

**THE EFFECT OF EYE DOMINANCE ON A BATTER
ASSOCIATED WITH HIS ABILITY IN BASEBALL**

BY

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THE EFFECT OF INTENSIVE PRACTICE ON A BATTER
ASSOCIATED WITH HIS ABILITY IN BASEBALL

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by
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to the Graduate Council:

I am submitting herewith a Research Paper written by Samuel Martin Cardwell, Jr., entitled "The Effect of Eye Dominance on a Batter Associated with His Ability in Baseball." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts in Education, with a major in Health and Physical Education.


Major Professor

Accepted for the Council:


Dean of the Graduate School

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CHAPTER I

INTRODUCTION

Baseball, America's great national pastime, has become a rapidly increasing sport on the high school and college level. Because of specialization in such areas as relief pitchers and pinch hitters, more research needs to be done in order to evaluate any factor which may have an effect on the game.

For some years oculists have known that eye dominance exists and plays a major role in visual acuity and depth perception. Left- or right-eye dominance is believed to be formed in early childhood as the child develops left- or right-hand preference.

In hand-eye coordinated skills it would seem to be to an individual's advantage if his dominant eye was in a position to sustain the majority of visual activity. Past studies by Lund (10:756) and Fink (7:37) have shown that subjects show better coordination using their dominant eye.

Hitting a baseball involves an intricate interaction and integration of factors which guide the bat to the ball and the ball to the bat. A primary factor in this act of guiding is seeing. In seeing, as will be later explained,

The two eyes do not affect the visual consciousness with equal force.

CHAPTER II

STATEMENT OF THE PROBLEM

The primary purpose of this study was to determine the effect of eye dominance on a batter's performance and to discover if there was a significant difference in:

1. Batting averages of unilateral and crossed lateral hitters,
2. Percentage of base on balls accumulated by unilateral and crossed lateral hitters, and
3. Percentage of strike outs accumulated by unilateral and crossed lateral hitters.

It is also hoped that through this study and similar studies physical educators will be aware of eye dominance and, whenever possible, encourage their students to develop right- or left-hand preference according to their dominant eye.

Terminology

The following terms have been defined as they were used in this study.

Acuity Dominance: One eye has greater visual acuity than the other. (1:5)

Oculist: A doctor of medicine skilled in the examination and treatment of the eye. (2:614)

Sight Dominance: One eye is constantly aligned with a near point when sighting or pointing at a far point. (2:614)

Visual Line: Line of reference with which most people sight an object, either left- or right-eyed rather than half way in between. (15:38)

Unilateral Dextral: A right-handed batter whose right eye is dominant. (1:5)

Unilateral Sinistral: A left-handed batter whose left eye is dominant. (1:5)

Crossed Lateral Dextral: A right-handed batter whose left eye is dominant. (1:5)

Crossed Lateral Sinistral: A left-handed batter whose right eye is dominant. (1:5)

Basic Assumptions

This study was based on the following assumptions:

1. Handedness of all subjects will be determined solely on the basis of their batting hand preference.
2. All right-handed batters are equal.
3. All left-handed batters are equal.
4. Left-handed batters have a definite advantage over right-handed batters by being closer to first base.
5. All other factors involved in batting ability will be assumed nonexistent.

Limitations

The author was limited in his research to testing only those members of the 1970 Austin Peay State University baseball team during a thirty-five game season, March 13, 1970, through May 16, 1970. The study was limited to twenty-one subjects, two of which were eliminated due to the fact that they were switch hitters.

Hypothesis

The hypothesis selected was that there is no significant difference between the means of the batting averages, base on balls, and strike outs of unilateral and crossed lateral batters.

CHAPTER III

REVIEW OF LITERATURE

According to the Better Vision Institute, nearly everyone has a dominant eye. That is to say, one of your eyes is the leader and you depend on it more than the other. (15:38) Studies have shown that this eye dominance not only affects batting ability, but also putting accuracy in golf, (12:34) gun marksmanship, (9:59) and any other hand-eye coordinated skill.

In a study of 319 college students by G. L. Wall, in which visual acuity was measured by the Bausch Lomb Orthometer, acuity dominance of the left eye was found to be most frequent. Tests were run with both the left eye first and the right eye first to avoid a testing pattern difference. The results are shown in Table I on the following page. (2:614)

In a related study by L. Bahagn, of 63 right-sighting dominant subjects 54 per cent were right-acuity dominant. Of 21 left-sighting dominant subjects 62 per cent showed left acuity dominance. A chi square test of independence showed chi square equal to 0.59; and probability was less than .01. (2:614)

TABLE I

Acuity Dominance as Measured by the Bausch Lomb Ortho-Rater

Acuity Dominance	Right-sighting Dominance	Left-sighting Dominance
none	66	21
right	76	23
left	30	53

In a study involving 400 persons, 60 per cent were found to be right-eye dominant, 20 per cent left-eye dominant and 15 per cent alternated dominance. (15:38) The right eye has been found dominant in most studies. The reason given for this is that 80 per cent of the population is right-handed and tend to hold their work to the right. Consequently the right eye sees better, more easily, and gets more use. (15:38)

In another similar study, about 65 per cent of the persons tested were right-eye dominant, about 35 per cent left-eye dominant, and 3 per cent impartial eyed. (13:114)

Generally your dominant eye will have the poorest vision because of its overuse. In some cases, the dominant eye has been proven responsible for 90 per cent of one's vision. (13:114)

There are two theories concerning the role of eye dominance in batting performance. One says that the

unilateral batter has the advantage, since the position of his dominant eye enables him to see his dominant batting hand better while swinging the bat; and thus he can more accurately interpolate where and when to swing at the pitched ball. The second theory states that the crossed lateral batter has the advantage since he sees the ball better with his dominant eye, which is located on the side of his head that is facing the pitcher and the pitched ball. (9:76)

Adam's study of twenty-eight college players from the University of California at Los Angeles and California State Polytechnic College supported the first theory. The results are shown in Table II. (1:7)

TABLE II

Study of Unilateral and Crossed Lateral Hitters

	Subject	Unilateral	Crossed Lateral	Significance at 5% Level
On-Base Average	28	.367	.318	+1.16
Batting Average	28	.234	.246	-0.77
Strike Outs	28	.158	.157	-3.83
Called Strike Outs	28	.046	.041	-3.58
Missed Swings	16	.210	.170	-0.50

While the results showed that the on-base average and batting average were significant at the five per cent level; the others were not. The findings indicate that the unilateral hitters were not at a disadvantage, but in fact just the opposite. A further study of sixteen of the unilateral hitters who had some consistence in their stance, either open (back foot nearer home plate than stride foot) or closed (stride foot nearer home plate than back foot), is shown in Table III. (1:8)

TABLE III
Study of Stances of Unilateral Hitters

	Closed Stance	Open Stance	Significance at 5% Level
On-Base Average	.378	.379	-3.83
Batting Average	.291	.302	-3.70
Strike Outs	.182	.128	+3.55
Called Strike Outs	.045	.036	-3.22

As this table shows, the unilateral hitters with an open stance did better in all departments.

In a study by George Mann, left-handed batters tended to be left-eyed, which means the view from their dominant eye is partially obstructed by the bridge of the nose while waiting for the ball. (11:18) Since left-handed batters have

a slight advantage over right-handed batters because they are closer to first base, the ideal combination would be a left-handed batter with right-eye dominance. A classic example of this is Babe Ruth. By coincidence, he was left-handed and right-eyed. (13:114)

CHAPTER IV

PROCEDURES

Selection of Subjects

The subjects in this study, as was stated earlier, were all members of the 1970 Austin Peay State University baseball team. They ranged in age from eighteen to twenty-three.

The subjects were divided into groups by taking a test which determined whether they were unilateral or crossed lateral batters. Group one, the unilaterals, consisted of fourteen subjects; and group two, the crossed laterals, consisted of five subjects.

Once the subjects were divided into these two groups, they were subdivided into four smaller groups. These smaller groups consisted of three unilateral sinistrals, eleven unilateral dextrals, five crossed lateral dextrals, and no crossed lateral sinistrals.

Test Selection

The "alignment test" and the "binocular peep-hole test," or "hole-in-card test" were given to each subject to determine his dominant eye. The first test was used to

determine the dominant eye, while the latter was used for verification.

These tests were chosen for the following reasons.

1. Either test could be administered by the author without the aid of an oculist or optometrist.
2. Both tests could be administered in almost any environment.
3. Very little equipment was needed, which made it possible for the author to test subjects at any time.

Test Administration

The administration of both eye dominance tests was relatively simple. For the "alignment test," each subject was given a pencil and was asked to hold it up at arm's length and, with both eyes open, to line it up with a black dot (1/2 inch in diameter) which was drawn on a wall at a distance of seven feet from the subject. The subject will actually see two images of the pencil; but he automatically disregards one, and brings the pencil, the black dot, and one of his eyes into a straight line. The subject was then asked to close his right eye. With this eye closed he was asked if the pencil was still lined up with the dot. The same procedure is done with only the left eye closed. The eye that saw the pencil directly lined up with the dot was considered the subject's dominant eye.

For reliability, a second eye dominance test was used--the "hole-in-card test." An eleven-inch cardboard square with a small hole ($1/4$ inch in diameter) in the center was held by the subject at an arm's length with both hands directly in front of his body. He was asked to use both eyes and to look through the hole at a white dot ($1/2$ inch in diameter) on the blackboard placed seven feet away. After the subject had located the object, the examiner then placed a card in front of the subject's right eye and asked him if the dot was still visible. Then the examiner held the card over the subject's other eye and asked him the same question. The eye that was not covered, and still able to see the dot on the blackboard, was the subject's preferred or dominant eye. The dot was not seen when the dominant eye was covered. Results were immediately recorded for each subject. Both tests disclosed identical results.

CHAPTER V

ANALYSIS OF THE DATA

Results of Tests for Eye Dominance

The "hole-in-card" test and the "alignment test" were administered to nineteen members of the 1970 Austin Peay State University baseball team. The subjects were then grouped according to their dominant eye. The unilateral subjects (hereafter referred to as Group I) numbered fourteen, and the crossed lateral subjects (hereafter referred to as Group II) numbered five.

The ranges and means obtained for both groups have been included in Table IV.

TABLE IV

Ranges and Means of Two Groups on Final Statistics

	Number	Ranges			Means		
		BA*	BB*	SO*	BA	BB	SO
Group I	14	.045-.350	1-20	3-25	.187	12.88%	19.18%
Group II	5	.000-.250	0-11	0-10	.150	20.0%	21.67%

*BA--Batting Average BB--Base on Balls SO--Strike Outs

As Table IV indicates, Group I is considerably larger than Group II. This can be attributed to the fact that in studies to determine eye dominance, not only are the majority of the people right-eye dominant; but also of those right-eye dominant persons 54 per cent were right-handed. Of the left-eye dominant persons 62 per cent were left-handed. This accounts for the majority of persons in the unilateral group.

Studies have shown that left-handed batters tend to have a higher batting average and higher on-base average than right handed batters, especially at the high school and college levels. This may be attributed to the fact that they face less left-handed pitchers. (1:6) The unilateral sinistrals' batting average was .36 points higher than the unilateral dextrals'. They averaged 4.53 per cent more base on balls but averaged striking out five per cent more.

The fact that there are less left-handed pitchers and no crossed lateral sinistrals may account for the fact that Group II averaged more strike outs. However, Group II had a higher per cent of base on balls.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to measure the effect of eye dominance on a batter's performance and to discover the difference in the two groups. One group was composed of those players whose dominant eye was the same as their hand preference, unilaterals. The other group consisted of players whose dominant eye was the opposite of their preferred hand, crossed laterals.

The unilateral players scored slightly higher than the crossed laterals in batting average. This difference was not significant at the five per cent level ($T=.79$). The crossed laterals averaged more base on balls than the unilaterals, but the difference was not significant at the five per cent level ($T=.91$). The unilaterals averaged striking out less, but this also was not significant at the five per cent level ($T=.57$).

Conclusions

The following conclusions are based on the findings from this study of eye dominance of the 1970 Austin Peay State University baseball team:

1. The first theory giving the unilateral batter the advantage seemed to be more substantial.
2. The crossed lateral batter does not necessarily follow the ball better. Therefore he does not have a higher batting average, higher base on ball average, or a lower strike out average than unilateral batters.
3. A batter's stance may affect his batting performance more than his dominant eye.
4. The hand preference of the pitcher may have a significant effect on the performance of the batter.

Recommendations

On the basis of the findings and conclusions derived from this study of eye dominance of the 1970 Austin Peay State University baseball team, it is recommended that:

1. A more complex study be conducted to determine the importance of eye dominance and other factors related to a batter's performance, particularly stance, and
2. Coaches and/or physical educators encourage students to use their dominant eye to their advantage whenever possible. An example would be developing switch hitting abilities.

APPENDIX

Austin Peay State University Cumulative Baseball Statistics for 1970

Name	Batting Hand Preference	Dominant Eye	AB	H	BA	BB	SO
Ed Inman	Left	Left	20	7	.350	3	5
Tim Burns	Right	Right	19	5	.263	3	4
Jim Davis	Right	Right	58	15	.259	7	8
Mike Hendricks	Right	Left	4	1	.250	4	1
Don Farmer	Right	Right	79	17	.215	18	25
Tonnie Simpson	Left	Left	81	17	.210	16	14
Shelby Rye	Right	Right	93	19	.204	6	8
Bill Munton	Right	Right	63	12	.190	9	13
Bright Maskins	Right	Left	16	3	.188	0	1
Doug Wesa	Right	Right	40	7	.175	5	7
Jim Hardie	Right	Right	30	5	.167	1	9
Carl Fought	Right	Left	37	5	.135	11	10
Chip Pearson	Right	Right	92	12	.130	20	10
Dwight Smith	Right	Right	49	6	.122	3	10
Roger Hill	Right	Right	34	4	.118	3	7
Mike Ramsey	Right	Right	11	1	.091	1	3
Roberto Visitacion	Left	Left	22	1	.045	6	8
Larry Deets	Right	Left	1	0	.000	0	1
Sean Boyer	Right	Left	1	0	.000	0	0

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