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THE EFFECTS OF FLASHMETER TRAINING ON THE ABILITY TO DETECT THE DIRECTION OF SPIN OF A PITCHED BASEBALL

Thesis for the Degree of M. A.
MICHIGAN STATE UNIVERSITY

Anthony C. Simone Jr.

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THE EFFECTS OF FLASHMETER TRAINING ON THE ABILITY TO DETECT THE DIRECTION OF SPIN OF A PITCHED BASEBALL

by

Anthony C. Simone Jr.

AN ABSTRACT OF A THESIS

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

MASTER OF ARTS

College of Education

Department of Health, Physical Education, and Recreation

1966

ABSTRACT

THE EFFECTS OF FLASHMETER TRAINING ON THE ABILITY TO DETECT THE DIRECTION OF SPIN OF A PITCHED BASEBALL

by Anthony C. Simone Jr.

Statement of the Problem

To investigate the effect of flashmeter training upon the ability of a batter in baseball to detect the direction of spin of a pitched ball.

Methodology

The study was initiated during the fall of 1965. Subjects used in the study were undergraduate physical education majors.

Three training techniques were used: flashmeter training, eye exercise, and isometric exercise. The subjects were not informed as to which group was the primary experimental group. The study was arranged so that the subjects were given a pre-test and matched on the results of this test. Then the three matched groups were trained for a five week period (14 sessions). At the end of the training a post-test was administered and the results compared for improvement.

Both the pre-test and the post-test, each of which consisted of ten pitches to each subject (5 fast balls, 5 curve balls) with

no set pattern, was administered in an indoor arena. The pitchers used were four varsity pitchers from the University team. The subjects indicated what they thought was thrown by pressing a button on a special bat devised for this study. The responses were right, wrong, or missed.

The flashmeter training consisted of flashing digits on a screen and requiring the subjects to record what was flashed. The eye exercise training involved the subjects closing their eyes and each one writing his name using his eyeballs. The isometric exercise training involved each subject holding a bat against an immovable object in three different batting positions for six seconds at each phase.

Conclusions

1. Flashmeter training in this limited study, did not significantly improve the ability of a batter to detect the direction of spin of a pitched ball.

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DEDICATION

This thesis is respectfully dedicated
to my Mother and Father

Mr. and Mrs. Anthony C. Simone

ACKNOWLEDGMENT

Thankful appreciation is extended to Dr. Wayne VanHuss and Coach Danny Litwhiler whose advice and assistance has made this study possible. Gratitude is also expressed to Coach Frank Pellerin, Mr. Sam Chaterjee, Mr. Thomas Tillman, Dr. William Heusner, Mr. David Anderson, Mr. Franklin Hartman, Mr. Ken Coutts, Mr. Stephen Harrington, and the pitchers and catchers who donated their time and effort.

A. C. S.

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CHAPTER I

INTRODUCTION

In baseball the skill of the player is dependent upon his ability to see movement, to interpret what he sees, and to react accordingly. The speed with which a player reacts will, in most cases, be a major factor deciding the outcome of a particular action.

It is stated that a fast ball travels from the pitcher's hand to home plate in approximately .43-.58 of a second. If the batter desires to swing at the ball, he must decide before the ball is from 22 to 30 feet from home plate, because it has been noted that it takes approximately .21 of a second to start and complete a swing in order to contact the ball properly.[6]

During the first 30.5 to 38.5 feet (distance from pitcher to home plate is 60.5 feet) the batter should be concentrating on the ball and attempting to interpret its spin, in order to determine whether it is a fast ball or a breaking ball. It is hoped that through flashmeter training the batter will be better equipped to visualize the spin of the ball and decide the type of pitch thrown. The important fractions of a second saved here will enable the batter to have more time to prepare his body for the proper execution of the swing.

Statement of the Problem

To investigate the effect of flashmeter training upon the

ability of a batter in baseball to detect the direction of spin of a pitched ball.

Importance of the Study

Stan Musial has stated he is able to see the spin of the ball directly after it leaves the pitcher's hand. It is also related in baseball circles that Ted Williams can read the label on a 78 rpm record while it is playing. Have these great hitting stars unknowingly trained their eyes to this high degree of perception? Can this result be accomplished through flashmeter training?

If these hitting stars have the ability to determine the spin of the ball directly after it leaves the pitcher's hand, they have a definite advantage in that they can quickly tell by the rotation if it is a fast ball, which spins with an upward rotation, or a breaking ball (curve), which spins with a downward rotation. Thus, they can adjust to the pitch sooner than the average batter, speed in adjusting being an important factor in hitting.

There could be various side effects that may be gained from this flashmeter training. It is hoped that the player will visualize more and interpret faster the plays that arise in baseball—for example, the ability of an infielder to see at a glance the position of base runners and the ball as well, after committing an error, and thus reacting faster.

Purpose of the Study

The purpose of this study was to determine if it is possible to improve through visual training the ability of a batter to distinguish between a fast ball and a curve.

Need for the Study

The Keystone View Company has said that 80 per cent of knowledge comes through the eyes.[4] They also stated that training with the tachistoscope conditions vision impulses to lower reflex levels where, as learning goes on, the time between reception and interpretation is reduced to almost nothing.[4] Why not devote time to training the eyes?

There is a need for the solution of this problem. It may be beneficial to coaches in developing better players, primarily better hitters, thus improving the game of baseball. Various sports are using scientific research to improve the ability of its participants, This study may stimulate others in baseball to conduct research, but hopefully in the area of training for the eyes.

Limitations of the Study

1. The small size of the groups.
2. There was a limited number of pitches allowed each subject.
3. Pitchers did not throw top speed during the final test

because they were not in condition

4. There was not a left handed pitcher in the final test.
5. The limited length of the training period.
6. Certain subjects did not adapt as well as others to the bat devised for testing.
7. Testing had to be conducted inside.

Definition of Terms

1. Flashmeter or Tachistoscope. An overhead projector with a camera shutter attachment on the lens. It permits the operator to flash or expose targets on a screen at varying speeds from 1 second to 1/100 of a second.[4]

2. 410 Baseball. A course in the Physical Education Department on fundamentals, strategy, and rules of baseball.

3. Eye Exercise. An exercise devised to strengthen the muscles around the eyes. The subject closed his eyes and wrote his name with his eyeballs.

4. Isometrics. Method of exercise which uses pressure against an immovable object to strengthen muscles or muscle groups. The muscle does not go through a range of motion.

5. The Test. The pre-test and post-test were the same. Each subject was thrown ten pitches (5 fast balls, 5 curve balls) with

no set pattern. The subject called the pitch right, wrong, or missed it.

6. Bat. The bat designed for this experiment which has two buttons, one under each index finger. The subject pressed one for a fast ball and the other for a curve.

7. Random Choice. Each subject or group having an equal opportunity to be chosen.

8. Digits. Numbers flashed on a screen with a tachistoscope to train the subjects in the flashmeter training group.

9. Missed Pitch. A pitch which was in the catcher's glove before the subject could indicate if it was a fast ball or a curve.

CHAPTER II

REVIEW OF THE LITERATURE

Literature related to flashmeter training in sports is limited. The majority of the material reviewed for this chapter concerns the use of the tachistoscope as a training device in athletics and various other areas.

An article[5] in the June 18, 1955 Meadville, Pennsylvania newspaper stated:

> A product of a Meadville concern is being used to prepare rookies for major league baseball.
>
> It's the tachistoscope, a machine manufactured by the Keystone View Company, designed to increase visual perception.
>
> Used to speed up reading, the instrument has been adapted by the Milwaukee Braves to train their rookies.
>
> The idea of using Keystone's tachistoscope came from Mrs. Alice Richardson, a former school teacher, who started visual aid classes at the Braves' rookie camp at Waycross, Georgia.
>
> "I work for speed and accuracy of the eyes," Mrs. Richardson said in an interview with the Milwaukee paper. "That doesn't mean I can strengthen a player's eyes. I

> don't prescribe or diagnose. I merely train, and in the process, attempt to improve a boy's visual perception on the baseball field."

Slater-Hammel and Stumpner[6] conclude that, "A fast-ball travels from pitcher to home plate from .43-.58 seconds. The ball must be more than a few feet from home plate for a successful reaction. To have sufficient time for a starting reaction, the ball would have to be from 22 to 30 feet from home plate."

Used in football Damron[3] found, "The 'field' test results indicate that high school football players can be very accurate in recognizing football defenses in one second of time following tachistoscope training with slides at 1/100 of a second."

Barnette[1] relates that in Physical Education:

> Students who have had tachistoscopic training to improve their reading have observed improved coordination in baseball, golf, and other sports requiring a very high degree of hand-eye coordination.
>
> If such improvement is noticeable in cases where the tachistoscopic techniques were not necessarily directed toward improvement in the factors of seeing as related to the athletic activity involved, one wonders what advantages might be derived if a course of tachistoscopic training were designed specifically

for the sport involved, including as targets such phraseology and targets as might be desirable.

Brown[2] states:

> Personnel at the Minnesota Hospital Service Association (Blue Cross) found that such training (Tachistoscope Training) stepped up their output from 6 to 33 per cent, the greatest increase being with those engaged in Key Punching operations. Similar training, but with a shorter 8-session course, resulted in a 24 per cent increase in on-the-job performance of those engaged in typing and key punching activities in a subscription office.
>
> Tachistoscopic training appeals to employees because it reduces to a minimum a major source of fatigue with most clerical workers—eye strain. Perceptual training makes their work easier and more pleasant.

According to Wittels,[1] in 1942, Dr. Samual Renshaw, of Ohio State University, developed a program of tachistoscopic recognition and interpretation for the Navy. The 4,000 instructors trained there subsequently trained 285,000 pre-flight cadets in this procedure. After early 1943 every Navy ship included in its complement at least one recognition officer.

The effects of this training can be seen in the fact that

after a year and a half in the middle of the Pacific fighting, an officer wrote that they never fired a shot at any of their own material.

The Keystone View Company[4] relates:

> When, in twelve weeks with the tachistoscope, we helped a fourteen-year-old eighth-grader to increase his reading speed from 143 words per minute to 263, with a proportionate increase in comprehension: when, in a like period, a twenty-year-old student raised from 402 words per minute to 585, with a proportionate increase in comprehension; and very generally such gains occur to all who are properly exposed to Keystone tachistoscopic training, it is apparent that such training is a necessity for all.
>
> Since we use but a fraction of our capacities, according to research psychologists, and since approximately 80 per cent of our knowledge comes to us through our eyes, it behooves all, especially students, to increase their usable vision and broaden their spans of perception and recognition and thus increase speed, comprehension, accuracy, and self-confidence in reading, sight reading of music, working with figures, and in fact all activities that involve the use of the eyes.

CHAPTER III

METHODOLOGY

The study was conducted to determine if flashmeter training could improve the ability of a batter to detect the difference between a fast ball and a curve ball by observing the direction of spin of the ball (backward for a fast ball, forward for a curve ball).

The study was initiated during the fall of 1965. Subjects used in the study were undergraduate physical education majors.

Three training techniques were used: flashmeter training, eye exercise, and isometric exercise. The subjects were not informed as to which group was the primary experimental group. They were told only that the investigator desired to find out which was the best method of training to improve hitting. It was felt that using this approach the three groups would be equal psychologically.

The subjects were administered the pre-test in an indoor dirt arena. This test consisted of ten pitches to each subject (5 fast balls, 5 curve balls) with no set pattern. The pitchers used were four varsity pitchers from the University team. They received the signal as to which pitch to throw from the catcher, after he was informed by the investigator who flashed an "F" for a fast ball or a "C" for a curve ball. Each pitcher threw three pitches and kept rotating until all subjects had an opportunity to "call" ten pitches. The responses were

right, wrong, or missed. A miss was a ball which hit the catcher's glove before he "called" it. All responses were recorded.

The subjects indicated what they thought was thrown by pressing a button on a special bat devised for this study. The bat was constructed in such a way as to enable both left handed and right handed batters to use it. Two buttons, each lighting individual lights mounted on the bat, were placed so that one was under each index finger. If the subject desired to indicate a curve ball he pressed the button under the index finger of his top hand which turned the light on which was mounted on the very tip of the bat. A fast ball was indicated by pressing the button under the index finger of his bottom hand which turned two lights on, one on the trade mark at the middle of the bat and the other on the opposite side.

To obtain three groups that were as equal to each other as possible, with regard to ability to detect the difference between a fast ball and a curve ball, the number of right responses were listed from most right to least right. The name of each subject was listed next to the number he had right. Then from most right to least right an A, B, or C was placed next to the name in this sequence: A, B, C, C, B, A, A, B, C, C, B, A and so forth until all thirty-three subjects had a letter next to his name. The letters A, B, and C were then written on a piece of paper and the investigator randomly chose one letter which put all those with this letter in the flashmeter group. He

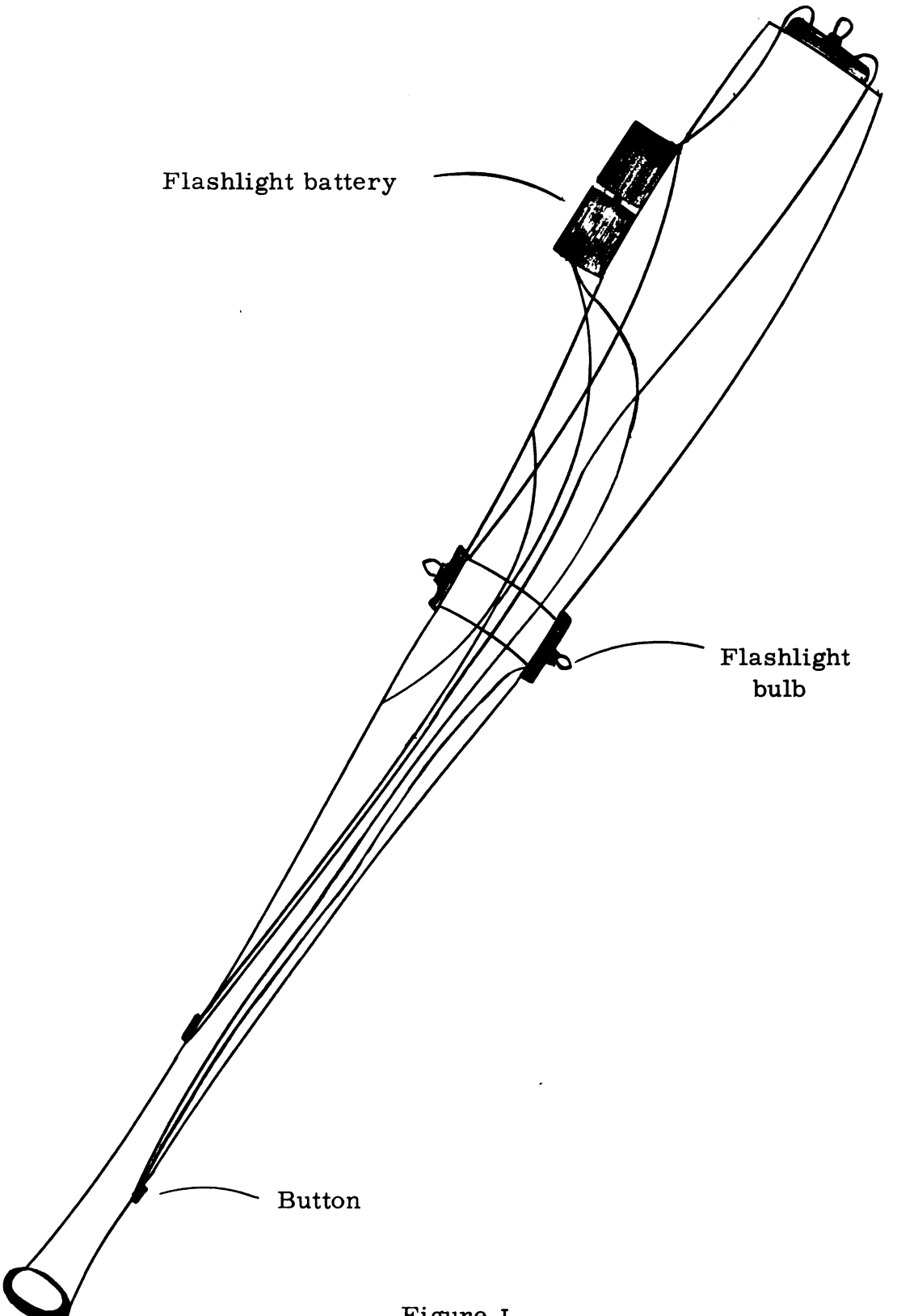

Figure I

then chose another letter putting this group in the eye exercise group, thus the remaining group was to be the isometric exercise group.

The training period then started. It began on October 25, 1965 and concluded on December 1, 1965. During this period the three training groups met at 2:20 P. M. every Monday, Wednesday, and Friday for approximately twenty minutes or until their particular training procedure was completed.

Flashmeter Training

All procedures and techniques used for this training, or variations of them, were obtained from Learning Through Seeing with Tachistoscopic Teaching Techniques by G. C. Barnette and The Keystone Tachistoscope: Advanced Teaching Techniques printed by the Keystone View Company, Meadville, Pennsylvania.

Equipment. The tachistoscope used for this study was provided by the University. The slides used were the Perceptual-Span Development Series (Digits from 1-16) purchased from the Keystone View Company of Meadville, Pennsylvania, which are 3-1/4" by 4" multiple-exposure slides.

The screen was a flat, smooth surface mat screen because one which is beaded, metal, or glass is not permissable in flashmeter training. The target had to be shown at the same spot on the screen at all times so the subjects would not have to search for it.

This was accomplished by using a mask over the slide table which had an area cut away permitting only one series of digits to be flashed, thus the flash was projected at the same spot on the screen at all times. The tachistoscope was the same distance off the floor as the bottom of the screen and it was placed approximately 7-1/2 to 10 feet from the screen.

The room in which the training was conducted had to be free from direct glare. The light in the room was as close to normal as possible while still permitting good focus for projection.

The seating arrangement varied from day to day in order to give the subjects a different view of the screen during each training period.

Daily Training Program. The flashmeter training program followed the same procedure daily except for a few variations which will be explained later. The subjects came into the classroom and took a pencil and a piece of paper. They then took any seat they wished as long as they were sitting toward the middle of the room around the general area of the tachistoscope. The subjects were informed to sit erect with both feet on the floor. On the paper they wrote their name, the date, and the number of the training session.

The investigator had to find the average level of the class with regard to the number of digits they could remember when a series was flashed. The subjects did very well at three digits but not extremely well at four digits so the training program started at four digits at

1/100 of a second and did not move on to the next series until the majority of the group could remember and write down four digits with 80-100 per cent accuracy. The investigator used the same procedure with each subsequent series of digits.

The only variation from this procedure occurred when the group found it difficult to advance from one series of digits to the next level. When this was the case the trainer would use "jumping digits." For example, if the group was going from five to six digits and could not achieve with all six numbers being flashed the span of six digits was flashed but two and then one number was blocked out until the group became accustomed to the increased span.

The targets were exposed in the same manner each time. The subjects were given an example of the type to be flashed when the numbers were being focused on the screen. They were then alerted, followed by the flash itself. The time between the alert and the flash varied to prevent the group from anticipating and thus being fooled. Just after the flash the group was told to make a mental picture of it before recording what they saw or thought they saw.

Each day the subjects were exposed to an average of forty flashes. At the end of twenty they corrected their responses. The investigator exposed the digits at such a pace as to permit the group to write in the correct series if it was wrong. If it was correct a check mark was placed next to it. The same procedure was used with

the last twenty exposures. When the class commenced, the subjects put next to their names the number wrong over the total. In this manner it was determined when to proceed to the next series. As it was stated before, in order to advance to the next group the majority of the subjects had to score 80-100 per cent right.

Eye Exercise

The eye exercise group met in a separate classroom.

Daily Training Program. The training for this group involved the subjects closing their eyes and each one writing his name using his eyeballs. This was done until the individual felt his eyes become tired, but never went over twenty minutes.

Isometric Exercise

This training was conducted in the adapted physical education room in Jenison Fieldhouse. Each individual had his own bat which he used for the training.

Daily Training Program. The training involved each subject holding a bat against an immovable object in three different batting positions for six seconds at each phase. The number of times for each position was increased at a rate of one per each day of training. The first position was the back of the swing; the second, the mid point; and the third, the position of the arms as the bat contacts the ball.

Post Test. The post-test was conducted in the same manner as the pre-test and all responses were recorded.

CHAPTER IV

ANALYSIS AND PRESENTATION OF DATA

The purpose of this study was to determine if flashmeter training could improve perception.

There were fourteen training sessions for the three groups, with a pre-test before the training and a post-test after it.

Analysis of variance was used to determine if there was any significance between the means of the three groups. Table I shows the total number of right responses and the means for each group in the final test. Table II shows that there was significance between the means of the groups. Table III shows that there was significance between the isometric and the eye exercise group at the .01 level of confidence. Also, that there was significance between the flashmeter and the eye exercise group at the .05 level of confidence.

The reasoning behind the statements concerning table III was evolved from the Tukey test which analyzes the difference between the means. If the difference was 1.29 or more it was significant at the .01 level of confidence. If the difference was 1.01 or more it was significant at the .05 level of confidence.

Results

The final results were tabulated and the total correct

responses recorded for the three groups. First observations indicated that the flashmeter or one of the experimental groups, with a total of 86 correct responses and a mean of 7.82, and the isometric or control group with a total of 90 correct responses and a mean of 8.18, was noticeably higher than the eye exercise or the other experimental group which had a total of 73 correct responses and a mean of 6.64. An analysis of variance was computed using the data and the approach related above which showed that there was a significant difference among the means of the groups involved.

The Tukey test was used to determine if there were significant differences between the group means. The flashmeter group mean (7.82) was significantly higher than the mean of the eye exercise group (6.64). There also was a significant difference between the mean of the isometric exercise group (8.18) and the eye exercise group (6.64). However, the difference between the mean of the flashmeter or experimental group (7.82) and the mean of the isometric exercise or control group (8.18) was not statistically significant.

It was also desired to find out if the increase in right responses was significant from the pre-test to the post-test, comparing fast ball with fast ball and curve ball with curve ball. A sine test was used by taking the number right in the first test and subtracting this number from the number right in the second test. These differences were used to determine which group had the best

Table I

	Flashmeter	Eye Exercise	Isometric
1	8	7	7
2	8	8	9
3	8	4	7
4	6	6	9
5	8	8	7
6	7	4	9
7	9	7	8
8	7	9	10
9	8	3	9
10	9	7	7
11	8	10	8
Total	86	73	90
Mean	7.82	6.64	8.18

Table II

Analysis of Variance

Source	Sum Squares	N-1 Degrees of Freedom	Mean Squared	F ratio	F_{95}	F_{99}
Total	42.182	32				
Among	14.364	2	$\frac{7.182}{.927}$	→ 7.747	→ 3.32	→ 5.39
Within	27.818	30				

Table III

Tukey .01 → $\frac{4.45}{3.32}$ = 1.34 × .96 = 1.29	Isometric Mean	8.18
	Eye Exercise Mean	6.64
	Difference	1.54
Tukey .05 → $\frac{3.49}{3.32}$ = 1.05 × .96 = 1.01	Flashmeter Mean	7.82
	Eye Exercise Mean	6.64
	Difference	1.18

percentage of people improving. Tables IV and V show the differences.

The results indicated that the control or isometric exercise group was the only group that improved significantly. Out of eleven subjects seven improved, three stayed the same, and one got poorer for both the fast ball and the curve ball. The total number of improved subjects for the control group was fourteen.

The flashmeter or experimental group's total improvement was thirteen. This was just one short of the control group's total improvement but because of the number that got poorer this improvement was not significant. To break it down, the flashmeter group had five improve, two stay the same, and four get poorer on the curve ball. On the fast ball eight improved, one stayed the same, and two got poorer.

It was difficult to determine the reason for the control group performing better than the experimental group even though the difference was very slight. The baseball coach was in charge of them throughout this training which may have been a biasing factor. On the other hand they may have had a "real good" day during the post-test which could also be the case with the flashmeter or experimental group. If these same results were obtained ten times out of ten, after a much longer training period than was allowed for this study, then it could be safely hypothesized that the flashmeter training was not beneficial to the subjects. The same hypothesis could be

Table IV

	Differences Flashmeter		Differences Eye Exercises		Differences Isometric Exercise	
	Curves					
1.	0		-1		+1	
2.	-1		+2		0	
3.	-2		0		-1	
4.	+2		-1		+2	
5.	+2	5 Better	0	3 Better	+1	7 Better
6.	0	2 Same	-3	2 Same	+1	3 Same
7.	+1	4 Poorer	-1	6 Poorer	+2	1 Poorer
8.	+1		+1		+1	Significant at
9.	-2		-2		0	.05 level of
10.	-1		-1		0	confidence
11.	+1		+1		+1	
	$\Sigma = +1$		$\Sigma = -5$		$\Sigma = +8$	
	Fast balls					
1.	+1		-1		+1	
2.	+2		+2		+2	
3.	+2		-2		0	
4.	-2		-1		+1	
5.	0	8 Better	0	5 Better	+2	7 Better
6.	+3	1 Same	+1	3 Same	+1	3 Same
7.	-1	2 Poorer	+2	3 Poorer	0	1 Poorer
8.	+1		+1		+1	Significant at
9.	+2		0		0	.05 level of
10.	+1		0		-1	confidence
11.	+2		+1		+2	
	$\Sigma = +11$		$\Sigma = +3$		$\Sigma = +9$	

Table V

Name	First Test			Second Test		
	Right	Wrong	Miss	Right	Wrong	Miss
Apisa	9	0	1	7	2	1
Buckmaster	5	4	1	7	1	2
Conant	7	3	0	9	0	1
Curzi	7	2	1	8	2	0
Davis, H.	4	5	1	8	2	0
Davis, L.	5	4	1	9	1	0
Ewald	7	2	1	8	1	1
Goovert	6	3	1	4	5	1
Hewitt	8	1	1	7	2	1
Jordan	6	2	2	9	1	0
Kaye	4	6	0	7	3	0
Kingdon	8	1	1	6	3	1
Kowalski	7	1	2	9	0	1
Landfair	6	1	3	8	0	2
Latham	5	1	4	7	0	3
Lewin	8	2	0	8	1	1
Litwhiler	4	4	2	7	0	3
Lucas	6	3	1	6	3	1
Maedo	6	3	1	8	1	1
March	6	3	1	4	2	4
Maull	6	1	3	7	1	2
McKie	8	1	1	10	0	0
Miller	5	5	0	8	2	0
Phipps	7	2	1	9	0	1
Smith	8	2	0	8	0	2
Sopha	9	1	0	9	0	1
Stevens	8	2	0	8	1	1
Thornhill	8	2	0	7	1	2
Triola	5	0	5	3	6	1
Tuschak	8	2	0	7	1	2
Walters	9	0	1	9	1	0
Fox	9	1	0	9	0	1
Howell	8	1	1	10	0	0

accepted if these results were obtained after each subject was tested with 100 or more pitches, and not just ten, in both the pre-test and the post-test.

This was a very limited study, because of so many restrictions, the primary one being time. The flashmeter group did improve. The investigator feels, because the flashmeter group did improve and because of the evidence presented in favor of this type of training, further, extensive research in this important area should be conducted.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was conducted to determine if flashmeter training could improve the ability of a batter to detect the spin of a pitched ball.

Summary

The subjects for this study were undergraduate physical education majors. All subjects were given a pre-test of ten pitches apiece (5 fast balls, 5 curve balls) with no set pattern. Using the number right, they were matched in triplicate, resulting in three groups that were as close to being equal as could be expected using this arrangement.

The three groups consisted of a control or the isometric exercise and the experimental groups which were the eye exercise and the flashmeter groups.

The training was conducted over fourteen sessions for each group. At the conclusion of the pre-arranged training period, the subjects were tested in the same manner as the pre-test. The data was processed and then analyzed.

Conclusions

The evidence obtained from the analysis of the data

leads to the following conclusion.

1. Flashmeter training, in this limited study, did not statistically improve the ability of a batter to detect the direction of spin of a pitched ball even though the flashmeter group improved.

Recommendations

The investigator desires to make the following recommendations.

1. The training period for the flashmeter group should be extended until the subjects are achieving at a high level with series of ten or more digits.

2. Some merit may be derived from using basic forms as targets along with digits.

3. The testing should allow for every subject to "look at" fifty pitches or more each testing session.

4. The groups should be matched on the results of fifty pitches or more.

BIBLIOGRAPHY

1. Barnette, G. C. Learning Through Seeing with Tachistoscopic Teaching Techniques, Wm. C Brown Company, Dubuque, Iowa, 1955.

2. Brown, J. I. Abstract of "Easing the Clerical Shortage with the Tachistoscope," Journal of American Society of Training Directors (January, 1958).

3. Damron, C. F. "Two and Three-Dimensional Slide Images Used with Tachistoscope Training Techniques in Instructing High School Football Players in Defenses," Research Quarterly, XXVI, No. 1 (March, 1955).

4. Keystone School and Guidance Center. The Keystone Tachistoscope: Advanced Teaching Techniques, Keystone View Company, Meadville, Pennsylvania, 1962.

5. "Keystone View Product Helps Braves' Players Get Their 'Batting Eye'." The Tribune Republican, Meadville, Pennsylvania (June 18, 1955).

6. Slater-Hammel, A. T., and Stumpner, R. L. "Batting Reaction-Time," Research Quarterly, XXI, No. 4 (December, 1950).

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