental practice and physical practice, had no significant effects on the expressed level of aspiration scores.

In the investigation of the relationships between the expressed level of aspiration scores and the performance scores, three sets of correlations were evaluated. Through these evaluations two hypotheses were examined:

1. That the subject tends to base her expectation on the most recent knowledge of her performance, and
2. That the verbal expression of an expectation is significantly related to subsequent performance.

A comparison of the correlations between the level of aspiration scores and the initial performance scores on the immediate session with the level of aspiration scores of the immediate session and the final performance scores of the previous session revealed evidence to support the first hypothesis. In general, the significant correlations between the level of aspiration scores of the immediate session and the final performance scores of the previous session were more numerous and of greater magnitude than the significant correlations between the level of aspiration scores of the immediate session and the initial performance scores of the immediate session. As the final performance score of the previous

session was given to the subject just prior to the expression of her expectation for the immediate session, there is some evidence to support the first hypothesis.

The second hypothesis, that the verbal expression of an expectation is significantly related to subsequent performance, was supported to some extent. The correlations between the level of aspiration scores and the final performance scores of the immediate session for the total group of subjects were significant for each of the six days of the experiment. However, it is interesting to note that when the correlations were evaluated for specific groups, only the scores of the two groups that engaged in actual practice produced significant correlations.

Price (33) found that a definite relationship existed between the level of aspiration and the performance of certain tasks. Strong (25) found that the expression of a level of aspiration served as an effective motivator for sixth-grade children on seven selected physical fitness tests. The results of this thesis support the evidence that the level of performance is related to the expressed level of aspiration with the qualification that actual practice enhances this relationship to a greater extent than no actual practice.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The primary purpose of this study was to determine the relative effectiveness of mental and physical practice conditions on the level of performance of a ball throwing accuracy task and on the level of aspiration for the task. A secondary purpose of the study was to determine the relationships between the level of aspiration scores and the performance scores in an attempt to evaluate two hypotheses:

1. That the expected or aspiration score is significantly related to the most recent knowledge of performance, and

2. That the verbal expression of an expected score is significantly related to subsequent performance.

Thirty-six women from the undergraduate physical education major population enrolled at the University of North Carolina at Greensboro during the Fall Semester of 1965 were the subjects for this study. Four groups of nine women were assigned to the four combinations of mental and physical practice conditions. Thirty-five of the women completed the study, but because of the statistical design utilized in the analysis of data, only eight scores were evaluated for each group.

All subjects were tested individually on a ball throwing accuracy task at six sessions over a period of two weeks. Procedures for the four groups were identical except for the treatment conditions which were imposed over nine trials at each of the six sessions. The treatment conditions consisted of the combinations of two levels of the two independent variables, mental practice and physical practice. Initial performance scores, final performance scores, and level of aspiration scores were obtained for each subject at each of the six sessions.

The data were analyzed and evaluated through the use of three methods of analysis: (1) 2x2 covariance factorial analysis, (2) 2x2 factorial analysis, and (3) coefficients of correlation. No significant results were found for the effects of the treatment conditions on either of the dependent variables, the level of aspiration or the level of performance. Forty-two of the ninety correlation coefficients relating the level of aspiration scores to the performance scores were significant.

Since the factorial analyses of data did not show significant findings, the author concludes that the components of mental practice, physical practice, and the interaction component of mental and physical practice did not significantly influence either the level of aspiration scores or the level of performance scores. Through the observation of the significant correlation coefficients, the author feels

that a trend was shown to support the suggested hypotheses. However, before the trend can become established fact, more research of an experimental nature must be made.

Therefore, within the limitations of this study, the following conclusions were drawn:

1. For the four groups of subjects utilized in this study, there were no significant differences on the dependent variable, the level of performance.

2. For the four groups of subjects utilized in this study, there were no significant differences on the dependent variable, the level of aspiration.

3. Evidence was revealed to support the hypothesis that the aspiration score is significantly related to the most recent knowledge of the performance level.

4. Evidence was revealed to support the hypothesis that the verbal expression of an expected score is significantly related to subsequent performance.

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LETTER TO SUBJECT

November 11, 1947

As a graduate student in physical education, I am conducting a research study for my master's thesis.

Your name was one of the forty names selected at random from the physical education major directory.

If you agree to participate in this study, you will be asked to act as an emergency driver in order to determine the relationship of mental and physical reaction conditions. The subject will require approximately seven different sports activities after the Thanksgiving holidays.

Would you indicate your willingness to participate in the study provided and leave this letter in my box in the mail room by the 15th of November?

APPENDIX

I will be a subject for your study.

I will not be able to participate in your study.

The first meeting will be held on _____ in the student lounge in the Coleman Building. The purpose of this meeting will be to answer any of your questions and to set a time for your testing. The meeting will begin at 5:00 P.M. and you should bring a notebook or your class notes. Your presence at this meeting will be appreciated.

Thank you for your cooperation.

Sincerely yours,

John Doe

LETTER TO SUBJECTS

November 11, 1965

Dear

As a graduate student in physical education, I am conducting a research study for my master's thesis.

Your name was one of the forty names selected at random from the physical education major students.

If you agree to participate in this study, you will be tested on an accuracy throw in order to determine the effectiveness of mental and physical practice conditions. The testing would require approximately seven fifteen-minute sessions after the Thanksgiving holidays.

Would you indicate your willingness to participate in the space provided and leave this letter in my box in the downstairs lobby in the Coleman building.

___ I will be a subject for your study.

___ I will not be able to participate in your study.

Our first meeting will be held on _____ in the student lounge in the Coleman building. The purpose of this meeting will be to answer any of your questions and to set a time for your testing. The meeting will begin at 8:30 P.M.; and you should bring a schedule of your classes with you. Your presence at this meeting will be appreciated.

Thank you for your cooperation.

Sincerely yours,

Myrna Stephens

PRACTICE APPOINTMENT

Schedule for _____

Group: _____

Place: _____

Time: _____

Dates: _____

wear gym suit and sneakers

LETTER TO SUBJECTS UNABLE TO ATTEND FIRST MEETING

THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

Department of Health, Physical
Education and Recreation

November 17, 1965

I have enclosed a schedule showing the dates that your group participates in the experiment. Would you please check the times that you could participate so that I can coordinate your schedule with the other subjects' schedules. Remember that the times you select should be possible participation times for each date given on the schedule.

After completing the information, please return the schedule to my box by Monday, November 22. I will select one of the times you have indicated and return the schedule to you.

Thank you for your cooperation and interest.

Myrna Stephens

INSTRUCTIONS FOR SECOND MEETING

Procedure: Greet the subject and ask her to take a position from which she can view the target. Read the instructions to the subject. Record scores and remind the subject of her next appointment and caution her not to discuss the experiment with anyone.

Instructions: "The purpose of this session is to allow you to become acquainted with the task that will be used in the experiment.

"On the wall in front of you there are three squares bounded by red tape. The smallest square is worth three points, the second largest square is worth two points, and the largest square is worth one point.

"You are required to stand behind this line until the ball leaves your hand. The throw must be an overhand throw and the object is to make the highest score that you possibly can.

"Today you will be allowed five warm-up tosses to me, and then ten practice trials at the target. Try to do as well as you possibly can, for I will record the last three practice trials for a score.

"Are there any questions about today's procedure?"

INSTRUCTIONS FOR THIRD THROUGH SEVENTH MEETINGS FOR M₁P₁

Procedure: Greet the subject and ask her to stand behind the line and take her five warm up tosses. Record the initial score for the first three balls tossed after the warm up tosses. Read the instructions for the practice session and for the obtainment of the expectancy score. Record the expectancy score and the score for the final three tosses. Remind the subject of her next appointment and caution her not to discuss the experiment with anyone.

Instructions: "Now you are ready to engage in nine practice trials. The condition of your practice trials indicates that you should repeat orally the 2x2 multiplication table up to 2x12 equals 24. Since you are to engage in nine practice trials, you should repeat the 2x2 multiplication table nine times. Start with 2x0 equals 0 and continue until you reach 2x12 equals 24. Do you have any questions? Then begin.

"At the last session you obtained a score of _____ for the last three balls that you threw. Before you throw the final three balls for a score for today's session, tell me what score you expect to obtain with the final three tosses."

INSTRUCTIONS FOR THIRD THROUGH SEVENTH MEETINGS FOR M₂P₁

Procedure: Greet the subject and ask her to stand behind the line and take her five warm up tosses. Record the initial score for the first three balls tossed after the warm up tosses. Read the instructions for the practice session and for the obtainment of the expectancy score. Record the expectancy score and the score for the final three tosses. Remind the subject of her next appointment and caution her not to discuss the experiment with anyone.

Instructions: "Now you are ready to engage in nine practice trials. The conditions of your practice trials indicates that you should close your eyes and imagine yourself throwing a ball at the target. Mentally rehearse the skill without allowing your arm to perform the throwing motion. Tell me the score that you obtain on each throw. You have nine practice trials so you will imagine yourself performing the skill nine times. Tell me your score after each throw. Do you have any questions?"

"At the last session you obtained a score of _____ for the last three balls that you threw.

Before you throw the final three balls for a score for today's session, tell me what score you expect to obtain with the final three tosses."

The initial score for the first three balls would allow the user to know. Then the instructions for the previous session are for the development of the expectancy score. Record the expectancy score and the score for the final three tosses. Discuss the subject of expectancy and making the subject of the next experiment and making the subject of the next experiment with anyone.

Instructions: When you are ready to start in your practice trials. The objective of your practice trials indicates that you should repeat orally the multiplication table while throwing the ball at the target. Start with 2x2 equals 4, and continue with the multiplication table until the ball has hit the wall. When you are to throw three balls, you will start the 2x2 multiplication table when you throw the ball in your hand and you are facing the target. Stop reciting the multiplication table when the ball has hit the wall. Repeat this process five times. Do you have any questions? Good night.

INSTRUCTIONS FOR THIRD THROUGH SEVENTH MEETINGS FOR M_1P_2

Procedure: Greet the subject and ask her to stand behind the line and take her five warm up tosses. Record the initial score for the first three balls tossed after the warm up tosses. Read the instructions for the practice session and for the obtainment of the expectancy score. Record the expectancy score and the score for the final three tosses. Remind the subject of her next appointment and caution her not to discuss the experiment with anyone.

Instructions: "Now you are ready to engage in nine practice trials. The condition of your practice trials indicates that you should repeat orally the 2×2 multiplication table while throwing the balls at the target. Start with 2×0 equals 0, and continue with the multiplication table until the ball has hit the wall. Since you are to throw nine balls, you will start the 2×2 multiplication table nine times. Begin reciting the multiplication table when you have the ball in your hand and you are facing the target. Stop reciting the multiplication table when the ball has hit the wall. Repeat this process nine times. Do you have any questions? Then begin.

"At the last session you obtained a score of ____ for the last three balls that you threw. Before you throw the final three balls for a score for today's session, tell me what score you expect to obtain with the final three tosses."

INSTRUCTIONS FOR THIRD THROUGH SEVENTH MEETINGS FOR M₂P₂

Procedure: Greet the subject and ask her to stand behind the line and take her five warm up tosses. Record the initial score for the first three balls tossed after the warm up tosses. Read the instructions for the practice session and for the obtainment of the expectancy score. Record the expectancy score and the score for the final three tosses. Remind the subject of her next appointment and caution her not to discuss the experiment with anyone.

Instructions: "Now you are ready to engage in nine practice trials. The condition of your practice trials indicates that you should close your eyes and imagine yourself throwing a ball at the target. Mentally rehearse the skill while actually performing the skill. Tell me the score that you obtain on each throw. Remember to keep your eyes closed. You have nine practice trials so you will mentally rehearse and actually perform the skill nine times. Tell me your score after each throw. Do you have any questions?"

"At the last session you obtained a score of ____ for the last three balls that you

threw. Before you throw the final three balls for a score for today's session, tell me what score you expect to obtain with the final three tosses."

SCORE CARD

Subject's Name:

Group:

Time:

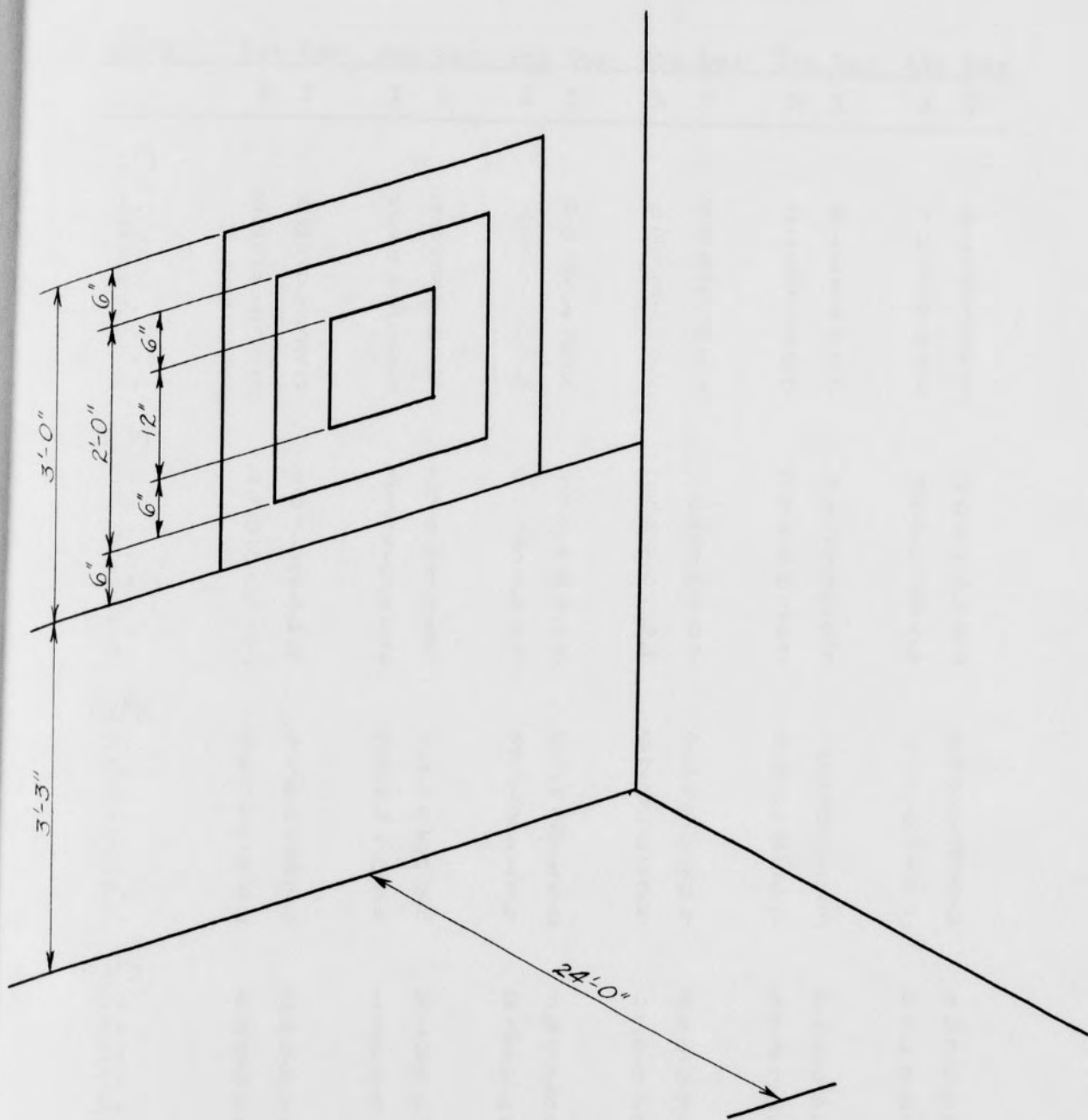
Performance Scores

Level of Aspiration Scores

	<u>X</u>	<u>Y</u>
1.	xxxxx	1.
2.		2.
3.		3.
4.		4.
5.		5.
6.		6.
7.		7.

1.	xxxxx
2.	
3.	
4.	
5.	
6.	
7.	

DIAGRAM OF TARGET SET UP



RAW SCORES
OF INITIAL (X) AND FINAL (Y)
PERFORMANCE SCORES FOR THE SIX SESSIONS

GROUP	1st Day		2nd Day		3rd Day		4th Day		5th Day		6th Day	
	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
M ₁ P ₁												
1.	8	6	5	4	3	6	6	5	8	2	5	6
2.	2	0	1	0	1	0	2	0	1	1	0	1
3.	3	5	4	5	2	3	3	0	3	5	3	3
4.	4	7	4	3	7	5	3	0	3	5	5	3
5.	1	3	3	7	3	1	3	1	6	4	7	3
6.	3	3	3	6	0	3	4	8	2	0	4	3
7.	8	2	5	7	7	5	7	8	6	7	3	5
8.	3	8	3	4	4	8	5	3	7	7	5	3
M ₂ P ₁												
1.	1	1	3	3	0	3	2	2	2	4	2	2
2.	3	6	3	7	4	3	6	6	4	1	5	6
3.	8	7	3	6	3	2	4	5	4	5	7	4
4.	3	6	7	6	5	4	7	8	8	5	4	4
5.	3	2	5	7	2	6	6	4	6	3	5	4
6.	5	5	4	3	4	4	5	9	3	5	2	4
7.	3	4	6	3	6	4	4	6	6	7	5	5
8.	3	4	2	5	3	9	4	7	7	5	4	6
M ₁ P ₂												
1.	5	4	5	5	3	5	6	7	5	3	6	4
2.	6	3	7	4	5	3	7	6	0	4	5	3
3.	5	6	6	4	1	4	3	6	5	3	7	8
4.	7	8	4	6	2	3	6	5	4	6	5	8
5.	5	3	5	5	6	7	6	7	2	5	3	3
6.	4	1	0	0	1	1	1	0	5	1	3	8
7.	6	7	9	7	5	5	7	8	6	7	8	8
8.	0	6	4	4	4	6	5	4	7	3	5	6
M ₂ P ₂												
1.	6	6	1	4	2	8	6	2	4	5	4	4
2.	6	4	3	1	3	4	7	4	7	4	8	4
3.	3	4	7	2	1	5	7	9	2	5	4	7
4.	6	8	8	8	9	7	8	9	5	6	9	8
5.	6	7	8	7	6	8	7	9	7	8	6	8
6.	7	5	3	6	5	5	8	3	7	8	5	7
7.	3	2	4	2	4	6	3	4	6	4	4	2
8.	0	4	4	1	3	3	3	1	2	1	3	2

RAW SCORES
OF LEVEL OF ASPIRATION FOR
THE SIX SESSIONS

GROUP	1st Day	2nd Day	3rd Day	4th Day	5th Day	6th Day
M₁P₁						
1.	8	6	5	6	6	5
2.	2	1	1	1	1	1
3.	4	5	5	4	3	3
4.	4	0	0	4	3	5
5.	2	3	4	1	5	5
6.	5	4	5	4	0	5
7.	5	5	5	0	0	5
8.	5	0	5	0	4	5
M₂P₁						
1.	2	3	2	3	3	3
2.	5	0	0	0	5	4
3.	7	7	7	0	0	0
4.	5	0	4	0	7	0
5.	5	4	4	4	4	0
6.	5	5	5	5	5	5
7.	7	5	5	4	5	0
8.	3	3	4	5	5	5
M₁P₂						
1.	7	6	5	5	6	5
2.	3	4	3	5	2	5
3.	7	6	6	0	0	0
4.	0	7	0	5	7	0
5.	0	4	5	2	2	2
6.	5	1	1	2	2	0
7.	5	7	7	7	7	0
8.	5	6	5	5	5	5
M₂P₂						
1.	5	7	6	7	6	7
2.	0	0	5	5	5	4
3.	4	5	0	0	0	0
4.	7	9	0	0	0	0
5.	7	8	0	9	0	0
6.	6	6	6	6	5	5
7.	4	0	4	4	3	3
8.	3	0	4	4	4	3