SKILL DIFFERENCES OF ANTICIPATION TIME

by

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(ABSTRACT)

The purpose of this study was to determine whether practice or different experiential background has an effect on anticipation time. Anticipation time is performing a movement upon the arrival of an outside stimulus and having them meet at a designated point or objective. It was hypothesized that Division I baseball players would have better anticipation timing scores than Division III players because of their experiential background.

Twelve Division I baseball players were compared to twelve Division III baseball players using a BASSIN Anticipation Timer. A ten foot runway with a string activated microswitch was used for the anticipation task. Subjects were asked to swing their hands, mimicing their regular batting motion through the string switch to coincide with the illumination of the last light on the runway. Each subject had twenty random trials at each of the two speeds. Nine mph represented a collegiate fastball, while eight mph represented a collegiate off-speed pitch.

Independent t-tests indicated that Division I players had significantly better anticipation time for the collegiate fastball (9 mph) than Division III players. There was no significant difference at 8 mph. Thus, the hypothesis, that Division I would have better anticipation time was supported for the higher speed pitches.

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CHAPTER 1

INTRODUCTION

Baseball players need to have good anticipation timing to be successful at hitting a pitched ball. Anticipation time is performing a movement as close as one can with the arrival of some external stimulus at a designated point (Wrisberg & Mead, 1983). While anticipation time does improve with age (Thomas, Gallagher, & Purvis, 1981), it can also be enhanced by practice. The more a baseball player practices his hitting, the more essential information he has stored in his memory. By being able to store specific sets in his memory, the better baseball player should be able to wait longer before committing his swing, thus enhancing anticipation time.

Statement of Problem

The purpose of this study was to determine whether practice or experience has an effect on anticipation time. Specifically, do Division I collegiate baseball players have better anticipation timing than Division III collegiate baseball players?

Research Hypothesis

Division I baseball players will be superior to Division III baseball players on an anticipation time test.

Ho: $\bar{x}$ Division I = $\bar{x}$ Division III

Ha: $\bar{x}$ Division I > $\bar{x}$ Division III

$p = 0.05$

CHAPTER 2

Review of Literature

AGE COMPONENT

In reviewing past research on anticipation time, much of the research focused on the development from infancy through adulthood. Anticipation time was not much of a factor for children under ten years of age. Thomas, Gallagher, & Purvis (1981) pointed out that this is because children under the age of ten do not have well developed motor plans stored in their memory.

In a study by Williams (1985), she noted that five year olds perform in a consistent reaction time pattern. When the speed on a tracking device was slow (2 mph), five year old subjects reacted the same as if it were at a faster speed (4 mph). They did not have the motor plans necessary to differentiate between the different speeds. However, as a person becomes older and gains more experience, better movement plans are developed and reaction time becomes less important (Thomas, Gallagher & Purvis, 1981). Anticipation time improves with age since it is not a neurophysiological trait like reaction time (Petrakis, 1985).

Knowledge of Results

Knowledge of results can play a major role in helping improve anticipation time because a person then has two sources of feedback. Visual feedback and knowledge of results provide information to help the person reach his goal (Ramella, 1984). A visual

search must be done so a person can successfully perform a skill (Abernethy & Russell, 1987). Ramella (1984) pointed out that correct anticipation time is extremely important when trying to develop an effective motor response for a moving object.

Essential Cues

Athletes need practice with different physical skills to develop a more efficient anticipation time. The more patterns or strategies a person has, the more likely he/she will select the appropriate response. Shank and Haywood (1987) used expert and novice players to view different types of pitches and found that the expert could identify the pitches better because of visual clues they had stored in their memory. Experts are able to differentiate between variables of interest and select the best response. Experts in all fields are better at recognizing the essential cues because the expert can store sets or patterns in memory on how to respond to a specific task (Zechmeister & Nyberg, 1982). The more experienced baseball player would therefore be able to wait longer before having to commit to swing.

Research supports the idea that the ability to learn is task specific (Petrakis, 1985, Shank, & Haywood 1987). Anticipation time can be improved by coaches and physical educators, if the person they are working with comprehends and stores the clues necessary to differentiate between variables. For coaches or educators to be helpful, they need to provide specific training experiences to provide each individual with the chance to improve (Wrisburg & Mead, 1983).

CHAPTER 3

RESEARCH METHODS

Introduction

The purpose of this study was to determine whether or not Division I collegiate baseball players have significantly better anticipation time scores than Division III collegiate baseball players. This chapter reviews subjects, apparatus, method, and design and data analysis.

Subjects

A sample of twelve male baseball players from a major university varsity baseball team were selected for the subjects labeled Division I baseball players. Twelve male baseball players from a small college varsity team made up the subjects labeled Division III baseball players. Both samples consisted of four seniors, five juniors, one sophomore, and two freshmen.

Apparatus

(Lafayette Instrument Co.)

A Bassin Anticipation Timer with a ten foot runway using a string activated microswitch attached to a stand was used. A control panel only visible to the experimenter allowed for control of velocity. A digital display on the control panel displayed the timing error in milliseconds and the direction (early/late) of the error.

Method

Two different speeds were used to simulate a collegiate fastball (9 mph) and a collegiate off-speed (8 mph) pitch. The speeds were randomly presented and each player was tested on twenty trials at each speed. One subject at a time was taken to the testing area where an informed consent form was read and signed. Other subjects were instructed to remain in a waiting area.

Before starting the testing procedure, each subject was asked if he was familiar with the light timing device. None of the subjects had used the BASSIN Timer before. The subjects were briefed on how the anticipation time task worked. Subjects were instructed to go through the same procedures as they do when they actually bat a pitched ball. All subjects were instructed to stand perpendicular to the last light with the string switch located directly over the last light. They were told to swing their hands through the string, like they would a baseball bat, to coincide with the illumination of the last bulb on the trackway. This caused a break in the microswitch allowing each subject's scores to be recorded to the closest millisecond.

Data Analysis

Mean scores were calculated for Division I baseball players and Division III baseball players for both fast and off-speed. The scores are presented in Appendix A and Appendix B. The means were subjected to an independent t-test (Table 1 and Table 2) to determine if there was a significant difference between Division I baseball players' and Division III baseball players' anticipation times.

CHAPTER 4

Discussion and Conclusions

Discussion

Past literature dealing with anticipation time reports on improvement both as a function of age and practice. The purpose of this study was to determine whether or not Division I baseball players would have better anticipation timing scores than Division III baseball players. The BASSIN Anticipation Timer was the instrument that would measure the difference. Division I and Division III players were given the same amount of trials randomly, with fast and off-speed pitches. An independent t-test was utilized to find out if there was a significant difference.

Findings

The findings of this study are reported in this section as derived from the independent t-test.

1. Division I players had significantly better anticipation timing scores than Division III players for the the fast speed (9 mph) task as shown in Table 1.

$$t = 2.23, (p < .05)$$

2. Division I players did not have significantly better anticipation timing scores than Division III players for the off-speed (8 mph) task as shown in Table 2.

$t = 1.11$ is not significant at the .05 alpha level

Table 1

Independent t-test for fast speed where:

t = the t-ratio

$\overline{x}_1 - \overline{x}_2$ = the observed difference between two means

$S\overline{x}_1 - \overline{x}_2$ = the standard error of the difference

df = degrees of freedom

Division I	Division III
$\overline{x}_1 = .0334$	$\overline{x}_2 = .0510$
$Sx_1 = .002021$	$Sx_2 = .006202$
df = 12	df = 12

t - Ratio is 2.23 at 22 df

Table of t-values at 22 df = 1.717

t-ratio of 2.23 is significant at .05 level

Table 2

Independent t-test for off-speed where:

t = the t-ratio

$\overline{x}_1 - \overline{x}_2$ = the observed difference between two means

$S\overline{x}_1 - \overline{x}_2$ = the standard error of the difference

df = degrees of freedom

Division I	Division III
$\overline{x}_1 = .0465$	$\overline{x}_2 = .0570$
$S\overline{x}_1 = .001567$	$S\overline{x}_2 = .010304$
df = 12	df = 12

t-ratio is 1.11 at 22 df

Table of t-Values at 22 df = 1.717

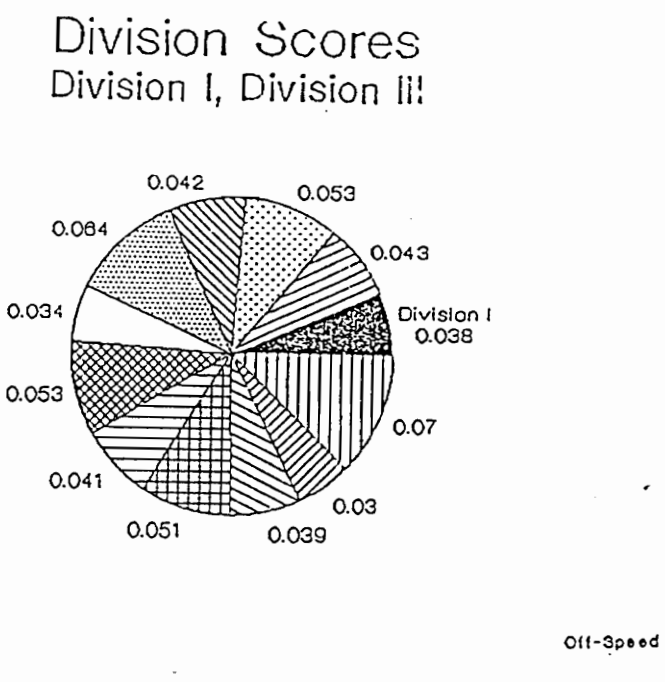
t-ratio of 1.11 is not significant at .05 level

Examination of the findings and reference to the literature supports that Division I baseball players are exposed more frequently to higher speed pitches than Division III baseball players. The hypothesis was partially supported that Division I players would have better anticipation timing scores.

There was not a significant difference for Division I compared to Division III for off-speed (8 mph). However, looking at Figure 1 and Figure 2 shows variation of the means. This indicates that a couple of means could have skewed the results of the test. The Division I means are more consistent than the Division III means for the off-speed, which could have made a difference due to the sample size.

Conclusion

Literature supports that experts or professionals are able to view pitches longer. Their head or eye movement stay focused on the ball closer to the swing than college players. This would allow professionals to hit any speed better than college players (Bahill & LaRitz, 1984). This could explain why Division I players have better anticipation timing scores than Division III players. It may not be as much of a difference as professional compared to college but there is a difference. Thus, it may be concluded that Division I players have better anticipation timing scores for higher speed pitches than Division III players.


Division Scores
Division I, Division II
0.042
0.053
0.064
0.043
0.034
Division I
0.038
0.053
0.07
0.041
0.03
0.051
0.039
Off-Speed

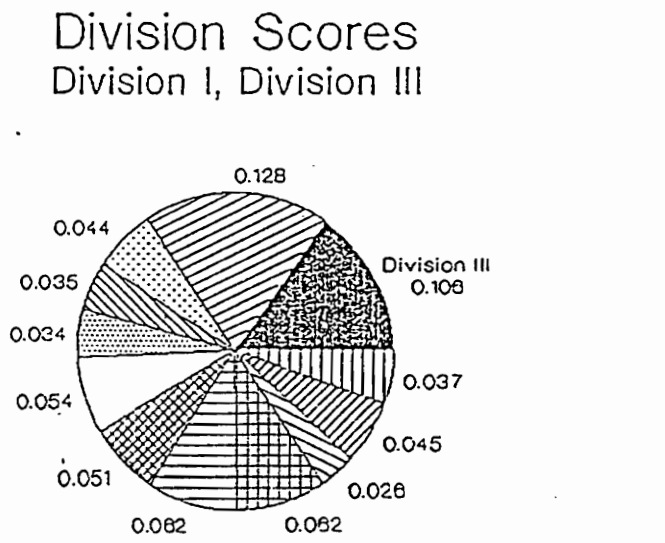
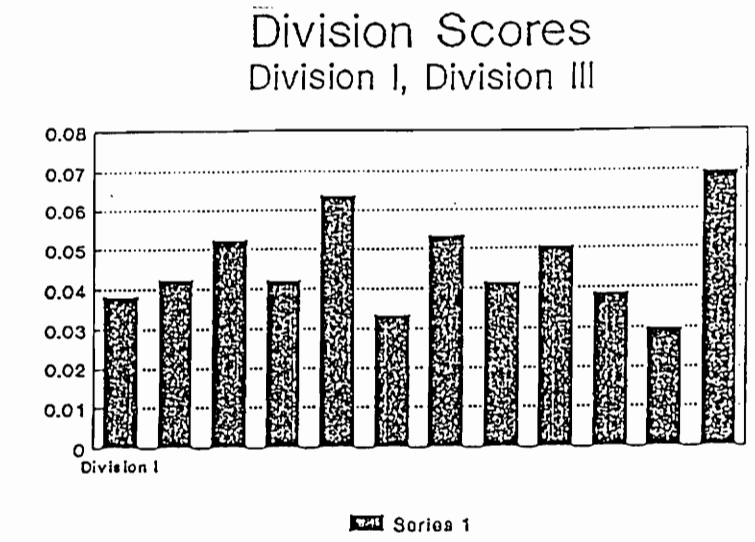

Division Scores
Division I, Division III
0.128
0.044
Division III
0.108
0.035
0.034
0.037
0.054
0.045
0.051
0.026
0.062
0.062

Figure 1


Division Scores
Division I, Division III
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Division I
Series 1
Off-Speed

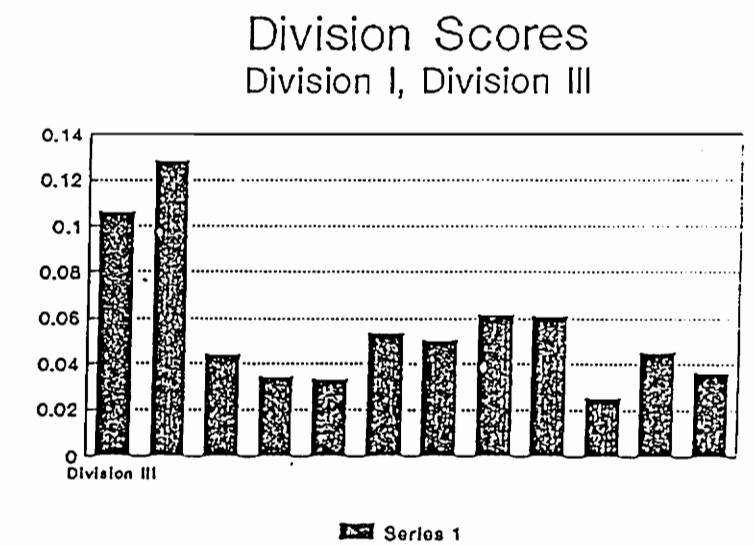

Division Scores
Division I, Division III
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Division III
Series 1
Off-Speed

Figure 2

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APPENDIX A

DIVISION I AND III MEANS FOR FAST SPEED

DIVISION I AND III MEANS FOR FAST SPEED

DIVISION I			DIVISION III		
Sub	Year	Mean	Sub	Year	Mean
1	Sr.	.0156	1	Sr.	.0329
2	Sr.	.0244	2	Sr.	.0490
3	Sr.	.0299	3	Sr.	.0846
4	Sr.	.0338	4	Sr.	.1025
5	Jr.	.0220	5	Jr.	.0207
6	Jr.	.0234	6	Jr.	.0303
7	Jr.	.0258	7	Jr.	.0336
8	Jr.	.0285	8	Jr.	.0452
9	Jr.	.0601	9	Jr.	.0484
10	Soph.	.0548	10	Soph.	.0541
11	Fr.	.0385	11	Fr.	.0423
12	Fr.	.0435	12	Fr.	.0687
		.0334			.0510

APPENDIX B

DIVISION I AND III MEANS FOR

OFF-SPEED

DIVISION I AND III MEANS FOR
OFF-SPEED

DIVISION I			DIVISION III		
Sub	Year	Mean	Sub	Year	Mean
1	Sr.	.0384	1	Sr.	.0348
2	Sr.	.0422	2	Sr.	.0442
3	Sr.	.0426	3	Sr.	.1062
4	Sr.	.0698	4	Sr.	.1283
5	Jr.	.0337	5	Jr.	.0256
6	Jr.	.0389	6	Jr.	.0372
7	Jr.	.0415	7	Jr.	.0454
8	Jr.	.0507	8	Jr.	.0540
9	Jr.	.0640	9	Jr.	.0615
10	Soph.	.0534	10	Soph.	.0507
11	Fr.	.0301	11	Fr.	.0339
12	Fr.	.0526	12	Fr.	.0621
		.0465			.0570