INFLUENCE OF KNOWLEDGE OF RESULTS

ON SOFTBALL THROW FOR ACCURACY

by

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A THESIS

Approved:

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Dean of the Graduate School

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by

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ABSTRACT

Defee, Erma M., Influence of Knowledge of Results on Softball Throw for Accuracy. Master of Arts, August, 1968, Sam Houston State College, Huntsville, Texas, 60 pp.

Purpose

The purpose of this study was to investigate the influence of knowledge or results upon the learning of a motor task. The specific problem was to determine if throwing a softball was enhanced through the use of a teaching aid which incorporated specific knowledge or results. A subproblem involved the evaluation of a target device as an indicator of throwing skill.

Methods

The methods used to examine the hypotheses set forth in this study included library investigation, controlled experimental examination, and statistical analysis.

The library investigation included a thorough examination of softball skill tests and practice devices. Literature concerning knowledge of results was also reviewed. The controlled experimental examination included the use of two groups of subjects. Defined practice sessions were set up for each group, and data were obtained through the use of judges' ratings scores and target scores. The statistical analysis included the use of coefficients of correlation and

t-tests for significant differences in the mean scores.

Findings

Within the limits and design of this study, the analysis of the data revealed consistently the following major findings:

1. No significant difference was noted between the practice programs involved in the study.

2. There was not a significant correlation between the target scores and the judges' ratings as used for evaluation of the throws.

Approved:

Supervising Professor

CHAPTER I

INTRODUCTION

Team sports are complex in design and demand not only many individual skills but also take into consideration the effects of the actions of other players and the immediate game situations. Because of this, excellence in performance in a team sport demands practice in each of these particular aspects. The teacher of team sports is constantly faced with problems as to the most efficient and effective way for the student to develop all the skills necessary. She is confronted with questions such as: Which skills should be taught first? (2) Which are the most important skills? (3) Which skills demand the most time to perfect? (4) Which skills must have constant teacher supervision? (5) Which skills can be made the responsibility of the student? This study is an attempt to look at problem five.

In order for an individual to improve his skill in a certain area, he must be aware of his abilities and weaknesses. He needs to determine whether or not immediate knowledge of results helps his awareness. If performance were measured immediately and these results known, would this facilitate his learning of specific skills?

The measuring of skills in team sports is difficult

because the performance of a single aspect of the game does not take into consideration the immediate game situations or the effects of the actions of other players. Each team sport has certain skills which are peculiar to that sport. This study chose to investigate softball and the skills that are important to that sport. Striking, catching, throwing, and running are important skills in softball. The throwing skills of girls are considered to be weak, and for that reason, the overhand softball throw was selected for study.

According to Meyer and Schwarz, throwing presents a special problem in softball in that the type of throw to be used varies with the kind of play, the place where the ball is recovered in relation to the body, and the distance of the next throw. Getting the ball to the proper base after fielding a hit is the important consideration. The fielder will often use an underhand whip or side arm throw when fielding a ball hit to the infield. However, the fielder will use the overhand throw when fielding a ball hit to the outfield.[1] In addition, Broer added that when speed and distance are required, the overhand throw is better because it involves many segments of the body.[2] Seaton, Clayton, Leibee, and

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[1]Margaret H. Meyer and Marguerite M. Schwarz, Team Sports for Girls and Women (Philadelphia: W. B. Saunders Company, 1957), p. 276.

[2]Marion Broer, Efficiency of Human Movement (Philadelphia: W. B. Saunders Company, 1966), p. 216.

Messersmith agree on the importance of the overhand throw by adding that more accuracy can be acquired when throwing from the outfield by using the overhand throw.[3]

A number of practice devices or skills tests are available for practice and for determining skill level for pitching, fielding, catching, base running, throwing for distance, and throwing for accuracy. Very few practice devices are available for aiding in the development of skill in batting, and no skill tests, teaching aids, or practice devices are available for an accuracy throw requiring a bounce on the playing field.

Because the need for such a practice device existed, an attempt was made to devise a target which determined the degree of accuracy of a softball throw from the outfield. The target-type device was incorporated into the situation in order that knowledge of results could be used to the greatest degree possible. Cratty stated that knowledge of results may come in the nature of verbal information, visual confirmation of accuracy, speed, or some other success criterion, or through the feel of a successfully completed movement.[4] Oxendine stated that an awareness of

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[3]Don Cash Seaton, Irene A. Clayton, Howard C. Leibee, and Lloyd Messersmith, Physical Education Handbook (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1959), p. 192.

[4]Bryant J. Cratty, Movement Behavior and Motor Learning (Philadelphia: Lea & Febiger, 1964), p. 262.

one's performance is important because it tends to motivate one to continue work on the task at hand. In addition, he observed that a greater understanding of performance and the making of necessary adjustments apparently resulted when subjects were able to personally observe the results.[5] Singer added that without knowledge of results, improvement of a motor skill cannot occur and that in those activities where visual results constitute the major source of knowledge or results, performance is improved through being able to see how one has done.[6]

In this particular study, visual knowledge of results in relation to throwing accurately at the target was used. Only the subjects in the experimental group practiced with the use of the target; therefore, knowledge of results was utilized to a greater extent by this group.

Statement of the Purpose

The purpose of this study was to investigate the influence of knowledge of results upon the learning of a motor task.

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[5]Joseph Oxendine, Psychology of Motor Learning (New York: Appleton-Century-Crofts, 1968), pp. 57-58.

[6]Robert N. Singer, Motor Learning and Human Performance (New York: The Macmillan Company, 1968), p. 186.

Statement of the Problem

The specific problem of this study was to determine if throwing was enhanced through the use of a teaching aid which incorporated specific knowledge of results.

Scope and Limitations of the Study

The scope of this study is bounded by the subjects used, the task employed, length of the learning period, and the learning situation itself.

The subjects were limited to twenty-six women physical education majors at Sam Houston State College who volunteered for the study. It was assumed that they were normal, healthy young women free from any handicap which might bias the findings. In addition, it was assumed that the subjects were serious and diligent in their desire to learn, and that the learning situations were the best and most constant available for the experimental conditions. It was recognized however, that as in most experimental situations, some unaccountable factors could have affected the variability of the performance scores.

Procedure

The subjects were divided into two groups. Thirteen subjects composed the experimental group and thirteen subjects composed the control group. Each subject in the

experimental group was matched with a subject in the control group based on judges' ratings. Both groups participated in practice sessions of twenty minutes duration for twelve days. The first and twelfth day was devoted to testing the subjects. Each subject was rated by each of three judges on five overhand throws and scored on twenty trials at the practice device target. During the practice sessions, the experimental group practiced using the target.

Definition of Terms

In an attempt to clarify intended meanings of words used in this study, the following terms are defined:

Judges' rating. A subjective rating based on criteria set up for determining skill in accuracy and form of an overhand softball throw.

General knowledge of results. Type of knowledge of results utilized by control group. Subject was able to see whether or not she was successful in throwing the softball in a general way.

Practice session. A period of time twenty minutes in length on each of twelve days used for practice of the overhand softball throw by the experimental and control groups.

Practice device target. The practice device under consideration in the present study.

Specific knowledge of results. Type of knowledge of results utilized by the experimental group. The subject knew the degree to which she was successful by the point values which were recorded for each of her throws at the target.

Target cells. Areas of the target determined by dividing lines on the target.

Organization of the Remaining Chapters

Chapter II contains a review of literature related to the present study. A description of the procedure, subjects, practice device target, judges' ratings, and statistical design is presented in Chapter III. Chapter IV includes an analysis of the data. Chapter V contains a discussion and interpretation of the findings, conclusion, and recommendations for further study.

CHAPTER II

REVIEW OF LITERATURE

As stated in Chapter I, team sports are complex in design and contain a number of individual skills. Before an individual can gain satisfaction and enjoyment from participation in a team sport, he must master, to a certain degree, skill in the various aspects of the sport. The teacher of team sports is constantly searching for ways in which to help the student improve his skill. Skills tests, teaching aids, and practice devices are available for use in improvement of skill in many aspects of team sports. The present study investigated skills which are important to softball and the practice devices which are available for use in improvement of these skills. Since no studies concerning softball practice devices have been found that specifically deal with an overhand softball throw involving a bounce on the infield, this aspect of softball skill was chosen for investigation.

Practice devices or skills tests which could be used in practice have been devised for (1) determining skill in throwing for distance using an overhand throw, (2) determining skill in throwing using an overhand throw associated with some other aspect of softball or involving throwing for

time, and (3) determining skill in throwing at a wall or ground target using an overhand throw. The following are descriptions of the practice devices and skills tests which are closely related to the present study.

Scott and French reported a throw for distance test involving an overhand throw. The player is limited to one step which must be taken behind a restraining line. Three throws constitute one trial, and only the best of the three is measured and recorded. Three trials (nine throws in all) are allowed.[1]

A throw for distance test reported by Barrow and McGee is a test item in the Peacock Achievement Scales in Physical Education Activities for Boys and Girls. The testee may stand any distance he chooses behind the restraining line. In making his throw, he may run up to the line but not cross it. Each subject is permitted four throws but only the longest is measured and the first is a practice throw.[2] Barron and McGee presented an additional throw for distance test in the Fringer Softball Battery. This particular test allows the subject to take one step but he must release the

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[1] M. Gladys Scott and Esther French, Measurement and Evaluation in Physical Education (Dubuque, Iowa: Wm. Brown Company Publisher, 1959), p. 203.

[2] Harold M. Barrow and Rosemary McGee, A Practical Approach to Measurement in Physical Education (Philadelphia: Lea & Febiger, 1966), p. 174.

ball before stepping over the restraining line. Three successive throws are made, and the best one is recorded.[3]

The American Association of Health, Physical Education, and Recreation in its Youth Fitness Manual reported a throw for distance test in which the subject remains within two restraining lines six feet apart and throws a regulation softball as far as possible. Any number of steps may be taken in making the throw provided the subject remains in the restraining area. Three trials are permitted and taken in succession. Only the farthest throw is marked.[4]

Palmer suggested a throw for distance test which uses home plate as a target. The subject starts throwing from a base and progresses into the field up to a distance of one hundred forty feet from home plate.[5]

Basically all the throw for distance tests were the same with variations existing only with the number of steps taken before the throw was made. However, the Palmer test required the subject to throw from the outfield to home plate.

A large number of skills tests or practice devices were

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[3]Ibid., p. 306.

[4]American Association for Health, Physical Education and Recreation, Youth Fitness Manual (Washington, D. C.: AAHPER, 1962), p. 11.

[5]Gladys E. Palmer, Baseball for Girls and Women (New York: A. S. Barnes and Company, 1929), p. 52.

found measuring the overhand throw skill associated with some other softball skill or involving throwing for time. Scott and French reported a repeated throws test used to determine skill in throwing. The subject stands behind a fifteen foot restraining line and throws the ball above a seven and one-half foot line as many times as possible in thirty seconds. Six trials are given with a rest of two minutes between trials. One point is counted each time the ball hits on or above the seven and one-half foot line. The score for the entire test is the total of six trials of thirty seconds each.[6] O'Donnell also included a repeated throws test in his battery of tests which is similar to the one suggested by Scott and French.[7]

The Latchaw Motor Achievement Tests include an additional repeated throws test. The test requires the subject to stand within a throwing area fifteen feet from the wall target which is five and one-half feet wide and ten feet high and throw overhand at the target which is six inches from the floor. The subject throws the ball into the target area and catches the ball on the rebound either on the fly

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[6]Scott and French, Measurement and Evaluation in Physical Education, pp. 199-200.

[7]Carlton R. Meyers and T. Erwin Blesh, Measurement in Physical Education (New York: The Ronald Press Company, 1962), p. 365.

or bounce and continues to throw for fifteen seconds. Two trials are given. The final score is the number of times the ball hits within the target area when thrown overhand from a position within the throwing area.[8]

Scott and French presented a fielding-throwing test involving a concentric circle target similar to the throw for accuracy test devised by O'Donnell. However, Scott and French added the fielding component which consists of fielding a ball rebounding from a wall and throwing to the target on an adjacent wall.[9] The Fringer softball Battery as reported by Barron and McGee, included a fly ball test which involves fielding a fly ball and throwing to a wall target. Also included in the Fringer Battery, as reviewed by Barron and McGee, is a skill test devised to measure the ability to field grounders, to run quickly to a base, and to throw quickly to a target with accuracy.[10]

Palmer suggested an accuracy throw test using concentric circles. The target is located five feet from the ground. The subject stands at different distances to throw

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[8]Marjorie Latchaw, "Measuring Motor Skill in Fourth, Fifth, and Sixth Grades," The Research Quarterly of the American Association of Health, Physical Education, and Recreation, Vol. 25 (December 1954), p. 442.

[9]Scott and French, Measurement and Evaluation in Physical Education, pp. 204-206.

[10]Barron and McGee, A Practical Approach to Measurement in Physical Education, pp. 304-306.

at the target, the first distance being from one base to another, and the second distance from first to third base.[11]

Several skills tests for determining accuracy of an overhand softball throw using a wall target were found. O'Donnell devised a test to determine accuracy independent of other softball skills with his overhand accuracy throw test. The test involves a throw from behind a forty-five foot restraining line to a target drawn on a wall with the center five feet from the floor. The target consists of concentric circles with radii of thirty-eight, twenty-one eleven, and three inches, scoring one, two, three, and four respectively. The score is the total points scored on ten trials.[12]

Rodgers also suggested a test similar to the O'Donnell test which measures accuracy of an overhand softball throw not dependent on other softball skills.[13] Brophy also devised a target for testing accuracy in throwing. The subject stands twenty-four feet from a wall target with a total

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[11]Palmer, Baseball for Girls and Women, pp. 49-50.

[12]Meyers and Blesh, Measurement in Physical Education, p. 365.

[13]Elizabeth G. Rodgers and Marjorie L. Health, "An Experiment in the Use of Knowledge and Skill Tests in Playground Baseball," Research Quarterly of the American Association of Health, Physical Education and Recreation, Vol. 2 (December, 1931), p. 115.

radius of thirty-three inches. The number of trials taken can vary according to the teacher giving the skills test.[14]

Summary

Chapter II presented a review of literature of skills tests or practice devices involving an overhand softball throw. Practice devices or skills tests were reviewed which could be used in practice for (1) determining skill in throwing for distance, (2) determining skill in throwing associated with some other aspect of softball or involving throwing for time, and (3) determining skill in throwing using a wall or ground target.

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[14]Kathleen Brophy, "A New Target for Accuracy in Throwing," Baseball and Volleyball, Spalding's Athletic Library (New York: American Sports Publishing Company, 1937), pp. 34-35.

CHAPTER III

PROCEDURES

This study was an attempt to develop a practice device or teaching aid which would enhance the development of accuracy of a softball throw from the outfield and to ascertain if practice with such device resulted in better performance. In order to investigate this, it was necessary to: (1) develop the target for the practice device, (2) develop procedure for a program of instruction, (3) select the students to be used, (4) set up an evaluation procedure, and (5) determine the technique for treating the data. These aspects of the study are explained in this chapter.

Development of the Target

Criteria for Development of the Target

The criteria used for development of the target apparatus included the following:

1. The target must be economical in cost.
2. The target must be portable.
3. The target must be constructed of material that is painted or colored so that it is easily visible.

4. A minimum of equipment must be used.

The criteria for target performance included the following:

1. Target scores must yield a high reliability in a pilot study.
2. The target scores must be a definitive measure of the amount of accuracy in throwing.
3. The target scores must be objective.
4. The target must be designed to yield standardized scores.
5. Administration of the test must be efficient and economical.
6. The target must yield a range of sources.

Development of the Target

After consulting physical education texts which defined good performance for throwing a softball to a base from the outfield and talking with physical education instructors who teach softball, a wall target was established. The wall target was established at the point where arbitrary horizontal and vertical references bisected thirty inches from the floor. The horizontal reference was extended ten feet on either side of the vertical reference. The vertical reference was extended downward to the floor and upward for a distance of ten feet.

A restraining line was drawn on the floor eighty feet from the wall target. This line of direction coincided with the vertical reference on the wall. The line of direction was also used as the vertical reference for the area in front of the wall target on the floor. An arbitrary horizontal reference which crossed the vertical reference fourteen feet from the wall was then drawn.

Ten women physical education majors volunteered to throw softballs so that they would bounce on the floor and into the wall target. Each subject threw ten balls. They threw at a distance of eighty feet from the target. No instructions were given regarding the exact spot the ball should bounce on the floor.

Since new regulation softballs were used, determining the points of contact on the floor was not difficult. As each ball bounced on the floor, a white mark was made. Pieces of masking tape, identifying the subject and number of throw, were placed on the point on the floor where each ball hit. Pieces of masking tape with corresponding numbers to those placed on the floor were placed on the wall target to identify each ball that hit the wall with its bounce on the floor. Three judges were used to determine the point of contact on the wall target. The points of contact on the wall target and the floor were then recorded by subject and number of throw using the vertical and horizontal references

given earlier. Balls striking either the wall or floor above or in front of the horizontal reference were designated as negative. All balls hitting to the right of the line of direction were recorded as being right of the vertical reference. Balls hitting to the left of the line of direction were recorded as being left of the vertical reference.

All points of contact were then plotted on graph paper to show the distribution of hits on the wall and floor. Hits on the wall within one foot in all directions from the point where the vertical and horizontal references bisected on the wall thirty inches from the floor were plotted on a separate graph. The points of contact of the bounced balls on the floor which corresponded to the balls hitting in the area on the wall were also plotted. The graph of the hits on the floor was used to determine the center cell of the practice device target.

Description of the Target

The graph which was plotted showing the points of contact on the floor corresponding to the hits within a two foot area of the center of the wall target was used to determine the dimensions of the center cell of the practice device target. The target consisted of three depth cells and five lateral cells. The deviations in depth and left and

right lateral deviations were graded. This gradation was based on the assumption that it was more important to discriminate between balls bouncing further away from the center of the target laterally than in depth.

The center cells (both laterally and in depth) were ten feet long and three feet wide. The cells located on either side of the center cells were four feet long and three wide. The lateral deviations were determined by drawing lines from the eighty foot restraining line to points marking the three foot width of the cells in the center of the target.

The practice device target was eighteen feet long. The center of the target measured fifteen feet in width while the bottom of the target was thirteen feet wide, and the top was sixteen feet, eight inches wide. The values of the lateral cells, beginning at the left of the target were -1, -3, +5, +3, +1. From top to bottom, the depth cells were +1, +3, -1.

Analysis of the Target

In order to determine the reliability of the target, the following procedure was used.

Thirty-two sophomore women physical education majors volunteered for the study. The practice device target was located in front of home plate with the center of the target

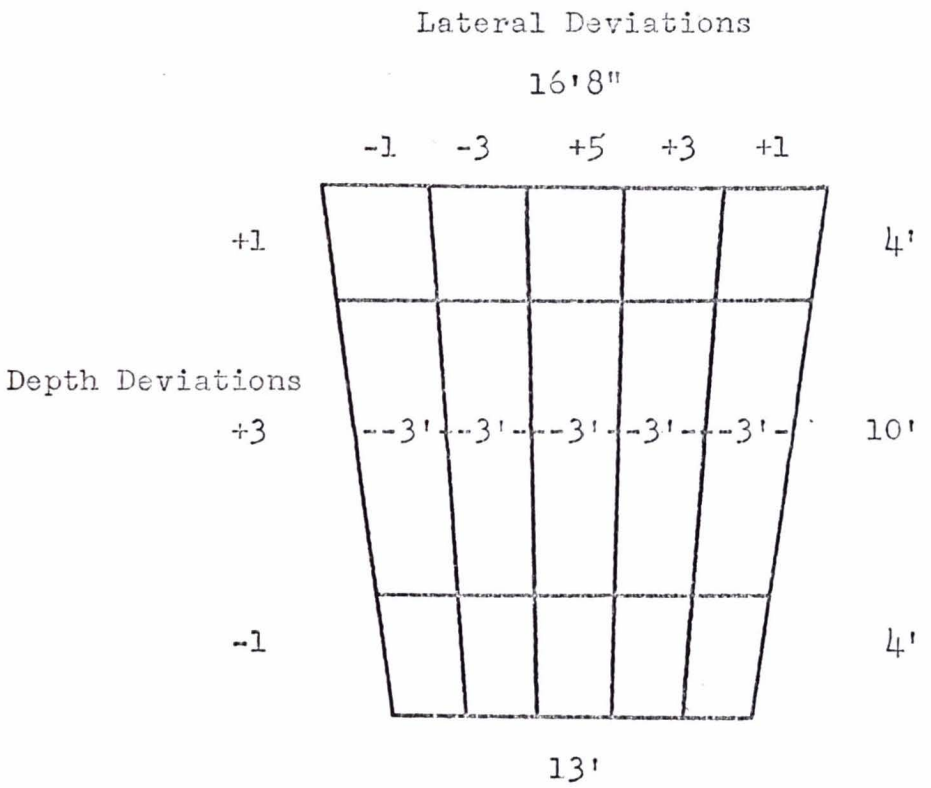

FIGURE 1

PRACTICE DEVICE TARGET BEFORE REVISIONS

sixty-nine feet, three inches from the throwing line. The test was administered indoors in the gymnasium.

The following instructions were read to the subjects taking the test: "The test subject shall stand in a designated spot sixty-nine feet, three inches from the center of the target. She is allowed to warm up by throwing three practice balls at the target. She will then throw ten balls, overhand, attempting to hit the target. Balls which are overthrown or bounce before they reach the target are considered a miss-trial and shall be repeated immediately. Balls hitting on a line shall be given the higher value." A replica of the target was used as a score card. The trials were plotted on the target. The score was determined for each of the trials by checking the depth deviations on the left and right and the lateral deviations on the top of the target.

In order to give each subject a total score, the plus and minus signs were disregarded, and the sum of the two scores was used for each trial. The higher the score on the test, the better it is.

Following collection of the data, the Pearson r was computed on split halves to estimate the reliability of the practice device. A low coefficient was obtained, and it was evident that revisions were necessary.

The dimensions of the lateral cells were revised so that there were three lateral deviations instead of five. The cells were five feet wide at the center of the target compared to the three feet width of the lateral cells in the target used previously. The scoring of hits on the target was also revised. Values differing by only one deviation were used. The lateral deviations, from left to right were scored -1, +2, +1. The depth deviations, scored from bottom to top of the target were given values of -1, +2, +1. This gives smaller numbers with which to work and eliminates the vast difference in scores of hits which lie in different areas of the target but only a few feet apart. In addition, the number of trials was increased to twenty.

The target was constructed of yellow nylon rope so that it would contrast with the playing area and could be easily seen. To further distinguish the center cell of the target, large wooden blocks were placed at each corner of the cell.

Following revisions, the practice device was administered six weeks later to the same subjects on two successive days outdoors. The directions for the practice device were typed out and read to the subjects. Each subject threw twenty balls, attempting to hit the center cell of the target. There was no rest between trials. A scorer recorded each subject's hits.

Following collection of data, reliability coefficients were estimated for the performances on day one and day two. A

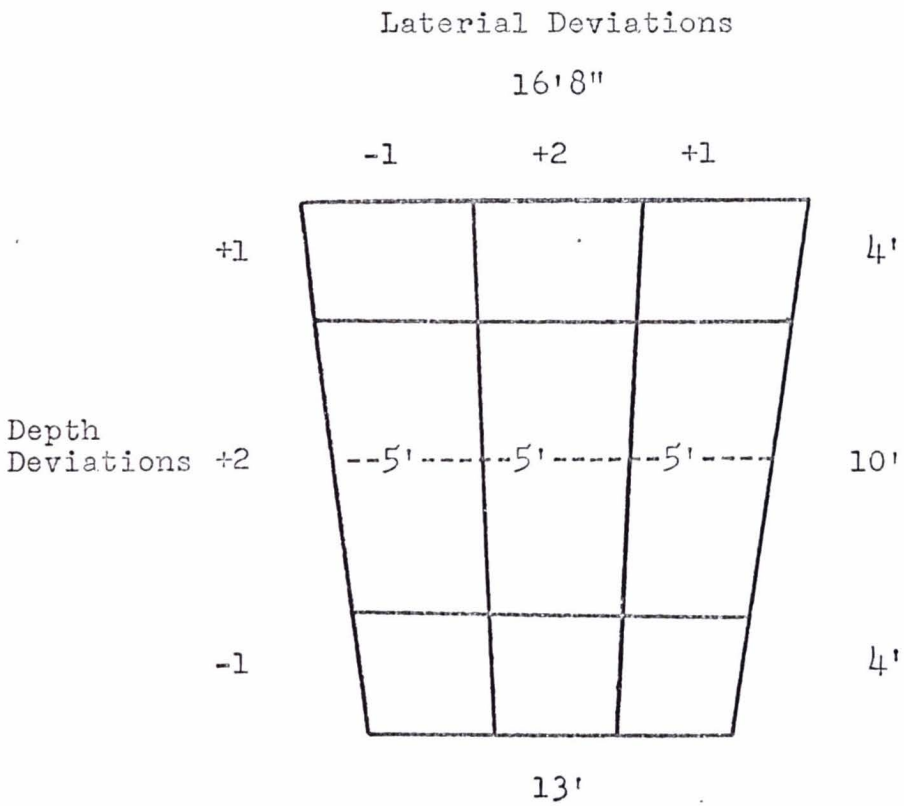

FIGURE 2

REVISED PRACTICE DEVICE TARGET

reliability coefficient of .50 was obtained for day one by using the split-halves method of estimating reliability and was increased to .66 by the application of the Spearman-Brown Prophesy Formula. The split-halves reliability coefficient obtained on day two was .81. It was increased to .90 by application of the Spearman-Brown Prophesy Formula. A between-day reliability coefficient of .67 was obtained by comparing the two days' performances. The coefficient was increased to .80 by the application of the Spearman-Brown Prophesy Formula.

The reliability coefficients obtained were not sufficiently high enough to warrant the use of the target device as a skills test to measure the accuracy of a softball throw from the outfield to a base. However, the coefficients obtained indicated the possibility that the target would be of value used as a practice device or teaching aid.

Development of Program of Instruction

Twenty-six undergraduate women physical education majors attending Sam Houston State College, Huntsville, Texas, participated in the present study. Enlistment of their services was obtained on a voluntary basis. For the purpose of this study, the subjects were divided into groups of thirteen subjects each. The group experimenting with the practice device was designated as the experimental group while the remaining

thirteen subjects were classified as the control group. Each subject in the experimental group was matched with a person in the control group. The matching of the pairs was administered as recommended by Guilford[1] and was based on judges' ratings.

Each group participated in twelve lessons of twenty minutes duration. The first lesson for each group was devoted to pre-testing the groups using the practice device target under consideration in this study. The experimental group continued to practice throwing from the outfield using the target while the control group practiced throwing without the target. The twelfth lesson for each group was used to post-test the group using the practice device target.

The twelve lessons of twenty minutes duration were selected on the basis that this was the approximate block of time spent on the skill of throwing from the outfield in a nine weeks softball unit. This approximation is based upon the best information available.

The specific lesson plans for the experimental and the control groups can be found in Appendix A of the present study. The target type device which was used in the daily practice

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[1]J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, Inc., 1956), p. 190.

sessions by the experimental group was situated in front of the designated base in such a manner that a ball hitting in the center cell could be fielded by the baseman playing that particular position.

Selection of Subjects

Criteria for Selection of Subjects

The criteria for selection of subjects included the following:

1. The subjects must be women physical education majors.

2. The subjects must have completed instruction in a softball course for physical education majors or have advanced beyond the beginning stage of softball skills.

3. The subjects must have achieved a level of proficiency of seventy feet or better in the softball distance throw.

4. The subjects must be able to participate in all the practice sessions.

5. The subjects must be volunteers.

Description of Subjects

Twenty-six women physical education majors attending Sam Houston State College, Huntsville, Texas, participated in the study. Enlistment of their services was made through major

physical education classes and was obtained on a voluntary basis. The subjects were classified as freshmen through seniors. They were assumed to be in good health and free from restricting defects.

Evaluation of the Throw

Criteria for Selection of Judges for Rating Subjects

1. The judges must be sports specialists with a background of analysis of sports skills.

2. The judges must have taught softball on the college level or have participated in softball on a competitive basis.

Judges' Rating Technique

Subjects in both the experimental and control groups were rated by each of three judges. Each subject took ten warm up throws at twenty yards and ten throws at a distance of thirty yards. To be rated by the judges, the subject stood within a ten foot approach area and threw five balls, overhand, to a catcher situated behind home plate, one hundred feet from the restraining line. Each subject had five trials. The subjects were instructed to throw the ball in such a manner that it would bounce in front of the catcher.

The three judges sat behind the restraining line in such a position so that they could not converse or in any way be

influenced in their ratings. The judges rated every subject on each of five throws. The throw was rated on the following criteria:

(1) Form

(2) Effectiveness

(3) Speed

The criteria for the throw are discussed and described further in Appendix B of the present study.

The subjects were rated by the scoring of numerical values from one to five for each throw. The lowest score possible was one, while the highest possible score was five on each throw. The composite score for each subject was the sum of the five throws recorded by each of the three judges. Appendices C and D of the present study contain the explanation of the scoring of points and the score sheets used by the judges.

Evaluation of Target Hits

In an attempt to examine the ability of the target to discern the throwing abilities as measured by the judges, the subjects in both groups were tested using the target device. Each subject performing the task stood in a designated spot, picked up a ball, and threw at the target using an overhand throw. Twenty trials were taken. Trials which failed to hit the target or those which were overthrown were scored zero.

A judge was used to record the hits on score cards which were replicas of the target. The score was determined for each of the trials by checking the depth deviation on the left and right and the lateral deviation on the top of the score card. Balls hitting on a line were given the higher value. Balls hitting in the center cell received the highest score on each trial.

A composite score was needed and was obtained by disregarding the plus and minus signs on the score cards. The sum of the two scores was used for each trial.

Treatment of Data

The raw scores obtained from the judges' ratings and the target scores were recorded and treated statistically in order to facilitate the interpretations of the findings. Pearson's Product Moment Coefficients of correlation as given by Guilford[2] for relationship analysis were computed. The t-test was used to determine the significance of the means of the groups. These computations were then analyzed and interpreted. Acknowledgement is given to Sam Houston State College Data Processing Center for assistance in the completion of this portion of this study.

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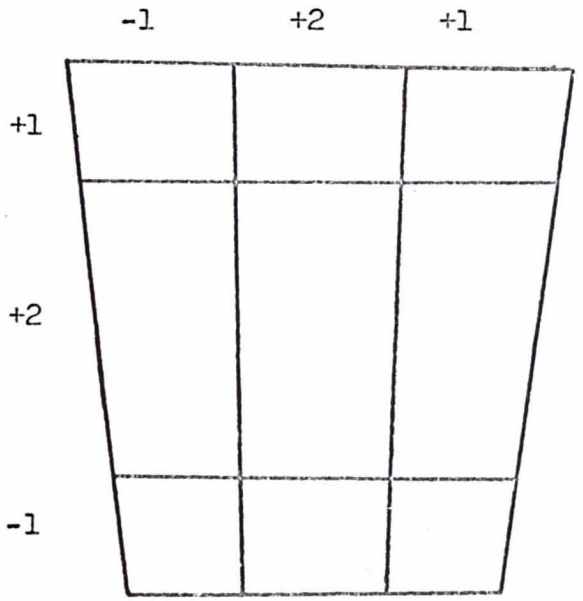
[2] *Ibid.*, pp. 138-141.

Name SOFTBALL PRACTICE DEVICE (Pre Test)

(Outdoor)



1._____ 2._____

3._____ 4._____

5._____ 6._____

7._____ 8._____

9._____ 10._____

11._____ 12._____

13._____ 14._____

15._____ 16._____

17._____ 18._____

19._____ 20._____

Total

FIGURE 3

SCORE CARD FOR TARGET HITS

Summary

Procedures used in the development of the present study have been presented in this chapter. The development of the target, development of the program of instruction, the selection of the subjects, the evaluation of the target hits and judges' ratings, and the treatment of the data were presented in this chapter.

CHAPTER IV

ANALYSIS, INTERPRETATION, AND TREATMENT OF FINDINGS

This investigation attempted to determine if practice with the use of a teaching aid or practice device resulted in better performance than did practice without the use of the device.

In order to examine the effects of practice utilizing specific knowledge of results, the data were analyzed for significant relationships. Performance scores were used in the following analyses:

(1) to consider the differences in the scores of the two groups.

(2) to examine the relationships between the target scores and the judges' ratings.

The last portion of this chapter is devoted to a discussion of findings.

Differences in Scores of Groups

In order to determine the differences in the scores of the two groups after practice, the Pearson product-moment coefficient of correlation was computed between the experimental group and the control group using each of the scoring systems. The t-test for significance of the mean difference

was computed, and the level of confidence found for either group did not reach the acceptable level of .05 as reported by Guilford.[1] The data are found in Table I on page 34.

Relationships of Judges' Ratings and Target Scores

In order to analyze the relationship of the judges' ratings scores and the target scores, the scores for the two groups for day one and day twelve were correlated. The Pearson product-moment coefficients or correlation showing the relationships of the judges' ratings to the target scores ranged from .637 to .302. The correlation coefficients obtained failed to reach the acceptable level of dependability reported by Guilford.[2] The data obtained for target scores and judges' ratings for day one and day twelve can be found on Tables II and III on pages 35 and 36.

Discussion of the Findings

As was indicated in the review of literature, knowledge of results is an important determinant in the learning of motor skills. For the purpose of this study, a visual type

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[1] J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, Inc., 1956), pp. 138-141.

[2] Ibid.

TABLE I

DATA OBTAINED FOR EXPERIMENTAL AND CONTROL GROUPS FOR TARGET SCORES AND JUDGES' RATINGS FOR DAY TWELVE

Item	Sum	Mean	SD	r	t
JUDGES' RATINGS					
Experimental Group	699.0	53.769	7.777	-0.034	.781
Control Group	661.0	50.846	10.575		
TARGET SCORES					
Experimental Group	485.0	37.308	9.219	0.422	.020
Control Group	486.0	37.385	14.944		

TABLE II

DATA OBTAINED FOR EXPERIMENTAL AND CONTROL GROUPS FOR TARGET SCORES AND JUDGES' RATINGS FOR DAY ONE

Item	Sum	Mean	SD	r
EXPERIMENTAL GROUP				
Judges' Ratings	591.0	45.462	10.924	
				0.637
Target Scores	453.0	34.846	14.330	
CONTROL GROUP				
Judges' Ratings	593.0	45.615	10.972	
				0.315
Target Scores	454.0	34.923	12.755	

TABLE III

DATA OBTAINED FOR EXPERIMENTAL AND CONTROL GROUPS FOR TARGET SCORES AND JUDGES' RATINGS FOR DAY TWELVE

Item	Sum	Mean	SD	r
EXPERIMENTAL GROUP				
Judges' Ratings	699.0	53.769	7.777	.053
Target Scores	484.0	37.308	9.219	
CONTROL GROUP				
Judges' Ratings	661.0	50.846	10.575	.302
Target Scores	486.0	37.385	14.944	

of knowledge of results was used in which definite and specific information was made available for the performer.

The fact that no significant difference in scores was found when use was made of specific knowledge of results could be attributed to several factors.

First, the number of practice sessions and the length of each session possibly could have been of insufficient length to warrant marked changes in the scores. Skill comes slowly at this level of achievement, and short sessions may have prevented notable progress.

Second, the target itself offered several clues for variability within the scores. The inability of the subjects to see the target clearly when practicing their throws for it could have caused the insignificant improvement in scores. It is also possible that the target device itself needed improvement or adjustment in the area of the cells, the scoring of points, or location of the target from the throwing line.

Third, the inclement weather conditions during the practice sessions and on the twelfth day could have affected the accuracy of the throws at the target. This was an unfortunate but uncontrollable problem. The difficulty here was increased because of the variability of conditions within a single day.

Fourth, lack of complete control over motivational

factors such as interest the subjects had in the study, their ability to perform the task, and the importance they placed on the study could have influenced their overall performance.

Fifth, the control group used general knowledge of results in that the subjects threw to specific bases and knew in a general way if they were hitting the target. It could be possible that this was not decisively different from throwing at the target. In addition, the level of skill of the group may have partially determined the effectiveness of specific knowledge of results. Higher levels of skill possibly can make independent interpretations and adjustments in throwing errors while lower levels of skill need more specific information.

The inconsistency caused by the subjectiveness of the judges' ratings as well as the inability to get all the subjects to throw the same for the judges and the target could have accounted partially for the low correlation between the two groups of scores.

The findings of this study seem to indicate that no significant changes in scores resulted when specific knowledge of results was used. There was not a high relationship between the target scores and the judges' ratings. However, the factors which might have influenced the outcomes must be taken into account when evaluating the effectiveness of the

target-type device under consideration in this study. Use of this device is seriously questioned, but there may be some value found for its use when the teacher must relegate independent practice while she works with other students on other skills.

Summary

This chapter included a discussion of the findings of this study. The relationships between the target scores and the judges' ratings and the differences in the scores of the two groups were scrutinized. Factors which might have influenced the outcomes of the study were presented and discussed.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The present study was undertaken to determine if practice with a teaching aid or practice device resulted in better performance than did practice without the device.

Twenty-six women physical education majors volunteered to participate in the study. Thirteen subjects composed the experimental group, and thirteen subjects composed the control group.

Both groups participated in twelve practice sessions of twenty minutes duration each. On the first and last day of the practice sessions, each subject was rated by each of three judges on five overhand softball throws and scored on twenty trials at the practice device target.

The Pearson product-moment coefficients of correlation were computed. The t-test was used to determine the significance of difference in the means of the two groups.

Data obtained from the target scores and judges' ratings were tabulated and analyzed. The findings, conclusions, and recommendations for further study are presented in this chapter.

Major Findings

The analysis of the data revealed consistently the following major findings:

1. No significant difference was noted between the practice programs involved in the study.

2. There was not a significant correlation between the target scores and the judges' ratings.

Conclusion

Within the limits and design of this study, it was concluded that specific knowledge of results does not appear to be more significant in learning than does general knowledge of results.

Recommendations

The following recommendations are made for further investigation in the study of improvement in skill performance with and without the aid of a practice device:

1. Conduct a more extensive study along the lines of the present study utilizing a greater number of practice sessions of longer duration and a larger sample.

2. Conduct a study making use of an elevated target.

3. Conduct a study involving the use of the overhand throw using elementary school children who have not established patterns of throwing.

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APPENDIX A

LESSON PLANS

Experimental Group

Day One

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Pre-test each subject using the target-type device. Subject attempts to hit the center cell of the target. Twenty throws are required.

3. Judges rate each subject on five overhand throws according to form, accuracy, and speed of the ball.

4. All subjects are to be rated by judges before throwing at target.

Day Two

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Each subject throws fifteen balls for maximum distance.

Day Three

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide the subjects into two groups. One group continues to work on throw for distance while the other group tosses at the target. Each subject working with the target stands one hundred feet from the target and throws ten balls attempting to hit the center cell. When each subject has thrown ten balls, she exchanges places with a subject in the group throwing for distance and practices on throws for distance.

Day Four

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups. One softball diamond and one target required for each group. Each subject throws five balls overhand at the target situated at home plate from any spot in right field, five balls from any spot in center field, and five balls from any spot in left field, moving from right to left as five balls are thrown.

Day Five

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as in Day Four. Use two softball diamonds and two targets. Each subject in each group shall field eight fly balls which are hit to her in center field and throw at the target which is situated at second base.

Day Six

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as in Day Four. Use two softball diamonds and two targets. Each subject in each group shall field eight fly balls which are hit to her in left field. The subject shall throw at the target as in Day Five with the exception of the target being situated at first base.

Day Seven

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as Day Four. Each subject shall field eight ground balls which are hit to her and throw at the target situated at third base.

Day Eight

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as Day Four. Each subject shall field eight ground balls which are hit to her

and throw from any place in the out field and throw at the target situated at home plate.

Day Nine

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as Day Four. Each subject shall field eight fly balls from any spot in the out field and throw to the base designated by the hitter. The target will not be used.

Day Ten

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as Day Four. Each subject shall field eight ground balls from any spot in the out field and throw to the base designated by the hitter. The target will not be used.

Day Eleven

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide subjects into two groups as Day Four. Each subject shall field eight balls which may be either flys or ground balls from any spot in the out field and throw to the base that is indicated by the hitter. The target will not be used.

Day Twelve

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Post test each subject using the target-type device. Subject attempts to hit the center cell of the target. Twenty throws are required.

3. Judges rate each subject on five overhand throws according to form, accuracy, and speed of the ball.

Control Group

Day One

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Pre-test each subject using the target-type device. Twenty throws are required. Subject attempts to hit the center cell of the target.

3. Judges rate each subject on five overhand throws according to form, accuracy, and speed of the ball.

4. All subjects are to be rated by judges before throwing at target.

Day Two

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Each subject throws fifteen balls for maximum distance.

Day Three

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Practice on distance throwing the same as for Day Two.

Day Four

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide the group into two sections. One softball diamond needed for each section.

3. Each subject shall practice throwing from any spot in the outfield to first, second, third, and home plate. She shall use an overhand throw and attempt to bounce the ball in front of each of the four bases. She shall throw three balls to each of the four bases, attempting to bounce the ball in front of the bases.

Day Five

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide the group into two sections as in Day Four. Each subject shall field eight fly balls which are hit to her, and using an overhand throw, throw two balls to each of the four bases attempting to bounce the ball in front of the base.

Day Six

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Each subject shall field eight fly balls which are hit to her and throw to each of the four bases as for Day Five.

Day Seven

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide the group into two sections as in Day Four. Each subject shall field eight ground balls which are hit to her and using an overhand throw, throw two balls to each of the four bases attempting to bounce the ball in front of the base.

Day Eight

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Each subject shall field eight ground balls which are hit to her and throw to each of the four bases as described for Day Seven.

Day Nine

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Divide the group into two sections as in Day Four. Each subject shall field eight balls which may be either flys or ground balls and throw to the base indicated by the hitter, attempting to bounce the ball in front of the base.

Day Ten

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Continue practice as for Day Nine.

Day Eleven

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Continue practice as for Day Nine.

Day Twelve

1. Warm up by tossing balls between partners. Toss ten balls from twenty yards and ten balls from thirty yards.

2. Post test each subject using the target-type device. Subject attempts to hit the center cell of the target. Twenty trials are required.

3. Judges rate each subject on five overhand throws according to form, accuracy, and speed of the ball.

APPENDIX B

CRITERIA FOR JUDGES RATINGS

Form--The form of an overhand softball throw was based on the following criteria:

(A) Grip--Hold ball between thumb and first two fingers, the third and fourth fingers resting against and slightly under the ball. The ball should be gripped with the fingers and not held in the palm of the hand.

(B) Throw--The player should stand in a forward-back stride position with the left foot forward. Shift weight to back leg and foot (right), rotate at the hips, bringing throwing arm behind head. The arm should be brought back as far as possible, the elbow bent at a right angle. Rotate the body around toward target. Bring arm forward with whipping action, beginning with the shoulder, then elbow, and ending with a snap of the wrist rolling the ball off the fingers. Throw hand forward as if reaching for the target.

(C) Release and Follow-through--Arm and whole body keeps moving in a full follow-through. Back leg (right leg) swings around into a balanced position receiving the body weight.

Effectiveness--The subject is required to bounce each throw in front of home plate. The effectiveness of the throw

is based on the subject's ability to bounce the throw to the catcher.

Speed of Throw--The subject was directed to throw the ball in such a manner that it would reach the catcher in the shortest time possible. This aspect of the throw was judged on the trajectory and speed of the ball, i.e., whether the ball was low and fast or high and "blooping."

APPENDIX C

Judges' Rating for Overhand Softball Throw

_____ 5 Excellent: Throw meets all specifications for good form and accuracy with no apparent errors.

_____ 4 Good: Throw gives a general impression of form but minor variations exist, the correction of which would improve the throw.

_____ 3 Average: Throw meets basic specifications but lacks smoothness, ease, and control in some respects.

_____1. Slight variations in proper grip which effects throw.
_____2. Improper stance.
_____3. Improper movements of throwing arm.
_____4. Follow-through not smooth and toward target.
_____5. Other_____.

_____ 2 Fair: Throw is inadequate and contains errors but indicates some control or merit.

_____ 1 Poor: Throw is recognizable but fails to meet the standard in practically every element involved.

APPENDIX D

Over Arm Softball Throw

JUDGE'S RATING FORM

TRIALS

Name	1	2	3	4	5	Total Score

Vita was removed during scanning