August 8, 1964

To the Graduate Council:

I am submitting herewith a thesis written by Michael Armour Sutton entitled "A Study of the Effects of the Track Starter's Time Intervals." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Physical Education.

Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Dean of the Graduate School

A STUDY OF THE EFFECTS OF THE TRACK STARTER'S TIME INTERVALS

A Thesis

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Michael Armour Sutton

August 1964

ACKNOWLEDGMENT

The writer wishes to acknowledge his indebtedness to Mr. Sam Venable, Associate Professor of Physical Education at the University of Tennessee, under whose guidance this study was conducted. The writer also wishes to thank Coach Chuck Rohe and the University of Tennessee Track Team and Coach Paul Kennedy of West Rome High School for their assistance and suggestions. A word of appreciation is extended to the coaches who took time to complete and return the questionnaires which helped to make this study possible.

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CHAPTER I

INTRODUCTION

The need for proper track officiating has been evident since the earliest Olympic Games. Although the Games of the ancient Greek Era were of great importance to the people of the known world, the later Games gained international importance with their revival in 1896. The Olympic Games expanded, representing all of the mutual sports of the worlds and creating a greater need for trained and competent officials. To err because of inexperience or a lack of knowledge could cause international repercussions.

In the United States there are close to 700,000 athletes participating in track and field programs. Of this number more than 600,000 are representing high school athletics. Their meets and officials are sanctioned by State High School Athletic Associations representing the National Federation of State High School Athletic Associations. Over 42,000 athletes represent the organizations of higher learning, the National Collegiate Athletic Association and the National Junior Collegiate Athletic Association.[1]

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[1]James T. Butz, Promotional Director, For the Record, The United States Track and Field Federation (Chicago, Illinois, 1964), p. 66.

To assure each of these athletes proper guidance in striving to achieve the objectives of these organizations, it is imperative that each coach attempt to provide the best possible officiating at track meets under his control.

One of the most important and most difficult positions to fill on the officiating staff, especially on the high school level, is that of the starter.

Bunn stated that:

> The starter is considered by far the most important track official. His success in getting races started fairly, in not exciting the runners, and in gaining their confidence is the mark of his ability as a starter.[2]

I. STATEMENT OF THE PROBLEM

The purpose of this study was to investigate the effects of the track starter's time interval on the performance of the track runner. It was also a purpose of the study to show the need for more competent starters and clinics for training these officials.

II. VALUE OF THE STUDY

The study compared different track starter's time intervals and the coaches' reactions to these intervals. It

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[2]John W. Bunn, The Art of Officiating Sports (New York: Prentice-Hall, Inc., 1950), p. 67.

is hoped that this study would be of help in the selection and training of starters through the means of track officials' clinics.

III. DEFINITIONS

The following terms are defined according to their use in this study.

Track Starter's Time Interval. This refers to the period of time between the command to "Get Set" and the firing of the starter's gun.

Fast Starter. "The term fast starter is applied to one who shoots a quick gun with little or no set position hold."[3]

Slow Starter. This refers to the starter who holds the runner for a period longer than necessary after the preparatory command.

Track Clinics. This term is applied to training sessions conducted by sponsoring organizations to familiarize the officials with their duties.

IV. LIMITATIONS OF THE STUDY

This study was conducted in three parts. The questionnaire was presented to high school track coaches participating in District, Region, and State Track Meets in Tennessee and to

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[3] Ben A. Plotnicki, "The Official Track Starter," Athletic Journal, 43:16, April, 1963.

coaches from five states competing in the Southern Interscholastic Competition in Knoxville, Tennessee. This method limits the study as it is impossible to be certain as to the percentage which will be returned. Another point to be considered is that all coaches may not necessarily interpret each question the same. A more reliable result would have been obtained by interview of the coach; however, this was impractical.

The second phase of this study was to study the time intervals used by starters in the Knoxville area and in the Rome, Georgia, area. Since this was an attempt to study various starters, the selection was not limited to known competent starters.

The University of Tennessee track team was used to conduct the third phase of the study. The sprinters' time for a distance of thirty yards was compared to the time intervals of the starter. The value of this phase is limited by the fact that a number of individuals were used. Each individual differs in his ability to get out the starting blocks quickly, while the speed of each becomes a factor. The nature of the weather also is a factor as the temperature affects the looseness of the athlete's muscles.

CHAPTER II

REVIEW OF LITERATURE

The amount of research on this type of study is limited. Only two actual studies have been conducted concerning the track starter's time intervals, although there is some related material. The latter will be reviewed first.

The Official Collegiate Track and Field Guide as published by the National Collegiate Athletic Association stated that the starter:

> . . . shall then instruct them to "Set." At this command all competitors shall at once and without delay assume their full and final set position. Then, after an interval of approximately two seconds and when all are motionless, he shall discharge the pistol.[1]

Meyer stated that the runner should stay in the "set" position until the starter is satisfied that all are steady on their marks. The runners should be properly "set" in a comfortable position and quite still. He found that the runners in the 100 meters of the 1948 Olympic Games took between 1.2 and 1.9 seconds to become steady in their "set" position.[2]

Sports Officiating stated that the major problem for

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[1]The 1963 Official National Collegiate Athletic Association Track and Field Guide (New York: The National Collegiate Athletic Bureau, 1963), p. 94.

[2]A. H. Meyer, Track and Field Athletics (New York: A. S. Barnes and Company, 1955), p. 314.

starters is to "properly handle the two seconds or more pause following 'Get Set.'"[3]

Bunn had this to say, "All runners must be stationary before they are permitted to start."[4] If the runners do not become steady without undue delay, the starter should tell the runners to stand up and then make a new start.[5]

Bresnahan, Tuttle, and Cretzmeyer found that there are psychological implications to the problems of starting. The runner requires a little time to adjust to the "set" position, and then another short period of time for the runner's attention to reach its peak. The peak of attention and the sound of the pistol must coincide if there is to be the best possible start.[6] They went on to say:

> Attention has proved to be a fluctuating phenomenon, reaching a peak, then subsiding and then returning to its peak again. If the pistol is fired before or after the peak of attention is reached, the start will be slower than if the peak of attention and the sound of the pistol coincide.[7]

Nakaruma conducted the first known research pertaining to the optimum time for holding a runner in the "set" position

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[3]Elmer D. Mitchell, editor, Sports Officiating (New York: A. S. Barnes and Company, 1949), p. 416.

[4]Bunn, op. cit., p. 67. [5]Ibid., p. 67.

[6]George T. Bresnahan, W. W. Tuttle, and Francis X. Cretzmeyer, Track and Field Athletics (St. Louis: The C. V. Mosby Company, 1964), p. 357.

[7]Ibid., p. 357.

before the gun. This study, conducted in Japan in 1928, compared the time intervals of 1.0 second, 1.5 seconds, and 2.0 seconds. A chronoscope, which is a very delicate and accurate watch, was used to record the time interval between the firing of the gun and the lifting of the hands from the ground. Electrical contacts attached to the gun started the chronoscope and contacts placed under the runner's hand stopped the instrument as the hands were lifted. He concluded that 1.5 seconds was the best time interval.[8] The method of measurement and the limited number of time intervals tested could give cause to the question of the reliability of this study.

Walker and Hayden in a similar study conducted in 1932, used the chronoscope connected to the gun and to the starting blocks. The instrument was started by the firing of the gun and stopped when the back foot of the runner was removed from the starting blocks. The times of 1.0 second, 1.2 seconds, 1.4 seconds, 1.6 seconds, 1.8 seconds, and 2.0 seconds were tested to ascertain their values as an optimum starting interval. Twenty-seven men of varying track experience, ranging from champsionship caliber to almost a complete absence of experience, were used as subjects in this study. The results

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[8]H. Nakaruma, "Experimental Study in Reaction Time of Start for Running Race," Japanese Journal of Psychology, 3:231-62. Cited by George A. Walker and Thomas C. Hayden, "The Optimum Time for Holding a Sprinter Between the 'Set' and the Stimulus (Gun Shot)," Research Quarterly, 4:124-30, May, 1933.

showed that for 62.9 per cent of the subjects, 1.6 seconds was the optimum time interval, while for 33.3 per cent it was 1.4 seconds. For one runner representing 3.8 per cent, 1.8 seconds was the optimum time interval. The poorest starting time interval below the optimum time was 1.0 seconds for 67.0 per cent and 1.2 seconds for 33.0 per cent. Above the optimum time interval the poorest interval for 81.0 per cent was 2.0 seconds and 1.8 seconds for the remaining 19.0 per cent.[9]

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[9]George A. Walker and Thomas C. Hayden, "The Optimum Time for Holding a Sprinter Between the 'Set' and the Stimulus (Gun Shot)," Research Quarterly, 4:124-30, May, 1933.

CHAPTER III

PROCEDURE

This study was conducted in three parts. The major portion of the study was conducted through the use of a questionnaire. A second phase of the study used the University of Tennessee track team as subjects and the third part of the study was a survey of the time intervals of high school track starters in the Knoxville, Tennessee, and Rome, Georgia, areas. The procedure used in the development of each phase is explained.

I. DEVELOPMENT AND DISTRIBUTION OF THE QUESTIONNAIRE

The questionnaire was developed with the assistance of Coach Chuck Rohe of the University of Tennessee Arhletic Department. It was read for criticism by two members of the Physical Education staff of the University of Tennessee.

The questionnaire was first distributed in the information packets to the coaches of teams participating in the Southern Interscholastic Competition in Knoxville, Tennessee. At a later date copies of the questionnaire were distributed to coaches of the schools participating in the Region and District meets in Knoxville, Tennessee. With the assistance of Coach Paul Kennedy of West Rome High School in Rome, Georgia, the questionnaire was distributed to coaches in Region 4-AA in

Rome, Georgia, and to the coaches in the Class AA State Track Meet.

A copy of the questionnaire was mailed to the track coaches in the Southeastern Conference. Included was a letter of explanation and a stamped self-addressed envelope for the convenience of the respondent. A copy of the questionnaire is shown in Appendix A.

II. DEVELOPMENT OF THE EXPERIMENT WITH THE UNIVERSITY OF TENNESSEE TRACK TEAM

Through the suggestion of Coach Rohe, it was decided to compare the performance of the sprinters over a distance of thirty yards with the starter's time interval. The starter used a stopwatch to record his time interval, while the runners were timed by the same method. Each runner's time was recorded along with the time interval on Table I, Appendix B.

III. DEVELOPMENT OF THE SURVEY OF THE STARTERS' TIME INTERVALS

In an attempt to ascertain the general time intervals of the high school track starter, the writer timed twelve starters in the Knoxville, Tennessee, and Rome, Georgia, areas. These times and the frequency of their time intervals are shown in Table II, Appendix B.

CHAPTER IV

ANALYSIS OF DATA

This chapter contains an analysis of the data collected in connection with this study. Each of the three phases of the study will be analyzed separately.

I. ANALYSIS OF THE QUESTIONNAIRE SURVEY

The questionnaire was composed of ten questions, eight of which pertained to the effects of the starter's time interval, one question which requested the number of meets in which each school was a participant, and one question which inquired as to whether the area had a clinic for track officials.

There were ninety-seven questionnaires distributed to high school and college coaches with response from thirty-seven of the eighty-seven high school coaches to whom it was distributed and eight of the ten college coaches to whom it was mailed. The 42.5 per cent response of the high school coaches is a possible result of the fact that they were distributed during meets which could have been of a great inconvenience to the coaches. There was an 80 per cent response from the college coaches. One of the two who failed to respond had retired and the new coach had not been appointed. There was no reason known for the failure of the other coach.

The questions will be analyzed in the order in which they appear on the questionnaire.

Question One: WHAT STARTER'S TIME INTERVAL DO YOU FIND IS THE MOST ADVANTAGEOUS TO YOUR RUNNERS?

Of the high school coaches, 16, or 43.3 per cent, stated that they preferred a 2.0 seconds time interval. Fourteen coaches, or 37.8 per cent, indicated that they felt that a 1.5 seconds time interval was more advantageous. The remaining coaches were divided with three, or 8.2 per cent, favoring 1.8 seconds and four, or 10.8 per cent, preferring 2.2 seconds. The average time interval of the high school coaches was 1.82 seconds.

The college coaches were inclined toward the 2.0 seconds time interval with four, or 50 per cent, indicating this preference. Two coaches, or 25 per cent, indicated 1.8 seconds as a holding time for the runners, while one, or 12.5 per cent, stated that he preferred 1.5 seconds. One coach failed to indicate his time interval preference, but stated that the gun should be fired when the runners are set and ready. The average time interval for the college coaches was 1.88 seconds.

Question Two: DO YOU THINK THAT A STARTER WITH A CONSISTENT SLOW GUN HAS AN ADVERSE EFFECT ON YOUR RUNNERS?

Twenty-four, or 64.9 per cent, of the high school coaches stated in the affirmative, while the remaining 13, or 35.1 per cent, stated that they did not feel that the "slow" gun had any effect.

Only two, or 25 per cent, of the college coaches felt that the "slow" gun had an adverse effect on the performance of the runners, while the other six coaches stated that they did not.

Perhaps this is an indication of the more experienced runner and more specialized coaching on the college level.

Question Three: DO YOU THINK THAT A STARTER WITH A CONSISTENT FAST GUN HAS AN ADVERSE EFFECT ON YOUR RUNNERS?

Twenty-nine, or 78.4 per cent, of the high school coaches felt that the "slow" gun hurt the performance of their runners, while eight coaches, or 21.6 per cent, stated that this had no effect on their runners.

Of the college coaches, only three, or 37.5 per cent, stated "yes," while the remaining five, or 62.5 per cent, felt that this had no effect on the performances of their runners.

This again may reflect the higher level of coaching and experience on the college level.

Question Four: TO WHICH EXTREME DO THE STARTERS TEND TO BE IN YOUR AREA?

The high school coaches were fairly evenly divided with twenty coaches, or 54.1 per cent, stating that the starters in their area were fast and sixteen coaches, or 43.3 per cent, stating that their starters were slow. One coach stated that the starters in his area were normal.

Six college coaches representing 75 per cent of the coaches indicated that the starters tended to be fast in their area, while only one coach stated that the starters in his area were slow. One coach classified the starters in his area as being normal.

Question Five: DO YOU PREPARE YOUR RUNNERS FOR A FAST OR SLOW STARTER IF YOU KNOW THAT YOU WILL HAVE ONE IN YOUR NEXT MEET?

Of the high school coaches, twenty-five, or 67.6 per cent, indicated that they prepared their runners for the type of starter that they expected to face in their next meet. Twelve coaches, or 32.4 per cent, stated that they did not alter their practice because of this.

Five, or 62.5 per cent, of the college coaches prepared their runners for the starter, while the remaining three did not. One coach stated that he reminded his runners to be alert; another cautioned his runners, while the third coach stated that he always worked for the proper 2.0 seconds hold.

Question Six: DO YOU FIND THAT THE STARTERS TEND TO BE CONSISTENT IN MORE HIGHLY COMPETITIVE MEETS, SUCH AS THE REGIONS?

More high school coaches, thirty-one, or 83.3 per cent, indicated that the starters in this type of meet tended to be more consistent, while seven, or 16.7 per cent, felt that they were not more consistent.

The college coaches indicated unanimously that the starters in this type of meet were more consistent. The range of starters to be chosen would be much broader on the college level than with the high schools.

Question Seven: DOES YOUR AREA HAVE ANY CLINIC OR METHOD FOR THE TRAINING OF PROSPECTIVE STARTERS OR TRACK OFFICIALS?

It was found that eleven coaches representing three areas had a clinic which helped to train high school officials. The areas represented were Knoxville, Bristol, and Nashville, all of which are in Tennessee. The University of Tennessee sponsors the clinic in the Knoxville area, while the high school coaching groups sponsor the clinics in the other two areas.

Only two of the colleges helped to sponsor these programs. Tulane University was the other college involved in this endeavor to improve the standards of track officiating.

Question Eight: HOW MANY TRACK MEETS HAS YOUR TEAM COMPETED IN THIS SPRING?

The number of meets competed in by high schools ranged from three to sixteen. There were six schools with eight meets, four with nine meets, and six with ten meets. The average number of meets among the high schools was 8.27. The coaches indicated their teams competed in a total of 306 meets.

The college coaches indicated that their teams competed in eighty-two meets. The number of meets ranged from seven to

fifteen with three teams competing in nine meets. The eight teams averaged 10.25 meets.

Question Nine: HOW MANY OF THE STARTERS DO YOU FEEL WERE CONSISTENT? COUNT YOUR OWN STARTER ONLY ONCE.

Of the 306 meets in which the high school teams competed, the coaches indicated that there were only 106 consistent starters, or a percentage of 31.35. Each team had an average of 2.86 consistent starters within the season. The teams with the larger number of meets saw fewer good starters. Only one coach stated that he had no consistent starters, while one coach stated that he had nine consistent starters in the nine meets in which his team competed. It is felt that there was some inconsistency on the part of some coaches.

The college coaches indicated a higher frequency of consistent starters. There were fifty-one consistent starters in the eighty-two meets. Each team saw an average of 6.5 starters who were considered to be consistent. It is noted here there were more than twice as many consistent starters on the college level as on the high school level. This is due to the higher level of competition and need for more competent officials on the college level. The percentage comparison indicates the need for methods of training officials, especially on the high school level.

Question Ten: IN ALL OF YOUR MEETS, WHAT DO YOU FEEL WAS THE AVERAGE STARTER'S TIME INTERVAL? (1.1 TO 3.0 SECONDS)

This question produced some inconsistency among the high school coaches. A number of the coaches had indicated in the fourth question that they felt that the starters in their area were fast, and then in the tenth question, the same coaches stated that they felt that the average time interval of the starters in their meets were 2.2 seconds and upward to 3.0 seconds.

The time interval given by the coaches ranged from 1.1 seconds to 3.0 seconds. Ten of the coaches indicated that their average time interval was 2.2 seconds or higher with two selecting 3.0 seconds and one 2.7 seconds. The average of the thirty-seven time intervals indicated by the coaches was 1.92 seconds.

The college coaches stated that their time interval average ranged from 1.3 to 2.0 seconds. Two coaches indicated that they had average time intervals of 1.5 seconds, while two more coaches had time intervals of 2.0 seconds. The other coaches' time interval averages ranged between these two figures at 1.5 seconds, 1.6 seconds, 1.7 seconds, and 1.8 seconds. The average time interval was 1.68 seconds, which was perhaps more realistic than the high school coaches.

II. ANALYSIS OF THE EXPERIMENT WITH THE UNIVERSITY OF TENNESSEE TRACK TEAM

This phase of the experiment used as subjects the sprinters of the University of Tennessee track team. The purpose was to determine if the time interval had any effect on the performance of a runner over a short distance. The distance selected was thirty yards and a finish line was clearly marked at this point. The starter was to use different time intervals, timing himself by the use of a stopwatch. The runners were timed from the gun until they crossed the finish line.

This phase of the study may be of less correlation with the rest of the study as several individuals were used. One individual may be more adept at getting out of the blocks than another and this did prove to be true. Also, the speed of the individual runner may be a factor. The type of weather had some effect on the sprinter because some of the times improved as the season progressed and the weather got warmer. The best times were recorded on the hottest day of practice.

In the process of collecting data, 115 times were recorded. The times ranged from 3.5 seconds to 4.4 seconds. The time intervals ranged from 1.0 seconds to 3.2 seconds. The most frequently used time intervals were 1.8 seconds, used twenty-five times, and 1.9 seconds, which was used twenty times. The frequency distribution chart showed that the average time needed to

cover a thirty yard distance was 3.947 seconds, while the average time interval was 1.959 seconds.

One of the subjects, who was the Southeastern Conference champion in the 100-yard dash and the 220-yard dash was timed fifteen times over the thirty yard distance. His times ranged from 3.5 seconds to 4.0 seconds, with 3.8 seconds being the most consistent with eight times. The time intervals for the eight times were 1.7 seconds, 1.8 seconds, 1.9 seconds three times, 2.2 seconds, and 2.5 seconds twice. This appears to show no effect of time intervals on the individual's performance.

A second subject who was timed seventeen times showed the difference in individual speed. His times averaged 4.0 seconds as compared to 3.83 seconds for the first subject. The time intervals ranged from 1.3 seconds to 3.2 seconds. He was timed at 4.0 seconds eight times with the time ranging from 1.3 seconds to 3.2 seconds. As in the case of the first subject it appears that the time intervals were of little consequence.

The frequency distribution chart shows that the extremely short or long time interval tends to produce slower times over the thirty yard distance. It must be noted that the three times of 4.4 seconds were recorded by the same person and the majority of the slow times were recorded on a cool day, which could be a major factor.

III. ANALYSIS OF THE SURVEY OF THE TIME INTERVALS OF TWELVE HIGH SCHOOL TRACK STARTERS

Twelve high school starters in the Knoxville, Tennessee, area and the Rome, Georgia, area were timed in an attempt to ascertain the general time interval of various starters. There was no attempt to distinguish between good and bad starters in the selection.

Each starter was timed eight times, giving a total number of ninety-six times. The times ranged from .4 second to 2.9 seconds. The average time interval was 1.62 seconds.

It must be realized that in some cases the officials at high school track meets are on a voluntary basis and that it is not always possible to select the best qualified personnel.

One starter of a Region track meet had starting intervals from .4 second to 2.9 seconds. Each of the distances raced produced false starts as the time intervals ranged from 2.2 seconds to 2.9 seconds. The runners complained of not knowing if they would have a "fast" gun or a "slow" gun. There was little consistency in the starter's pattern.

The starters generally tended to be fast with 1.6 seconds being the most consistent time, being used nineteen times. The time intervals of 1.5 seconds, 1.7 seconds, and 1.8 seconds were each used thirteen times. One and four-tenths seconds was used ten times, and 1.3 seconds was used nine times. The

next to lowest time interval was used three times.

It was noted that some of the starters were not clear in their directions to the runners as they took their places at the starting lines. This created confusion in some cases which resulted in false starts. The starters in two cases seemed anxious to finish the meet and attempted to hasten the runners into getting into their positions.

CHAPTER V

CONCLUSIONS

The conclusions which were drawn from the analysis of data are presented in this chapter.

1. The 2.0 seconds time interval is more advantageous for the high school and college runner.
2. The high school runner is more adversely affected by the "fast" or "slow" gun than the college runner. There is little effect on the experienced college runner.
3. The average high school and college track starter tends to be fast. This may be a result of the fact that many starters tend to start the runners when they are steady rather than attempting to observe a set time interval.
4. A majority of the high school and college coaches attempt to prepare their runners for the type of starter which they expect to face in their next meet.
5. The starters in the higher levels of competition tend to be more consistent than on the local level.
6. A need is evident for more track clinics to prepare competent track officials. These clinics should

be sanctioned and required by the State High School Associations.

7. More research is needed to determine the effects of the track clinic. A study of this type should be conducted nationwide to determine if the State High School Associations do sponsor such clinics, and their effect, if any, on track officiating.

BIBLIOGRAPHY

BIBLIOGRAPHY

Bresnahan, George T., W. W. Tuttle, and Francis X. Cretzmeyer. Track and Field Athletics. St. Louis: The C. V. Mosby Company, 1964.

Bunn, John W. The Art of Officiating Sports. New York: Prentice-Hall, Inc., 1950.

Butz, James T, Promotional Director. For the Record, The United States Track and Field Federation. Chicago, 1964.

Meyer, A. H. Track and Field Athletics. New York: A. S. Barnes and Company, 1955.

Mitchell, Elmer D. Sports Officiating. New York: A. S. Barnes and Company, 1949.

Nakaruma, K. "Experimental Study in Reaction Time of Start for Running Race," Japanese Journal of Psychology, 3:231-62, 1928. Cited by George A. Walker and Thomas C. Hayden. "The Optimum Time for Holding a Sprinter Between the 'Set' and the Stimulus (Gun Shot)," Research Quarterly of the American Association of Health, Physical Education, and Recreation, 4:124-30, May, 1933.

Plotnicki, Ben A. "The Official Track Starter," Athletic Journal, 43:16-7, April, 1963.

The 1963 Official National Collegiate Athletic Association Track and Field Guide. New York: The National Collegiate Athletic Bureau, 1963.

Walker, George A., and Thomas C. Hayden. "The Optimum Time for Holding a Sprinter Between the 'Set' and the Stimulus (Gun Shot," Research Quarterly of the American Association of Health, Physical Education, and Recreation, 4:124-30, May, 1933.

APPENDICES

APPENDIX A

QUESTIONNAIRE

APPENDIX A

QUESTIONNAIRE

Coach_____ School_____

City _____ State _____

Gentlemen:

The purpose of this brief questionnaire is to provide information for a thesis, "A Study of the Effects of the Track Starter's Time Intervals." The object of this study is to determine if the fast starter (1.0 to 1.5 seconds) or the slow starter (2.2 to 3.0 seconds) has any effect on the performance of the runner.

I appreciate your indulgence and help in answering these questions.

Michael A. Sutton
The University of Tennessee

1. What starter's time interval do you find is the most advantageous to your runners? _____

2. Do you think that a starter with a consistent slow gun has an adverse effect on your runners? _____

3. Do you think that a starter with a consistent fast gun has an adverse effect on your runners? _____

4. To which extreme do the starters tend to be in your area? _____

5. Do you prepare your runners for a fast or slow starter if you know that you will have one in your next meet? _____

6. Do you find that the starters tend to be more consistent in more highly competitive meets, such as the Regions? _____

7. Does your area have any clinic or method for the training of prospective starters or track officials? _____

8. How many track meets has your team competed in this spring? _____

9. How many of the starters do you feel were consistent? Count your own starter only once. _____

10. In all of your meets, what do you feel was the average starter's time interval? (1.1 to 3.0 seconds) _____

Comments:

APPENDIX B

TABLES

TABLE I

FREQUENCY OF SPRINTERS' TIMES AND TIME INTERVALS IN THE EXPERIMENT WITH THE UNIVERSITY OF TENNESSEE TRACK TEAM

Time Intervals	Elapsed Time Over Thirty Yards										Total
	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	
3.2					1	1					2
3.1							1	1			2
3.0						1		1			2
2.9											-
2.8						1			1		2
2.7											-
2.6											-
2.5											-
2.4							1				1
2.3											-
2.2				1	4	7	2	4	1		19
2.1						2		1			3
2.0			2	3	4	5	1	1			16
1.9			2	10	5	2	1				20
1.8		3	1	2	9	5	3			2	25
1.7				2	5	2	1				10
1.6			2	1	1						4
1.5					1	1					2
1.4	1						1				2
1.3					2						2
1.2											-
1.1											-
1.0						2	1				3
Totals	1	3	7	19	31	29	12	8	2	3	

TABLE II

FREQUENCY OF THE TIME INTERVALS
OF TWELVE HIGH SCHOOL
TRACK STARTERS

Time Intervals	Frequency
.4	1
.5	-
.6	-
.7	-
.8	-
.9	-
1.0	-
1.1	3
1.2	1
1.3	9
1.4	10
1.5	12
1.6	19
1.7	13
1.8	13
1.9	7
2.0	3
2.1	-
2.2	1
2.3	-
2.4	2
2.5	-
2.6	-
2.7	-
2.8	-
2.9	1