VIDEO QUALITATIVE ANALYSIS OF SOCCER PLACE-KICK

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Abstract

Biomechanical analysis of any sporting activity provides both quantitative and qualitative information about the event. This present work aims to examine the sequences of different body segments before, through and after side place-kick. Ten students taking advanced course at the Physical Education Department at Yarmouk University agreed to take part in this study.

Qualitative investigation of the position of the non-kicking foot, degree of trunk lean back, the position of the kicking knee in relation to the ball and the pattern of the follow-through is presented, and showed two different patterns among players in positions of the body segments before, through and after the kick.

Introduction

Qualitative and quantitative analysis of any sporting activity are important for coaches and physical educators, to develop and improve the performance of their athletes, (Kreighbaum and Barlhels (1958), O'connel, A. L. and Gardner (1972). Williams and Lissner (1977)). There are several instrumentations available for investigators to observe and measure the movements in the event including Videography.

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Although in soccer, several basic skills are important including controlling, passing, throwing and kicking the ball. However, researchers have pointed out that kicking is the essence of soccer (Malcolm, 1960; Dettre, 1978).

Soccer kick is a form of striking, and from mechanical point of view striking the ball at rest is different from striking it while it is moving as one has to consider both the direction of the ball and the direction one wishes to send the kick.

The ball can be kicked in different ways including the inside of the foot kick, the inside of the instep kick, the full instep kick.

*The inside of the foot kick* is the most frequently used in soccer (Dettre, 1978). It is used when accuracy and short or medium range are required and the kick is made with the inside of the foot over a large kicking surface.

*The inside of the instep kick* is used for sending the ball over long distance. (Dettre, 1978) reported that such kick is made with smaller kicking surface compared with the inside foot kick, while the approach in the inside foot kick is straight, in this type of kick it is slightly curved (side approach).

*The full instep kick* is used for both distance and power (Dettre, 1978; Learmouth, 1979; Tyler, 1980) and is made with the front part of the foot between the curve of the ankle and the base of the toes (Nelsin, 1983).

Hay (1978) divided the place-kick into four consecutive phases namely, the initial stance, the approach, swing and kick and finally the follow throw. The purpose of this study is to examine qualitatively the inside of the foot place-kick using a portable video camera linked to a video recorder.

**Review of Literature**

Hay (1978) stated that a good kicker starts his approach from the same position for kicks of the same type. Several researchers has examined the position of the non-kicking foot in relation to the ball (Dodd, 1954, Becker, 1963, Bunn, 1972), and reported wide variations in their results. Hay (1978) suggested that since it is likely that the position of the non-Kicking foot may have some effect on the results obtained by a place-kicker, this topic requires further investigation.
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Other researchers (Manzi, 1967, Plagenhoef, 1971) carried out experiments to compare between the kinematics of the side approach place-kick and the straight approach place-kick. (Manzi, 1967) found that the side approach produced greater accuracy in distance than the straight approach, whereas Plagenhoef (1971) reported that the side approach produced greater ball velocity.

Metcalf and Roberts (1967) examined the mechanics of kicking using high speed photography. They found that the knee extension at and through contact has contributed mostly to the speed of the ball.

The importance of leaning forward at contact with ball in place-kick (side approach) was reported by Doust (1958). Scott (1942) stated that "The force of the kick depends upon the length of arc of the swinging leg, speed with which it is moved throughout this arc and the speed of knee extension".

Learnmouth (1979) reported that, the knee of kicking leg should be immediately above the ball as contact is made.

The use of the big toe of the foot instead of the medial side or the dorsum was indicated by Agmich (1988). Adel (1987) concluded in his study on football place-kick technique that, the non-kicking foot be placed relative to the ball, both angular and linear velocity of the foot increased before contact, swing of kicking foot began with leg bent about 90 degrees.

Review of literature indicates clearly that several researchers have investigated into the mechanical parameters of football kick. This present work aims to analyze the football place-kick technique (kicking the ball with the inside of foot) using Videographic technique.

Procedure

Ten male (65-75Kg) in weight and (165-175cm) in height of physical education students taking advanced soccer course agreed to take part in this study.

A portable video camera was mounted on a tripod linked to a video recorder, both were powered from 9 volt battery. The camera was positioned 12 meter away from the point of kicking the football (Figure 1). Five markers of 0.45 meter height with a small metal ball placed on the top (to improve accuracy in locating distance) at 1 a small metal ball placed on the top (to improve accuracy in locating distance) at 1
meter intervals were placed in line parallel to the path used by the player to kick the ball and were also on a line drawn from the video camera to avoid parallax (Figure 1). A ground marker was positioned to make sure that players started their run-up from the same position in all trials and the soccer was positioned on the ground at the same place in every kick.

Discussion of Results and Conclusion

Results
Qualitative study of the approach, swing and kick and follow through of 29 kicks of 10 players is presented. Table 1 and Figure (1) shows the distances travelled by each kick of each player.

1- Qualitative analysis of the approach.
a. The players in all 29 kicks in this study have started their approach from the same position, this would minimize the effect of the run-up length on the performance. Hay (1968) stated that starting from the same distance for the same type of kick is a good kicker characteristics.

b. Each kicker has used regular number of strides during the approach. Woosman (1972) suggested that the Golden information for kicking is to approach the ball with a regular striding run. However in all trials the last stride was long.

2- Qualitative analysis of swing and kick.
a. The pattern of the swing of the kicking leg varied from player to another, even in some cases different for the same player. The swing started in players (3, 5, 7 and 10) when the kicking foot was nearly as high as the hip, compared with other players who started their swing with the kicking foot height lower than the hip. Adel (1988) found in his study that good kickers should bring their kicking foot as high as hip, as this would increase the distance through which forces may be exerted.

b. Wide variations in the position of the non-kicking foot was seen in this study. Players (1, 2, 4, 6, 8, and 9) have placed their non-kicking foot slightly behind the ball, whereas players (3, 5, 7 and 10) placed their foot to the side of the ball.
Whittakes and Fabian (1950) reported that the non-kick foot should be placed alongside the ball before the kicking leg is swung. Similar results was found by Abo-Abdo (1979) using high speed photography. Learmouth (1979) reported that the non-kicking foot should be placed beside and slightly behind the ball. Deutre (1978), however, stated that the non-kicking foot should be placed to the side of the ball.

Recently, Adel (1987) concluded in his study that it is an important factor that the non-kicking foot be placed relative to the ball.

c. The position of the knee of the kicking leg was observed throughly at time of contact. In all trials the knee of the players was behind the ball with slight variation. However, Abo-Abdo (1979) found that the knee was infront of the center of the ball. Learmouth (1979) reported that the knee of the kicking leg should be above the ball at contact.

3- Qualitative analysis of position of trunk.

Examination of the position of the trunk at contact showed that the 10 players leaned back, but players (1, 2, 4, 6, 8, 9) have had greater lean-back than the players (3, 5, 7, 10). Other researchers have emphasized the importance of leaning back at contact. Abo-Abdo (1979) found that the trunk moved closer to the ball during the kicking action and was in back of the ball. Similar results was reported by Learmouth (1979) and cooper et al (1982).

4- Qualitative analysis of the follow-through.

Two patterns of the kicking leg follow-through was observed. The kicking leg in the first pattern moved straight at the beginning and then curved to the left. However, in the second pattern the kicking leg moved straight in the direction of the ball. Players (1, 2, 4, 6, 8, 9) used the first pattern, whereas, players (3, 5, 7, 10) used the second pattern.

From a mechanical point of view, it seems that players using the second pattern has applied their force in the direction of the target. Learmouth (1979) reported that kicking in the direction of the target is important to get good follow-through.
Conclusions

Soccer place-kick of 10 players performed 29 kicks is qualitatively analysed and showed that there are two kins of soccer place-kick players.

First: Players placed their non-kicking foot behind the ball, trunk leaned back, kicking knee behind the center of the ball and curved kicking leg follow through.

Secondly: Players placed their non-kicking foot to the side of the ball, trunk leaned very little to the back, kicking knee behind the ball straight kicking let follow through.

Recommendations for further study

1- Qualitative analyses of the different types of kicking, this is important for comparative purposes.

2- Examine the impluse during the kick for the different types of kicking by the use of accelerometer.

3- Examine the pattern of the swing leg of the kicking leg by the use of cine cameras.

Table 1
Distance Travelled by the ball for each player

<table>
<thead>
<tr>
<th>Player No.</th>
<th>Distance of Kick one</th>
<th>Distance of Kick 2</th>
<th>Distance of Kick 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31.9</td>
<td>54.9</td>
<td>- -</td>
</tr>
<tr>
<td>2</td>
<td>28.2</td>
<td>47.1</td>
<td>42.9</td>
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<td>3</td>
<td>41.6</td>
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<td>4</td>
<td>40.8</td>
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<td>40.6</td>
<td>43.1</td>
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</tr>
<tr>
<td>7</td>
<td>50.1</td>
<td>48.8</td>
<td>56.0</td>
</tr>
<tr>
<td>8</td>
<td>43.1</td>
<td>41.5</td>
<td>50.0</td>
</tr>
<tr>
<td>9</td>
<td>26.7</td>
<td>24.3</td>
<td>28.6</td>
</tr>
<tr>
<td>10</td>
<td>44.1</td>
<td>36.6</td>
<td>39.3</td>
</tr>
</tbody>
</table>
Figure (1) Experimental Set-up
Figure (2) Distance of the ball for 29 Kicks of 10 players


1. Overview of different applications of soccer video analysis. In particular according to the events that automatic systems have to recognize, different characteristics of the video have to be the players involved in the action, the kind of event in which they considered: for goal events, close-up shots of the players, camera are involved (penalty, card, goal) and so on. Video analysis transitions are taken into account and dynamic programming extracts the low-level evidence whereas the semantic analyzer techniques are used to obtain the maximum likelihood interprets the high-level semantics. Within Soccer, the use of notational analysis enables coaches to improve aspects of their own team’s play, at both an individual or collective level and also to interpret the actions of any future opposition. Previous literature (Hughes & Franks, 2004) has proposed that notational analysis serves 5 purposes. The qualitative data were gathered, post event, based on the relative successful execution of techniques performed. Players were classified by position as goalkeepers, defenders, midfielders or strikers. A comparison was also made between the technical distributions of both a successful and unsuccessful team. Place kicking plays an important role in the outcome of rugby union matches. However, the understanding of rugby place kicking technique is currently limited and this study aimed to start bridging the gap between contemporary coaching expertise and the biomechanical understanding of rugby place kicking. An Interpretive Phenomenological Analysis of a semi-structured interview with an elite kicking coach was used to identify the key technical features of rugby place kicking and thus provide direction for future biomechanical research. Ball placement, the approach, body position at support leg.