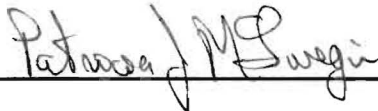


AN ABSTRACT OF THE THESIS OF

Eric Halstead Kaifes for the Master of Science
in Physical Education presented on July 9, 1987

Title: A Comparison of the Effectiveness of Two Methods of
Punting: The Vertical Drop Method and the Push Up and Out
Drop Method on the Development of Distance, Hangtime, and
Direction Among Novice Punters.

Abstract Approved: 

Committee Members: Dr. Patricia J. McSwegin, Chairperson, Dr.
Loren Tompkins, Dr. Marge Stone.

The purpose of this study was to determine the effectiveness of two methods of punting: the vertical drop method and the push up and out method and the effect that these methods have on distance, hangtime, and direction in punting. Forty-five subjects were selected and assigned to three groups: a control group and two experimental groups. The three groups were pre-tested on distance and hangtime, and post-tested on distance, hangtime and direction. The two experimental groups participated in a four week treatment phase utilizing the vertical drop method or the push up and out method.

An analysis of variance was used in this study to determine the degree of variation in effectiveness of directional punting among the three groups. To determine the degree of variation in effectiveness of punting for distance and hangtime among the three groups, an analysis of covariance was used. If a significant difference appeared in the three groups tested, the Tukey test was implemented to locate the difference. The subjects that trained with the push up and out method of punting scored significantly higher in distance than did the control subjects or the vertical method subjects. Data on hangtime and direction exhibited no differences. These results led to the rejection of the null hypothesis among the three groups. Based on the results of this study, there is a significant difference in effectiveness in distance between the two methods of punting: the vertical drop and the push up and out drop. This same study concludes that there is no significant difference for hangtime and direction.

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wishes to
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Chapter 1

Introduction

The kicking game is a vital aspect of the sport of football. The effectiveness of kickers, including punters, field goal kickers, and kick-off specialists, has a direct and major impact on the results of the game. The key to a successful team often lies in the legs of the kicking specialists (Leighty, 1967). Teams which neglect the kicking game will usually suffer one or more losses during a season as a result of this neglect (Cunningham, 1976). Therefore, the various kicking specialists are continually being motivated to improve the effectiveness of their kicking style not only to achieve a higher level of individual competency, but also to contribute immeasurably to the success of their team.

The kicking game consists of kick-offs and kick-off returns, field goals and field goal returns, punt and punt returns, onside kicks, and the occasional blocked field goals and/or blocked punts. Each of these areas has an equal degree of importance in the kicking game, and each brings to the overall game plan various strategies of execution. The kicking game is extremely important in football because each play executed involves an appreciable distance in terms of yardage gained. For example, a properly executed punt averages between 25 and 40 yards (Zauner, 1978). One mistake

by either team in covering the punt can decidedly change the outcome of the game. Therefore, it is important to minimize the mistakes in the kicking game. Failure to do so often results in a score for the opponents. Frequent mistakes in the kicking game include poor blocking, poor hangtimes, and missed tackles. To understand the important and the changing roles of the kicking game, one must understand the total game of football.

A basic football game is broken down into three categories: offense, defense, and the kicking game (Storey, 1974). The objective of the offense is to score, usually by moving the football downfield through a series of maneuvers, until a touchdown is made or a field goal is attempted. The objective of the offense then is to gain a minimum of ten yards in three successive plays, thereby obtaining a first down. Using this conservative approach, the offense can control the football and the opponent's defense must remain on the field. However, statistics show that the average distance of an offensive play in the National Football League is only 4.5 yards (CBS, 1986). This indicates that a first down is not easily earned. If the single plays of the offense do not gain the ten yards needed for the first down, the offense must punt the football away.

The objective of the defense, on the other hand, is to stop the forward progress of the offense and to force the offense to give up the football either by a turnover, such as a fumble, by an interception, or by not allowing the offense

to gain the minimum of ten yards and a first down, thereby forcing a punt. The defense also must have the capability to minimize the yardage gained by the offense and limit all big plays, such as long touchdown passes and running plays.

In most situations, the winning team does not score on every possession of the football (Fuoss, 1959). The best offensive football teams on both the scholastic and collegiate levels score only about one-third of the time they have possession of the football over the course of the game (Fuoss, 1959). This generally forces the losing team to punt more often than the winning team. Statistics show that 78% of football games are won or lost according to the outcomes of the kicking game (Storey, 1979). To prevent big plays in the kicking game, specifically in the punt, certain variables must be understood.

Originally, the sole objective of punting was to propel the football straight down the field at a maximum distance. This punting distance was measured from the line of scrimmage where the ball was downed by a player, where it rolled to a complete stop, or where it was kicked out of bounds. However, as faster players began playing the game, a long straight punt gave an advantage to the return team and not to the punting team. A football which is kicked straight down the field reaches the return man before the covering team has an opportunity to move down the field and set up its own defensive strategy. This allows the returner the opportunity

to gain an advantage by not encountering any opposition until he has reached full speed, making him harder to tackle.

To minimize the advantage the return team gained from long distance punts, punters began to develop a kick with greater hangtime. They also developed the ability to direct the kick to any part of the field which allowed their own teams to limit that area of the field in which the returner could maneuver.

Hangtime is the time the ball is in the air from the point of impact of the punter's foot to the time the ball touches the punt returner or the field of play. A quality hangtime is 4.6 seconds or longer; a punt with a hangtime lower than 4.6 seconds is considered inefficient and more likely to result in a long return (Pelfrey, 1979). The longer the ball is in the air, the more time the punting team has to move down the field and contact the returner before he reaches maximum speed.

Directional punting is kicking the football so that it lands near the sideline, right or left, pinning the opposing team against the sideline. The standards for a quality directional kick are 4.6 seconds or better hangtime and a distance of 45 yards from the line of scrimmage (Pelfrey & Hoffman, 1987). The objective of this type of punt is to divide the field into halves, taking away one side of the field from the top returners. This type of punt is used also to kick away from the top return specialist, thus nullifying the chances of a long run back. An example of an outstanding

punt returner is Phillip Epps of the Green Bay Packers. Epps, a world class sprinter (10.1 in the 100 meters), needs only one opening to return the punt for a long touchdown. With his superior speed, Epps is able to outrun the coverage team if the entire field is left open for the return. The more freedom Epps has to maneuver, the more dangerous he becomes. Therefore, a kicker must use good strategy and punt the ball to an area of the field in which Epps cannot field the punt or to punt the football near one sideline, minimizing the area in which Epps can maneuver and return the punt. Also, if Epps must field a punt which has good hangtime, he will encounter the punt coverage team before he can accelerate to his top speed. In effect, a well placed punt with good hangtime neutralizes the speed of a returner like Epps.

When the football is kicked and finally covered by the punting unit, the result of the punt is field position. If the punt has quality hangtime, distance, and direction, the punt can be covered without significant return yardage. If the punt is of poor quality, however, it is likely to be returned a significant distance, giving the offensive (non-kicking) team good field position. In this case, poor field position for the punting team is the result.

Field position is the result of a quality punt, pinning the opposing team deep into its territory and causing the receiving team to travel the length of the field. Field position many times is determined by the results of the punting team (Zauner, 1978). Thus, the quality of a punt can

change the entire game strategy. An example of this was illustrated by a football game played between the Washington Redskins and the New York Giants (1986). The punter for the Redskins averaged a disappointing 24.7 yards per kick in the first quarter, consistently losing a valuable field position for his team, thereby giving the New York Giants an opportunity for greater field position and easier scoring opportunities. Therefore, the Giants consistently started their offensive drives inside the Redskins' territory because of the poor punting by the Redskins' kicker. Conversely, the New York Giants' punter did not even have to attempt one punt in the first half because the Giants always had such good field position resulting from the Redskins' poor punting abilities. The New York Giants eventually won the game and earned a position in the 1987 Super Bowl.

As the characteristics of a quality punt changed from mere distance to hangtime and to direction, the mechanics of punting also changed. Two methods were not utilized to meet the new objectives that hangtime and directional kicking demanded: they were the vertical drop method and the push up and out method.

The mechanics of the vertical drop method of punting are very basic. The kicker lines up in a relaxed balanced position so that the alignment and approach of his body is straight down the field. In order to get the punt off safely, the kicker must take from one to three steps. As the punter takes the last step in the approach, the ball is released

downward and the impact of the foot on the ball is a quarter of the lock of the kicking leg (Zauner, 1978, Appendix G). The punter's trunk is leaning back and the leg follows through as much as the punter's flexibility allows.

The mechanics of the push up and out drop method of punting requires a complicated series of movements. The alignment and approach to the football is either right or left, according to the situation of the football game (the kicking coach during the game decides upon the direction which the football will be kicked). The punter then takes a maximum of three steps in kicking the football, to assure a safe get-off time. The release of the football from the hand is projected up and out and the foot should contact the football just before leg-lock of the kicking leg (Appendix H). It is vital to contact the football just before leg lock for two reasons. First, this allows full use of the arc of the kicking leg, and secondly, as the football is floating downfield, the momentum of the body can be used in adding distance and hangtime to the punt (Pelfrey & Hoffman, 1987).

In comparing the two distinct methods of punting, significant differences can be detected. The vertical drop method emphasizes the speed of the kicking leg; the push up and out method combines the speed of the kicking leg with the body's momentum as an aid in kicking the football. As the football descends downward in the vertical drop, the kicking leg does not have adequate time to lock after contacting the football. Also, if the football descends towards the field

too soon, the body must stop its forward progress, thereby causing the body to lean back and negate the extra power the body can add to the kick, thus limiting the maximum results of a smoothly executed punt. In the push up and out method, however, the football is placed in a position to free-float downfield, allowing the kicking leg enough time to snap through the ball, thus resulting in a higher kick. As the football is floating downfield, the body is then able to incorporate its momentum into the snap of the leg thereby aiding in distance and hangtime.

Statement of the Problem

It was the purpose of this study to determine the effectiveness of the two most commonly used punting methods: the vertical drop method and the push up and out drop method. In comparing the two distance methods of punting, major technique differences appear in the mechanics. The differences are so significant that a punter who uses the proper fundamentals of the punt is more likely to win a football game; in the same manner a punter who uses poor fundamentals is more apt to lose a football game.

Purpose

It was the purpose of this study to determine the effectiveness of two methods of punting: the vertical drop method and the push up and out drop method, on the development of distance, hangtime and direction kicking on novice punters. This was done by comparing the results of the subjects using

the two methods of kicking a football measured by hangtime, distance, and direction kicking. The training program lasted four weeks. The subjects were divided into three groups: a control group, a vertical drop method group, and a push up and out method group. The three groups were pre-tested in hangtime and distance and post-tested in hangtime, distance, and direction.

Significance

The common concerns among coaches and punters are maximum efficiency and consistency. To perform at a consistent and superior level of 45 yards and 4.6 seconds or better per punt, proper technique must be learned and performed consistently. In comparing the two distinct styles of punting, significant differences appear in the mechanics of the punt. To fully understand the two different theories of the punt, proper studies must be initiated or updated and the results made available for coaches, punters, and potential punters.

Kermond and Konz (1978) report that minimal scientific studies on the punt have emerged over the last 27 years. Most of the literature pertaining to football refer only briefly to kicking with little or no reference to research (Murray & Falcone, 1970). There are many written articles concerning the vertical drop method, but the ideas put forth in such articles are based mainly on opinion and subjective evaluations. Little systematic investigation has been done on the push up and out method because of the relative newness of

the technique. The present study will provide objective information to coaches and all who are concerned with the most effective method of punting a football.

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Chapter 2

Review of Literature

Punting is a skill which is rated as one of the most difficult skills for the coach to teach and the athlete to master (Zauner, 1978). Only through continued practice of the fundamentals can one hope to achieve success in punting (Leighty, 1967). On the other hand, Leroy Mills (1936) states that any average punter can improve his punting skills, provided fundamental techniques are stressed and practiced diligently. Learning to punt a football involves various principles concerning motion, levers, trajectories, and application of forces (Zauner, 1978). To optimize the teaching of these various types of principles for the football punt, coaches and teachers need a better understanding of the mechanics of kicking and the importance of the foot's placement on the ball (Plagenhoef, 1971). To provide clarification of the complexities of punting a football, this chapter contains a review of the literature pertaining to the anatomical, mechanical, biomechanical, and the motor learning aspects of punting a football.

The Anatomical Analysis of the Punt

Understanding the muscular action of the punt is important for three reasons. First, it gives a punter a vivid picture of the relationship between good form and proper

muscular action. In this way, it serves as a basis for the teaching program. Second, the punter with a clear understanding of the proper muscular action can direct attention to the specific muscle groups which require development. Third, such an understanding provides the key to controlling factors which reduce fatigue (Allen, 1950). The following analysis of the punt will be divided into three sections: catching the snap and the preparation for the release of the football, the swing phase of the kicking leg, and the follow through phase of the kicking leg. (The analysis describes a two step, right-footed punter.)

Catch/Preparation

When the football is snapped to the punter from the center, the punter flexes the shoulder and extends the elbow joints while making limb and trunk adjustments for the height and lateral direction of the snap (Olson & Hunter, 1986). The major muscles that are involved in catching the football are the triceps, deltoid, and hand muscles (Appendix B). As a right-footed punter begins the approach to the football, the first step towards the line of scrimmage is a full stride with the right foot. In taking the full stride with the right foot, the muscles that are working are the right quadriceps, the gluteus maximus, the rectus abdominus, the external oblique, and the deltoid. In coordinating these particular muscle groups, the body maintains equal balance and develops a forward momentum by contributing a forceful push-off for the

second step. Also during the first full stride, eccentric extension occurs as the right foot contacts the ground (Olson & Hunter, 1986, Appendix C). The second stride (the final approach step) incorporated the deltoid, triceps, external oblique and rectus abdominous, hamstrings, rectus femoris, and quadricep muscles. The above muscles are working together to maintain balance and to generate forward momentum. During the second stride, the kicking knee is eccentrically extended. This eccentric action is important to the punt because it absorbs the punter's forward momentum and coordinates the quadriceps in preparation for explosive extension of the knee of the non-kicking leg (Stone & Bryant, 1982, Appendix D).

Swing Phase

The swing phase of the kicking leg is very critical in determining distance and hangtime of the punt (Appendix E). The leg swing draws additional force from simultaneous extension of the left knee and plantar flexion of the left ankle as they push the punter's body mass forward and up (Olson & Hunter, 1986). A critical factor of the leg swing is the extreme plantar flexion of the kicking foot which contributes to maximum force by exposing the rigid long arch of the kicking foot. This arch is the optimum striking surface of the foot and, when its center of mass contacts the football's center of mass, an efficient transfer of momentum occurs (Olson & Hunter, 1986). During the contact of the foot with the football, the primary muscles used are the: hamstrings, calf, trunk, and the abdominal.

Follow Through

In the follow through, the right hip is eccentrically extended and the right knee statically flexed (Appendix F). As the foot is contacting the football, the kicking leg extends to its maximum range of motion.

By understanding the anatomical usage of the body during the football punt, the punter is better able to understand the preparation the body needs for a quality punt. Without the proper knowledge of the positioning of the body, a punter cannot fully maximize his abilities.

The Mechanics of the Football Punt

The first priority of the punter is to kick the football off in 2.1 to 2.3 seconds from the center snap, otherwise, the punt is likely to be blocked (Belichick, 1970). The snap phase requires .8 to 1.0 seconds, therefore, the punter must be able to kick the football in 1.2 to 1.3 seconds after receiving the snap from the center (Zauner, 1978). The number of steps involved in the total approach of the punt varies from 1.5 steps to four steps (Kermond & Konz, 1978). However, the majority of punters in college and the N.F.L. use a two to three step approach. The approach chosen is influenced by the fact that the kicker has only 1.2 to 1.3 seconds from reception of the snap to completion of the kick in order to reduce the chances of having the kick blocked. A longer approach, though mechanically sound, would not be effective because of the increased risk of the punt being blocked.

The punter's stance is an individual matter. Above all, the stance should be relaxed and comfortable with the weight evenly distributed over both feet (Leighty, 1967). As the punter receives the football, he should catch the football with both hands and look the football in to his hands (Fuoss, 1959). Upon receiving the football, the consensus of the experts is that the kicker should place the laces of the football either on top of the football for symmetrical balance or on the side of the football to aid in imparting a spiral action to the football. Most coaches maintain that as long as the laces are not kicked, the positioning of the laces makes little difference (Fuoss, 1959). The football is held in front of the body and over the kicking leg with arms extended (Pelfrey, 1978). As the punter approaches the line of scrimmage, his steps should be kept relatively short. The first step should be approximately 24 inches while the second step should be approximately 30 inches. If the steps are too long, the base of support will be too wide and prevent the kicker from bringing his kicking leg up with the necessary snap and velocity (Belichick, 1976). Also, if the stride is too long, thereby, taking up extra time, the football will drop closer to drop to the ground and create an angle of contact which is not suited for a quality punt. The primary objective of the steps prior to contact is to provide linear movement, which starts the body in motion in the direction of the desired flight of the football (Fuoss, 1959).

The majority of the research agrees that the kicker's support foot should remain on the ground during the punt. Fuoss (1959), Summerall (1968), Storey (1974), Belichick (1976), and Hager (1977) conclude that the foot should remain on the ground to prevent the loss of power. Young (1959) and White (1949) claim the plant foot determines the flight of the football. They state that if the plant foot is placed right or left, the football will travel in the direction the plant foot is pointed.

The release of the football has become one of the most controversial elements of the punt, even though the placement and the drop of the football are considered 90% of the punt (Zauner, 1978). Ramsey (1984) states that the most crucial point in the punt is the drop. There are four different types of hand positions involving the release of the football: the upper hand technique, the hand on the top of the football technique, the hand on the side of the football technique, and the hand on the end of the football technique (Pelfrey & Hoffman, 1987). The two most accepted theories of the release are the hand on top of the football technique and the underhand technique.

Kuharich (1960) believes that the football should be dropped straight down. Fuoss (1959), Kagler (1969), Hager (1977), and Zauner (1978) also agree that release of the football should be from a vertical drop. They claim that if the football is pushed out, the punter must reach for the football, resulting in poor contact between the foot and football.

With the overhand drop, many experts conclude the release of the football should be horizontal. Cooper, Adrian, Glassow (1982) state the more horizontal the drop, the more effective the punt. In the most authoritative study reviewed, Alexander and Holt (1976) claim the football should be released in a horizontal plane for a mechanically sound and effective punt. Pelfrey and Hoffman (1987) contend the football should be pushed up and out during the release of the football in order to prevent the natural pull of gravity affecting the desired flight of the football. The process of contacting the football is divided into four phases: the football height at contact, the kicking leg at contact, the foot location at contact, and the launch angle at contact.

The height of contact of the football should be approximately 15 to 21 inches from the ground according to the situation of the game. If more height is required in the punt, then the contact level should be higher than normal. However, when kicking in windy conditions, the contact level should be closer to the ground in order to prevent the wind from pushing the football downward.

There is reasonable agreement among researchers on the positioning of the leg when contacting the football. Cooper (1982), Pelfrey and Hoffman (1987), Glassow (1982) conclude that the foot should contact the ball just before leg-lock of the kicking leg. However, Hager (1977) and Kahler (1969) disagree on the positioning of the leg when contacting the

football. They state that the leg should be forcibly locked and straight when contacting the football.

The angle of the football when contacting the foot is disputed among the experts. Alexander and Holt (1976) and Young (1959) claim that the football should be contacted on the instep of the kicking leg with a little angle on the instep. Pelfrey and Hoffman (1987) claim the football should be horizontal to the kicking foot with no angle to the ball.

The optimum launch angle of the punt, as with any object, is 45 degrees, according to the projectile theory. However, the need for hangtime and the need to protect against blocked punts encourages kicking at angles over 45 degrees (Kermond & Konz, 1978). Smith (1949) states that the optimum angle should be 47.5 degrees, Watson (1974) advocates 51 degrees, and Cunningham (1974) claims 50 degrees to be best.

Although much has been written on the follow through to the punt, there is little agreement on its role (Kermond & Konz, 1978). David Jennings (1978) states that a good follow through adds height and distance to the kick. Mills (1936) claims a good follow through only improves the distance of the punt. Campbell (1979) comments that a good follow through is a total component of a good punter. However, through research, it is known that follow through allows the football to remain in contact with the striking surface of the kicking foot for a longer period of time, thus extending the application of maximal force to the ball, which results in better hangtime (Olson & Hunter, 1987).

There are a variety of thoughts concerning the best method of developing the punt in football. Although there are many subjective writings, no scientific findings have developed. Pelfrey and Hoffman (1987) feel a three day camp can significantly develop a novice punter. Pelfrey and Hoffman (1987) pre-test the campers on the first day and by the third day, through personal instruction, significant differences are seen in the post-test. However, Storey (1979) claims a punter must kick 200 footballs to develop into a skilled punter. Storey claims only through repetition, can a punter maintain high standards.

The Biomechanics of the Punt

Little research on the biomechanical analysis of the football punt has been completed. The following discussion focuses on those studies that have produced scientific findings on obtaining maximum distance of the punt.

Smith (1949) in his research studied an expert, an average, and a beginning punter. He concluded that the distance the football dropped, the velocity of the release, and the angle of release all made up the difference between expert and poor punters. The expert punter had the least drop time, the greatest velocity of the football at release, and the greatest kicking angle. Marino and Young (1979) also concluded that the major differences between the highly and less skilled football punters are: a shorter total kicking

time, higher rotational velocity of the lower leg segment, and higher linear velocity of the kicking foot.

Roberts and Metcalf (1968) found that foot speed upon contact with the football produced the longest punt. However, Alexander and Holt (1976) disagreed with the findings of Roberts and Metcalf. They found that there is no significant difference between good and average punters in regard to foot speed.

Alexander and Holt (1976) state that the transfer of the foot to the football produced the longer kick. Macmillan (1975) agreed with Alexander and Holt and also commented that foot contact on the ball promoted the longer kick.

Cooper, Adrian, and Glassow (1982) claim that the velocity of the foot as it strikes the football, coupled with the angle of release, determines the distance attained. Finally, (Plagenhoef, 1971), after thoroughly analyzing the football and soccer kick, stated that placement of the foot on the ball is of more importance than is the attainment of maximum foot velocity.

Motor Learning Aspects

In developing a new skill, such as the punt or any particular motor skill, a sufficient amount of time must be allowed for the learner to practice and gain an understanding of the movement. Few people will dispute the important role practice has in the learning of a motor skill (Knapp & Dixon, 1952). Numerous investigations have been collected on the

various theories regarding duration, frequency, and whole movement versus part of the aspects of learning a motor skill. McGoech (1931) concludes there is no superior method. However research indicates a prolonged period of time in skill acquisition is beneficial.

Harmon & Miller (1950) conducted an experiment with three groups in which novice billiards players practiced for three weeks. They found that the group which practiced seven times in the first two weeks performed better than the groups which performed equally throughout the experiment. However, the other two groups also showed improvement from their beginning skills. Scott (1954) also found some indication that beginning swimmers improved when the subjects practiced more at the beginning of the study rather than over an extended period of time.

Young (1954) states that learning in the early stages seems to be improved when the practice periods are relatively massed but that once fundamental training has taken place, learning is more rapid if the practices are distributed over longer periods of time. Laskly (1953) also suggested that two stages of learning are involved, the stage of exploration and adjustment during which the right response is discovered, and the stage of fixation during which the right response is made more certain.

Although minimal scientific research has been focused on the adaptability of the punt, a few subjective evaluations can be made. Pelfrey and Hoffman (1987) in conducting kicking

camps, contend three days of practice time can improve one's kicking ability. Foster's (1985) football camps also state that improvement can be made in a four day period. However, in both camps, the punter must continually seek improvement through individual training.

A quality punt requires a smooth rhythmic motion. Without a smooth motion, the punter cannot manufacture the same drop and approach consistently. Development of a smooth consistent motor pattern requires repetition. The more complex the skill the more repetition is required. But through continual practice, the punter can reach his potential. Stetson (1923) states performance of skilled movements involves not only speed and accuracy but also other aspects including such variables as rhythm and coordination. Fitts (1964) also states tasks in which both object and body are moving are more difficult to complete than when the body and object are at rest.

As the beginning punter involves himself with the proper fundamentals of the punt, his body also adapts physically. His body becomes more flexible which enables the punter to extend his leg higher and increase his leg velocity to kick the football higher and farther (Pelfrey, 1979).

Summary

This literature review was comprised of many theories and subjective evaluations on the muscular, mechanical, biomechanical, and motor skills of the punt. In the areas of

the punt such as the plant foot, the release of the football, the swing of the kicking leg, the contact point of the kicking leg, and the follow through, many formulated opinions were presented. In summarizing these conclusions, there is no perfect solution. Research shows that punting is not a matter of strength but a matter of correct form and flexibility. Only through experimentation and practice can a punter develop a style which is individually sound and correct for himself.

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Chapter 3

Methods

This chapter describes the methods and procedures used to compare the effectiveness of two types of punting methods: the vertical drop method and the push up and out method of punting. The target population, sampling procedures, instrumentation, test validity and reliability, procedures and methodology of data collection, and the method used for the statistical analysis of the data are also presented.

Target Population

The subjects used for this study consisted of male students enrolled at Emporia State University for the spring of 1987. The subjects' ages ranged between 18 to 23 years.

All subjects in this study were novices in regard to punting experience and skill. That is, they had no high school or college game experience in punting. The use of subjects with no prior skill in punting prevented interference or facilitation from previously learned punting skills. This study was designed to test the effectiveness of the two punting methods in regard to distance, hangtime, and direction, as manifested in subjects whose only learning experiences for punting occurred during the four week experimental period.

Sampling Procedures

The subject pool consisted of 45 male volunteers from Emporia State University. The subjects were divided into three non-randomized groups, two experimental groups and one control group. All subjects signed an Informed Consent Form (Appendix A) before taking part in the study. The Informed Consent Form explained all areas of testing: the pre-test, post-test, and treatment phases. It also described possible risks to the subjects and requested their voluntary consent to participate.

The focus of the study was to investigate the effectiveness of two methods of punting. The control group participated only in the pre-test and post-test. The group utilizing the vertical drop technique was designated Experimental Group 1 and the group utilizing the push up and out technique was designated Experimental Group 2. Distance, hangtime, and directional kicking test results were used in order to measure the two different types of treatment results in the post-test. Directional kicking was not implemented in the pre-test because of the difficulty of the movement. Pelfrey (1979) states that through repetition, skill in directional kicking can be achieved.

Validity and Reliability of Testing Procedures

The testing was completed at the football fields and a gymnasium at Emporia State University. Each subject attempted eight punts in the pre-test and post-test. Eight punts was

the number used in order to avoid fatiguing the subjects' kicking legs. Punting is an explosive movement which requires maximum effort. If more than eight punts were attempted, the kicking legs of novices would become fatigued and the maximum effort of the punters could not be measured accurately.

Distance and hangtime were used as variables in determining the quality of the punt in the pre-test. These variable were selected because they are the most important factors in a successful punt. The National Football League, colleges, and high schools all use this standard of the measurement in selecting a starting punter.

The pre-test included eight punts judged on distance and hangtime. Distance was measured on a regulation football field. The distance was marked from the point of contact of the football with the subject's foot to the impact of the football on the field.

Hangtime, the time between impact of the punter's foot on the football to the catch or the impact of the football with the field, was monitored by a Seiko watch. In the pre-test and post-test, hangtime was measured by the impact of the football on the playing field.

The post-test was used to measure distance, hangtime, and directional kicking. Each subject received eight attempts which were evaluated for distance, hangtime, and directional kicking.

Directional kicking was measured from the right hash mark to the right corner of the end zone (Appendix B). Any deviation from the target line was measured and recorded.

For additional validation of the study regarding test and treatment results, all footballs were inflated to NCAA standards. Testing instruments, such as timing and field markings, were calibrated before use and all subjects wore tennis-like shoes. Regulation football cleats were not allowed. The subjects were supervised by the investigator at all times throughout the treatment period and testing procedures. The treatment period included kicking of footballs, drilling on the release of the football, and stretching through flexibility routines to increase the range of motion of the subjects.

Research Design

The nature of this study was to investigate differences in effectiveness of two punting methods: the vertical drop method with the push up and out drop method as measured by distance, hangtime, and direction.

This study also attempted to control all independent variables such as the weather and field conditions. Although the weather conditions for testing could not be controlled directly, temperature and wind velocity were monitored to assure that post-testing conditions were similar to pre-testing conditions. A minimum temperature of 60° Fahrenheit and a wind velocity of less than 15 mph were acceptable conditions for the two testing periods. Colder temperatures or greater wind velocity were considered to be detrimental to the punting methods, and testing was not conducted on such

days. The pre-test lasted two days. The temperature of the pre-test ranged from 63° to 75° Fahrenheit with a wind velocity of 8 to 12 mph. The post-test also lasted two days. The temperature ranged from 65° to 70° Fahrenheit with a wind velocity of 6 to 10 mph. All subjects kicked with the wind during the pre-test and post-test.

A one-way analysis of co-variance was incorporated to study each factor of distance and hangtime. The experimental group 1 represented the vertical drop method, experimental group 2 the push up and out drop method, and group 3 the control group.

	Pre-test	Treatment	Post-test
Experimental Group 1 (Vertical Drop Method)	X	X	X
Experimental Group 2 (Push Up and Out Method)	X	X	X
Control Group 3	X	X	X

A one-way analysis of variance was used in analyzing direction.

	Pre-test	Treatment	Post-test
Experimental Group 1 (Vertical Drop Method)		X	X
Experimental Group 2 (Push Up and Out Method)		X	X
Control Group 3			X

Field Procedures

The two treatment groups were designated experimental groups 1 and 2. Group 1 consisted of subjects who underwent the vertical drop method of training; group 2 consisted of subjects who underwent training with the push up and out method. Group 3, the control group, did not receive any treatment during this experimental phase.

The treatment phase lasted four weeks. The subjects in group 1 practiced on Mondays, Wednesdays, and Fridays. They received detailed instructions on how to properly execute the vertical drop method of punting. The instructions also included the taking of proper steps and alignment, the release of the football, the contact point of the foot, and the follow through. The subjects learned these movements by punting footballs into a kicking net and practicing the vertical drop itself. Punting into a net provided the novice punters with an atmosphere that permitted them to concentrate solely on the form of the punt. Many times novice punters concentrate on the distance the football travels, rather than focusing on the importance of the fundamentals of the kick.

The alignment drills consisted of the subjects walking and dropping the football straight on the line. As the learner developed a sense of walking and dropping the football straight down, a true line developed in the practicing of his approach. (If a punter walks across the line while practicing his approach, the punter's efficiency is decreased by 50% (Pelfrey, 1979). Subjects in both experimental groups practiced this drill.

Since the drop plays an important role in executing the punt, great importance was placed on the proper positioning of the football. Group 1 practiced the vertical drop by letting the football fall freely. By allowing the football to fall freely to the ground, the subject could view the positioning of the football when it contacted the ground. If the football bounced from the ground precisely the way it was positioned in the hands, it was considered a quality drop. However, if the football bounced sideways or end over end from the ground, the drop was considered "inadequate."

Punting a football is an explosive movement and if executed too frequently, muscle pulls are likely to occur; therefore, group 1 participated in a maximum of 30 kicks per session. The maximum number of 30 kicks was employed to reduce the possibility of muscle fatigue in each subject.

The treatment phase was administered for one week indoors and three weeks outdoors. The practice sessions were held indoors because of uncooperative weather conditions. During those indoor sessions, the subjects had an opportunity to punt into a net and to practice alignment and drop drills. The workouts for both experimental groups were identical in frequency and duration. Group 2 subjects practiced on Tuesdays, Thursdays, and Fridays, focusing their instructional practice time on the push up and out method.

Both groups had the same number of practice sessions and practiced the same number of punts and drills. The amount of time allowed for practice for each group was considered to be

a very important element in the research design; therefore, all subjects utilized the same amount of practice time. This prevented one group from receiving extra practice time to improve that group's score.

Data Analysis

A one-way ANCOVA technique was used to determine the degree of variation of the two punting methods in distance and hangtime. The co-variate used in this study was the pre-test of the subjects. A .10 level of significance was set to reject or accept the null hypothesis. Minium (1978) suggest that a .10 level of significance be selected for preliminary stages of a new study. (The first reported research on the push up and out drop, was conducted by Pelfrey, 1979.) A lower value of significance gives a greater assurance that there will be a difference. If a significant difference was exhibited in distance and hangtime, a Tukey's test was employed to identify the location of the difference(s). An ANOVA was used in analyzing the variation of direction according to the standard deviations and means.

Substantive Hypothesis

The first null hypothesis in this study was: that there is no significant difference in the effectiveness between the vertical drop and the push up and out drop punting methods in development of distance in punting. The second null hypothesis was that there is no significant difference in effectiveness between the vertical drop and the push up and

out drop punting methods in regard to development of hangtime. The third null hypothesis was that there is no significant difference in effectiveness between the vertical drop and the push up and out methods of punting in regard to the development of direction of punting.

An alternate hypothesis in this study was: that there is a significant difference in effectiveness between the vertical drop and the push up and out drop punting methods in regard to distance. The second alternate hypothesis was that there is a significant difference in effectiveness between the vertical drop and the push up and out drop punting methods in regard to direction.

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Chapter 4

Analysis of Data

This chapter contains the results of the various data analyses used in the study and the explanations of the data configurations. Included are the following: the findings of the two one-way ANCOVA's (analysis of co-variance) and the one-way ANOVA (analysis of variance) analyses, the standard deviations, group means, significance(s), and the Tukey test results used to locate the significant differences between the treatment groups when needed. The chapter concludes with a brief summary of the data results.

Data Configuration

A one-way ANCOVA technique was used to measure the significance of observed differences in the conditions and interactions on distance and hangtime. The ANCOVA was used in the study because of the non-random selections of the three testing groups. The ANCOVA technique takes in to account the variety of differences of the abilities of the punters by selecting a co-variate. The co-variate used in the analysis was the pre-test scores of the subjects. In analyzing direction, an ANOVA was used. Both testing measures were set at the .10 level of significance. Table 1 illustrates the ANCOVA results on distance.

Table 1

The Analysis of the Co-Variance on Distance

Source	SS	DF	MS	F	P
Distance	78.799	2	39.399	3.633*	.03
Error	444.615	41	10.844		

*Significant Difference

The significant column (P) refers to the mathematical probability associated with difference between the designated measures. The level of significance in this study was .10. The primary purpose of this analysis was to determine any significant difference between the vertical drop method, the push up and out method, and the control group on distance. According to the results from Table 1, distance was significantly better in the push up and out $F(2,41)=3.663$, $p<.10$, compared to the vertical method and control groups. The Tukey test was utilized in locating the significance among the three groups. The critical value for the Tukey Test (dt) for the study was $dt=1.675$. If the value was greater than 1.675, a significant difference in the groups was exhibited. Since there was a significant difference located in the push up and out method in distance, the null hypothesis was rejected and the alternate hypothesis accepted. That is, there is a significant difference in effectiveness between the vertical drop and the push up and out drop methods in regard to distance.

Table 2 illustrates the means and the standard deviations of the three groups for distance.

Table 2

Standard Deviations and Means According to Distance

Group	Mean	S.D.	Grand Mean
Push Up & Out -- Group 1	39.59	3.93	
Vertical -- Group 2	37.27	4.97	
Control -- Group 3	36.46	6.00	37.78

The push up and out group had the highest mean score (39.59) and the lowest standard deviation (3.93). The vertical group mean was the second highest (37.27) with a standard deviation of 4.97, and the control group with a mean of 36.47 had the highest standard deviation with 6.00. The results in the table indicate that the push up and out drop was the most consistent and produced the longest punts. The punts by the vertical drop subjects were approximately 2 yards less than those of the push up and out group and the control group subjects were 3 yards less.

Table 3 illustrates an ANCOVA technique used in describing the hangtime differences. Table 3 includes SS, DF, MS, F, and P.

Table 3

The Analysis of Co-Variance on Hangtime

Source	SS	DF	MS	F	P
Hangtime	.031	2	.016	.340	
Error	1.917	41	.047		

Table 3 shows no significant difference in the three distinct groups in hangtime. A level of .10 of significance was set to locate any differences in the three methods. From Table 3, the difference was not significant among the groups' performances. This indicates that any of the three methods can be utilized in kicking a football and still maintain the same results.

Table 4 describes the analysis of variance according to direction.

Table 4

The Analysis of Variance According to Direction

Source	SS	DF	MS	F	P
Direction	3.147	2	1.574	.105	
Error	629.609	42	14.991		

Table 4 indicates that there is no significant difference among the three groups concerning direction. Since there was no significant difference in direction, a Tukey test was not utilized.

Summary

According to the two analyses of co-variance techniques used, a significant difference was found in distance but not in hangtime. An F ratio of 3.633 was found to exist in distance. The Tukey test located a significant difference of 3.13 in the push up and out method compared to 2.32 in the vertical drop. The analysis of variance technique demonstrated no significant difference in direction.

The three null hypotheses in this study were $H_0 = M_1 = M_2 = M_3$ at the .10 level of significance. In this study, since a difference was located among the groups, the null hypothesis was rejected in regard to distance, but accepted for hangtime and direction.

Chapter 5

Summary

Summary

This study was designed to determine differences in the effects of two types of punting methods: the vertical drop method and the push up and out drop method. Forty-five subjects were divided into three groups: a control group, a vertical drop group, and a push up and out group. All groups were pre-tested in hangtime and distance. The vertical and the push up and out groups participated in a four week treatment phase. After this treatment phase was completed, the groups were post-tested on hangtime, distance, and directional kicking.

An ANCOVA technique was used to measure the co-variance in the conditions and the interaction of the conditions on distance and hangtime. A .10 level of significance was used to measure any significant difference(s). The co-variate used in the analysis was the pre-test scores of the subjects. If a significant difference was exhibited, the Tukey's test was used to locate the effectiveness of the treatment. In analyzing direction, an ANOVA was used to test the interactions of the conditions. A .10 level of significance was used to measure any significant difference of 3.633 was located in experimental group 2 (push up and out technique) for distance. Hangtime and direction showed no significant

differences between the control and experimental groups. However, improvement in both of the variables was evidenced in experimental group 2 (push up and out). Although there was an improvement in experimental group 2 (push up and out) a conclusion cannot be made because of the lack of statistical significance. These results led to the rejection of the null hypothesis on distance and the acceptance of the null hypotheses on hangtime and direction.

Discussion

The results of this study indicated that there was a directional difference in the two types of treatment. According to the findings of this study, the push up and out treatment phase yielded significant gains in distance and relative gains in hangtime and direction in comparison with the vertical drop and the control group.

The push up and out group yielded improvement in distance because the kicking leg is maximized in kicking the football (Pelfrey & Hoffman, 1987). As the football is pushed out and up, the kicking leg is able to extend itself through leg lock, producing a stronger leg swing. Although there is no recent research or evidence to substantiate this conclusion, many punters and past punters concur with this reasoning. These punters include John Misko (Los Angeles Rams), Bob Groupp (Kansas City Chiefs), Brian Hansen (New Orleans), Mike Horan (Philadelphia Eagles), Jim Arnold (Detroit Lions) and Mike Saxon (Dallas Cowboys), (Pelfrey & Hoffman, 1987).

Limitations

A major concern in this study was the motivation factor of all the subjects tested. The majority of the subjects maintained interest and were enthusiastic throughout the study. However, through subjective evaluation, a few subjects began to lose interest and enthusiasm. Although the results might have been different because of this human error, the $n(15)$ was large enough to exhibit a true indication of the population.

Also, the study anticipated that there would be inherent motor skill deficiencies from individual to individual. Throughout the design, however, the less coordinated individuals tended to even out among the groups. Again for the analyses of co-variance and variance techniques, the number of subjects was sufficient to account for the human error.

Another factor of error in this study might have been the John Henry effect (Isaac & Michaels, 1983). This occurs when the members of the control group discover their status and try to out perform the experimental groups. The control group could have been highly motivated to punt the football farther, even though the group had no interest or treatment in the study.

During the treatment period, the subjects were involved in various drills such as alignment and approach, kicking into a net, and the punt itself. Many of them commented on the fact that they were experiencing leg soreness. Although the

subjects felt a slight discomfort in their legs, the soreness did not impede the progress of the treatment.

The results of the study also indicated there was significant improvement in the distance achieved by the subjects who trained with the push up and out method of punting. Although there was no significant difference concerning hangtime and direction, there was a relative gain in these areas. If the study were conducted over a longer period of time, the extended period of training might allow the push up and out group to show significant differences in hangtime and direction. Distance was more readily changed in the four week treatment phase because it is the simpler of the three skills to master. To master the complexities of hangtime and direction, more time is needed to practice the skills. In improving hangtime and direction, the body must be able to adjust to specific angles and movements, extra repetition is needed. As the subject improves his hip and leg flexibility through the training sessions, he is able to keep his foot longer on the ball at contact, producing a higher kick. Also, as the subject becomes fluid with the punting motion, he is able to control the direction of the football as his consistency improves.

The weather conditions during the treatment phase continually interrupted the treatment phase. Constant Kansas winds were a nuisance to the punters because the high winds continuously changed the direction of the drop, affecting the total outcome of the punt.

Finally, through subjective evaluation, test anxiety was a problem for many of the subjects. Test anxiety derives from many forms such as being overly nervous, or simple trying too hard. In a few of the subjects, a difference was noticed between the practice sessions and the post-test between the variables of distance, hangtime, and direction.

Recommendations

On the basis of the results of this study, the following recommendations are suggested for future investigations:

1) A four week treatment period was used in this study because the subjects were primarily novices in the area of punting. Perhaps this length of time was not sufficient for developing proper techniques. If similar studies are initiated in the future, the treatment phase should be extended to a time frame lasting from eight to twelve weeks.

2) Subjects used in this study were novice punters. During the treatment phase, a few subjects became apathetic and disinterested. In future studies involving competition, the sample size should include only novice punters who are interested in learning and developing their skills and who will maintain interest and enthusiasm throughout the study. Also, a motivational scale could be used to identify the unmotivated subjects who would have a tendency to discriminate against the testing procedure and affect the outcome.

3) Weather conditions during the treatment phase affected the subjects' learning capabilities. High winds and

wet conditions continually hampered the subjects' development. Future studies should be conducted indoors to prevent adverse conditions which affect the subjects' treatment phase.

Swim Movement Studies

and Motor Skill Learning

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Appendix A
Informed Consent Form

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Informed Consent Form

I, Eric Kaifes, am requesting your participation in a study designed to investigate the effectiveness of two styles of punting a football: the vertical drop vs. the push up and out drop. As a participant in the study, you will be asked to participate in one of three groups: Control, Experimental Group 1, or Experimental Group 2. Results will be presented in a manner which will not allow recognition of any one particular subject. Only the primary investigator, Eric Kaifes, will have access to the master list matching code numbers to names. All identification information will be destroyed at the completion of the study.

The Control group will simply carry on their normal activities between the period of the pre-test and post-test. Participants in Group 1 and 2 will carry out four weeks of treatment to their assigned punting method. Those subjects will work out approximately thirty minutes per day three days a week.

The pre-test and post-test will include eight punts. All subjects will be properly stretched and warmed up. The subjects will be tested in distance, hangtime, and directional kicking. Following the pre-test and post-test, proper cool down will be incorporated.

Both experimental groups will take part in a four week instructional period. The training sessions will include drills for kicking footballs, specified drills on the release of the football and activities to improve flexibility. There is only a minor chance of developing an injury while taking part in the practices or testing periods. Muscle soreness may develop in the lower extremities but is not likely to develop in the upper extremities. Each subject will undergo warm-up and cool down activities designed to limit soreness.

The major objective of this program is to study the effectiveness of two styles of punting: the vertical drop vs. the push up and out. The testing variables will include distance, hangtime, and directional kicking. Results of this study will be useful in instructing coaches and potential punters on the most effective style of punting a football.

Your permission to use the data described above is requested for use in conducting research for a thesis. If you have any questions concerning this program, please feel free to call Eric Kaifes, at 342-2897.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and I assume them voluntarily. I likewise understand that I can withdraw from the study at any time without being subjected to reproach."

Subject

Date

Appendix B

The Muscular Analysis of Positioning and
Catching the Football Punt

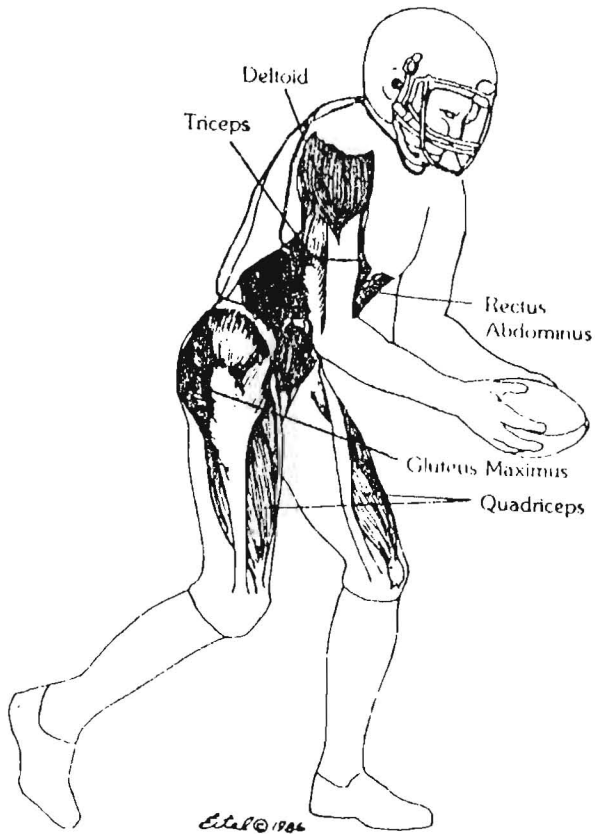


Illustration From:

An Anatomic Analysis of Football Punting with Implications for Conditioning. National Strength & Conditioning Association Journal, by Olson, John & Dunnam, L.G. (1986).

Appendix C

The Muscular Analysis of the First Stride
of the Football Punt

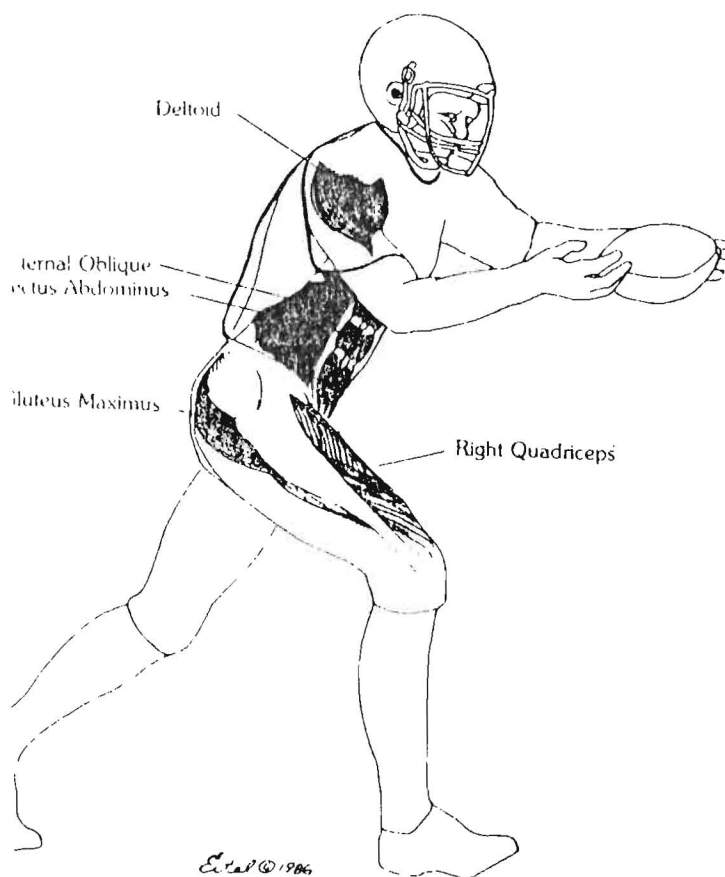


Illustration From:

An Anatomic Analysis of Football Punting with Implications for Conditioning. National Strength & Conditioning Association Journal, by Olson, John & Dunnam, L.G. (1986).

Appendix D

The Muscular Analysis of the Second Stride
of the Football Punt

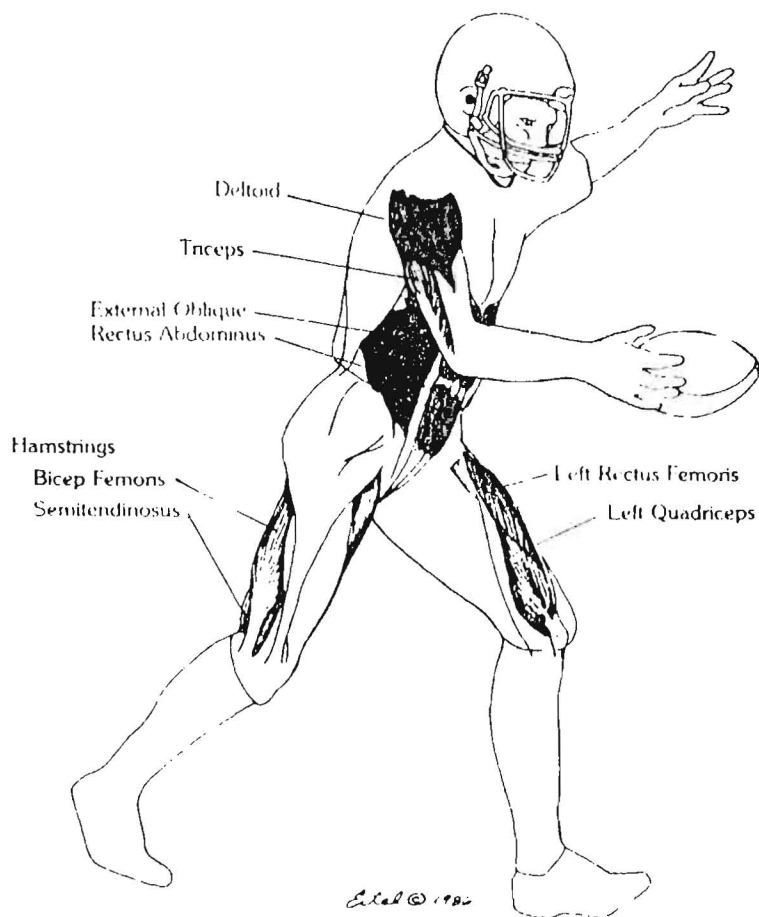


Illustration From:

An Anatomic Analysis of Football Punting with Implications for Conditioning. National Strength & Conditioning Association Journal, by Olson, John & Dunnam, L.G. (1986).

Appendix E
The Muscular Analysis of the Swing Phase
of the Football Punt

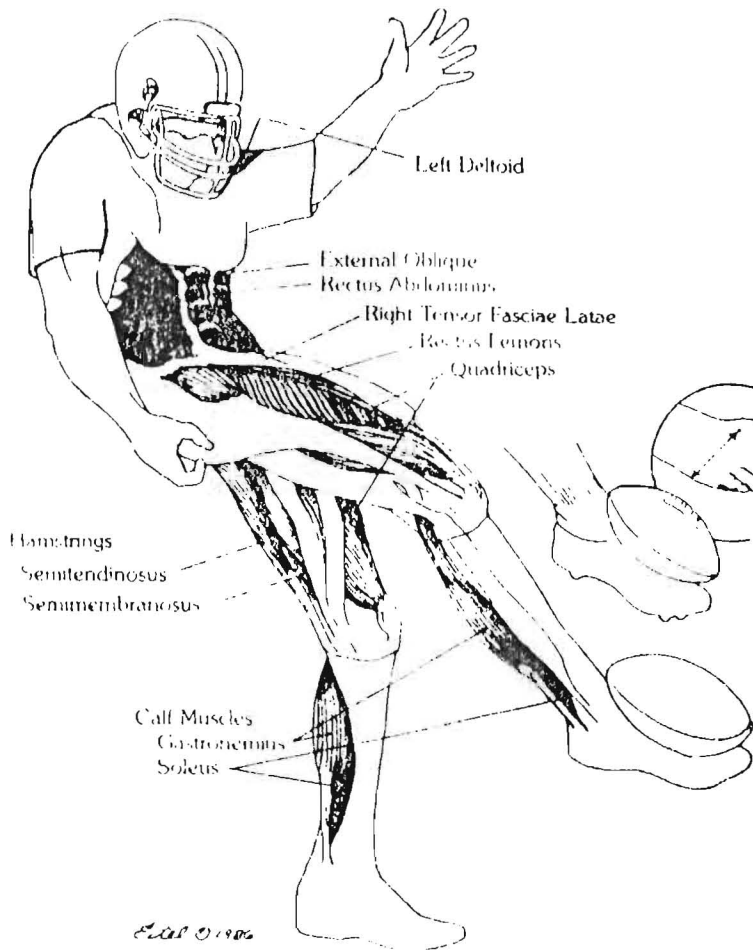


Illustration From:

An Anatomic Analysis of Football Punting with Implications for Conditioning. National Strength & Conditioning Association Journal, by Olson, John & Dunnam, L.G. (1986).

Appendix F
The Muscular Analysis of the Follow-Through
of the Football Punt

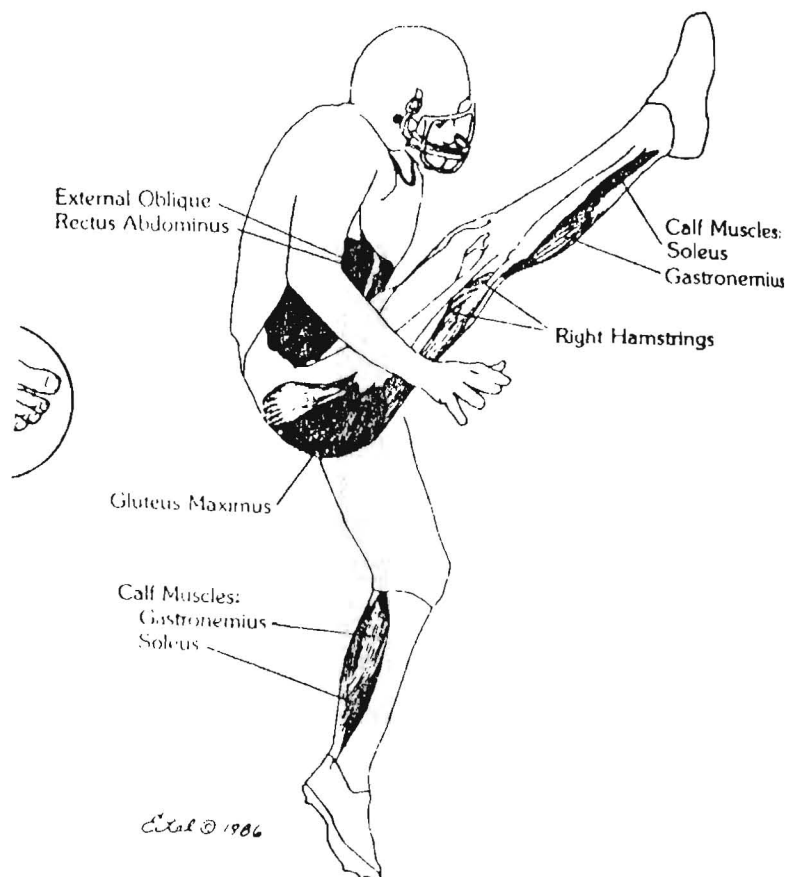
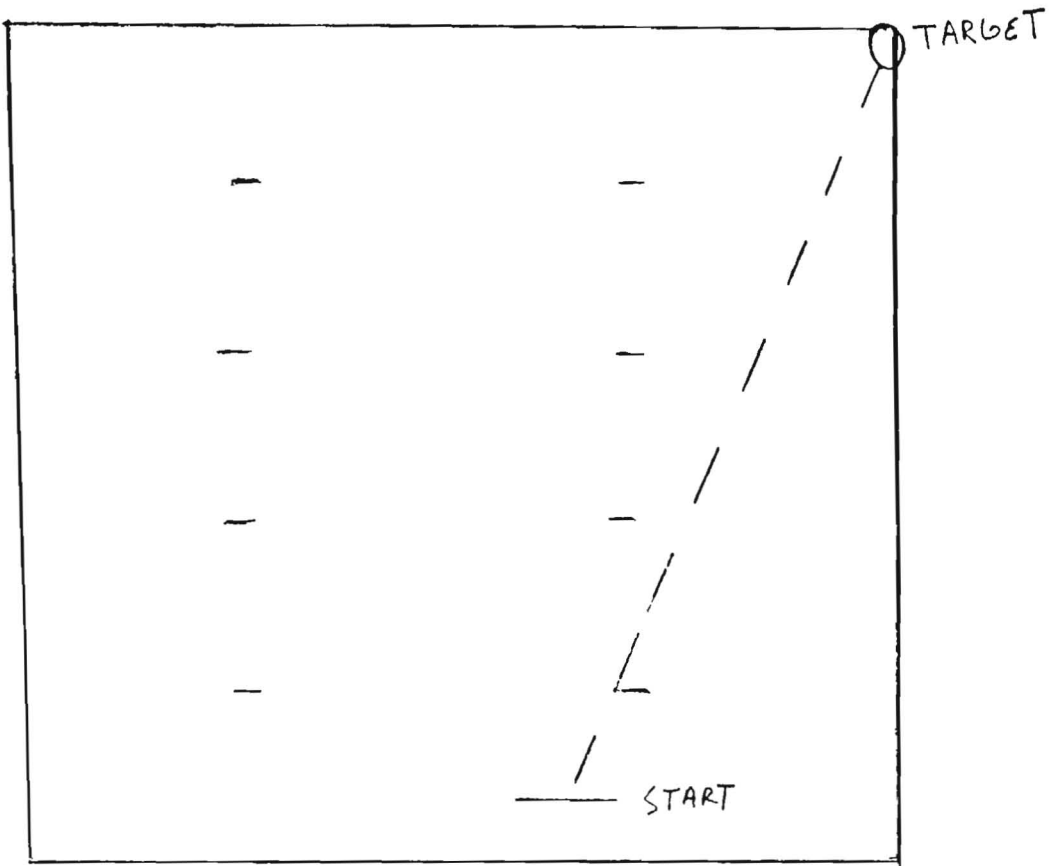


Illustration From:

An Anatomic Analysis of Football Punting with Implications for Conditioning. National Strength & Conditioning Association Journal, by Olson, John & Dunnam, L.G. (1986).

Appendix G

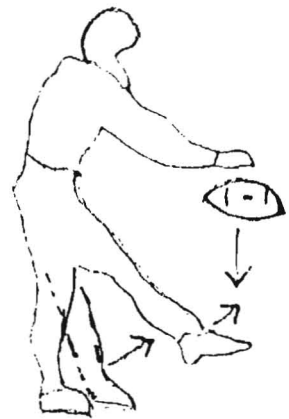
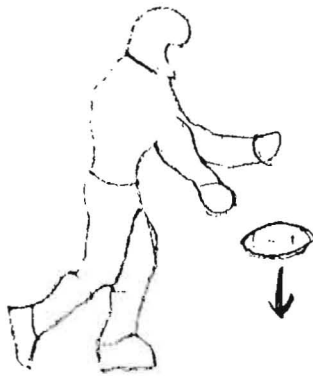
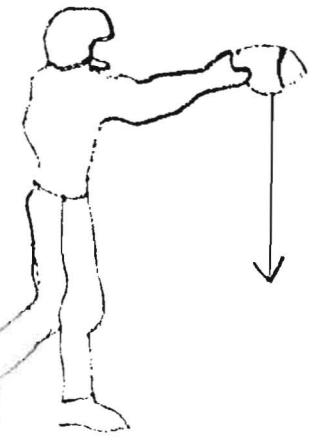
A Post-test Graphic of Directional Kicking



Appendix H

A Graphic Illustration of the Vertical

Drop at Leg-lock



Appendix I

A Graphic Illustration of the Push Up and Out
Drop at Leg-lock

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