M.Sc. THESIS

ARAZ ALI

A STATISTICAL ANALYSIS OF TACTICAL MOVEMENT PATTERNS IN ASSOCIATION FOOTBALL

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30 June, 1986

UNIVERSITY OF ST. ANDREWS

A STATISTICAL ANALYSIS OF TACTICAL MOVEMENT PATTERNS IN ASSOCIATION FOOTBALL

A THESIS SUBMITTED TO THE

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A Statistical Analysis Of Tactical Movement Patterns In Association Football

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Abstract

The main purpose of this study was an attempt to reveal more information about types of attacking patterns in association football. Seven types of attacking formation were identified from a total of eighteen league matches. These were analysed using a number of statistical and visual techniques.

For set plays, twenty-four matches were analysed using the same statistical and visual techniques as were used for the ordinary attacks. There are, of course, two types of pattern for corner-kicks and throw-ins; one from the right-hand side and the other from the left-hand side of the pitch. For free-kicks, however, there were no obvious patterns.

In further analysis, the result showed that there were significant relationships for ordinary attacks, thus: Types of pattern with final actions (significance level = 0.001); final actions with the number of long passes (significance level = 0.02); types of pattern with the number of short passes and dribbling sections (significance level = 0.001 for both). For set plays, it was found that only for corner-kicks were the number of short passes with the final actions statistically significant

(significance level = 0.01).

Also, the result indicated that the most successful attacking pattern formations in providing shooting and scoring opportunities were 1 and 6. This means that the most successful moves are those which proceed along the length of either wing. Although pattern 2 (an attack initiated close to the centre spot of the pitch, towards the left side line briefly along the wing, and then into the penalty area by a number of passes, and terminated by shooting) succeeded in providing shooting and scoring opportunities, it also resulted in more corner-kicks being awarded. Furthermore, attacks culminating in final action 7 (off-side) have a very high average number of long passes involved within the attack pattern. Generally, the more complex the attacking pattern, the less likely it was to result in potential scoring opportunities, e.g. pattern 7 (an attack initiated from the middle of the pitch, about halfway between the centre and the left side line, diagonally towards the left side line with a number of short passes, followed by a pass into the penalty area and terminated by shooting). It was found that corner-kicks that included a number of short passes were more successful in providing scoring opportunities, than those that consisted of a single cross into the goal area.

PREFACE

DECLARATION

I would like to declare that this thesis was composed entirely by myself. The research, the results of which appear in this thesis, was carried out by myself except where collaboration was necessary as mentioned in the Acknowledgements.

Neither this thesis, nor any other representation of the research carried out, has been accepted in fulfilment of the requirements of any other degree or professional qualification.

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My deepest thanks are due to the staff of the Physical Education Department and especially Mr. A. S. Strachan, whose everyday example provided the motivation for this work and often invaluable advice.

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Mr. A. S. Head

Mr. J. G. Devereux

Mrs. G. Hoggard

In addition I would like to express a particular word of thanks to the Manager, Coaches and Players of Dundee United F.C., who kindly allowed me to carry out my research on them. I would like to thank everyone who showed an interest in my research and discussed it with me. Finally, I am indebted to Margaret Wilson who so kindly typed the manuscript.

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CHAPTER ONE

INTRODUCTION AND REVIEW OF LITERATURE

INTRODUCTION

Association football is not only a game, but a professional sport, the object of careful study and scientific research, an exciting spectacle and a commercial activity. As in most professional sports today, the political, sociological and economic aspects of the game have assumed an importance which reaches far beyond the mere practice of the sport and performance of the players.

The game has been completely transformed because of the various technical and physical improvements which have been made to it. This justifies a deep analysis of football technique and tactics, to discover how influential a role they play in the outcome of a match. Part of football technique and tactics is concerned with the movement of the ball when attacking.

The main purpose of this study is to discover whether there are any identifiable attacking patterns and to assess their success. The main questions which the study raises, therefore, are:

(i) Are there specific patterns of attack which can be identified in the game?

(ii) How successful is each individual pattern in influencing the result of the match?

(iii) How important are long passes, short passes and dribbling movements for any positive result in the game?

In attempting to identify types of attacking pattern formation, players from the Scottish Premier Division were

used as subjects and computer programmes and statistical tests used to analyse the data.

The results of this study could be helpful to football managers and coaches. It could show them how important certain attacking patterns are for the result of a match, and so help them plan their own team's tactics accordingly.

REVIEW OF LITERATURE

Winterbottom was one of the first managers to collect information for match analysis. In 1959 he published data obtained by tracking professional soccer players for an entire game on a scale plan of the pitch, to assess the distance covered by the team. The overall average distance covered by the team was 3,780 metres, which consisted of 2,480 metres of walking and jogging, and 1,300 metres of running at speed.

In 1967, Wade reported that the distance covered by professional soccer players during each game ranged between 1,600 - 5,486 metres. The total distance covered by walking or jogging, and running at speed ranged between 1,372 - 3,657 metres, and 229 - 1,829 metres respectively. No indication was given as to how these figures were derived. Both the preceding reports contained in coaching books were designed to supply students of the game with information on the running requirement of soccer.

Brooke and Knowles obtained data during the 1970-1971 season on over forty different players in four matches involving Manchester City Football Club. Overall figures of 1,703, 2,610 and 4,833 metres for walking, jogging and total distance respectively, were obtained.

In 1976, Reilly and Thomas reported overall mean distance of 2,150, 3,187, 1,810, 974 and 559 metres, for walking, jogging, cruising (striding), sprinting and backing respectively.

Whitehead, in an analysis of two full-backs and two mid-field players, from the English First and Second Division,

revealed an overall average of 11,692 metres covered per game.

Dr. R.T. Withers did further analysis and reported the total distance covered as 2,869, 4,671, 1,901, 1,128 and 625 metres, for walking, jogging, sprinting, moving backwards and moving sideways respectively. He also reported that in England, the higher the level of the soccer played, the greater the total distance covered, either walking, jogging, striding or sprinting. Also, the higher the level of soccer played, the greater the total distance covered by sprinting.

Saltin reported a similar reduction in the distance covered between the first and second halves for nine Swedish football players. The players with lowest glycogen content in their thigh muscles at the start of the game covered 25% less distance than the other players. An even more marked difference was observed for running speed. The players with low glycogen content covered half the total distance walking and 15% at maximum speed, compared with 27% walking and 24% sprinting for the high glycogen players. He concluded that initial muscle glycogen appears to be important in playing soccer.

Bell and Rhodes reported from the study of English College players, that goalkeepers were taller ($\bar{x}$ 180 cm) and had more body fat (16.5%) than outfield players. The shortest outfield players were the midfield players ($\bar{x}$ 173 cm). The outfield players differed little from other groups in body fat, with a range of 14.64 to 14.74%. No difference in somatotype was apparent between defenders, midfield players and strikers. Goalkeepers ($\bar{x}$ = 81 Kg) were heaviest, with

midfield players ($\bar{x}$ = 68 Kg) lightest. The goalkeepers had higher values for arm length than any outfield group, which would constitute an advantage for playing in this position. However, when arm length was expressed as proportionate to stature, to eliminate the effect of body size, this difference was not significant. Similarly, no significant differences in somatotype were detected between the playing positions. The authors concluded that at this somewhat low level of ability the players represented a morphologically homogeneous group.

Raven et al. found that among 18 North American Soccer League players, goalkeepers were taller, heavier and had more body fat than outfield players. Comparison of various outfield groups was not warranted by the sample size in the study.

Reilly reported that among defenders, centre backs were taller than full-backs, and goalkeepers were the tallest members of the professional playing staff, the smallest being the midfield players.

Reilly and Thomas, using a principal component analysis and fitness data on soccer players obtained by means of a multi-item test battery, showed that 23% of the total variance between individuals could be accounted for by a component related to body size, while a further 10% was explained by a component related to body density. A cluster analysis of these results showed that centre backs congregated together, as did goalkeepers and midfield players, while attackers with similar tactical roles also grouped together. The attackers who functioned as target men and operated mainly in a central

position (being reputedly good in aerial tussles for possession) closely resembled the centre-backs, while the full-backs were the more heterogeneous group. This analysis indicated that players who did not gain First Team Selection clustered together, suggesting that physical characteristics may have contributed to their failure. The investigation concluded that clustering according to positional role was not absolutely clear-cut, due to the presence in the squad of a number of individuals, particularly the younger players, who had the capability to change positional roles as tactics and needs dictated. Inclusion of such versatile individuals in the team may be desirable for tactical purposes.

Durnin and Passmore reported that data for energy expenditure in soccer shows large variations. The authors quoted a range of 5 - 12 Kcal/minute for the energy requirements of soccer. They concluded that few players expend 600 Kcal in a soccer game and many much less.

Reilly and Holmes have analysed selected game skills to find out how these are related to outfield positional roles. They discovered that, overall, defence players were more successful than their midfield and attacking counterparts, in terms of their passing, controlling, dribbling, tackling and heading.

Herbin (a key player in the French championship team, writer and editor) and Rethacker (soccer player, writer and editor) analysed and studied the skills of soccer. They showed how to use every part of the body, foot, instep, inside of foot, outside of foot, toe and sole, leg, chest and head and

how to select the part to use for every situation. Finally, they demonstrated with photographs, many ways to obtain and maintain control of the ball, as well as various ways to steer, dribble, strike, pass and kick.

A group of observers analysed ten international matches in the 1978 World Cup Championship. They analysed each match action by action, and discovered that the average number of ball-contacts per game was 2,322 with 1,111 being the lowest figure, and 2,622 the highest. There were overall 26 contacts per minute, or roughly one every two seconds.

Adams, reporting on the final of the 1974 World Cup Championship in Munich, analysed the final match from the television coverage. From observing several Dutch and German players, he found examples which helped him to identify some aspects of both individual and team play for both teams taking part. Some of these examples (for the German team) were:

(i) In passing, the overall level of success was high, with less success in the second half. This could have been due to the score in the first half, pressure on the winners, or mental and physical fatigue.

(ii) In shooting, from six shots at the target, two produced goals.

(iii) In set plays, from six corner-kicks, there were strikes at goal from five of them. Free-kicks and goal-kicks were also analysed.

Cook did analysis for different levels of soccer players, considering schoolboy and league club players, and the performance of teams and players over the years. His analysis

was based upon three general areas:

(i) Individual performance, by charting the individual's skill in technical, psychological or tactical performances and the individual player's success or failure at passing, shooting, covering in defence and goalkeeping.

(ii) Team or group performance, by charting the technical play and the system of play, restarts and goals scored or lost by both the opposition and his own team.

(iii) Fitness performance, by charting-players' physical output to determine how hard they were working and what changes required to be made to the training programme in terms of distance covered, number of sprints and jumps. He analysed many matches, when he was a coach at Bradford City A.F.C., examining both his own and opposing teams. He believed that player and team performance analysis was a valuable tool for the coach if used properly. It could help to spot what was going wrong with his players and team, and motivate them to improve their effectiveness. It could also help his team to win matches, by locating strengths and weaknesses in the position that required special attention.

Roxburgh, in analysing the Scottish International team based his analysis on the following points: (i) Attitude; (ii) Fitness; (iii) Passing; (iv) Supporting; (v) Decision-making; (vi) Finishing; (vii) Individual play; (viii) Group play; (ix) Defending as individual; (x) Team play.

An analysis of goal scoring in soccer, has been done by Wilkinson and Thomas. Their purpose was to measure the skill of the goal scorer in certain aspects of scoring opportunity. Three experimental operators were chosen. Operator A was the main analytic operator, a skilled player and experienced Football Association coach. Operator B was a university lecturer and experienced Football Association staff coach. Operator C was a sports scientist with no specific soccer expertise. They watched a television film of thirty-one goals scored in professional league soccer. From this film it was found that the correlation analysis between each of the three pairs of operators was highly significant.

Jerome analysed the goal scoring achievements of all the ninety-two league clubs in the 1970-1971 season. He reported that the average number of goals scored in the first 45 minutes was 2,336 (or 45.54% of the total number) and that those scored in the second 45 minutes numbered 2,793 (or 54·46%)

Cohen and Dearnaley had studied certain aspects of football in the context of psychological probability. From two professional teams, Manchester United and West Bromwich Albion in the First Division of the English Football League, a University team and a Grammar school team acted as subjects. The experiments were classified into stages, thus:

Stage 1: Assessments of skill.

Stage 2: Longest shot attempted.

Stage 3: Measurement of skills.

Stage 4: Method preferred by player in order to feel most certain of scoring.

They expressed the result as follows:

(i) Assessments of skill.

(ii) Accuracy of assessments of skill.

(iii) Longest shot, furthest distance from the opponents' goal at which a player first attempted to score.

(iv) Players' preferred method.

(v) Reliability of measurement.

In another analysis of goals scored in relation to position in the team, authors asked numbers of managers to provide details of the number of goals scored in each position of the team for a period of time. They gave the number of goals scored by the players and position in the team. This information in relation to the players position, is indicated below:

(i) Centre-forwards scored the largest proportion of goals: almost one-third.

(ii) Next came the two inside-forwards who scored about one-fifth of the goals each.

(iii) The inside-forwards accounted for another quarter of the goals, the outside left scoring a statistically significant larger proportion than outside right.

(iv) The wing-halves scored some 3% between them, the centre-half scoring significantly less than either of these two.

Kane, J. collected data on the personality structure of outstanding football players, both amateur and professional. Analysis of the scores led to six factors being identified, which Kane suggests supports the possibility that there is a "Footballer type". He describes this type as a stable, extravert,

tough-minded radical, of good general ability and ruthless efficiency.

From the analysis of the films of the World Cup games in 1966, certain inferences may be drawn which have a bearing on the strategy of the game. The first inference is that in each group of matches, the proportion of successful attempts to score goals is much greater inside the penalty area, than it is outside. This conclusion matches a similar pattern identified by analysing films of the 1956 Cup Final and the 1960 European Cup Final. In this case there were, in both matches combined, thirteen successful attempts inside the penalty area, as against thirty-one unsuccessful attempts outside the penalty area, the corresponding figures being one and thirty-one. The second inference is that, in each group of matches, the difference between winners and losers is not related so much to what they do outside, as to what they do inside the penalty area. In every one of the groups, the winners make far more attempts than the losers to score inside the penalty area. Outside the penalty area this is not the case. In groups 1, 2 and the semi-final, the losers actually made more attempts than the winners. And taking all 27 matches as a whole, the ratio of attempts by winners to attempts by losers is much bigger inside than outside penalty area. What seems to count decisively is play within the penalty area. Here, too, the results confirm the pattern in the 1956 and 1960 Cup Finals referred to above. Within the penalty area, the winning teams made 28 attempts as against 16 attempts made by the losing teams. Outside the penalty

area, winning and losing teams both made 16 attempts. The third inference relates to play in the two halves of the game. In 17 out of 27 matches, the winners were leading at the end of the first half. In only two matches (Spain versus Switzerland and Portugal versus North Korea) did the team leading at half time lose in the end. The author considered the relationship between the ratio of games won to games lost and the final position in the league table. He took data from the 1970-1 results for the First Division. What is striking here is the marked difference between the top two teams and the rest. These two teams seem to be in a class by themselves with respect to the ratio. The ratio for Arsenal was 4.8 and for Leeds 5.4. The next ratio, for Tottenham, drops to 2.1.

In 1972-3, the position is slightly different in that the top three teams appear to stand out above the rest, Liverpool, Arsenal and Leeds (ratios 3.6, 2.9 and 2.1). The fourth team - Ispwich, drops to a ratio of 1.5. The results for the Scottish League First Division show the same trend. As well as the ratio of the games won to games lost, the author considered the ratio of the goals for, to goals against, in relation to the final position. In 1970-1 there seems a slight trend for those at the bottom of the Division 1 table to have more draws. However, this was not the case for the Scottish League, 1970-1. Combining the English results for 1970-1 and 1972-3, the trend still exists. Whether it is statistically significant is doubtful. The number of goals scored is always greater in home than in away matches, but the difference, as assessed by

the author from the 1972-3 figures, is larger for the best than for the worst team. In the case of Arsenal second in 1972-3, the mean number of goals scored at home was no different from the mean number scored away.

The author also examined the proportion of games won, lost or drawn by the higher placed team in relation to the positions in league table at the time of the match. He also looked at how victory, defeat, or a draw related to the relative positions of the two teams in the league table when the game is played. For clearer analysis, taking the results for Division 1 in 1972-3, he grouped the league positions into four categories: 1-5, 6-10, 11-15 and 16-21. He found that the number of positions separating two teams at the time they played a match was a factor of importance in relation to the result of the match.

The German analyst, Winkler, tried to discover how he could find out which playing system a future opponent would use, and which playing system he would then choose for his own team. With this aim in mind, he used video tape recordings of two successful teams, deliberately choosing those with an acknowledged high level of play: Brazil, selected by the experts as having the best playing system at the 1982 World Cup Tournament, and Hamburg SV, from the 1984-1985 season. Winkler found that it was not possible to assign wing defenders and midfield players to positional groups because of the similarities the tasks involved. For example, a 4-4-2 System during the match would convert to 2-6-2 or 2-3-3-2. Citing a new definition of the playing system, he suggested that this should

be the objective and precise distribution of the individual playing area of each player on the pitch. By relying on this definition, it is possible to give one's own team a fairly exact description of the behaviour of the future opponent, and it is also possible to show players their own team's errors, by using a video recorder.

Sledziewski and Kisonda, aiming to design the model characteristics of top-level football team-play, have calculated the basic indices of play as the number and ratios of offensive actions and goals, the number of ball losses, the ratio of the number of offensive actions and the number of ball losses, and the ratio of positional attacks and speed actions. They obtained their data by analysing video tape recordings of the twelve World Cup Championships. The data were correlated with various determinants of sport performance level, and they came to certain conclusions about play model components and problems in their design. Their analysis suggests that the model values for a high class team per game were:

(i) The ratio of offensive actions to losses - 0.75 and above.

(ii) The number of losses less than 60.

(iii) Number of shots above 15.

(iv) Number of offensive actions above 45.

However, they found it difficult to identify the factor which decisively influences the result of a game and to forecast which factor could bring a victory over a strong opposing team.

Cooper and Payne investigated the nature of effective leadership among soccer players and associated staff (trainers,

coaches and managers). They administered a basic orientation inventory to staff and players from seventeen soccer teams in the senior division of the English Football League. The inventory measured three personality characteristics: (i) Task orientation (i.e., the extent to which a person is concerned about completing a job, solving problems, working persistently and doing the best job possible); (ii) Self orientation (the extent to which a person desires direct personal rewards regardless of the job he is doing or the effect that what he does has upon others working with him); (iii) Interaction orientation (the extent of the concern for maintaining happy and harmonious relationships in a superficial way, often making it difficult to contribute to the task at hand or to be a real help to others).

As predicted, coaches and trainers task orientation scores were significantly and positively related to team success, but the large differences obtained between teams on self, and interaction, orientation were not related to team success. Interestingly, however, the more successful teams had far more players who were high on self-orientation and low on both interaction and task orientation. Moreover, attacking players were found to be more self-oriented than defensive players. Findings like these would appear to throw valuable light on how a team should be composed and the sort of person likely to make a good coach or manager.

Yaffe, Moreno and Munnich studied players from a top team in the Hungarian First Division (M.T.K.). The players were given 25 questions to answer such as: "Who is your best friend in the team?" and "Who is the player who carries

the team during a game, that is, who is the person who can instil motivation and get spirits up?" They got answers from each player in the team and then constructed a sociogram for the whole team. Each circle represented a player and the connecting lines between the players signified the strength of shared feeling between them. The more lines between two players, the greater their affiliation. Each line represents a reciprocal positive response. They found for Ferencvaros, who were doing well in the league, that positive relationships existed among many of the team. In MTK there were a number of solitary players, which was associated with lack of cohesiveness and a poor level of functioning. The team in fact, was having quite a struggle to survive in the first division at the time. They measured cohesiveness and functioning by noting who passed the ball to whom during actual matches. They found, that the players who were friendly with one another passed the ball to each other significantly more often than to those with whom they were not friendly. This showed them that personal relationships between players play a considerable part in determining the structure and pattern of play.

Veit, in a similar study to Yaffe, Moreno and Munnich, carried out on juvenile soccer teams in West Germany, showed overlapping of positive and negative judgements of their fellow team-mates' ability, that is, where occasions one or more team members are named both as one of the three best players and as one of the two worst players occurs more frequently in teams low in effectiveness, and seldom in teams high in effectiveness. He also demonstrated that good teams frequently have an accepted "playmaker", the player whom at

least two thirds of the team-mates named as authoritative for the teams' style and for organization of action. On the other hand, teams low in effectiveness seldom have such a "playmaker" accepted by the majority of team members.

Essing studied teams in the German Federal League and found that only a constant team line-up is conducive to the development of mutual knowledge and anticipation of the actions of the other teams' members. In fact, he found a positive correlation between measures of team success and the degree to which a team line-up remains constant. He also showed that successful teams played their old-established players more than the unsuccessful ones. Conversely, the successful teams were less likely to put new players in their line-ups.

Volkamer looked at the circumstances surrounding fouls committed by German soccer teams in over 1,800 games, and obtained some extremely interesting findings. For instance, he found that losing sides commit more fouls than winning sides; home sides commit fewer fouls than do visiting teams; fouls are less frequent when a high number of goals are scored than when there are few. He also found that goals bring about a reduction in tension but that tension remains at a high level when goals are few and far between. Also, low-placed teams apparently commit more fouls than those who are highly placed in the league table.

It should be noted that most of those who have been involved in the research mentioned above, have done analysis of distance and the proportion of running, jogging, walking

and work rate. Some have analysed individual skills during match and practice. Others have studied and tested the performance of teams and players from different standpoints. However, few if any of them have become involved in an objective statistical analysis of the game, which could be of much value to coaches and managers.

CHAPTER TWO

METHOD

Method

Field work

Eighteen league matches, played on the home pitch of a professional team in the Tayside area, were observed during a complete football season. Figure 2.1 shows a photograph of the pitch where observations were made. For analytical purposes, the playing area was taken to measure 104 metres long by 64 metres wide, as shown on the diagram sheet (see Figure 2.2). Fourteen basic types of notation were identified and each was assigned a shorthand symbol, as shown in Table 2.1. Players from a Scottish Premier Division football team were used as subjects and their performance during attacking moves was observed throughout the various matches.

The observer was in a stand about seven feet above the pitch and close to the centre line. This position did not raise any difficulties in precisely marking the movement of the ball on the diagram sheets. As soon as the match started, the observer began to note the movements of the ball. The observer started noting these movements on diagram sheets whenever the ball crossed the centre line of the visitors' half of the pitch; specifically when the home team had possession of the ball and started to build up an attack in this half. These movements were all noted down, each attack being drawn on a separate diagram sheet. The symbolic notation, allowing specific information to be marked down as quickly as possible, is shown in Figure 2.3. All the attacks

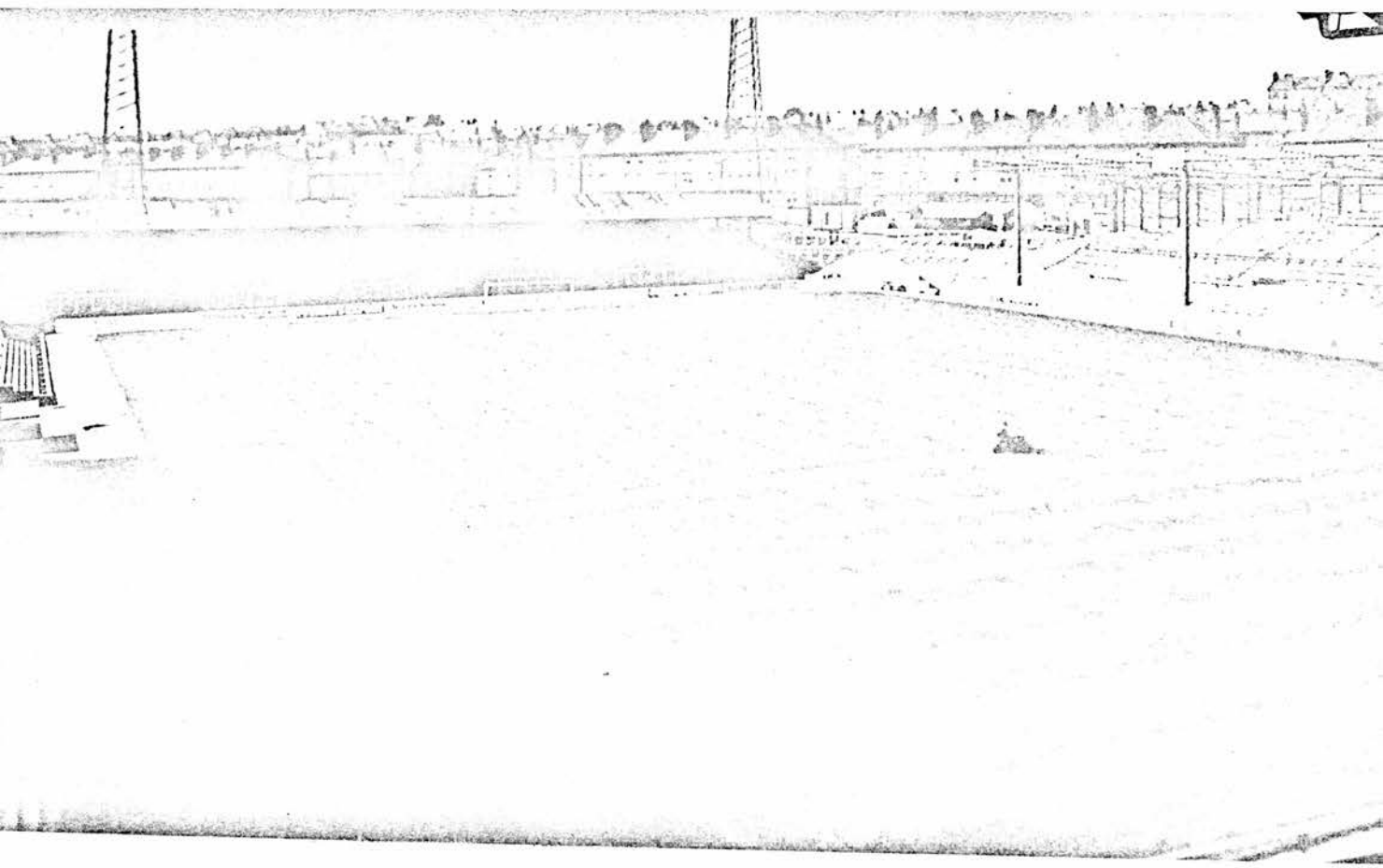


Figure 2.1 Photograph of the pitch where observations were made

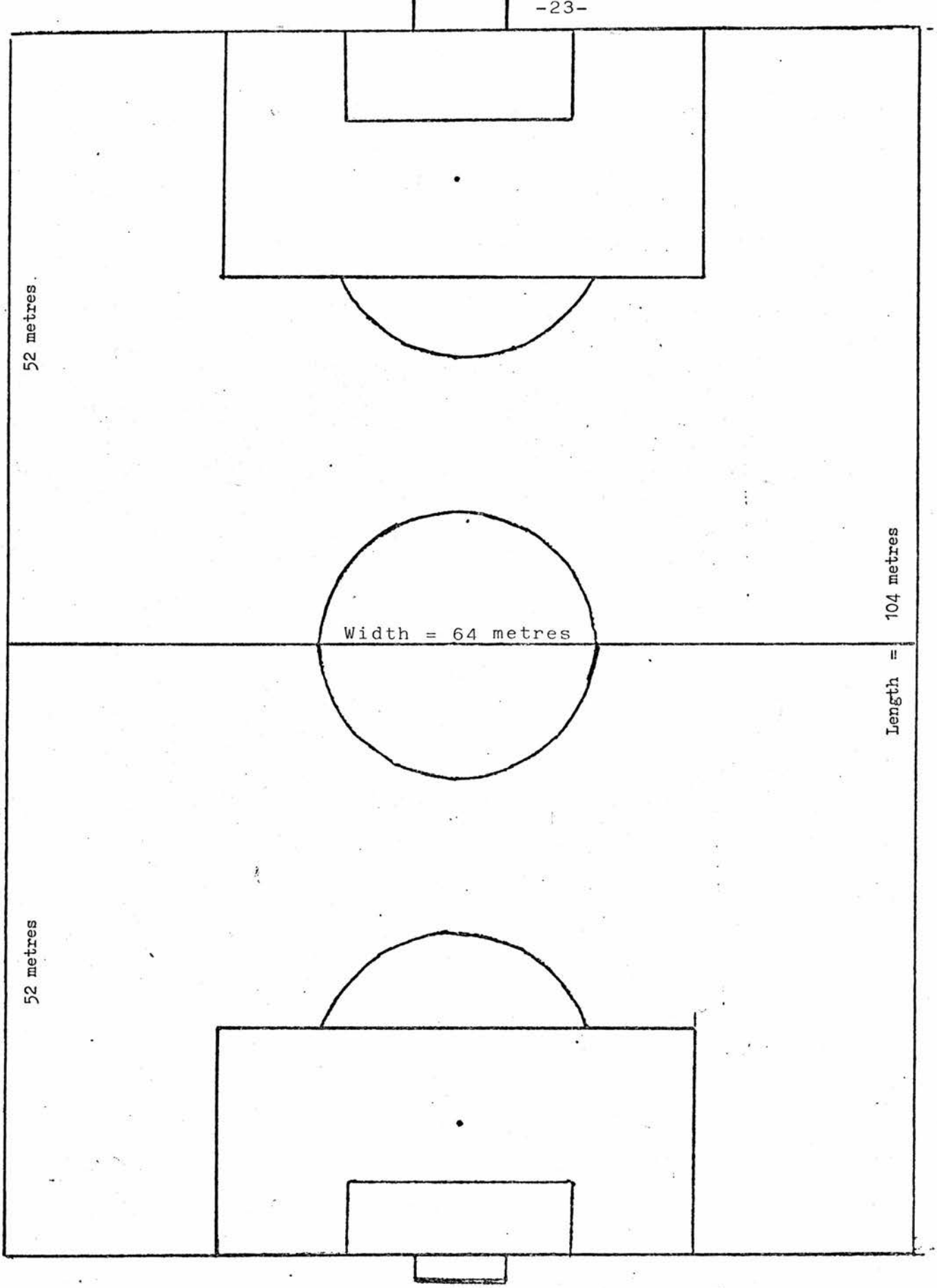
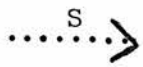
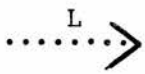
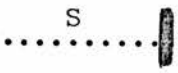
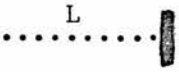
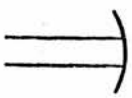
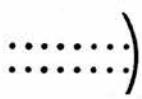
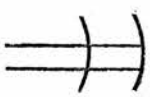
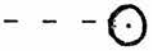
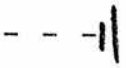


Figure 2.2 Scale of the pitch

Table 2.1 Shorthand symbols

.	Ball
	Dribbling
	Short pass
	Long pass
 DF	Short pass intercepted by defender
 DF	Long pass intercepted by defender
	Kick on target
	Header on target
	Kick off target
	Header off target
+	Indicates position of Free-Kick, Throw-in or Corner-Kick
	Goal
	Off-side
 GK	Ball intercepted by goalkeeper

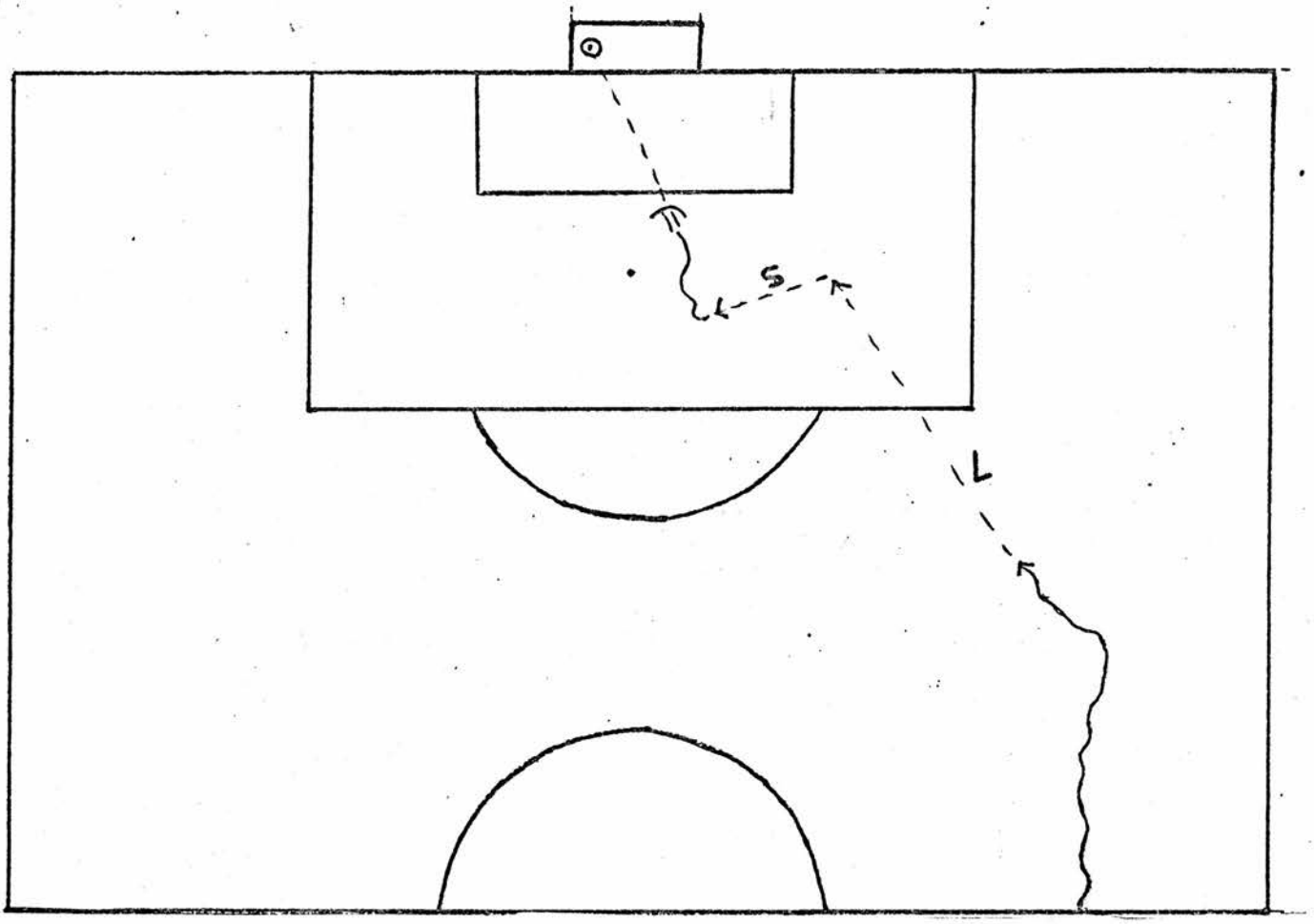


Figure 2.3 Example of notation used for one attack

in each match were drawn and numbered on these sheets. These numbers allowed each attack to be individually recognized.

Data collection

For the purposes of analysis, a grid of twenty-six squares long by thirty-two squares wide as shown in Figure 2.4 was drawn on transparent graph paper and laid over the diagram of the half pitch. Each square is 2 x 2 metres, thus representing an area of four square metres. Thus: the length of half the pitch is represented by 26 squares, each square representing 2 x 2 metres. The width of the pitch is represented by 32 squares, each square representing 2 x 2 metres. Each attack was analysed with respect to the separate, constituent moves and, by using the grid, the starting and finishing points of each move were noted down in terms of their X axis and Y axis co-ordinates. The data obtained was fed into the computer as follows:

(i) The title of each match.

(ii) The total number of attacks for each match.

(iii) The X co-ordinate of the starting and finishing points for each move of each attack.

(iv) The Y co-ordinate of the starting and finishing points for each move of each attack.

(see Appendix A pp.88-108 for data and input format). A separate file was created to hold the data for each match using the format described. Corner-kicks, throw-ins and free-kicks which occurred in each match were separated from the ordinary attacks. These attacks were converted through the same procedure into separate sets of data and fed into the computer as described above (see Appendix A pp.112-138).

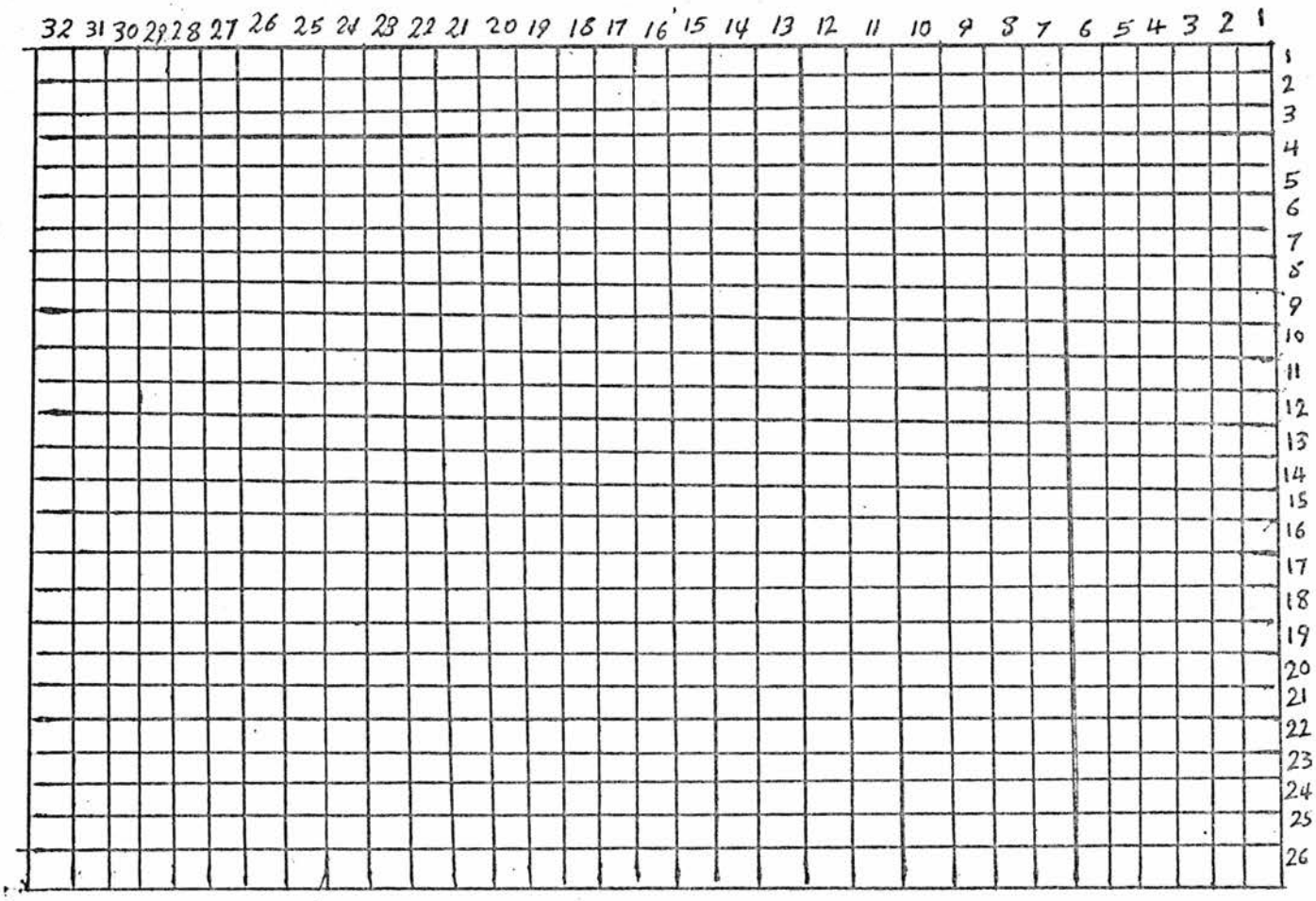


Figure 2.4 Grid of the half pitch

Data analysis

Given a large number of attacking movements, the aim was to obtain a scatter diagram of points, each point representing one attack, attacks which are similar to one another being represented by points that are close together. This aim is achieved in two stages:

(i) A measure of the dissimilarity between each pair of attacks is constructed by the programme called 'KSOC'

Each attack is summarized by a set of locations, representing positions at which there was a change in direction of movement of attack, for example, the starting and finishing position of a dribbling section, or the beginning and ending of pass. Two movements are compared by merging the two sequences of locations so as to find the single sequence that minimizes the discordance 'K' defined below, while preserving the order within each sequence. The contribution of each position to the discordance is defined as the smaller of the two distances from it to the two positions in the other sequence that bracket it in the combined sequence. 'K' equals the sum of this quantity over all positions in each sequence divided by the total number of positions in the two sequences. For example, consider comparing the sequences (1, 2, 3, 4) and (A, B, C) as shown in Figure 2.5. It is clear that the joint sequence is (1, A, 2, 3, B, C, 4). The contribution of A to the discordance is the minimum of the two distances d (A, 1) and d (A, 2), clearly d (A, 2).

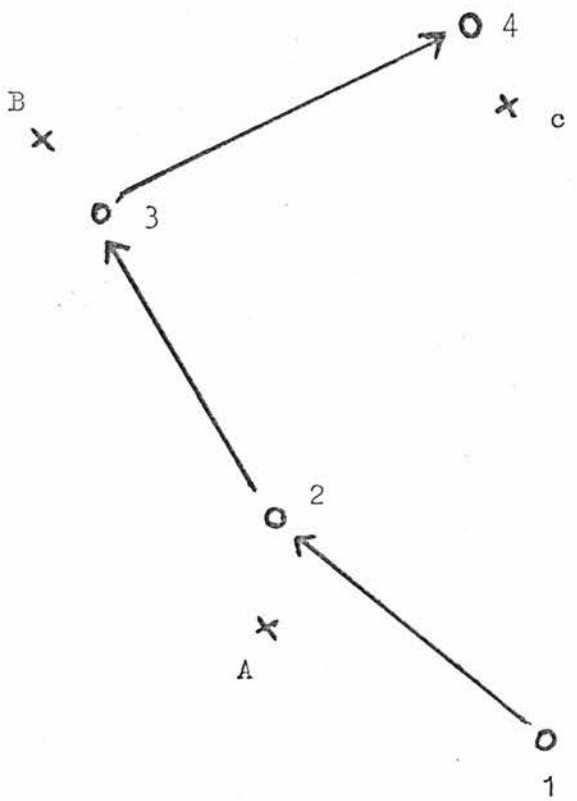


Figure 2.5 Example of two movements compared

$$'k' = \frac{1}{7} \; d(A,2) + d(B,3) + d(C,4) + d(1,A) + d(2,A) + d(3,B) + d(4,C)$$

(Gordon, 1973) .

(ii) A configuration of points is obtained, with the property that the distance between any pair of points approximates their pairwise dissimilarities. This was performed by another programme called 'GEOM'. Given a matrix of dissimilarities (Kij), which are assumed to correspond to interpoint distances between points in some configuration, one could envisage seeking this configuration of points by a process of triangulation = place point 1 and 2 a distance K12 apart; locate point 3 at one of the intersections of (the circle centred at point 1 with radius K13) with (the circle centred at point 2 with radius (K23) as shown in Figure 2.6. This procedure has unsatisfactory features; the method of principal coordinates analysis aims to achieve the same result more reliably and efficiently, using eigenanalysis (Gordon, 1981). It should be noticed that there is no guarantee that one can get a perfect fit in two dimensions. The two-dimensional representations provided are the best one can do, with respect to a mathematically-defined criterion.

Once all eighteen league matches had been observed, drawn on the diagram sheets and converted into data, eighteen graphs were produced. Each graph was subjected to a visual

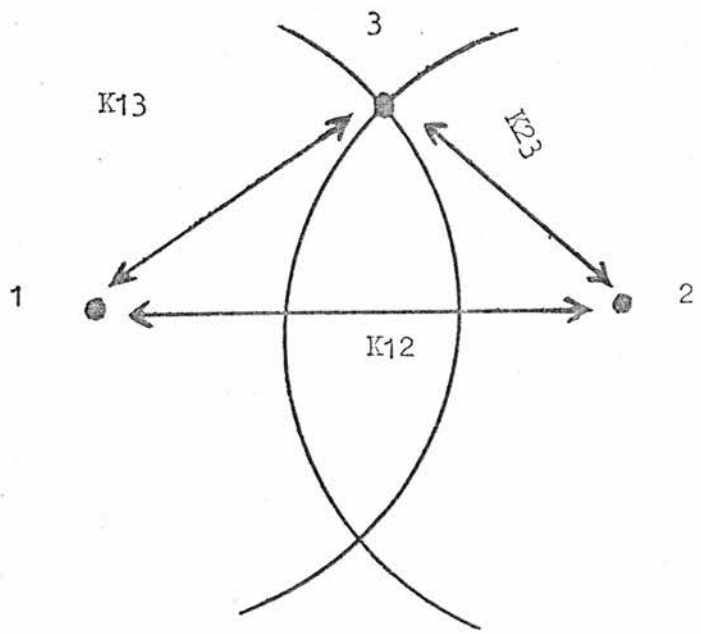


Figure 2.6 Example of dissimilarities among points

cluster analysis, thereby grouping similar patterns of attack with each other as shown in Figure 2.7. The method was supplemented by comparison of the original diagram sheets of the attacks within each cluster. From each cluster for each individual match, an attack was selected which represented the mean of that particular cluster. This attack, termed the optimum attack pattern for that cluster, was selected by visual analysis, as shown in Figure 2.8. The optimum attacks chosen from all eighteen league matches were grouped into a new data set. (see Appendix A pp.109-112 for data and input format). The same programme as had been used previously was run for this data. Using a similar cluster analysis technique to that above, these optimum attacks could be classified into seven major clusters as shown in Figure 2.9. Each attack, from each match, could then be classified into these seven major clusters. The reason for adopting this two-tier approach to the data analysis was that the programme 'GEOM' was not able to handle such a large quantity of data in a single run. By analysing each match separately and then analysing the resultant concentrated data it was possible to overcome this limitation.

A similar procedure was adopted for corner-kicks, throw-ins and free-kicks except that, since there were fewer data associated with these categories, the final analysis for each set play could be completed in a single run. It should be noted that data for set plays were collected from twenty-four matches. Graphs were drawn accordingly, using 'GEOM', and were subjected to the same cluster analysis in place of the seven principal pattern-types found for the

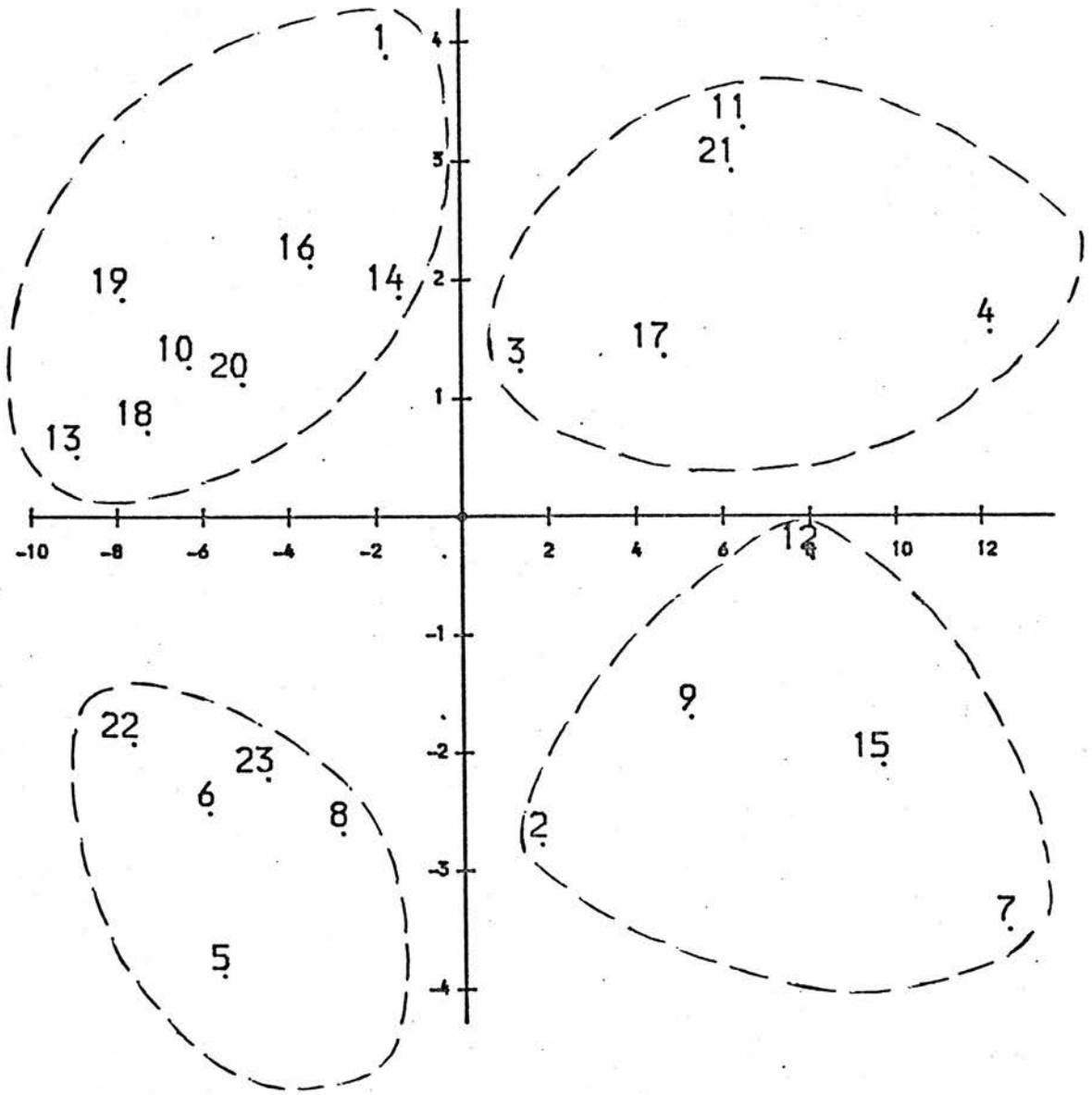


Figure 2.7 Graph of one league match which divided into four clusters

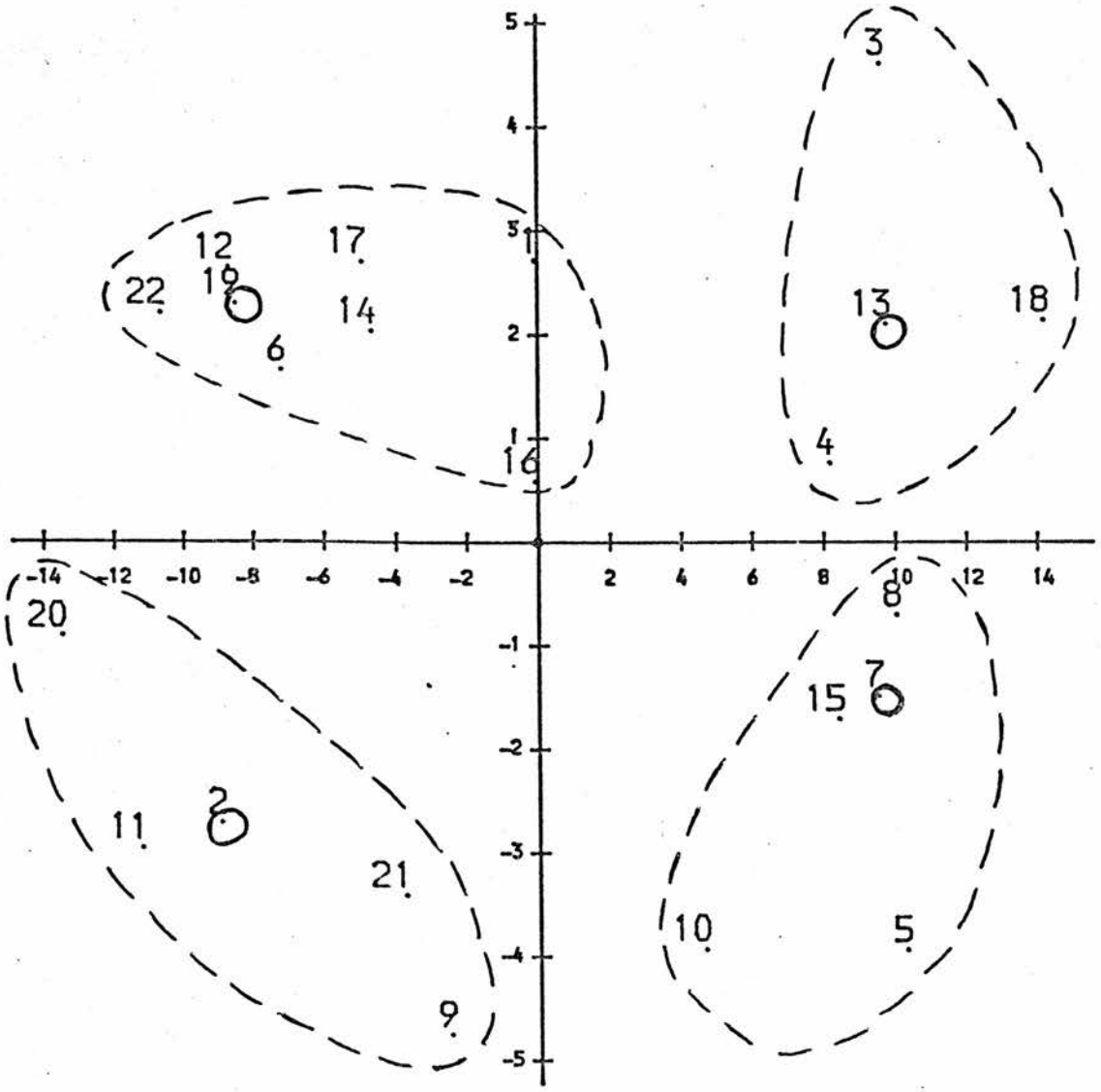


Figure 2.8 Example of a graph of the league match with optimum attacks

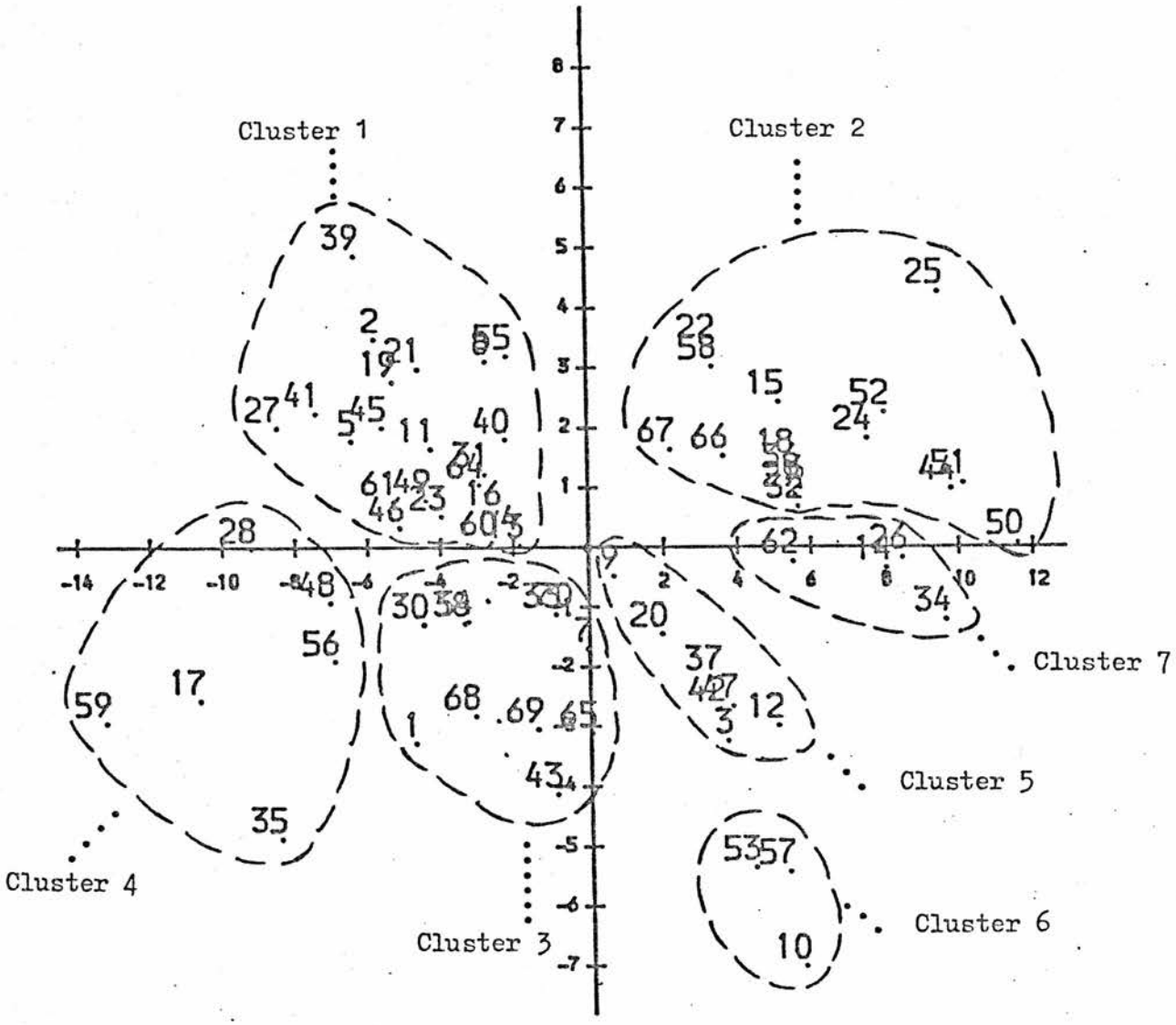


Figure 2.9 Graph of seven major clusters of optimum attacks

ordinary attacks. The pattern-types for corner-kicks and throw-ins from left and right sides of the pitch, as expected, were clustered separately as shown in Figure 2.10 and Figure 2.11 respectively. However, for free-kicks these points were so spread out on the graph there was no obvious clustering, as shown in Figure 2.12. These have consequently been regarded as belonging to a single pattern type.

Each attack was also analysed in terms of its final action. In all, nine different types of final action were determined and were classified numerically as shown in Table 2.2. Also it should be noticed that in ordinary attacks and free-kicks, final actions 8 and 9 did not occur, therefore there are only seven final actions in the ordinary attacks and free-kicks. Thus for each of the 381 ordinary attacks, 174 corner-kicks, 159 throw-ins and 168 free-kicks associated data were collated, concerning pattern types and final actions along with the number of long passes (a pass greater than 10 metres), number of short passes (a pass less than 10 metres) and dribbling sections (see Tables 1, 2, 3 and 4 respectively in Appendix B pp.140-173). It should be noted that some passes, intended to be long passes were intercepted by an opponent. These were defined as long passes. Also it should be noted that in the types of pattern, corner-kicks and throw-ins, right and left hand refer to the side of the pitch from the point of view of the player facing the opposition goal.

Having obtained a grouping of the set of movements into classes of similar attacks, each attack was then categorized by one of the nine final actions. One thus has a two-way

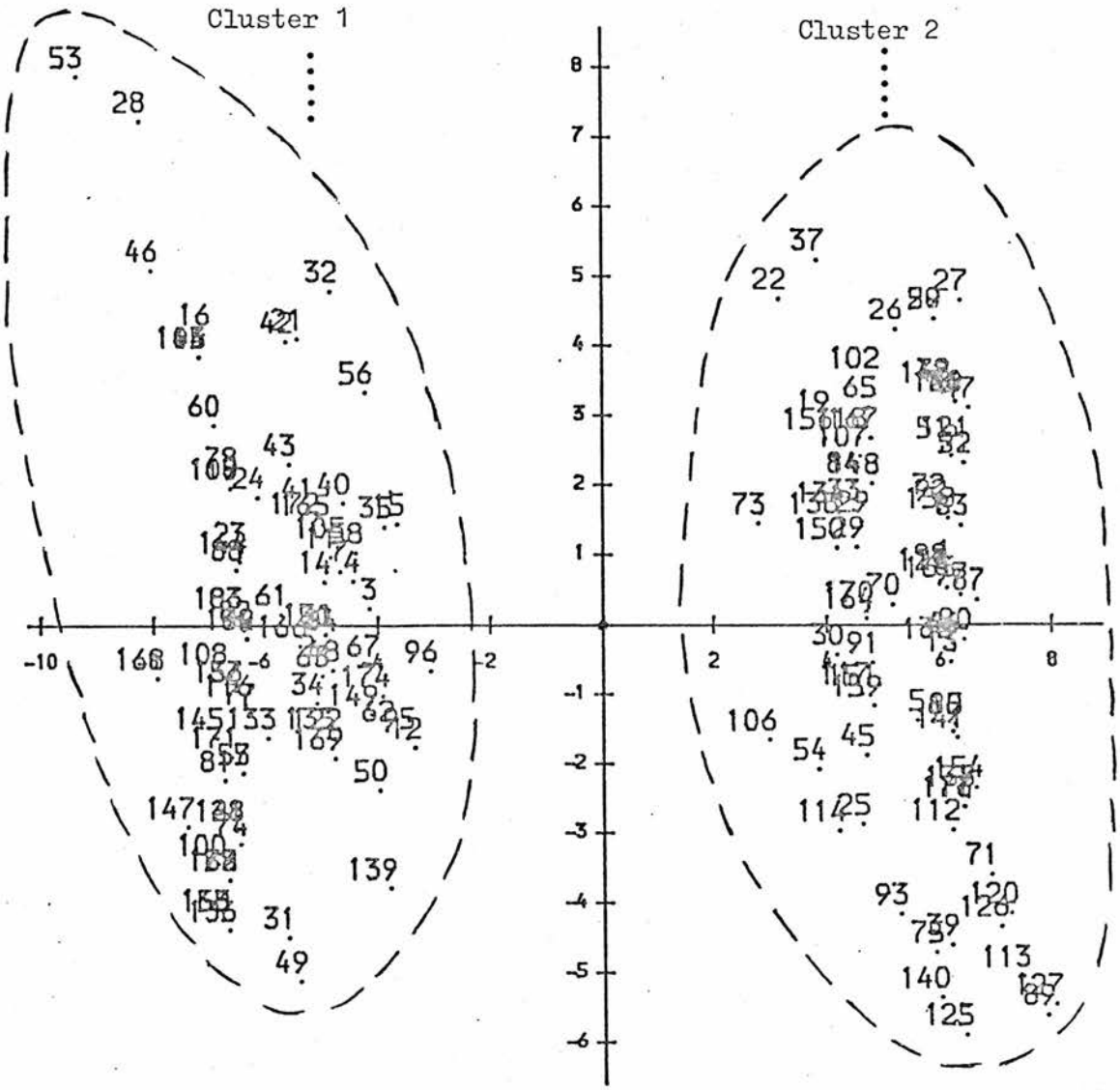


Figure 2.10 Graph of corner-kicks with two clusters

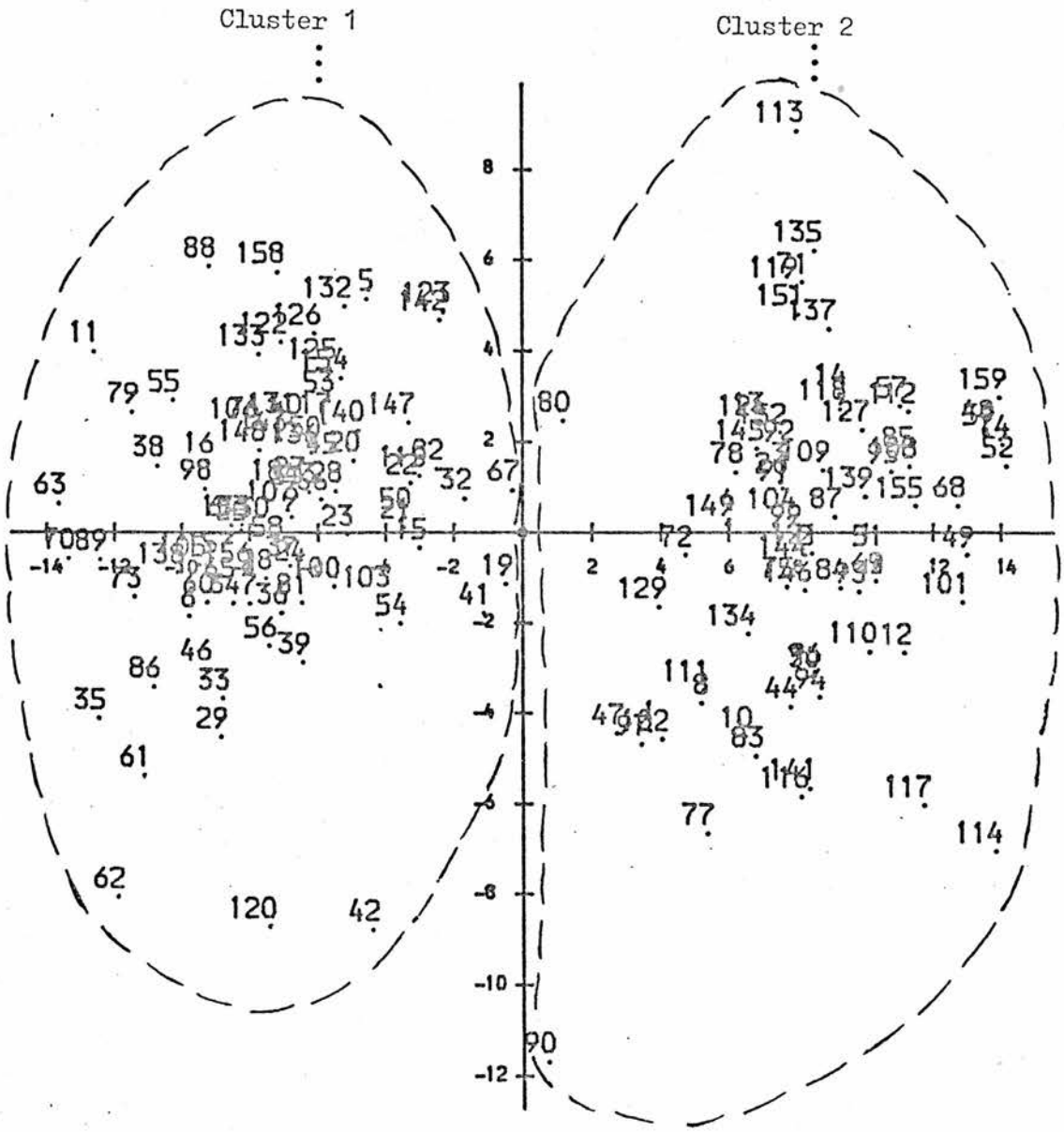


Figure 2.11 Graph of throw-ins with two clusters

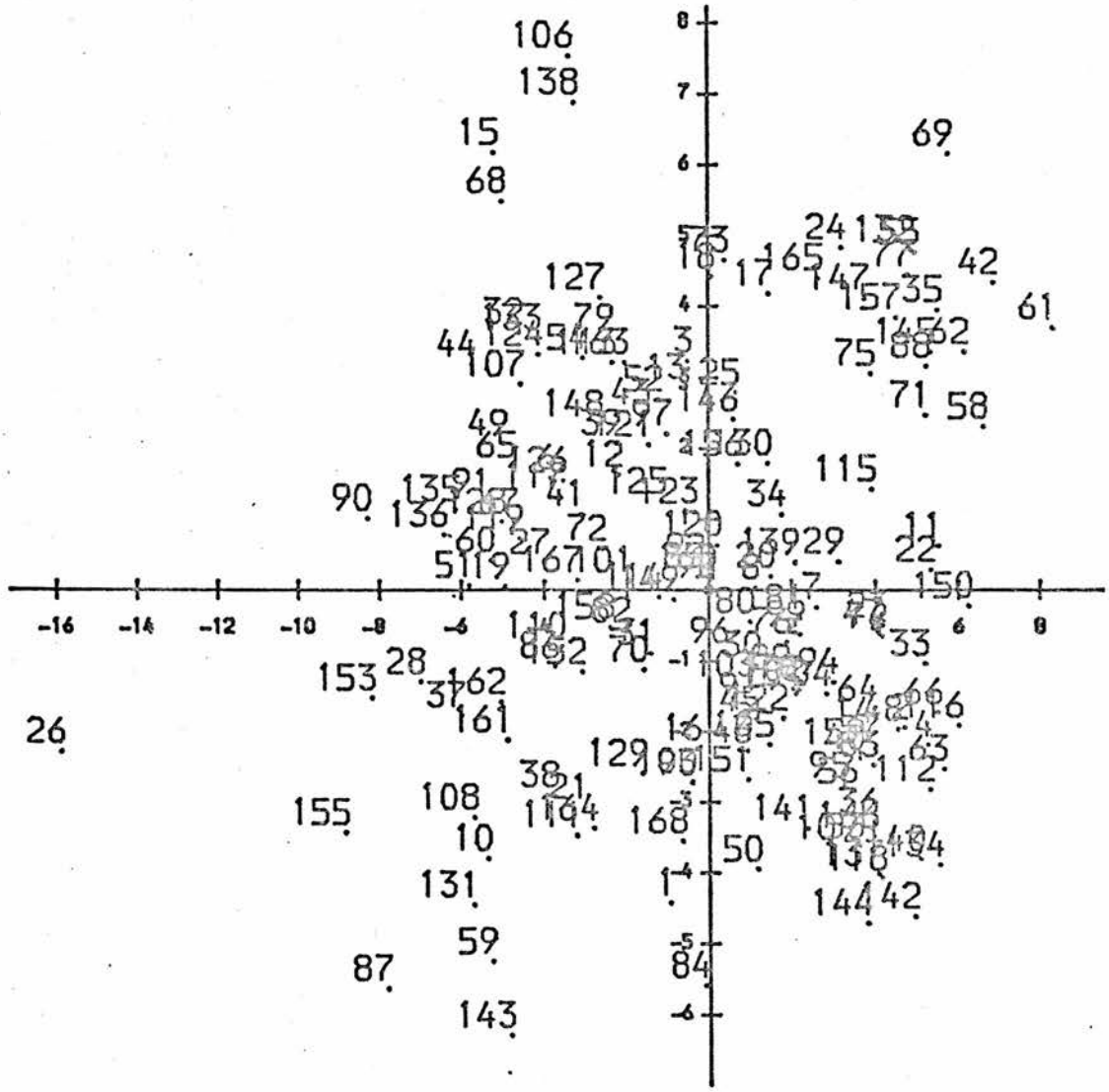


Figure 2.12 Graph of Free-kicks

Table 2.2 Symbols of final actions

1	Goal
2	Shot on target saved
3	Shot off target
4	Lost possession
5	Corner-kick
6	Throw-in
7	Off-side
8	Penalty
9	Free-kick

table of counts to be assessed. The method of correspondence analysis (Greenacre, 1984) provides a means of extracting information from such data. This method represents a set of points in a scatter diagram, one point for each type of pattern and one point for each final action. Such scatter diagrams provide the following types of information:

(i) Types of pattern which have a similar profile of final actions are represented by points that are close together.

(ii) Final actions that have a similar profile of types of pattern are represented by points that are close together.

(iii) A type of pattern point will tend to be attracted to an area of the plane containing the points for those final actions that occur relatively more often in that type of pattern.

It should be noted that a two-dimensional representation will inevitably not capture all of the variations. This correspondence analysis was performed using the programme called 'CORRAN'.

To test whether the mean number of long passes, short passes or dribbling sections can be regarded as the same for each of the 'K' outcomes, one can carry out a hypothesis test based on the test statistic:

$$2 \sum_{i=1}^{K} t_i \, \mathrm{Log}_e \, (m_i / M)$$

where t_i = total number of (long passes, short passes or dribbling sections) in the i th outcome.

m_i = mean number of long passes, short passes or dribbling sections in the i th outcome.

M = overall mean number of long passes, short passes or dribbling sections.

The value of the test statistic is compared with a χ^2_{K-1} distribution to determine whether the null hypothesis that the 'K' means are all the same is rejected or not, large values of the test statistic leading to rejection of the null hypothesis, (Mood, Graybill and Boes, 1974).

CHAPTER THREE

RESULTS

Results

Analysis of ordinary attacks

Using the method of analysis described previously, seven major types of pattern were found from the total of all three hundred and eighty-one attacks; each of these types of pattern represented a number of attacks thus:

(i) Pattern 1. An attack initiated from the right side of the pitch, moving along the right wing towards the right side corner flag and terminated by crossing from this position to the penalty area for shooting. (See Figure 3.1 - representing 134 attacks).

(ii) Pattern 2. An attack initiated close to the centre spot of the pitch, towards the left side line, briefly along the wing, and then into the penalty area by a number of passes. It is terminated by shooting. (See Figure 3.2 - representing 96 attacks).

(iii) Pattern 3. An attack initiated from the centre spot, up the middle of the pitch, towards the penalty arc and terminated by a shot. (See Figure 3.3 - representing 47 attacks).

(iv) Pattern 4. An attack initiated from the middle of the pitch close to the right side line moving briefly along the wing and then towards the penalty area and terminated by shooting. (See Figure 3.4 - representing 31 attacks).

(v) Pattern 5. An attack initiated close to the centre spot of the pitch, moving to the left and then towards the penalty arc and terminated by shooting. (See Figure 3.5 - representing 22 attacks).

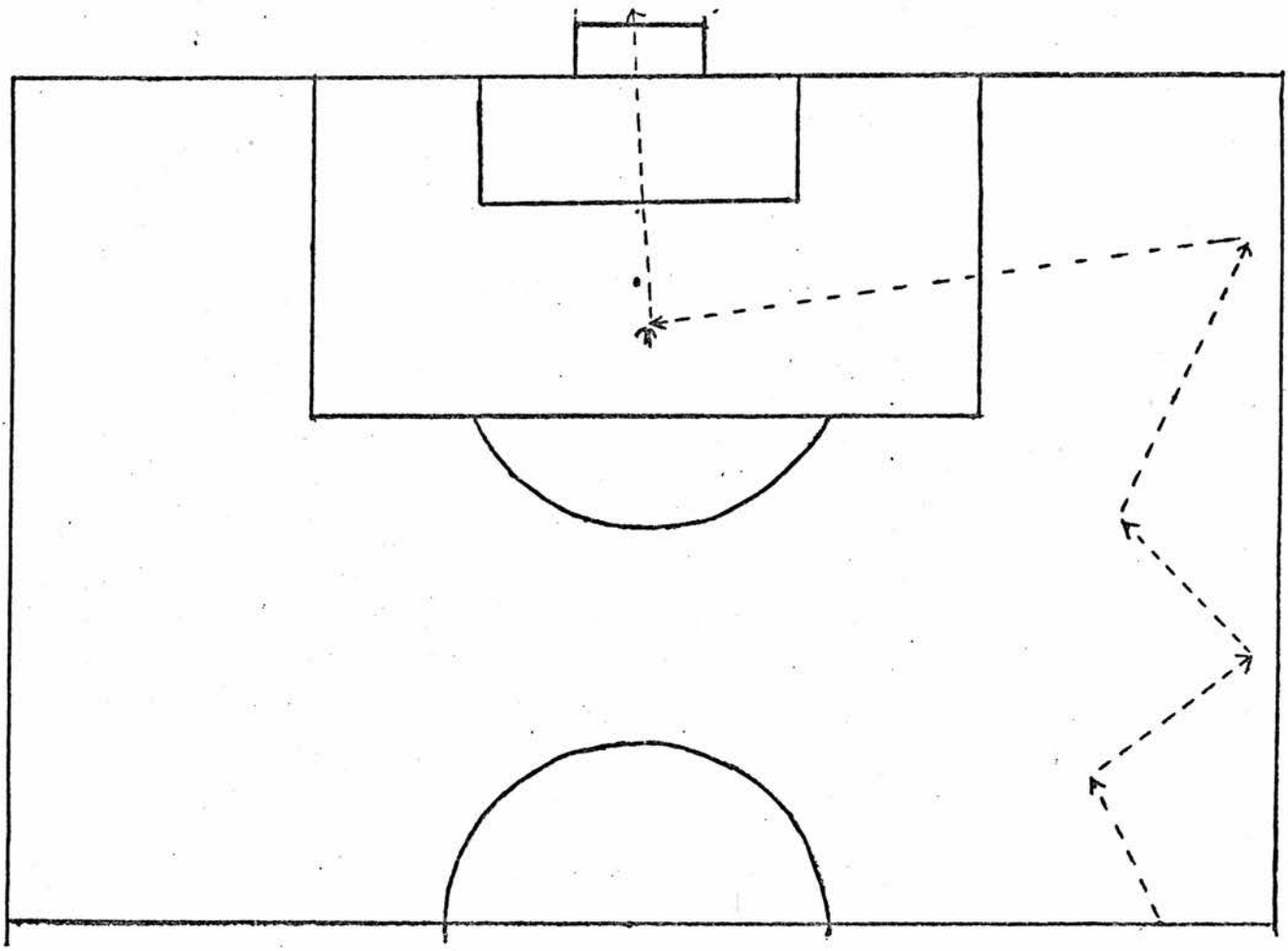


Figure 3.1 Represents pattern 1. An attack initiated from the right side of the pitch, moving along the right wing towards the right side corner flag and terminated by crossing from this position to the penalty area for shooting.

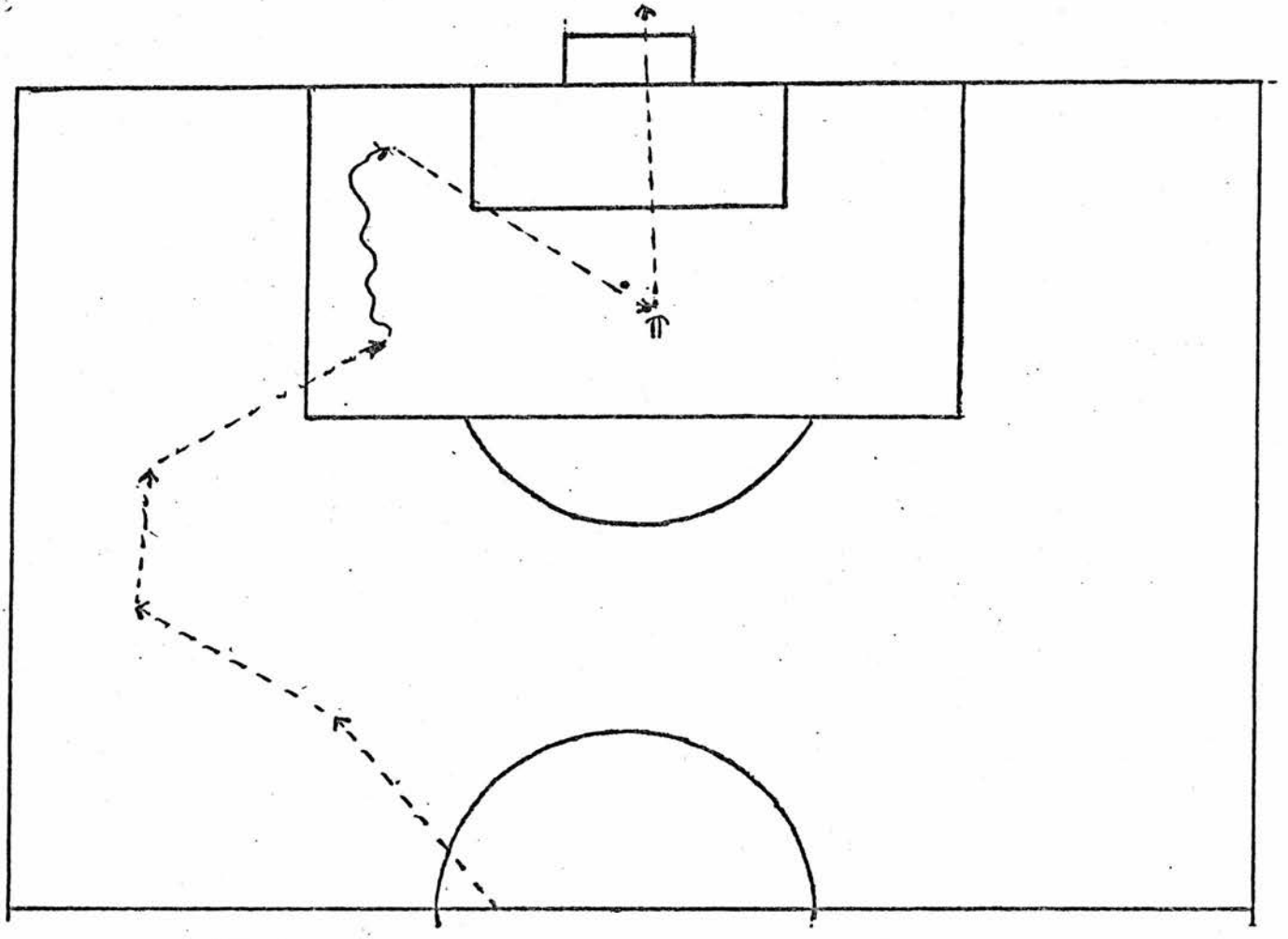


Figure 3.2 Represents pattern 2. An attack initiated close to the centre spot of the pitch towards the left side line briefly along the wing and then into the penalty area by a number of passes. It is terminated by shooting.

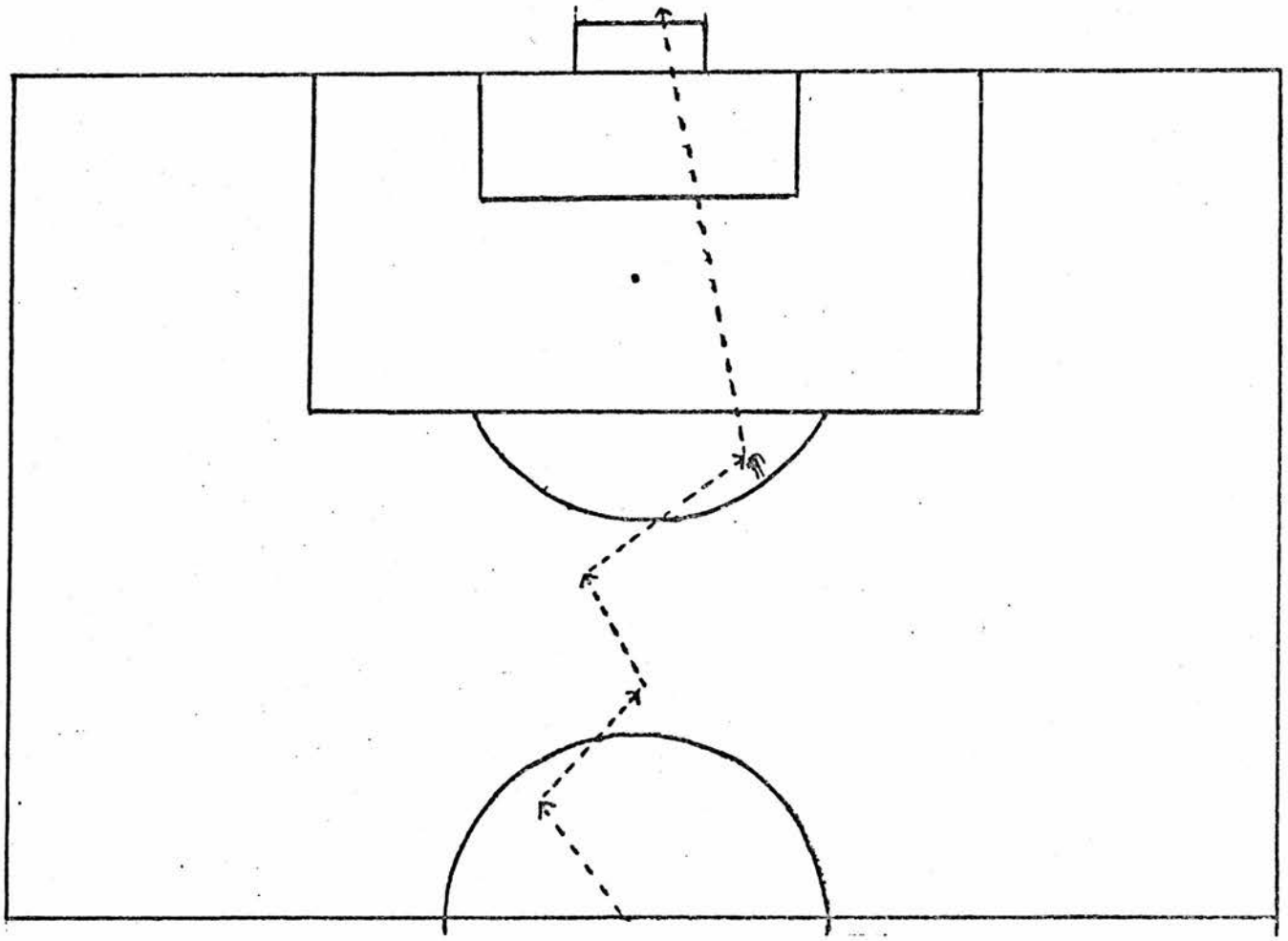


Figure 3.3 Represents pattern 3. An attack initiated from the centre spot, up the middle of the pitch, towards the penalty arc and terminated by a shot.

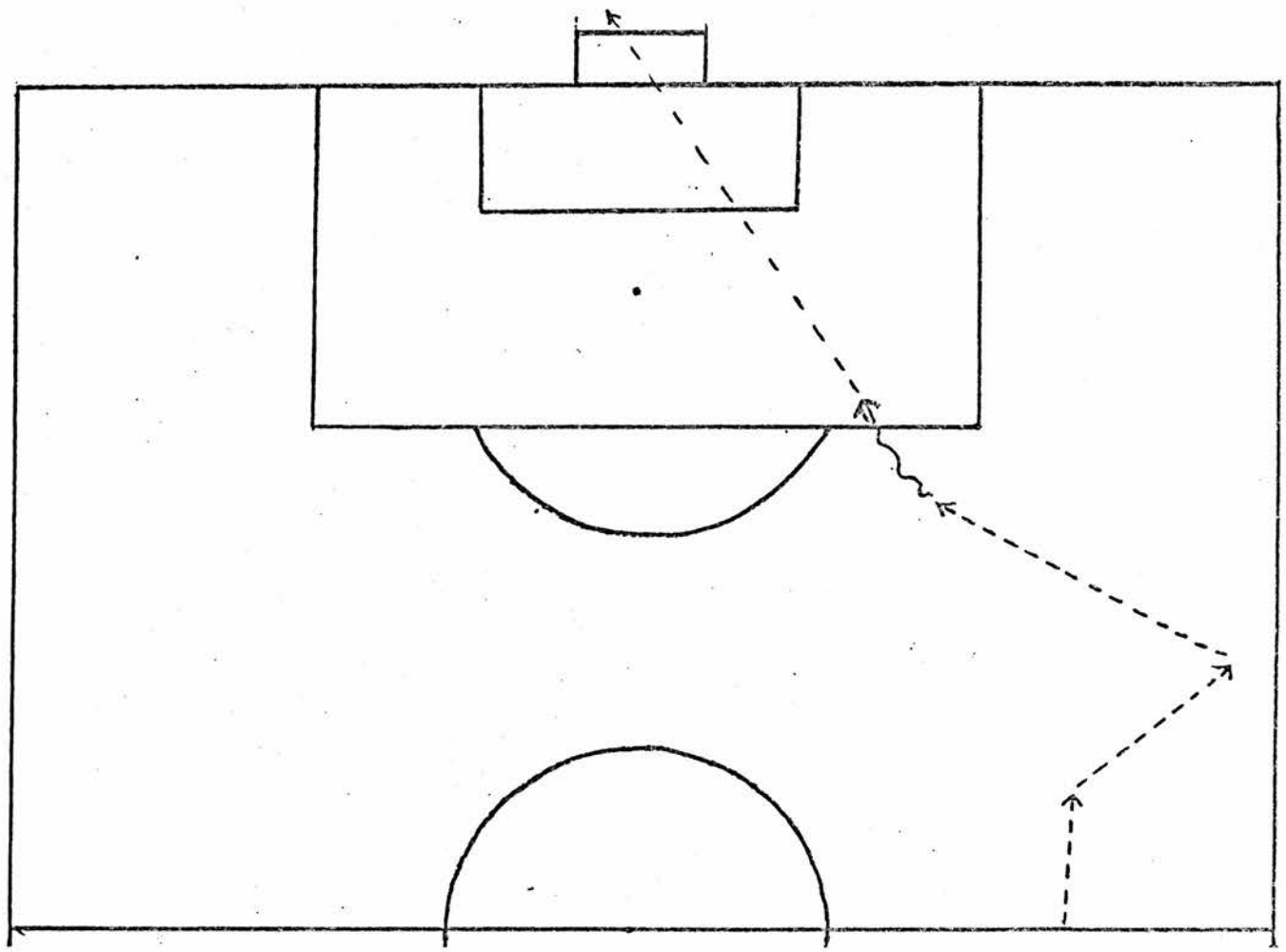


Figure 3.4 Represents pattern 4. An attack initiated from the middle of the pitch close to the right side line, moving briefly along the wing and then towards the penalty area and terminated by shooting.

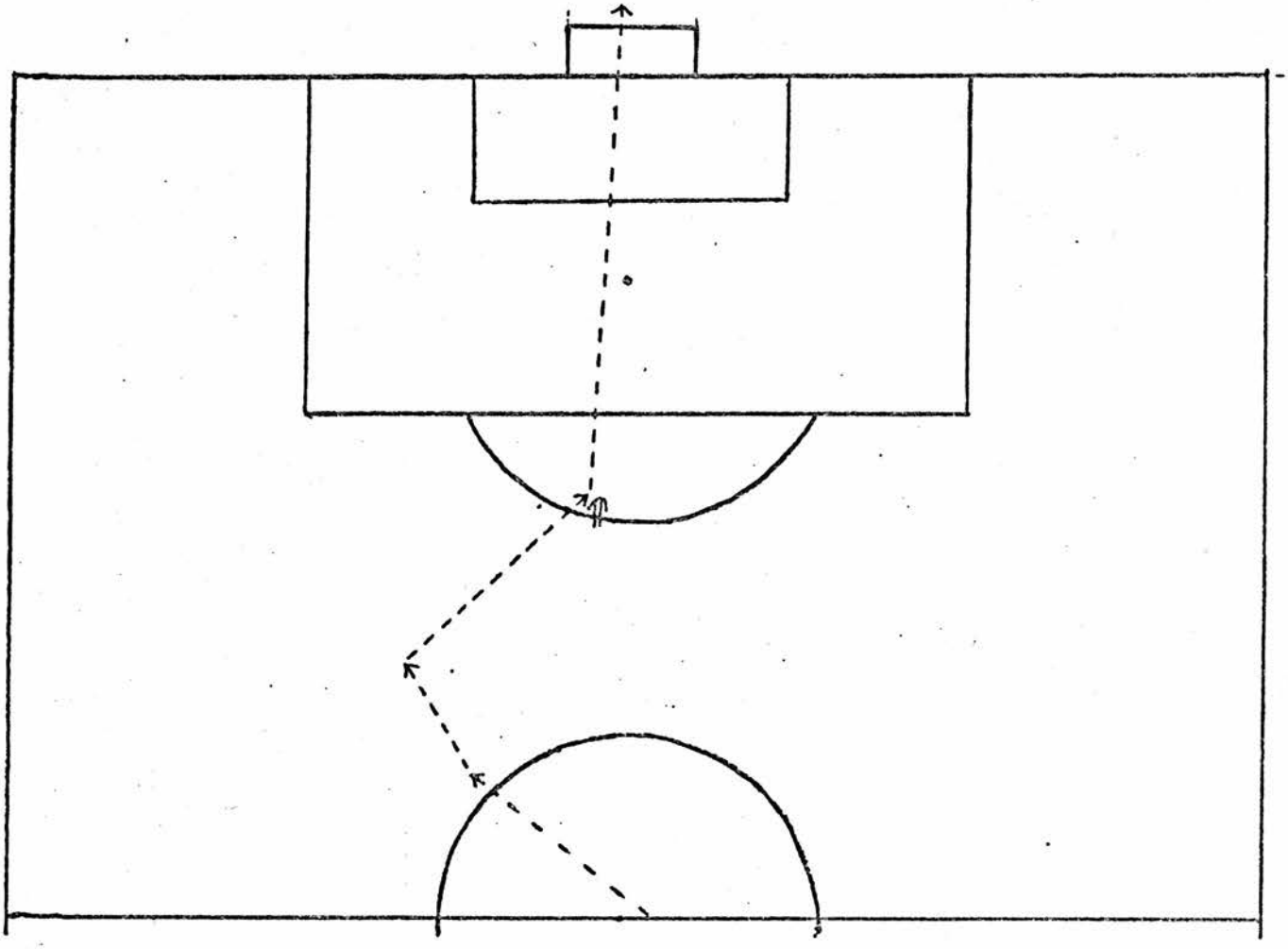


Figure 3.5 Represents pattern 5. An attack initiated close to the centre spot of the pitch, moving to the left and then towards the penalty arc and terminated by shooting.

(vi) Pattern 6. An attack initiated from the left side of the pitch, moving along the left wing towards the left side corner flag and terminated by crossing from this position to the penalty area for shooting. (See Figure 3.6 - representing 29 attacks).

(vii) Pattern 7. An attack initiated from the middle of the pitch, about halfway between the centre and the left side line, diagonally towards the left side line with a number of short passes, following by a pass into the penalty area and terminated by shooting. (See Figure 3.7 - representing 22 attacks).

Final actions with types of pattern

An analysis of the relationship between the types of pattern and final actions, after frequency analysis and tabulation, was carried out using the chi square test. This indicated a significant relationship (value of chi-squared statistic = 66.37; significance level = 0.001). However, since more than 20% of all the cells have an expected frequency of less than 5.0, the mathematical assumptions upon which the chi square test is based are not met. Despite this consequent invalidation, it should be noted that significance level 0.001 is high and could therefore, be regarded as being, at the very least, indicative of some sort of causal relationship between the two variables. It was noted that if categories are further reduced, in order to raise the expected frequency of the final actions, the result does not yield more information for the investigation. These frequency data, relating to final actions and types of pattern, were further treated to a correspondence analysis using 'CORRAN'.

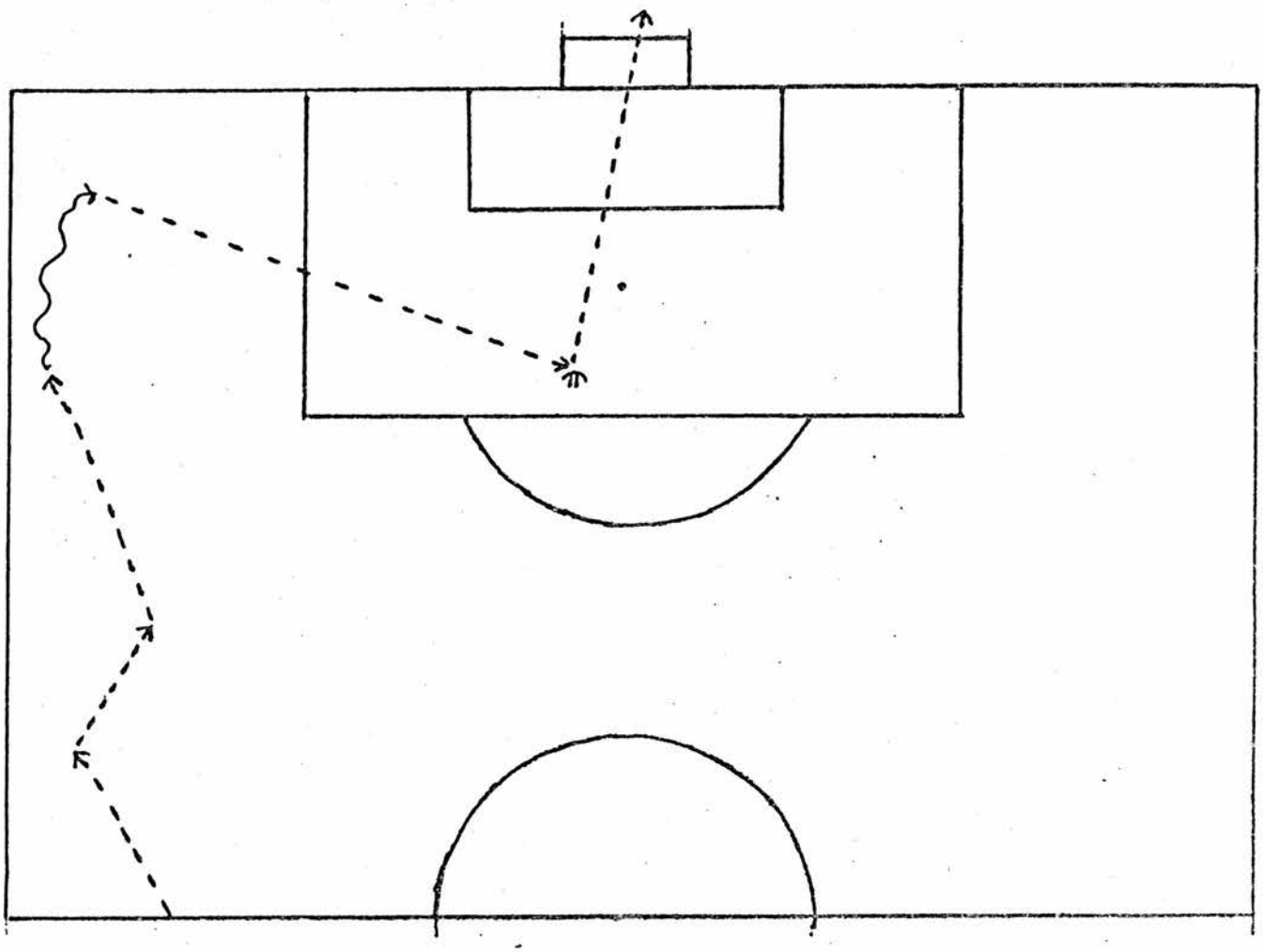


Figure 3.6 Represents pattern 6. An attack initiated from the left side of the pitch, moving along the left wing towards the left side corner flag and terminated by crossing from this position to the penalty area for shooting.

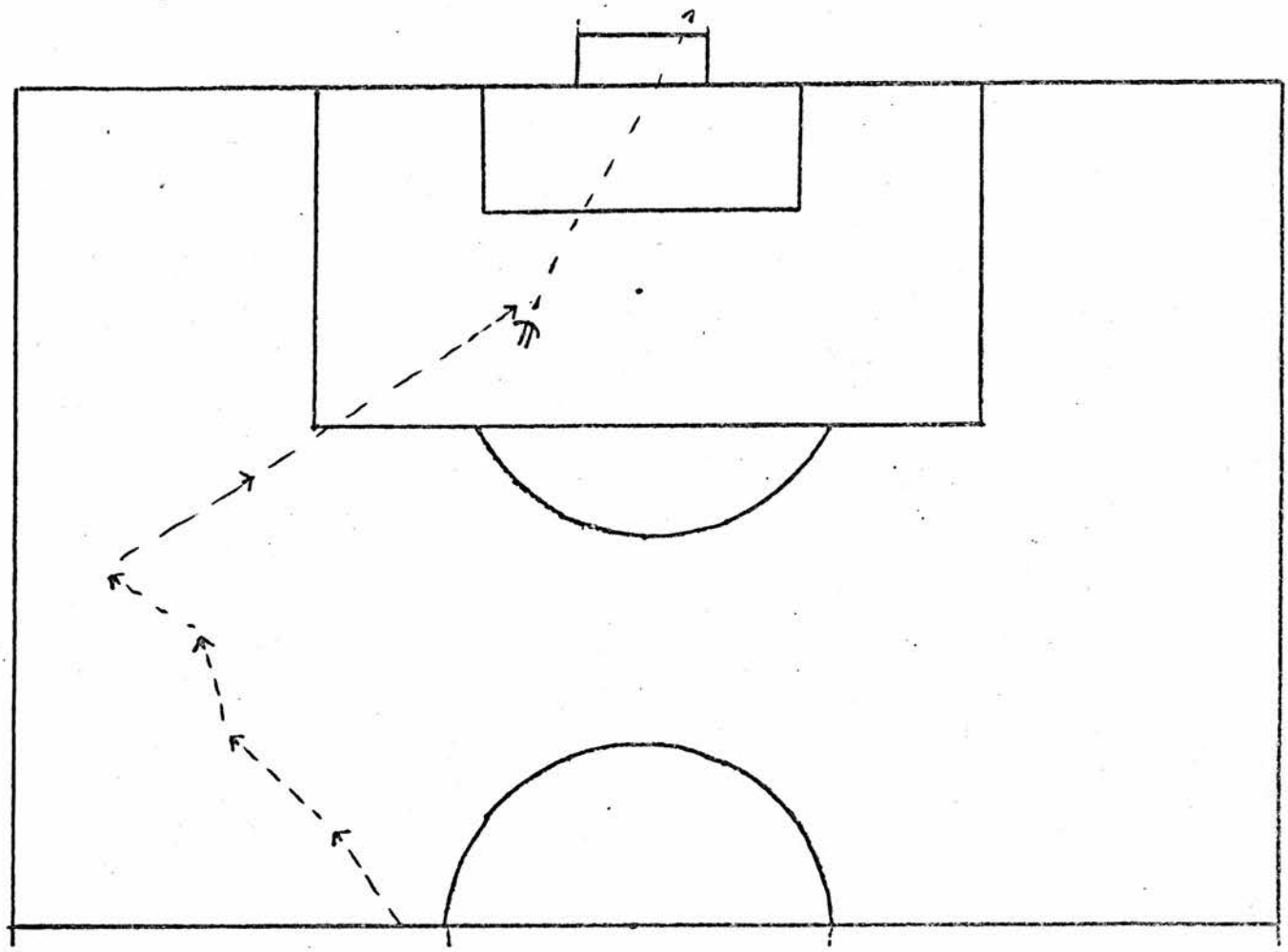


Figure 3.7 Represents pattern 7. An attack initiated from the middle of the pitch, about halfway between the centre and the left side line, diagonally towards the left side line with a number of short passes, following by a pass into the penalty area and terminated by shooting.

Table 3.1 Summarizes the frequency distribution of ordinary attacks between final actions and types of pattern.

Crosstabulation of
Final Actions with Types of Pattern

Final Actions	Count / Row Percentage / Column Percentage / Total Percentage	Types of Pattern 1	2	3	4	5	6	7	Row Total
	1	13	9	1	1	1	3	0	28
		46.4	32.1	3.6	3.6	3.6	10.7	0.0	7.3
		9.7	9.4	2.1	3.2	4.5	10.3	0.0	
		3.4	2.4	0.3	0.3	0.3	0.8	0.0	
	2	17	6	7	1	1	4	2	38
		44.7	15.8	18.4	2.6	2.6	10.5	5.3	10.0
		12.7	6.3	14.9	3.2	4.5	13.8	9.1	
		4.5	1.6	1.8	0.3	0.3	1.0	0.5	
	3	37	12	5	3	0	8	4	69
		53.6	17.4	7.2	4.3	0.0	11.6	5.8	18.1
		27.6	12.5	10.6	9.7	0.0	27.6	18.2	
		9.7	3.1	1.3	0.8	0.0	2.1	1.0	
	4	54	36	22	17	17	9	13	168
		32.1	21.4	13.1	10.1	10.1	5.4	7.7	44.1
		40.3	37.5	46.8	54.8	77.3	31.0	59.1	
		14.2	9.4	5.8	4.5	4.5	2.4	3.4	
	5	12	22	6	6	2	4	2	54
		22.2	40.7	11.1	11.1	3.7	7.4	3.7	14.2
		9.0	22.9	12.8	19.4	9.1	13.8	9.1	
		3.1	5.8	1.6	1.6	0.5	1.0	0.5	
	6	0	4	3	2	0	1	0	10
		0.0	40.0	30.0	20.0	0.0	10.0	0.0	2.6
		0.0	4.2	6.4	6.5	0.0	3.4	0.0	
		0.0	1.0	0.8	0.5	0.0	0.3	0.0	
	7	1	7	3	1	1	0	1	14
		7.1	50.0	21.4	7.1	7.1	0.0	7.1	3.7
		0.7	7.3	6.4	3.2	4.5	0.0	4.5	
		0.3	1.8	0.8	0.3	0.3	0.0	0.3	
COLUMN TOTAL		134	96	47	31	22	29	22	381
		35.2	25.2	12.3	8.1	5.8	7.6	5.8	100.0

From Figure 3.8, which indicates the relationship between the types of pattern and final actions following correspondence analysis of Table 3.1, the undernoted observations were made:

(i) Pattern 1 and pattern 6 have a closer relationship with final actions 1, 2 and 3 than the other patterns. (Final actions 1, 2 and 3 are all shooting at the goal).

(ii) Pattern 2 has a closer relationship with final action 5 than the other patterns, and also has a relationship with final actions 1, 2 and 3.

(iii) Pattern 7 has a strong relationship with final action 4 (which represents lost possession).

Final actions and types of patterncorrelated with the number of long passes, number of short passes and dribbling sections

The relationship of final actions and types of pattern with the number of long passes, number of short passes and dribbling sections in each of these moves, was investigated using the theory outlined in Chapter Two.

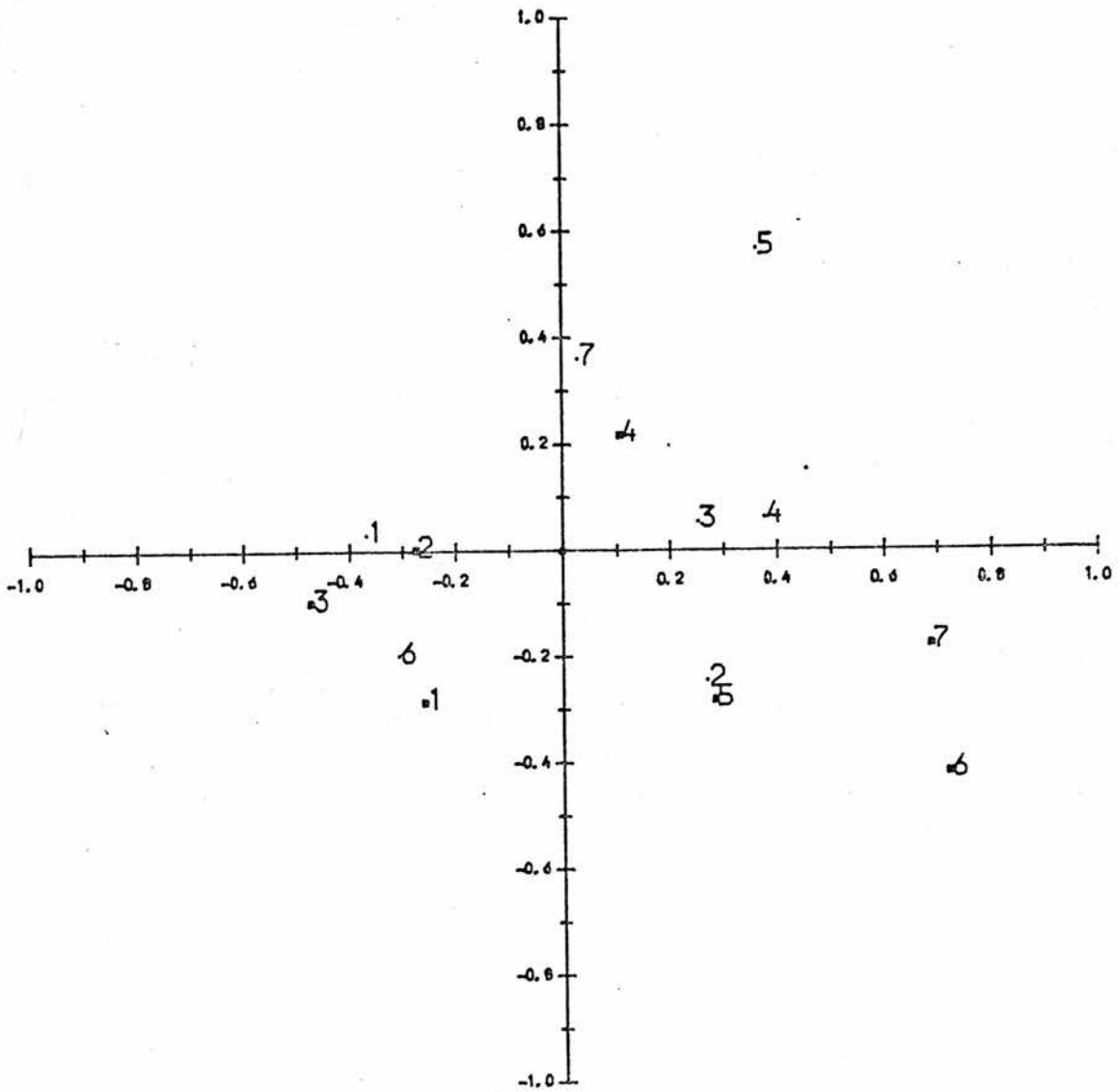


Figure 3.8 Indicates the relationship between final actions and types of pattern following correspondence analysis of Table 3.1 (It should be noticed that pattern points are shown as '.' and final action points as '■').

Table 3.2 Indicates the relationship of types of pattern and final actions with the number of long passes, the number of short passes and dribbling sections.

	Final actions		Types of Pattern	
Variable	Value of chi-squared statistic	Significance level	Value of chi-squared statistic	Significance level
Number of long passes	15.09	0.02	4.13	N.S.
Number of short passes	11.33	N.S.	60.62	0.001
Dribbling sections	3.24	N.S.	28.94	0.001

Of the six possible relationships, only three were found to be statistically significant as shown in Table 3.2:

(i) The relationship between the final actions and the number of long passes.

(ii) The relationship between the types of pattern and the number of short passes.

(iii) The relationship between the types of pattern and the number of dribbling sections.

Final actions with long passes

To test whether the mean number of long passes can be regarded as the same for each 'K' outcomes, these frequency data, as shown in Table 3.3 were investigated using the theory outlined in Chapter Two:

$t_1 = (0x0) + (1+14) + (2x9) + (3x4) + (4x1) + (5x0) = 48$

$t_2 = (0x5) + (1x12) + (2x14) + (3x6) + (4x1) + (5x0) = 62$

$t_3 = (0x7) + (1x39) + (2x16) + (3x6) + (4x1) + (5x0) = 93$

$t_4 = (0x10) + (1x43) + (2x75) + (3x29) + (4x11) + (5 \times 0) = 324$

$t_5 = (0x4) + (1x22) + (2x17) + (3x9) + (4x1) + (5x1) = 92$

$t_6 = (0x2) + (1x3) + (2x5) + (3x0) + (4x0) + (3x0) = 13$

$t_7 = (0x0) + (1x0) + (2x10) + (3x3) + (4x0) + (5x1) = 34$

$$M_1 = \frac{48}{28} = 1.714$$

$$M_2 = \frac{62}{38} = 1.632$$

$$M_3 = \frac{93}{69} = 1.348$$

$$M_4 = \frac{324}{168} = 1.929$$

$$M_5 = \frac{92}{54} = 1.704$$

$$M_6 = \frac{13}{10} = 1.3$$

$$M_7 = \frac{34}{14} = 2.429$$

Table 3.3 Summarizes the frequency distribution of ordinary attacks between final actions and number of long passes.

Crosstabulation of

Final Actions with Long Pases

Final Actions	Count / Row Percentage / Column Percentage / Total Percentage	Long Passes 0	1	2	3	4	5	ROW TOTAL
1		0	14	9	4	1	0	28
		0.0	50.4	32.1	14.3	3.6	0.0	7.3
		0.0	10.5	6.2	7.0	6.7	0.0	
		0.0	3.7	2.4	1.0	0.3	0.0	
2		5	12	14	6	1	0	38
		13.2	31.6	36.8	15.8	2.6	0.0	10.0
		17.9	9.0	9.6	10.5	6.7	0.0	
		1.3	3.1	3.7	1.6	0.3	0.0	
3		7	39	16	6	1	0	69
		10.1	56.5	23.2	8.7	1.4	0.0	18.1
		25.0	29.3	11.0	10.5	6.7	0.0	
		1.8	10.2	4.2	1.6	0.3	0.0	
4		10	43	75	29	11	0	168
		6.0	25.6	44.6	17.3	6.5	0.0	44.1
		35.7	32.3	51.4	50.9	73.3	0.0	
		2.6	11.3	19.7	7.6	2.9	0.0	
5		4	22	17	9	1	1	54
		7.4	40.7	31.5	16.7	1.9	1.9	14.2
		14.3	16.5	11.6	15.8	6.7	50.0	
		1.0	5.8	4.5	2.4	0.3	0.3	
6		2	3	5	0	0	0	10
		20.0	30.0	50.0	0.0	0.0	0.0	2.6
		7.1	2.3	3.4	0.0	0.0	0.0	
		0.5	0.8	1.3	0.0	0.0	0.0	
7		0	0	10	3	0	1	14
		0.0	0.0	71.4	21.4	0.0	7.1	3.7
		0.0	0.0	6.8	5.3	0.0	50.0	
		0.0	0.0	2.6	0.8	0.0	0.3	
COLUMN TOTAL		28	133	146	57	15	2	381
		7.3	34.9	38.3	15.0	3.9	0.5	100.0

$$M = \frac{(28x0) + (133x1) + (146x2) + (57x3) + (15x4) + (2x5)}{381} = \frac{666}{381} =$$

$$= 1.748$$

$$K_1 = t_1 \times \text{Loge} \left(\frac{M_1}{M}\right) = 48 \times \text{Loge} \frac{1.714}{1.748} = -0.9428100$$

$$K_2 = t_2 \times \text{Loge} \left(\frac{M_2}{M}\right) = 62 \times \text{Loge} \frac{1.632}{1.748} = -4.257297$$

$$K_3 = t_3 \times \text{Loge} \left(\frac{M_3}{M}\right) = 93 \times \text{Loge} \frac{1.348}{1.748} = -24.16608$$

$$K_4 = t_4 \times \text{Loge} \left(\frac{M_4}{M}\right) = 324 \times \text{Loge} \frac{1.929}{1.748} = 31.92353$$

$$K_5 = t_5 \times \text{Loge} \left(\frac{M_5}{M}\right) = 92 \times \text{Loge} \frac{1.704}{1.748} = -2.345435$$

$$K_6 = t_6 \times \text{Loge} \left(\frac{M_6}{M}\right) = 13 \times \text{Loge} \frac{1.3}{1.748} = -3.849405$$

$$K_7 = t_7 \times \text{Loge} \left(\frac{M_7}{M}\right) = 34 \times \text{Loge} \frac{2.429}{1.748} = 11.18625$$

$$2 \times \left[K_1 + K_2 + K_3 + K_4 + K_5 + K_6 + K_7 \right] =$$

$$2 \times \left[(-0.9429100) + (-4.257297) + (-24.16608) + (31.92353) + (-2.345435) + (-3.849405) + (11.18625)\right] =$$

$2 \times 7.548720 = 15.09744$ observed value of chi-squared statistic, compared with the χ^2_6 the significance level were (0.02), hence null hypothesis can be rejected at this level of significance.

From the values of 'Mi's as listed below:

$M_1 = 1.714$; $M_2 = 1.632$; $M_3 = 1.348$; $M_4 = 1.929$; $M_5 = 1.704$; $M_6 = 1.3$; $M_7 = 2.429$.

The undernoted observation was made:

(i) Attacks culminating in final action 7 (off-side) have a very high average number of long passes.

Types of pattern with short passes

To test whether the mean number of short passes in the ordinary attacks can be regarded as the same for each 'K' outcomes, these frequency data, as shown in Table 3.4, were investigated using the theory outlined in Chapter Two.

From the values of 'Mi's as listed below:

$M_1 = 1.097$; $M_2 = 0.927$; $M_3 = 1.277$; $M_4 = 1.419$; $M_5 = 1.181$; $M_6 = 0.897$; $M_7 = 1.727$

The undernoted observation was made:

(i) Attacks representing Pattern 7 have a very high average number of short passes.

Types of pattern with dribbling sections

To test whether the mean number of dribbling sections in the ordinary attacks can be regarded as the same for each 'K' outcomes, these frequency data, as shown in Table 3.5, were investigated using the theory outlined in Chapter Two.

From the values of 'Mi's as listed below:

$M_1 = 1.097$; $M_2 = 0.927$; $M_3 = 1.277$; $M_4 = 1.419$; $M_5 = 1.181$; $M_6 = 0.897$; $M_7 = 1.727$.

The undernoted observation was made:

(i) Attacks representing Pattern 7 have a very high number of dribbling sections, on average.

Table 3.4 Summarizes the frequency distribution of ordinary attacks between types of pattern and number of short passes.

Crosstabulation of

Types of Pattern with Short Passes

Types of Pattern	Count / Row Percentage / Column Percentage / Total Percentage	Short Passes 0	1	2	3	4	5	Row Total
1		51	44	23	9	5	2	134
		37.6	33.1	17.3	6.8	3.8	1.5	35.2
		34.7	40.0	30.3	31.0	35.7	40.0	
		13.2	11.6	6.1	2.4	1.3	0.5	
2		43	28	16	7	2	0	96
		43.6	29.8	17.0	7.4	2.1	0.0	24.9
		28.5	25.5	21.1	24.1	14.3	0.0	
		10.8	7.4	4.2	1.9	0.5	0.0	
3		13	12	18	4	0	0	47
		27.7	25.5	38.3	8.5	0.0	0.0	12.4
		9.0	10.9	23.7	13.8	0.0	0.0	
		3.4	3.2	4.8	1.1	0.0	0.0	
4		11	8	5	3	3	1	31
		35.5	25.8	16.1	9.7	9.7	3.2	8.2
		7.6	7.3	6.6	10.3	21.4	20.0	
		2.9	2.1	1.3	0.8	0.8	0.3	
5		10	4	3	4	1	0	22
		45.5	18.2	13.6	10.2	4.5	0.0	5.8
		6.9	3.6	3.9	13.8	7.1	0.0	
		2.6	1.1	0.8	1.1	0.3	0.0	
6		12	9	7	1	0	0	29
		41.4	31.0	24.1	3.4	0.0	0.0	7.7
		8.3	8.2	9.2	3.4	0.0	0.0	
		3.2	2.4	1.9	0.3	0.0	0.0	
7		7	5	4	1	3	2	22
		31.8	22.7	18.2	4.5	13.6	9.1	5.8
		4.9	4.5	5.3	3.4	21.4	40.0	
		1.9	1.3	1.1	0.3	0.8	0.5	
COLUMN TOTAL		147	110	76	29	14	5	381
		38.1	29.1	20.1	7.7	3.7	1.3	100.0

Table 3.5 Summarizes the frequency distribution of ordinary attacks between types of pattern and dribbling sections.

Crosstabulation of

Types of Pattern with Dribbling Sections

Types of Pattern	Count / Row Percentage / Column Percentage / Total Percentage	Dribbling Sections 0	1	2	3	4	5	Row Total
1		28	66	35	4	1	0	134
		20.9	49.3	26.1	3.0	0.7	0.0	35.2
		41.8	33.7	37.6	20.0	25.0	0.0	
		7.3	17.3	9.2	1.0	0.3	0.0	
2		17	57	16	5	0	1	96
		17.7	59.4	16.7	5.2	0.0	1.0	25.2
		25.4	29.1	17.2	25.0	0.0	100.0	
		4.5	15.0	4.2	1.3	0.0	0.3	
3		10	16	19	1	1	0	47
		21.3	34.0	40.4	2.1	2.1	0.0	12.3
		14.9	8.2	20.4	5.0	25.0	0.0	
		2.6	4.2	5.0	0.3	0.3	0.0	
4		4	17	5	4	1	0	31
		12.9	54.8	16.1	12.9	3.2	0.0	8.1
		6.0	8.7	5.4	20.0	25.0	0.0	
		1.0	4.5	1.3	1.0	0.3	0.0	
5		3	12	5	2	0	0	22
		13.6	54.5	22.7	9.1	0.0	0.0	5.8
		4.5	6.1	5.4	10.0	0.0	0.0	
		0.8	3.1	1.3	0.5	0.0	0.0	
6		3	19	6	0	1	0	29
		10.3	65.5	20.7	0.0	3.4	0.0	7.6
		4.5	9.7	6.5	0.0	25.0	0.0	
		0.8	5.0	1.6	0.0	0.3	0.0	
7		2	9	7	4	0	0	22
		9.1	40.9	31.8	18.2	0.0	0.0	5.8
		3.0	4.6	7.5	20.0	0.0	0.0	
		0.5	2.4	1.8	1.0	0.0	0.0	
COLUMN TOTAL		67	196	93	20	4	1	381
		17.6	51.4	24.4	5.2	1.0	0.3	100.0

Set Plays Analysis

Corner-kicks

There are two types of pattern, corresponding, respectively, to corner-kicks taken on the right and on the left side of the pitch, each pattern representing a number of corner-kicks. Pattern 1, (corner-kicks on the right) represents 86 corner-kicks; Pattern 2, (corner-kicks on the left) represents 88 corner-kicks.

Final actions with types of pattern

An analysis of the relationship between the types of pattern and final actions after frequency analysis and tabulation, was carried out using the chi square test. This indicated that there is no significant relationship (value of chi-squared statistic = 5.72; significance level = 0.67).

Final actions and types of pattern correlated with the number of long passes, number of short passes and dribbling sections

The relationship of final actions and types of pattern with the number of long passes, number of short passes and dribbling sections in each of these moves, was investigated using the theory outlined in Chapter Two.

Table 3.6 Indicates the relationship of types of pattern and final actions with the number of long passes, number of short passes and dribbling sections.

	Final actions		Types of Pattern	
Variable	Value of chi-squared statistic	Significance level	Value of chi-squared statistic	Significance level
Number of long passes	2.01	N.S.	0.23	N.S.
Number of short passes	25.83	0.01	1.78	N.S.
Dribbling sections	5.49	N.S.	0.57	N.S.

Of the six possible relationships, only one was found to be statistically significant as shown in Table 3.6:

(i) The relationship between the final actions and the number of short passes.

Final actions with short passes

Again as before, to test whether the mean number of short passes can be regarded as the same for each 'K' outcomes, these frequency data, as shown in Table 3.7 were investigated using the theory outlined in Chapter Two.

From the values of 'Mi's as listed below:

M_1 = 1.167; M_2 = 0.181; M_3 = 0.321, M_4 = 0.1; M_5 0.083;

M_6 = 0.667, M_7 = 0.5; M_8 = 0; M_9 = 0.

The undernoted observation was made:

(i) Corner-kicks culminating in final action 1 (goal) have a very high average number of short passes.

Table 3.7 Summarizes the frequency distribution of corner-kicks between final actions and number of short passes.

Crosstabulation of

Final Actions with Short Passes

Final Actions	Count / Row Percentage / Column Percentage / Total Percentage	Short Passes 0	1	2	3	Row Total
	1	2	2	1	1	6
		33.3	33.3	16.7	16.7	3.4
		1.4	7.7	50.0	100.0	
		1.1	1.1	0.6	0.6	
	2	9	2	0	0	11
		81.8	18.2	0.0	0.0	6.3
		6.2	7.7	0.0	0.0	
		5.2	1.1	0.0	0.0	
	3	20	7	1	0	28
		71.4	25.0	3.6	0.0	16.1
		13.8	26.9	50.0	0.0	
		11.5	4.0	0.6	0.0	
	4	99	11	0	0	110
		90.0	10.0	0.0	0.0	63.2
		68.3	42.3	0.0	0.0	
		56.9	6.3	0.0	0.0	
	5	11	1	0	0	12
		91.7	8.3	0.0	0.0	6.9
		7.6	3.8	0.0	0.0	
		6.3	0.6	0.0	0.0	
	6	1	2	0	0	3
		33.3	66.7	0.0	0.0	1.7
		0.7	7.7	0.0	0.0	
		0.6	1.1	0.0	0.0	
	7	1	1	0	0	2
		50.0	50.0	0.0	0.0	1.1
		0.7	3.8	0.0	0.0	
		0.6	0.6	0.0	0.0	
	8	1	0	0	0	1
		100.0	0.0	0.0	0.0	0.6
		0.7	0.0	0.0	0.0	
		0.6	0.0	0.0	0.0	
	9	1	0	0	0	1
		100.0	0.0	0.0	0.0	0.6
		0.7	0.0	0.0	0.0	
		0.6	0.0	0.0	0.0	
COLUMN TOTAL		145	26	2	1	174
		83.3	14.9	1.1	0.6	100.0

Throw-ins

There are two types of pattern, corresponding, respectively, to throw-ins taken on the right and on the left side of the pitch, each pattern representing a number of throw-ins.

Pattern 1 (throw-ins on the right) represents 86 throw-ins;

Pattern 2 (throw-ins on the left) represents 73 throw-ins.

Final actions with types of pattern

An analysis of the relationship between the types of pattern and final actions after frequency analysis and tabulation, was carried out using the chi square test. This indicated that there is no significant relationship (value of chi-squared statistic = 10.75; Significance level = 0.21).

Final actions and types of pattern correlated with number of long passes, number of short passes and dribbling sections

The relationship of final actions and types of pattern with the number of long passes, number of short passes and dribbling sections in each of these moves, was investigated using the theory outlined in Chapter Two.

Table 3.8 Indicates the relationship of types of pattern and final actions with the number of long passes, number of short passes and dribbling sections.

	Final Actions		Types of Pattern	
Variable	Value of chi-squared statistic	Significance level	Value of chi-squared Statistic	Significance level
Number of long passes	6.36	N.S.	0.12	N.S.
Number of short passes	7.87	N.S.	0.25	N.S.
Dribbling sections	3.10	N.S.	0.74	N.S.

Out of all possible relationships indicated in Table 3.8 none was found to be statistically significant.

Free-kicks

Using the method of analysis described previously, no obvious types of pattern emerged. For this reason, all one hundred and sixty-eight free-kicks were taken into account and are treated as one type of pattern. It was decided that the comparison of final actions with types of pattern was unnecessary.

Final actions correlated with the number of long passes, number of short passes and dribbling sections

The relationship of final actions with the number of long passes, number of short passes and dribbling sections in each of these moves, was investigated using the theory outlined in Chapter Two.

Table 3.9 Indicates the relationship of final actions with the number of long passes, number of short passes and dribbling sections.

Variable	Value of chi-squared statistic	Significance level
Number of long passes	7.00	N.S.
Number of short passes	0.40	N.S.
Dribbling sections	8.79	N.S.

Out of all possible relationships indicated in Table 3.9 none was found to be statistically significant.

CHAPTER FOUR

DISCUSSION

Discussion

The major aim of the investigation in this study was to discover which particular type of pattern of attacking move would result in providing the most opportunities for scoring. A further aim was to find out whether the number of long passes, the number of short passes and dribbling sections would have any effect on such an outcome and could be correlated with the types of pattern used. The results are best explained by following the format used in the results section.

Ordinary attack

Of the seven major types of attacking pattern found, patterns 1 and 6 are more successful than the others in that they provide more scoring and shooting opportunities. This means that the most successful moves are those which proceed along the length of either wing. Pattern 2 (an attack initiated close to the centre spot of the pitch, towards the left side line briefly along the wing, and then into the penalty area by a number of passes, and terminated by shooting), althoughit alsohas advantages in providing scoring and shooting opportunities, is more successful than the others in providing corner-kick opportunities. There are a number of possible reasons for this:

(i) The strategy of the team. It is possible that the team has repeated these particular types of pattern in practice more often than they have the others, believing that these patterns fit better into the particular style of play that the team employ, and

will therefore provide more opportunities for victory over the opposing team.

(ii) Individual players. The team has possibly utilised their best players in creating these patterns, since such players would have enough skill to perform these patterns successfully.

(iii) The weather and condition of the ground. It may be that these patterns are more successful on wet and muddy pitches, especially patterns 1 and 6 which included long crosses. These could cause difficulties for the defending team due to their relative inability to balance and turn quickly on this type of pitch, and in this sort of weather. This would present the attacking team with more favourable scoring opportunities.

(iv) Style of long pass and short pass. The suitability of the particular combination of long and short passes within these patterns may have been such that it helped towards keeping possession of the ball and thus gave advantages in scoring and shooting opportunities.

Types of pattern and final actions correlated with the number of long passes, the number of short passes and dribbling sections

Statistically significant relationships were shown both for the number of long passes with final actions, and for the number of short passes and dribbling sections with types of pattern.

The results of the relationship between final actions and the number of long passes showed that the greater the number of long passes within a single move, the more likely it was to end in final action 7 (which represents off-side). Possible reasons for this are:-

(i) Penetration into the opposition territory. This can be achieved more easily and an attack can be launched at speed. This appears to be one of the most important factors in football today. For this the team often used a number of long passes for their attacks. This style of play, however, requires greater passing skill since it is obviously more difficult to make a long and accurate pass than it is to make a short, accurate one. Also one must remember that with the frequent occurrence of long passes there is a greater risk of losing possession of the ball and attack will stop very quickly. However, the players in the team did not all have the requisite skill, thus their forwards often played off-side as a result of a long pass.

(ii) Players' judgement of off-side. For an attacking player to be judged on-side, he must be in front of at least two defending players in the opponent's half of the pitch when the pass is made. Off-side is defined below. The nearer the possessor of the ball is to another attacking player, the easier it will be to judge whether or not this second player would still be

on-side should a pass be made. Consequently, an attacking situation in which the attacking players are close to one another, (therefore primarily involving short passes) is less likely to result in a player's being caught off-side. Similarly, an attacking situation that requires one or more long passes implies some distance between the passer and the receiver of the ball. The greater the distance, the more likely it is for the passer either to mis-judge whether another attacking player would be played off-side, or to notice the forward movement of another player too late, and so delay the pass. The number of long passes and being caught off-side may be due to errors in the timing of the pass to coincide with the forward movement of another attacking player. The errors would increase as the distance between passer and receiver increased.

OFF-SIDE: A player is off-side if he is nearer his opponent's goal line than the ball, at the moment the ball is played, unless:

(i) He is in his own half of the pitch.

(ii) There are two of the opponents nearer to their own goal line than he is.

(iii) He receives the ball direct from a goal-kick, a corner-kick, a throw-in or when it was dropped by the referee.

(iv) The ball last touched an opponent or was played by him.

The results of the relationship between the types of pattern with the number of short passes and dribbling sections showed that the greater the number of short passes and dribbling sections within a single move, the more likely it was to be pattern 7 (an attack initiated from the middle of the pitch, about halfway between the centre and the left side line, diagonally towards the left side line with a number of short passes, following by a pass into the penalty area and terminated by shooting). There are a number of possible reasons for this:

(i) The very complexity of structure of pattern 7 requires a greater number of individual sections than do the other attacking patterns.

(ii) The defensive tactics. Many teams these days are playing defensive football, for example man to man marking in their half of the pitch or zone defending when close to their penalty area. For these reasons also, pattern seven will require players to be highly efficient in dribbling and passing skills in order to penetrate and not lose the possession of the ball quickly.

Set Plays

Each type of set play is discussed individually, as shown below.

Corner-kicks

There are two types of pattern, one from each side of the pitch.

The results of the relationship between types of pattern

and final actions showed that it was not statistically significant. It was, however, found that the number of short passes with final actions was statistically significant. This means that the most successful corner-kicks are those which included a number of short passes. Also it was found that the greater the number of short passes within a pattern, the more likely it was to be associated with final action 1 (which represents a goal). This means that the corner-kicks which included a greater number of short passes would provide more goals. There are a number of possible reasons for this:

(i) Frequency of short corner-kicks used. It is possible that because a lower frequency of the short corner-kicks were used (from the total 174 corner-kicks only 29 corner-kicks included a number of short passes) (see Table 2 Appendix B pp.154-160). This caused confusion to the opposition defending players as to how to defend in this situation.

(ii) The opposition goalkeepers. Since the opposition goalkeepers have the advantage over an attacking forward in gaining possession of a high long cross (being allowed to handle rather than merely head the ball), it may be that corner-kicks that utilise short passes tend to be more successful, because the danger of loss of possession is not so great.

Throw-ins

There are two types of patterns, one from each side of the pitch. The results indicated that there is no significant relationship between types of pattern and final actions. The

result also indicated that out of all possible relationships of types of pattern and final actions with the number of long passes, the number of short passes and dribbling sections, none was found to be statistically significant. However, there must be some reasons for the lack of statistical significance out of all the possible relationships. This leads to a number of speculations:

(i) The strategy of the throw-ins. Coaches differ in their instructions for bringing the ball back into play in the throw-ins. For example. "Take the throw quickly", "Throw to an unmarked man", "Throw it so it is easy to control". Their strategies link with general ones such as to prefer the long throw in the attacking third of the pitch in order not to waste time on throw-in patterns during training sessions.

(ii) The rules. In the throw-ins the ball has to be brought into the game by a throw according to the rules. Obviously the throw-in does not have the same effect as the kick. The only thing teams pay attention to is bringing the ball into the game and not losing possession, which always starts as an ordinary attacking move.

Free-kicks

It was found that in this case there was no obvious type of pattern, and the result indicated that there was also no significant relationship between final actions and the number of long passes, the number of short passes and dribbling sections. However, there must be some reasons for the lack

of an obvious type of pattern and also for the lack of statistical relationship between them. A possible reason is:

(i) The attitude of managers and coaches. Many managers' and coaches' attitudes to the way of taking free-kicks vary widely, for example, there are some instructions which many managers give their teams for performing free-kicks during the game; "The less complicated the better", "Go for direct shots in front of goal". Also there are many plans but they only use each one once in a match since the opposition will learn it and then be able to defend against it with more likelihood of success.

Summary

Seven types of attacking pattern formation were identified from a total of eighteen league matches. These were analysed using a number of statistical and visual techniques. The most successful of these patterns, in providing shooting and scoring opportunities, were 1 and 6. This means that the most successful moves are those which proceed along the length of either wing. Pattern 2 (an attack initiated close to the centre spot of the pitch, towards the left side line briefly along the wing, and then into the penalty area by a number of passes, and terminated by shooting) resulted in more corner-kicks being awarded. Further, attacks tended to end in being caught off-side when the number of long passes involved within the attack pattern increased. Generally, the more complex the attacking pattern, the less likely it was to result in potential scoring opportunities, e.g. Pattern 7 (an attack initiated from the middle of the pitch, about halfway between the centre and the left side line, diagonally towards the left side line with a number of short passes, followed by a pass into the penalty area and terminated by shooting).

For the set plays, twenty-four matches were analysed using the same statistical and visual techniques as were used for the ordinary attacks. There are two types of pattern for corner-kicks and throw-ins; one from the right-hand side and the other from the left-hand side of the pitch. For

free-kicks, however, there were no obvious patterns. This analysis also showed that the outcome was not dependent on which side of the pitch the corner-kicks or throw-ins were taken from. It was also found that corner-kicks which included a number of short passes were more successful in providing scoring opportunities than those that consisted of a single cross into the goal area.

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APPENDIX

APPENDIX A

\+ The data referring to eighteen league matches, optimum attacks and set plays

(i) Data referring to eighteen league matches consecutively

APPENDIX A

```
 100  MATCH 1
 200    24
 300     4
 400    18  24  23  28
 500     1   8  14  26
 600     7
 700    16  13  18  10   7   9   5
 800     1   6   6   9  19  19  26
 900     3
1000    23  24  12
1100     1  12  26
1200     7
1300    30  30  26  29  29  26  23
1400     1   2   5  13  23  19  19
1500     7
1600    29  28  30  26  25  22  22
1700     1   4   3   3  13  13  26
1800     5
1900     4   4  11  24  22
2000     1   3   7  16  13
2100     8
2200    30  29  27  23  20  16  18   1
2300     1   2   9   7   9  15   8  18
2400     5
2500     8   7  17  15  16
2600     1  10  13  11  26
2700     5
2800    23  20  12  20  17
2900     1   6  15  21  25
3000    10
3100    16  16  12   4   8  14   8   9  15  25
3200     1   2   4   7   7   5   9  12  11  26
3300     6
3400    31  28  31  26  24  17
3500     1  17  17  11  25  25
3600     4
3700     5   5  13  12
3800     1  16  20  26
3900     8
4000    16  15  18  30  28  21  22  13
4100     1   5   3   4  13  18  15  26
4200     5
4300    16  14  17  12  15
4400     1   9   9  18  26
4500     9
4600    16  18  23  25  29  24  20  19  18
```

MATCH 1

4700	1	6	6	8	13	11	11	13	26		
4800	6										
4900	23	26	28	29	23	20					
5000	1	9	17	11	18	18					
5100	10										
5200	4	4	2	2	4	7	8	10	16	17	
5300	1	3	8	12	11	10	15	13	25	26	
5400	6										
5500	2	2	1	7	13	16					
5600	1	4	12	9	11	26					
5700	9										
5800	8	5	8	8	3	18	12	12	15		
5900	1	5	5	9	15	14	12	17	26		
6000	5										
6100	3	8	30	27	14						
6200	1	6	12	17	20						
6300	6										
6400	27	26	24	30	29	10					
6500	1	5	12	12	16	26					
6600	11										
6700	3	3	6	9	13	2	2	4	12	13	14
6800	1	7	12	9	7	13	18	25	22	14	21
6900	7										
7000	12	9	2	4	11	17	13				
7100	1	5	9	11	15	10	17				
7200											
7300											
7400	16	16	5	7	11	16					
7500	1	8	16	19	15	25					
7600	3										
7700											
7800	6										
7900	16	16	5	7	11	16					
8000	1	8	16	19	15	25					

100	MATCH 2									
200	21									
300	5									
400	21	21	22	22	16					
500	1	6	16	20	25					
600	10									
700	20	20	27	23	21	16	18	21	12	17
800	1	6	7	12	13	18	18	16	19	26
900	4									
1000	29	29	20	23						
1100	1	5	17	26						
1200	3									
1300	3	4	15							
1400	1	15	19							
1500	7									
1600	31	32	30	15	14	13	15			
1700	1	19	19	21	15	16	26			
1800	9									
1900	12	2	3	6	16	10	25	27	19	
2000	1	18	9	10	19	9	9	13	19	
2100	3									
2200	25	12	16							

APPENDIX A
MATCH 2

```
2300     1  13  32
2400     4
2500    13   3  10  15
2600     1  14  10  25
2700     9
2800     6   6   3  31   3   1   8  10  12
2900     1   6   4  11  21  17  20  16  26
3000     7
3100    26  29  26  20  24  22  25
3200     1   9   5   6   8  11  16
3300     4
3400    25  19  14  17
3500     1  13  21  26
3600     6
3700    31  32  23  20  21   9
3800     1  11  12  16  11  15
3900     4
4000    14  16  15  17
4100     1   8  23  26
4200     4
4300    21  21  24  20
4400     1   9  15  26
4500     5
4600    20  21  18  27  26
4700     1  10   5   5  12
4800    10
4900    14  12  16  25  27  27  29  24  21  17
5000     1   7  10  13  17  11  16  15  16  24
5100     3
5200    29  25  14
5300     1  15  26
5400     7
5500    10  10  16  19  27  23  17
5600     1   3   2  10  11  14  24
5700     9
5800     9  29  31  30  25  24  21  27  24
5900     1  16  17  12  15  19  19  22  23
6000     5
6100    29  19  19  18  15
6200     1  16  12  15  26
6300     5
6400     9  16  20  10   5
6500     1  12  11  17  26
```

```
 100  MATCH 3
 200    20
 300    10
 400     6   2   4  15  12   3   7  27  27  22
 500     1   4   6  12  15  19  21  18  21  26
 600     9
 700    16  14  13   7   5   3   2   3   2
 800     1  10   5  14  19  15  20  21  26
 900     5
1000     1   3   3   4   4
1100     1  10  24  24  26
1200     4
1300     5   3   9  25  20
```

APPENDIX A
MATCH 3

1400	1	8	11	24	21			
1500	6							
1600	29	29	32	32	15	16		
1700	1	10	17	20	21	26		
1800	6							
1900	14	13	7	6	8	7		
2000	1	5	12	22	23	26		
2100	7							
2200	2	3	7	14	14	18	17	
2300	1	6	5	15	11	19	24	
2400	5							
2500	7	23	19	22	16			
2600	1	15	16	21	26			
2700	4							
2800	14	5	8	25				
2900	1	11	20	26				
3000	4							
3100	21	30	23	16				
3200	1	8	16	26				
3300	3							
3400	26	27	1					
3500	1	15	16					
3600	5							
3700	31	28	30	32	25			
3800	1	3	15	10	16			
3900	8							
4000	28	27	32	29	16	5	5	17
4100	1	7	14	19	20	16	21	23
4200	5							
4300	17	16	18	15	14			
4400	1	14	12	12	26			
4500	8							
4600	26	26	29	26	30	24	31	21
4700	1	5	7	8	13	12	7	20
4800	4							
4900	18	13	19	18				
5000	1	12	20	24				
5100	4							
5200	26	23	27	24				
5300	1	7	5	15				
5400	2							
5500	18	22						
5600	1	14						
5700	5							
5800	22	23	20	28	27			
5900	1	7	6	2	14			
6000	2							
6100	9	12						
6200	1	15						

100	MATCH 4					
200	24					
300	2					
400	14	10				
500	1	10				
600	6					
700	14	7	5	5	17	16

APPENDIX A
MATCH 4

800	1	22	17	25	20	26		
900	8							
1000	26	25	25	32	30	31	29	26
1100	1	6	8	12	9	3	5	11
1200	7							
1300	19	13	2	6	4	3	13	
1400	1	7	12	16	12	20	20	
1500	7							
1600	17	17	20	30	30	15	16	
1700	1	7	3	9	18	19	25	
1800	6							
1900	30	29	26	7	5	20		
2000	1	12	12	25	18	20		
2100	7							
2200	5	5	2	3	11	12	16	
2300	1	8	14	19	21	12	25	
2400	5							
2500	5	11	27	28	16			
2600	1	6	13	17	25			
2700	7							
2800	8	10	19	13	13	13	10	
2900	7	11	12	8	13	15	26	
3000	5							
3100	9	7	10	10	15			
3200	1	9	5	20	21			
3300	7							
3400	7	3	3	12	2	10	15	
3500	1	20	23	19	16	9	19	
3600	6							
3700	15	13	6	5	12	13		
3800	1	8	12	18	23	25		
3900	4							
4000	15	12	5	8				
4100	1	5	14	14				
4200	6							
4300	14	17	24	28	26	28		
4400	1	8	7	18	18	26		
4500	4							
4600	29	23	21	14				
4700	1	18	23	26				
4800	5							
4900	18	16	3	5	17			
5000	1	8	17	20	21			
5100	7							
5200	29	32	28	32	32	20	22	
5300	1	5	8	15	18	24	26	
5400	8							
5500	29	29	26	30	16	18	22	
5600	1	10	9	6	8	18	15	26
5700	7							
5800	5	2	4	11	4	5	9	
5900	1	8	9	12	12	15	24	
6000	3							
6100	30	31	24					
6200	1	17	20					
6300	7							
6400	18	23	20	18	29	29	11	
6500	1	9	10	7	13	17	26	
6600	9							

APPENDIX A
MATCH 4

```
6700    29  31  27  31  29  31  29  19  16
6800     1   7   6  12  17  19  22  22  26
6900     6
7000    21  22  29  24  20  17
7100     1   5  10  24  22  26
7200     6
7300    15  17  26  24  18  20
7400     1   2  16  22  22  26
7500
7600
7700
7800
```

```
 100  MATCH 5
 200    25
 300     6
 400    16  15  11   7  21  23
 500     1  10  10  14  22  26
 600     5
 700    13  13  31  31  32
 800     1   5   2  10  20
 900     5
1000    30  20  27  24  19
1100     1  17  12  23  21
1200     4
1300    27  16  18  21
1400     1  14  13  17
1500    12
1600    28  28  30  27  23  27  29  23  24  31  28  18
1700     1   2  11  11  17   7  14  12  10  19  23  21
1800     7
1900     7   5   2   8  12  11   7
2000     1   9   9  11  17  18  19
2100     4
2200    29  23  23  17
2300     1  12  14  24
2400     4
2500    24  22  16  17
2600     7   9  15  26
2700     8
2800     8   8   3   6   3   6   7   7
2900     1   8   7  10  18  23  23  26
3000    10
3100    30  32  29  26  32  30  23  32  31  31
3200     1   2   5  14  14  17  14  10  12  19
3300     4
3400     6   4   7  20
3500     1   6  22  26
3600     4
3700    13   8  10  15
3800     1  13  20  26
3900    12
4000    18  18  20  29  26  19  18  19  15   7   9  15
4100     1   5   4   6   9  13  11   9  12   9  13  26
4200     9
4300     8   5   8   8   3   3   4   5  14
4400     1  10   7  12  11  14  21  25  23
```

```
4500     6
4600    29  26  22  18  18  16
4700     1  12  22  21  24  26
4800     4
4900    24  18   4   8
5000     1   4   6  13
5100     6
5200    18   8  13  10  16  17
5300     1   9  10  20  20  26
5400     3
5500    10   9   7
5600     1  22  26
5700     7
5800     6   2   3   7   5   1   5
5900     1   6   8  11  12  17  16
6000     4
6100    19  17  16  10
6200     1  11   5  18
6300     4
6400     3   2   9  10
6500     1  11  18  19
6600     6
6700    14  12  13  16  17  18
6800     1  16  16  16  26  26
6900     5
7000    18  17  22  23  15
7100     1   8   7  12  21
7200     9
7300    32  30  31  26  27  30  28  27  29
7400     1  12   9  12   9  14  21  23  26
7500     7
7600     8   8  11  11  17  14  16
7700     1  12   8   4  14  19  25
```

```
 100  MATCH 6
 200    20
 300     5
 400    27  26  30  30  29
 500     1   6   6  12  19
 600     7
 700    23  23  27  30  21  24  29
 800     1   9  14  14  18  11  16
 900     4
1000    29  21  21  17
1100     1  16  13  26
1200     6
1300    26  31  32  32  15  12
1400     1   5  14  20  23  26
1500     5
1600    31  31  32  29  29
1700     1   8   7  18  20
1800     8
1900    21  23  29  26  22  19  18  20
2000     1   5   7  12  13  20  24  26
2100     3
2200    10   5  20
2300     1  23  22
```

APPENDIX A
MATCH 6

```
2400     6
2500    17  17  14   9   4  11
2600     1  10  12  19  19  26
2700     6
2800    12  25  30  31  31  26
2900     1   4  14  12   7  14
3000     4
3100    26  26  28  14
3200     1   6   3  22
3300     5
3400    27  27  31  27  21
3500     1   7  13  14  19
3600     6
3700     2   4  32  30  22  26
3800     1   6   7  10  18  24
3900     3
4000    18  18  16
4100     1   9  15
4200     7
4300    16  16  11   2   3   4   5
4400     1   5   4  10  21  14  16
4500     5
4600    14  15  16  17  17
4700     1  12   9  12  26
4800     6
4900    16  15   8   6  23  25
5000     1   8   4   9  10  16
5100     4
5200    19  18  23  27
5300     1  16  11  17
5400     3
5500    29  26  13
5600     1  12  22
5700     8
5800    19  21  31  27  23  23  24  19
5900     1   8  11   6  11  16  14  26
6000    11
6100    15  17  26  30  27  21  18  19  23  25  26
6200     1   3   5  12  13  13   9  15   9  22  26
```

```
 100  MATCH 7
 200    22
 300     9
 400     2   2   4  10  24  31  30  18  18
 500     1  11   7   6   2  10  16  14  16
 600     4
 700    10   4   7   6
 800     1  19  23  26
 900     5
1000    25  31  31  26  26
1100     1   5  22  24  26
1200     6
1300    28  31  23  24  22  23
1400     1  17  15  13  14  17
1500     5
1600    25  26  31  29  23
1700     1   5   5   9   4
```

APPENDIX A
MATCH 7

1800	7									
1900	3	2	5	13	12	6	15			
2000	1	7	3	5	10	16	26			
2100	5									
2200	28	32	28	25	22					
2300	1	5	9	11	15					
2400	7									
2500	31	31	28	31	31	21	21			
2600	1	5	12	14	19	14	15			
2700	7									
2800	20	18	16	9	7	9	6			
2900	1	9	5	13	19	19	26			
3000	7									
3100	32	31	29	28	24	3	4			
3200	1	12	20	16	13	15	19			
3300	7									
3400	4	3	3	9	4	4	2			
3500	1	12	16	11	20	22	26			
3600	7									
3700	3	6	9	1	3	16	16			
3800	1	6	5	11	19	29	26			
3900	7									
4000	31	32	29	26	25	23	26			
4100	1	8	4	14	16	19	26			
4200	4									
4300	11	1	3	22						
4400	1	17	23	19						
4500	7									
4600	26	25	28	30	20	22	26			
4700	1	4	12	8	10	6	12			
4800	5									
4900	19	16	15	15	15					
5000	1	14	16	14	26					
5100	7									
5200	2	15	13	8	10	16	16			
5300	1	16	12	19	26	24	26			
5400	2									
5500	31	30								
5600	1	19								
5700	5									
5800	4	4	6	10	16					
5900	7	15	17	15	26					
6000	2									
6100	3	4								
6200	1	18								
6300	10									
6400	16	19	14	4	8	5	10	10	7	13
6500	1	4	7	5	7	10	9	13	12	20
6600	6									
6700	2	2	5	1	2	14				
6800	1	6	6	12	18	22				

100	MATCH 8				
200	23				
300	5				
400	22	22	27	23	32
500	1	15	15	11	10

APPENDIX A
MATCH 8

600	5											
700	10	11	29	27	12							
800	1	3	11	19	21							
900	12											
1000	28	26	2	5	4	9	28	23	18	18	15	12
1100	1	5	10	11	15	12	18	12	15	12	11	15
1200	12											
1300	18	15	2	4	8	5	1	4	9	14	17	10
1400	1	5	12	11	9	7	15	16	12	13	10	19
1500	6											
1600	4	3	1	2	18	18						
1700	1	7	17	22	22	26						
1800	8											
1900	19	19	16	4	1	2	3	9				
2000	1	6	9	10	11	15	8	13				
2100	4											
2200	7	21	14	17								
2300	1	17	17	26								
2400	3											
2500	27	25	21									
2600	1	3	18									
2700	3											
2800	18	23	17									
2900	1	17	26									
3000	7											
3100	4	3	7	12	16	17	18					
3200	1	10	6	12	10	14	26					
3300	6											
3400	6	3	2	5	14	12						
3500	1	3	12	9	13	15						
3600	8											
3700	11	9	3	8	13	12	15	14				
3800	1	6	11	10	17	20	26	26				
3900	9											
4000	25	29	31	22	11	2	17	22	10			
4100	1	2	9	10	7	15	19	13	21			
4200	5											
4300	16	11	12	16	22							
4400	9	14	20	24	20							
4500	5											
4600	13	19	15	13	16							
4700	1	4	9	21	26							
4800	5											
4900	13	11	7	9	6							
5000	1	5	16	19	26							
5100	8											
5200	32	30	32	29	24	27	14	15				
5300	1	13	17	17	16	20	24	26				
5400	6											
5500	14	16	28	26	22	17						
5600	1	3	11	20	18	26						
5700	5											
5800	21	22	24	17	17							
5900	1	7	15	20	26							
6000	4											
6100	17	7	11	14								
6200	1	11	15	26								
6300	7											
6400	25	21	16	23	32	26	22					

APPENDIX A
MATCH 8

```
6500    1   6  10   9  10  13  18
6600    5
6700   15  12  10  18  18
6800    1   4  11  22  26
6900    6
7000   24  24  30  28  14  14
7100    1   7  15  22  22  26
```

```
 100  MATCH 9
 200   24
 300    4
 400   26  32  32  29
 500    1   8  14  26
 600    6
 700   11  12   9   4   4  10
 800    1   4   2  11   3  14
 900    8
1000   16  16  13  16  28  29  29  11
1100    1   8   7  10   6  17  22  26
1200    6
1300   24  25  25  29  31  32
1400    1  13  21  12  18  19
1500    6
1600   29  27  31  31  30  23
1700    1  10   6  14  16  14
1800    7
1900   16  17  13  10   3   7  18
2000    1   4   3   9  10  11  14
2100    9
2200   31  30  30  31  31  31  29  14  14
2300    1  10  21  20  17  13  14  20  26
2400    6
2500   25  22  15   6   7  12
2600    1   9  11  16  21  20
2700    6
2800    8   8   6   8   9   1
2900    1   3  14  12   8  17
3000    5
3100    9   1   6  21  18
3200    1  14  15  23  26
3300    4
3400   29  29  31  20
3500    1  13  19  26
3600    4
3700    7   4   2  14
3800    1  10   5  24
3900    5
4000   19  15   4   2  10
4100    1   5   5  11  20
4200    6
4300    3   1   5   7  12  13
4400    1   6   6  11  19  22
4500    3
4600   20  23  22
4700    1  21  22
4800    4
4900   10  15  15  17
```

PENDIX A
MATCH 9

```
5000     1  17  22  26
5100     5
5200     5   5   2   4  15
5300     1   7   6  25  24
5400     5
5500     3   6   9  11   7
5600     1   5  15   7  18
5700     6
5800    23  18   6  10  14  14
5900     1   7  14  19  25  26
6000     6
6100    22  10  11  16  18  19
6200     6  10  15  24  24  26
6300     9
6400    23  10  10  18  19  16  17  15  16
6500     1  13  16  26  23  26  19  20  26
6600     8
6700    10   3   1   4   4   2   3  14
6800     1  11  17  14  11  20  23  20
6900     4
7000     7   2   5  19
7100     1  10  24  26
7200     7
7300    14   6   2   8  11   4  17
7400     6   9  15  11  22  21  22
```

```
 100  MATCH 10
 200    20
 300     9
 400    28  31  23  19   7   7  23  20  16
 500     1  18  18   8   9  19  20  17  17
 600     5
 700    30  15  21  17  18
 800     1  14  15  25  26
 900     5
1000     5   6  10  26  13
1100     1   9   7   7  18
1200    13
1300    29  27  31  27  12  23  24   8  11  18  19  19  18
1400     1   5   6   7  16  19  22  20  14  11  19  21  25
1500     5
1600    18  22  29  28  17
1700     1   8  14  18  18
1800     7
1900     7   6  12  10   4   4  12
2000     1  12   8  22  21  19  15
2100     4
2200    23   9  19  15
2300     1   8  13  26
2400    10
2500     3   4   4   8  13  16   2  19  16  15
2600     1   4  10  13   3   3   6  13   9  15
2700     6
2800    13  18  30  25  30  17
2900     1   9  10   5   7  17
3000     8
3100    24  31  29  10  20  13  15  16
```

APPENDIX A
MATCH 10

3200	1	15	15	18	11	19	25	26		
3300	5									
3400	8	7	3	3	20					
3500	1	10	17	21	26					
3600	8									
3700	3	4	2	4	2	7	11	16		
3800	1	2	4	5	14	16	15	26		
3900	8									
4000	29	30	31	30	28	24	16	15		
4100	1	5	12	21	18	14	20	20		
4200	10									
4300	10	10	1	5	10	10	12	12	11	17
4400	1	3	17	15	22	24	22	23	25	26
4500	4									
4600	6	9	10	16						
4700	1	12	25	22						
4800	5									
4900	30	31	31	15	17					
5000	1	12	16	23	26					
5100	6									
5200	19	17	20	30	21	14				
5300	1	10	7	9	15	20				
5400	8									
5500	4	1	3	11	13	14	11	14		
5600	1	6	9	20	22	23	24	26		
5700	5									
5800	15	12	11	16	18					
5900	8	13	19	25	26					
6000	6									
6100	3	2	9	16	16	17				
6200	1	6	14	26	23	26				

100	MATCH	11					
200	9						
300	6						
400	13	13	24	22	21	28	
500	1	10	16	11	16	26	
600	7						
700	22	18	16	3	10	22	20
800	1	6	2	7	14	18	19
900	5						
1000	23	21	20	18	18		
1100	1	19	17	18	26		
1200	5						
1300	16	14	5	7	18		
1400	1	6	4	7	16		
1500	6						
1600	18	15	4	6	11	11	
1700	1	8	11	15	12	14	
1800	3						
1900	7	17	19				
2000	1	18	25				
2100	4						
2200	30	28	2	4			
2300	1	5	16	14			
2400	7						
2500	7	9	10	17	15	13	2

```
2600     1  11   7   5  12  12  14
2700     4
2800    13   6  10  20
2900     1  10  20  26
3000
```

```
 100  MATCH 12
 200    23
 300    4
 400    18  16  27  23
 500     1   7  20  21
 600     4
 700    24  10  11  14
 800     1  14  18  26
 900     5
1000    12   7  30  27  11
1100     3   9  14  15  22
1200     3
1300     2   3   9
1400     1  11  17
1500     3
1600    30  29  14
1700     1  17  22
1800     5
1900    31  29  26  18  21
2000     1  13   7   5  18
2100     3
2200     7   4   1
2300     1  19  20
2400     7
2500    27  30  30  15  21  12  17
2600     1   6   3  13  14  19  26
2700     4
2800    15   3   5  17
2900     1  19  18  17
3000     8
3100    27  27  31  28  22  24  19  19
3200     1  12  16  10  19  25  24  26
3300     3
3400     5  10  17
3500     1  14  24
3600     7
3700     8   7   4   6   3   4  18
3800     1  10  10  12  15  24  20
3900     8
4000    30  30  32  30  27  27  30  19
4100     1  11  12  12   9  13  22  19
4200     4
4300    18  20  21  18
4400     1  12  14  26
4500     6
4600     7   6   3   3  11   9
4700     1   6  12  20  20  26
4800     5
4900    22  22  26  24  18
5000     1  13  24  19  23
5100     4
```

5200	14	9	8	17				
5300	1	12	7	14				
5400	6							
5500	29	28	31	31	19	18		
5600	1	11	15	21	20	24		
5700	4							
5800	28	27	29	20				
5900	1	16	22	26				
6000	8							
6100	24	25	29	30	26	32	14	16
6200	1	11	16	18	15	19	20	26
6300	5							
6400	8	3	10	14	32			
6500	1	12	19	16	23			
6600	5							
6700	30	28	32	31	17			
6800	5	11	14	16	18			
6900	5							
7000	30	29	19	19	17			
7100	1	7	15	19	26			

100	MATCH	13				
200	21					
300	6					
400	4	2	5	9	9	11
500	1	3	10	20	25	26
600	6					
700	19	18	30	30	15	12
800	5	9	14	17	20	26
900	3					
1000	3	4	3			
1100	1	25	26			
1200	3					
1300	15	24	16			
1400	1	4	17			
1500	2					
1600	10	7				
1700	1	15				
1800	5					
1900	25	25	31	26	23	
2000	1	6	7	10	15	
2100	4					
2200	28	28	27	26		
2300	1	9	15	16		
2400	5					
2500	31	29	20	18	16	
2600	1	7	12	15	26	
2700	5					
2800	27	25	21	17	14	
2900	1	11	8	14	26	
3000	6					
3100	16	18	9	8	19	20
3200	1	12	14	25	24	26
3300	3					
3400	18	7	6			
3500	1	25	26			
3600	4					

APPENDIX A
MATCH 13

```
3700     7   7   3   1
3800     1   3  21  21
3900     4
4000    29  28  25  20
4100     1   6   4  14
4200     5
4300    16  16  11   8  18
4400     1   3   7  19  22
4500     5
4600     5   8   5   7   3
4700     1   5  15  14  20
4800     5
4900    10  17  26  23  18
5000     1  11  14  15  26
5100     2
5200    16  18
5300     1  15
5400     6
5500    16  16   8   8  18  16
5600     1  10  15  21  21  26
5700     8
5800    21  22  29  23  31  21  20  16
5900     1   4   4  10  14  22  24  26
6000     4
6100     6   3   5  23
6200     1  14  17  26
6300     6
6400    25  25  31  23  24  26
6500     1   4   4  19  25  26
```

```
 100  MATCH 14
 200    22
 300     6
 400    10   4   3  24  14  14
 500     1  20  24  20  21  26
 600     8
 700     3   3   6   2   7   3   2   1
 800     1   2   5   9   2  17  20  20
 900     6
1000    16  16  18  23  18  18
1100     1   9  14  12  20  23
1200     6
1300    17  15  13   2   7  21
1400     1   9  11  13  13  19
1500     8
1600     7   4   6   3   5   8  10  10
1700     1   4   5  15  14   8   8  22
1800     6
1900    29  28  32  31  30  32
2000     1  10  16  18  19  19
2100     6
2200    11  14  10   5   5  16
2300     1  17  18  21  24  25
2400    13
2500    28  27  24  20  17  23  31  28  26  20  14  18  16
2600     1   7   5   9   7   4   6   8  10  10  17  15  25
2700     5
```

APPENDIX A
MATCH 14

```
2800    15  14   7  10  15
2900     1   5  13  16  25
3000     4
3100    30  20  23  15
3200     1  16  14  25
3300     4
3400    13  17  15  17
3500     1  16  15  26
3600     7
3700     5  13  14  11   3   4   3
3800     1  10   7  10  16  25  26
3900     5
4000    18  17  15   3   3
4100     1  14  15  11  15
4200     4
4300     9   2   2  13
4400     1   9  11  18
4500     8
4600    18  17  19  28  27  24  12  21
4700     1  15  14  12   9  14  21  26
4800     6
4900    18  17   3   6   7  19
5000     1   3  12  15  12  26
5100     5
5200    17  21  20  17  16
5300     1  12  19  20  26
5400     3
5500    24  30  15
5600     1   4  19
5700     5
5800    26  27  30  30  17
5900     1   8  15  20  24
6000     6
6100    19  18  22  30  23  19
6200     1   5  10  18  16  26
6300     5
6400    19  19  30  30  19
6500     1   7  13  17  19
6600     5
6700    27  22  19  16  16
6800     1  10   8  15  25
```

```
 100  MATCH 15
 200    20
 300     9
 400    31  29  31  27  26  29  29  27  28
 500     1   5   8   6  11  22  24  24  26
 600    12
 700    28  28  28  32  26   7   9  11   4  15  23  24
 800     1   7   9  12  10  15  12  16  13   6   5  26
 900     9
1000    18  15  20  21  15  11  18  22  27
1100     1   6   6  13  13   8   8   7   4
1200     6
1300    16  16  11  10  13  11
1400     1   8  14  22  22  26
1500     8
```

APPENDIX A
MATCH 15

1600	16	13	14	23	29	11	11	12	
1700	1	9	10	12	9	21	24	26	
1800	4								
1900	16	9	9	18					
2000	1	18	24	24					
2100	5								
2200	21	19	15	13	16				
2300	1	15	16	13	26				
2400	4								
2500	25	24	29	23					
2600	1	19	20	17					
2700	7								
2800	29	24	22	20	14	13	17		
2900	1	14	11	14	13	17	26		
3000	5								
3100	31	29	32	30	32				
3200	1	10	12	20	19				
3300	4								
3400	18	13	13	17					
3500	1	19	17	26					
3600	5								
3700	17	17	27	22	17				
3800	1	3	7	16	26				
3900	3								
4000	30	25	26						
4100	1	26	26						
4200	4								
4300	3	5	10	18					
4400	1	7	8	13					
4500	9								
4600	18	16	3	7	10	6	1	3	12
4700	1	6	10	12	10	6	11	5	16
4800	3								
4900	26	16	18						
5000	1	16	26						
5100	4								
5200	2	2	18	16					
5300	1	6	16	26					
5400	5								
5500	17	16	3	15	10				
5600	1	2	8	15	19				
5700	3								
5800	27	25	15						
5900	1	12	18						
6000	4								
6100	4	2	2	18					
6200	1	6	26	24					

100	MATCH	16				
200	24					
300						
400	6					
500	14	12	6	5	21	26
600	1	6	12	25	21	26
700	5					
800	19	21	24	17	17	
900	1	9	5	12	20	

APPENDIX A
MATCH 16

1000	5								
1100	6	8	15	12	13				
1200	1	4	7	14	26				
1300	7								
1400	11	9	11	7	12	29	21		
1500	1	6	6	10	8	14	17		
1600	6								
1700	29	30	30	26	23	17			
1800	1	5	13	12	13	26			
1900	5								
2000	14	11	9	5	16				
2100	1	9	11	23	21				
2200	4								
2300	25	31	31	22					
2400	1	16	22	21					
2500	7								
2600	16	14	10	6	6	10	9		
2700	1	11	15	22	25	25	26		
2800	8								
2900	27	27	22	22	6	17	17	12	
3000	1	6	11	7	15	15	12	26	
3100	4								
3200	15	3	5	17					
3300	1	16	18	26					
3400	6								
3500	27	27	19	30	26	18			
3600	1	3	14	16	17	27			
3700	9								
3800	30	31	20	25	24	28	31	30	30
3900	1	15	20	9	14	13	21	23	26
4000	7								
4100	19	17	29	16	16	17	17		
4200	1	5	20	20	22	18	26		
4300	7								
4400	15	9	7	6	4	16	19		
4500	1	18	24	21	23	22	26		
4600	6								
4700	22	22	25	28	16	16			
4800	1	8	10	6	19	26			
4900	4								
5000	7	7	7	15					
5100	1	13	17	15					
5200	7								
5300	31	31	29	27	10	13	16		
5400	1	8	8	5	19	19	20		
5500	4								
5600	23	10	11	23					
5700	1	23	24	20					
5800	5								
5900	3	5	9	11	15				
6000	1	5	13	20	26				
6100	6								
6200	15	29	30	30	14	15			
6300	1	6	16	21	22	26			
6400	4								
6500	2	1	12	20					
6600	1	3	16	26					
6700	6								
6800	18	17	20	13	13	17			

APPENDIX A
MATCH 16

```
6900     1   3   2  15  20  26
7000     5
7100    18  23  24  21  17
7200     1  19  18  17  26
7300     7
7400    16  13  16   6  20  17  17
7500     1  10  12  21  21  19  26


 100  MATCH 17
 200    17
 300     7
 400    31  32  27  10   3  11   9
 500     1   3   7   2   9   7  19
 600     6
 700    17  18  17  16  14  15
 800     1  15  13  15  17  26
 900     6
1000    23  21  26  25  14  16
1100     1   8  13  23  19  26
1200     6
1300    28  27  30  31  17  15
1400     1   6  13  19  19  26
1500     7
1600    24  23   9   8  20  22  15
1700     1  10  14  24  21  21  26
1800     7
1900    30  30  19   4   4   6   5
2000     1   6   8  16  25  25  26
2100     4
2200    14  15  12  15
2300     1  13  25  26
2400     5
2500    16   3  11  13  18
2600     1  17  18  18  26
2700     6
2800     6   9  13   6   2   7
2900     1   9   6   5  11  14
3000     4
3100    14  11  12   8
3200     1  13  20  26
3300     6
3400     4   4  19  19  19  21
3500     1   7  17  20  22  26
3600     7
3700     8  10  13  16  26  27  25
3800     1   7   3   9   9  17  18
3900     8
4000     3   4   8  13  23  27  22  14
4100     1   8  11   6  14   9   7  19
4200     4
4300    15  15  20  14
4400     1   8   7  16
4500     3
4600    14   4   8
4700     1  15  19
4800     6
4900    17  13   2  29  26  27
```

APPENDIX A
MATCH 17

```
5000     1  10  20  18  21  23
5100     6
5200    31  31  30  12  13  17
5300     1  17  20  19  22  26
```

```
 100  MATCH 18
 200    16
 300     5
 400    17  15  11  12  17
 500     1  11  17  19  26
 600    11
 700    19  19  16   5  15  17  30  24  26  25  27
 800     1   8   7  14  11  11  15  17  23  24  26
 900     8
1000     4   7  15  14  28  29  24  22
1100     1   8  11   8   4   9  17  15
1200     6
1300    29  30  31  28  22  24
1400     1   6  15  19  14  20
1500     4
1600     4   5  12  13
1700     1  11  24  25
1800     4
1900    30  28  23  24
2000     1  18  24  26
2100     6
2200    16  15  14  28  25  16
2300     1   7  12  14  16  25
2400     6
2500     5   6   7   7   9   9
2600     1   4  19  24  25  26
2700     5
2800    17  18  28  26  20
2900     1   2  15  24  20
3000     5
3100    22  22  19  20  16
3200     5   7  12  15  25
3300     5
3400    12   8   6  14  15
3500     1  12  15  24  26
3600     5
3700    30  30  24  20  18
3800     1   6  17  20  22
3900     8
4000    27  29  31  31  25  21  15  12
4100     1   6  16  19  19  12  24  26
4200     5
4300    17  14   7  11  13
4400     1  10  18  18  16
4500     6
4600    20  19  17   1   9  17
4700     1   2   2  13  25  24
4800     7
4900    25  20  15  11  12  14  22
5000     1   5  10   8  12  16  26
```

APPENDIX A
OPTIMUM ATTACKS (ii) Date referring to optimum attacks

```
 100  OPTIMUM ATTACKS
 200    70
 300     4
 400    18  24  23  28
 500     1   8  14  26
 600     6
 700    27  26  24  30  29  10
 800     1   5  12  12  16  26
 900    10
1000    16  16  12   4   8  14   8   9  15  25
1100     1   2   4   7   7   5   9  12  11  26
1200     8
1300    16  15  18  30  28  21  22  13
1400     1   5   3   4  13  18  15  26
1500     4
1600    29  29  20  23
1700     1   5  17  26
1800     4
1900    13   3  10  15
2000     1  14  16  25
2100     7
2200    10  10  16  19  27  23  17
2300     1   3   2  10  11  14  24
2400     5
2500    29  19  19  18  15
2600     1  16  12  15  26
2700     4
2800    18  13  19  18
2900     1  12  20  24
3000     4
3100     5   3   9  25  20
3200     1   8  11  24  21
3300     4
3400    21  30  23  16
3500     1   8  16  26
3600     7
3700     2   3   7  14  14  18  17
3800     1   6   5  15  11  19  24
3900     7
4000    17  17  20  30  30  15  16
4100     1   7   3   9  18  19  25
4200     7
4300     7   3   3  12   2  10  15
4400     1  20  23  19  16   9  19
4500     6
4600    15  13   6   5  12  13
4700     1   8  12  18  23  25
4800     7
4900    18  23  20  18  29  29  11
5000     1   9  10   7  13  17  26
5100     9
5200    32  30  31  26  27  30  28  27  29
5300     1  12   9  12   9  14  21  23  26
5400     4
5500    13   8  10  15
5600     1  13  20  26
5700     4
5800    29  23  23  17
5900     1  12  14  24
```

APPENDIX A
OPTIMUM ATTACKS

6000	6							
6100	16	15	11	7	21	23		
6200	1	10	10	14	22	26		
6300	4							
6400	29	21	21	17				
6500	1	16	13	26				
6600	6							
6700	17	17	14	9	4	11		
6800	1	10	12	19	19	26		
6900	8							
7000	21	23	29	26	22	19	18	20
7100	1	5	7	12	13	20	24	26
7200	7							
7300	16	16	11	2	3	4	5	
7400	1	5	4	10	21	14	16	
7500	4							
7600	10	4	7	6				
7700	1	19	23	26				
7800	5							
7900	4	4	6	10	16			
8000	7	15	17	15	26			
8100	5							
8200	28	32	28	25	22			
8300	1	5	9	11	14			
8400	7							
8500	31	32	29	26	25	23	26	
8600	1	8	4	14	16	19	26	
8700	8							
8800	19	19	16	4	1	2	3	9
8900	1	6	9	10	11	15	8	13
9000	7							
9100	25	21	16	23	32	26	22	
9200	1	6	10	9	10	13	18	
9300	5							
9400	21	22	24	17	17			
9500	1	7	15	20	26			
9600	8							
9700	11	9	3	8	13	12	15	14
9800	1	6	11	10	17	20	26	26
9900	8							
10000	16	16	13	16	28	29	29	11
10100	1	8	7	10	6	17	22	26
10200	5							
10300	5	5	2	4	15			
10400	1	7	6	25	24			
10500	6							
10600	24	25	25	29	31	32		
10700	1	13	21	12	18	19		
10800	5							
10900	19	15	4	2	10			
11000	1	5	5	11	20			
11100	5							
11200	5	6	10	26	13			
11300	1	9	7	7	18			
11400	5							
11500	18	22	29	28	17			
11600	1	8	14	18	18			
11700	5							
11800	30	31	31	15	17			

APPENDIX A
OPTIMUM ATTACKS

11900	1	12	16	23	26			
12000	5							
12100	30	15	21	17	18			
12200	1	14	15	25	26			
12300	5							
12400	31	27	25	23	20			
12500	1	14	10	13	26			
12600	5							
12700	16	14	5	7	18			
12800	1	6	4	7	16			
12900	6							
13000	13	13	24	22	21	28		
13100	1	10	16	11	16	26		
13200	6							
13300	7	6	3	3	11	9		
13400	1	6	12	20	20	26		
13500	5							
13600	31	29	26	18	21			
13700	1	13	7	5	18			
13800	8							
13900	24	25	29	30	26	32	14	16
14000	1	11	16	18	15	19	20	26
14100	4							
14200	14	9	8	17				
14300	1	12	7	14				
14400	6							
14500	25	25	31	23	24	26		
14600	1	4	4	19	25	26		
14700	8							
14800	21	22	29	23	31	21	20	16
14900	1	4	4	10	14	22	24	26
15000	5							
15100	5	8	5	7	3			
15200	1	5	15	14	20			
15300	6							
15400	4	2	5	9	9	11		
15500	1	3	10	20	25	26		
15600	7							
15700	5	13	14	11	3	4	3	
15800	1	10	7	10	16	25	26	
15900	4							
16000	9	2	2	23				
16100	1	9	11	18				
16200	6							
16300	19	18	22	30	23	19		
16400	1	5	10	18	16	26		
16500	5							
16600	27	22	19	16	16			
16700	1	10	8	15	25			
16800	4							
16900	25	24	29	23				
17000	1	19	20	17				
17100	4							
17200	3	5	10	18				
17300	1	7	8	13				
17400	6							
17500	16	16	11	10	13	11		
17600	1	8	14	22	22	26		
17700	5							

APPENDIX A
OPTIMUM ATTACKS

```
17800    31  29  32  30  32
17900     1  10  12  20  19
18000     6
18100    15  29  30  30  14  15
18200     1   6  16  21  22  26
18300     6
18400    27  27  19  30  26  18
18500     1   3  14  16  17  26
18600     5
18700     6   8  15  12  13
18800     1   4   7  14  26
18900     7
19000    30  30  19   4   4   6   5
19100     1   6   8  16  25  25  26
19200     6
19300    23  21  26  25  14  16
19400     1   8  13  23  19  26
19500     6
19600    17  13   2  29  26  27
19700     1  10  20  18  21  23
19800     5
19900    16   3  11  13  18
20000     1  17  18  18  26
20100     5
20200    17  15  11  12  17
20300     1  11  17  19  26
20400     5
20500    17  18  28  26  20
20600     1   2  15  24  20
20700    11
20800    19  19  16   5  15  17  30  24  26  25  27
20900     1   8   7  14  11  11  15  17  23  24  26
21000     6
21100    16  15  14  28  25  16
21200     1   7  12  14  16  25
```

(iii) Data referring to corner-kicks

```
  100  CORNER-KICKS
  200   174
  300     2
  400     1  18
  500    26  24
  600     3
  700    32  14  20
  800    26  19  26
  900     4
 1000    32  13  19  20
 1100    26  17  21  26
 1200     4
 1300    32  18  20  17
 1400    26  19  14  25
 1500     5
 1600     1   2   4  19  18
 1700    26  23  19  23  26
 1800     2
 1900     1  17
 2000    26  23
 2100     4
```

APPENDIX A
CORNER-KICKS

2200	32	18	26	15				
2300	26	21	15	21				
2400	2							
2500	1	15						
2600	26	23						
2700	2							
2800	1	20						
2900	26	21						
3000	2							
3100	1	16						
3200	26	23						
3300	3							
3400	32	18	19					
3500	26	22	26					
3600	5							
3700	32	18	17	15	12			
3800	26	20	22	21	26			
3900	2							
4000	1	17						
4100	26	21						
4200	6							
4300	32	11	18	28	31	19		
4400	26	22	7	12	7	18		
4500	8							
4600	32	13	10	25	26	24	24	18
4700	26	20	12	8	12	16	20	17
4800	2							
4900	32	21						
5000	26	22						
5100	2							
5200	1	15						
5300	26	22						
5400	2							
5500	1	21						
5600	26	24						
5700	5							
5800	1	16	28	29	26			
5900	26	23	16	20	21			
6000	2							
6100	1	26						
6200	26	23						
6300	5							
6400	32	28	31	20	19			
6500	26	25	23	20	26			
6600	5							
6700	1	26	24	23	27			
6800	26	21	18	22	26			
6900	2							
7000	32	18						
7100	26	22						
7200	5							
7300	32	21	32	28	11			
7400	26	25	9	9	22			
7500	5							
7600	1	10	6	11	19			
7700	26	24	16	13	23			
7800	2							
7900	1	28						
8000	26	24						

APPENDIX A
CORNER-KICKS

8100	2					
8200	1	26				
8300	26	21				
8400	3					
8500	32	26	29			
8600	26	25	20			
8700	3					
8800	1	19	18			
8900	26	23	26			
9000	5					
9100	1	11	6	28	19	
9200	26	25	14	20	21	
9300	3					
9400	32	10	13			
9500	26	21	18			
9600	6					
9700	32	23	32	30	20	20
9800	26	25	15	20	23	26
9900	4					
10000	1	22	17	14		
10100	26	21	11	15		
10200	5					
10300	32	31	9	10	17	
10400	26	21	19	21	26	
10500	4					
10600	32	20	18	18		
10700	26	22	25	26		
10800	2					
10900	32	16				
11000	26	21				
11100	4					
11200	1	28	28	25		
11300	26	20	15	18		
11400	2					
11500	1	17				
11600	26	23				
11700	3					
11800	1	10	14			
11900	26	16	26			
12000	4					
12100	32	22	23	14		
12200	26	25	18	26		
12300	4					
12400	32	23	25	12		
12500	26	25	16	26		
12600	5					
12700	32	17	30	32	24	
12800	26	23	7	19	19	
12900	4					
13000	32	19	30	15		
13100	26	23	15	16		
13200	2					
13300	1	17				
13400	26	24				
13500	3					
13600	1	16	16			
13700	26	21	26			
13800	2					
13900	32	23				

APPENDIX A
CORNER-KICKS

14000	26	25			
14100	2				
14200	1	21			
14300	26	20			
14400	3				
14500	32	17	17		
14600	26	24	26		
14700	3				
14800	32	11	12		
14900	26	22	26		
15000	4				
15100	32	16	16	13	
15200	26	20	23	26	
15300	2				
15400	1	20			
15500	26	22			
15600	2				
15700	1	20			
15800	26	20			
15900	4				
16000	32	31	28	32	
16100	26	24	24	21	
16200	5				
16300	1	15	4	18	16
16400	26	25	17	22	22
16500	2				
16600	32	15			
16700	26	22			
16800	4				
16900	32	20	20	23	
17000	26	22	23	26	
17100	2				
17200	32	15			
17300	26	22			
17400	4				
17500	32	18	17	20	
17600	26	24	14	25	
17700	2				
17800	1	26			
17900	26	23			
18000	2				
18100	32	20			
18200	26	24			
18300	3				
18400	32	14	24		
18500	26	19	26		
18600	4				
18700	32	13	17	19	
18800	26	20	24	26	
18900	3				
19000	32	17	16		
19100	26	19	25		
19200	3				
19300	32	18	16		
19400	26	20	25		
19500	3				
19600	1	22	20		
19700	26	21	26		
19800	2				

APPENDIX A
CORNER-KICKS

19900	1	17			
20000	26	24			
20100	5				
20200	32	16	18	22	13
20300	26	19	21	12	19
20400	2				
20500	32	13			
20600	26	22			
20700	2				
20800	32	17			
20900	26	23			
21000	3				
21100	1	15	22		
21200	26	25	26		
21300	2				
21400	1	14			
21500	26	20			
21600	2				
21700	1	19			
21800	26	23			
21900	5				
22000	1	28	26	21	13
22100	26	20	17	18	26
22200	2				
22300	32	14			
22400	26	24			
22500	3				
22600	1	13	11		
22700	26	25	26		
22800	2				
22900	1	15			
23000	26	22			
23100	2				
23200	32	16			
23300	26	23			
23400	2				
23500	32	19			
23600	26	22			
23700	2				
23800	1	21			
23900	26	24			
24000	2				
24100	1	17			
24200	26	25			
24300	2				
24400	32	15			
24500	26	26			
24600	2				
24700	32	17			
24800	26	22			
24900	2				
25000	1	19			
25100	26	20			
25200	3				
25300	1	22	18		
25400	26	21	25		
25500	2				
25600	1	16			
25700	26	23			

APPENDIX A
CORNER-KICKS

25800	2					
25900	32	17				
26000	26	21				
26100	2					
26200	1	18				
26300	26	19				
26400	2					
26500	32	18				
26600	26	24				
26700	2					
26800	1	11				
26900	26	23				
27000	3					
27100	32	18	16			
27200	26	20	26			
27300	3					
27400	1	19	14			
27500	26	20	26			
27600	2					
27700	1	19				
27800	26	22				
27900	3					
28000	1	12	15			
28100	26	22	26			
28200	2					
28300	32	17				
28400	26	23				
28500	4					
28600	32	11	19	18		
28700	26	24	24	26		
28800	6					
28900	32	20	16	17	12	17
29000	26	20	18	20	20	26
29100	2					
29200	1	18				
29300	26	20				
29400	2					
29500	1	18				
29600	26	23				
29700	2					
29800	1	16				
29900	26	22				
30000	2					
30100	32	13				
30200	26	21				
30300	2					
30400	1	21				
30500	26	21				
30600	3					
30700	1	21	22			
30800	26	24	26			
30900	2					
31000	32	17				
31100	26	21				
31200	2					
31300	32	21				
31400	26	24				
31500	4					
31600	32	20	26	12		

APPENDIX A
CORNER-KICKS

31700	26	24	20	22		
31800	6					
31900	1	11	19	15	18	18
32000	26	24	16	26	22	26
32100	3					
32200	1	21	19			
32300	26	22	26			
32400	2					
32500	32	16				
32600	26	20				
32700	2					
32800	32	19				
32900	26	23				
33000	2					
33100	32	19				
33200	26	23				
33300	2					
33400	1	15				
33500	26	22				
33600	4					
33700	1	3	12	17		
33800	26	23	14	26		
33900	2					
34000	1	12				
34100	26	23				
34200	4					
34300	1	14	12	17		
34400	26	24	16	26		
34500	2					
34600	32	21				
34700	26	24				
34800	2					
34900	32	16				
35000	26	22				
35100	3					
35200	1	16	18			
35300	26	22	26			
35400	3					
35500	1	22	19			
35600	26	22	26			
35700	2					
35800	1	18				
35900	26	22				
36000	2					
36100	1	13				
36200	26	24				
36300	2					
36400	1	20				
36500	26	26				
36600	3					
36700	32	16	16			
36800	26	22	26			
36900	2					
37000	1	18				
37100	26	22				
37200	2					
37300	1	21				
37400	26	21				
37500	3					

APPENDIX A
CORNER-KICKS

37600	1	11	10	
37700	26	24	26	
37800	2			
37900	1	13		
38000	26	23		
38100	2			
38200	1	11		
38300	26	24		
38400	2			
38500	32	14		
38600	26	22		
38700	3			
38800	1	20	18	
38900	26	21	26	
39000	2			
39100	1	21		
39200	26	21		
39300	3			
39400	32	17	17	
39500	26	19	22	
39600	2			
39700	32	17		
39800	26	23		
39900	2			
40000	32	15		
40100	20	21		
40200	3			
40300	1	23	17	
40400	26	21	24	
40500	3			
40600	32	12	19	
40700	26	20	25	
40800	2			
40900	32	12		
41000	26	23		
41100	2			
41200	1	15		
41300	26	23		
41400	3			
41500	1	23	16	
41600	26	23	19	
41700	4			
41800	32	12	15	15
41900	26	24	21	26
42000	3			
42100	1	12	11	
42200	26	24	26	
42300	2			
42400	1	16		
42500	26	21		
42600	2			
42700	1	21		
42800	26	23		
42900	2			
43000	32	21		
43100	26	24		
43200	2			
43300	32	18		
43400	26	23		

APPENDIX A
CORNER-KICKS

43500	2			
43600	32	15		
43700	26	20		
43800	2			
43900	1	21		
44000	26	21		
44100	2			
44200	32	13		
44300	26	19		
44400	3			
44500	1	24	18	
44600	26	17	20	
44700	4			
44800	32	12	23	15
44900	26	20	19	26
45000	3			
45100	1	22	16	
45200	26	22	24	
45300	3			
45400	1	15	19	
45500	26	23	26	
45600	2			
45700	32	13		
45800	26	22		
45900	2			
46000	32	12		
46100	26	22		
46200	2			
46300	1	15		
46400	26	24		
46500	2			
46600	32	12		
46700	26	22		
46800	4			
46900	1	23	22	18
47000	26	18	24	26
47100	2			
47200	32	16		
47300	26	21		
47400	2			
47500	1	19		
47600	26	21		
47700	3			
47800	1	18	14	
47900	26	20	26	
48000	2			
48100	32	12		
48200	26	22		
48300	2			
48400	32	14		
48500	26	22		
48600	2			
48700	1	17		
48800	26	23		
48900	2			
49000	1	18		
49100	26	21		
49200	3			
49300	1	17	19	

APPENDIX A
CORNER-KICKS

```
49400    26  20  26
49500     3
49600    32  18  20
49700    26  21  26
49800     4
49900    32  13  17  32
50000    26  20  17  23
50100     3
50200     1  20  21
50300    26  21  26
50400     2
50500    32  15
50600    26  17
50700     3
50800    32  15  17
50900    26  22  26
51000     3
51100     1  16  21
51200    26  22  26
51300     2
51400    32  15
51500    26  21
51600     3
51700    32  19  19
51800    26  25  26
51900     2
52000    32  13
52100    26  22
52200     4
52300    32  19  15  15
52400    26  24  24  26
```

(iv) Data referring to throw-ins

```
  100  THROW-INS
  200   159
  300     7
  400     1   7  12  15  22  26  18
  500    13  15  12  14   9   8  20
  600     8
  700     1   3   4  13   1   6  15  16
  800     8  16  23  21  21  19  19  17
  900     4
 1000     1   3  15  14
 1100    19  15  19  26
 1200     5
 1300     1   8  14  15  17
 1400    14  13  18  22  26
 1500     7
 1600    32  30  27  22  24  14   4
 1700    18  20  24  22  25  25  26
 1800     5
 1900    32  31  29  32  19
 2000     2   8   6  16  23
 2100     7
 2200    32  29  24  20  32  29  26
 2300     1   7  18  19  22  24  19
 2400     8
 2500     1   3   5  16  13  11  25  21
```

APPENDIX A
THROW-INS

2600	11	17	16	18	16	14	15	12	
2700	4								
2800	32	25	24	20					
2900	13	20	18	19					
3000	5								
3100	1	6	8	4	22				
3200	11	9	11	12	18				
3300	2								
3400	32	29							
3500	19	22							
3600	5								
3700	1	3	7	4	11				
3800	7	10	13	19	20				
3900	5								
4000	1	3	4	20	17				
4100	14	18	23	22	26				
4200	6								
4300	1	3	3	4	14	14			
4400	19	17	20	25	21	26			
4500	5								
4600	32	31	27	6	10				
4700	7	15	12	20	20				
4800	5								
4900	32	26	31	30	24				
5000	15	17	18	22	26				
5100	5								
5200	32	32	29	15	16				
5300	11	19	19	22	26				
5400	4								
5500	32	31	28	15					
5600	8	16	13	25					
5700	5								
5800	32	28	6	7	14				
5900	12	11	12	17	26				
6000	8			-					
6100	32	30	30	31	26	19	7	17	
6200	20	20	18	17	13	11	23	22	
6300	9								
6400	32	31	30	27	30	5	15	10	7
6500	13	18	16	19	19	23	13	14	19
6600	4								
6700	32	30	10	19					
6800	8	14	20	26					
6900	4								
7000	32	31	18	16					
7100	19	12	11	21					
7200	7								
7300	32	27	27	32	26	23	12		
7400	8	13	18	14	15	16	26		
7500	5								
7600	32	30	27	26	20				
7700	9	16	17	19	23				
7800	5								
7900	1	4	11	12	18				
8000	21	21	13	14	26				
8100	9								
8200	32	31	30	31	31	23	23	14	14
8300	13	6	9	15	18	23	26	23	26
8400	12								

APPENDIX A
THROW-INS

8500	32	31	32	32	29	19	29	25	28	23	21	20
8600	1	11	10	21	23	22	14	14	17	17	23	26
8700	4											
8800	32	29	26	21								
8900	1	8	12	17								
9000	6											
9100	1	8	9	2	4	17						
9200	12	15	13	16	17	16						
9300	8											
9400	32	29	29	32	29	26	16	16				
9500	14	17	14	13	20	25	24	20				
9600	5											
9700	32	27	10	3	20							
9800	13	20	13	24	20							
9900	4											
10000	32	29	26	21								
10100	9	14	15	14								
10200	9											
10300	32	30	32	32	24	29	27	26	18			
10400	1	12	16	15	18	20	12	15	24			
10500	6											
10600	32	32	31	29	27	28						
10700	3	12	17	8	8	20						
10800	4											
10900	32	31	29	16								
11000	8	15	14	18								
11100	5											
11200	32	29	18	31	24							
11300	7	14	18	21	22							
11400	2											
11500	32	26										
11600	20	17										
11700	5											
11800	32	29	26	23	16							
11900	10	14	14	15	16							
12000	5											
12100	32	29	29	20	17							
12200	14	19	22	20	26							
12300	6											
12400	32	29	26	4	4	19						
12500	4	7	7	17	22	20						
12600	3											
12700	32	31	15									
12800	3	1	12									
12900	6											
13000	32	25	28	29	18	20						
13100	14	18	12	21	20	26						
13200	7											
13300	1	2	4	12	12	4	20					
13400	15	12	11	8	10	14	19					
13500	5											
13600	32	31	32	14	14							
13700	7	14	20	21	26							
13800	6											
13900	32	26	27	29	30	25						
14000	9	13	14	19	15	16						
14100	6											
14200	1	4	8	31	29	14						
14300	12	9	8	13	10	24						

14400	2									
14500	1	6								
14600	20	19								
14700	3									
14800	1	6	5							
14900	19	17	15							
15000	3									
15100	32	16	21							
15200	10	19	23							
15300	2									
15400	1	10								
15500	13	19								
15600	4									
15700	1	3	4	3						
15800	8	20	25	26						
15900	6									
16000	32	27	30	29	24	11				
16100	20	24	24	26	13	20				
16200	8									
16300	32	31	28	25	16	10	10	20		
16400	9	7	9	14	11	15	25	23		
16500	4									
16600	32	27	27	29						
16700	15	23	25	26						
16800	10									
16900	32	32	30	30	28	31	32	23	12	16
17000	1	11	13	10	14	17	20	13	15	25
17100	5									
17200	1	7	5	6	6					
17300	14	20	23	24	26					
17400	6									
17500	32	29	27	24	22	20				
17600	15	16	14	13	15	26				
17700	2									
17800	1	6								
17900	18	20								
18000	9									
18100	32	29	28	28	26	28	30	30	24	
18200	9	14	14	8	15	18	19	21	26	
18300	4									
18400	32	30	27	25						
18500	8	13	8	13						
18600	5									
18700	32	31	31	24	29					
18800	1	7	3	12	12					
18900	2									
19000	32	30								
19100	13	23								
19200	9									
19300	32	30	28	20	32	31	29	28	29	
19400	10	19	22	19	10	19	24	24	26	
19500	4									
19600	32	31	26	21						
19700	11	15	15	19						
19800	8									
19900	32	25	26	32	29	31	14	13		
20000	12	11	16	17	21	22	23	26		
20100	5									
20200	32	29	4	6	6					

APPENDIX A
THROW-INS

20300	7	13	19	22	26					
20400	3									
20500	1	5	7							
20600	15	20	19							
20700	6									
20800	1	4	12	1	4	3				
20900	12	10	19	19	20	17				
21000	4									
21100	32	31	31	32						
21200	10	16	22	26						
21300	4									
21400	1	7	9	17						
21500	20	25	24	25						
21600	4									
21700	1	5	20	18						
21800	5	14	20	26						
21900	5									
22000	32	30	29	28	29					
22100	10	14	16	17	26					
22200	4									
22300	1	4	2	2						
22400	17	18	20	22						
22500	5									
22600	1	4	10	13	17					
22700	15	11	15	13	26					
22800	4									
22900	32	31	21	22						
23000	12	18	23	26						
23100	10									
23200	1	5	2	6	10	17	20	20	18	15
23300	7	6	8	7	4	10	6	12	12	26
23400	3									
23500	1	4	20							
23600	15	23	20							
23700	2									
23800	32	27								
23900	17	21								
24000	7									
24100	1	7	29	26	20	20	22			
24200	18	21	17	25	22	24	26			
24300	9									
24400	32	29	32	20	21	31	24	26	16	
24500	11	13	12	11	13	17	17	18	26	
24600	9									
24700	32	26	29	28	5	10	6	21	24	
24800	19	22	18	17	13	9	22	21	26	
24900	5									
25000	1	9	16	14	10					
25100	13	15	9	16	11					
25200	3									
25300	1	10	10							
25400	12	17	19							
25500	4									
25600	1	6	8	8						
25700	8	20	25	26						
25800	3									
25900	32	29	25							
26000	13	11	14							
26100	3									

APPENDIX A
THROW-INS

26200	1	9	12					
26300	18	18	18					
26400	2							
26500	32	24						
26600	21	23						
26700	2							
26800	32	28						
26900	13	18						
27000	8							
27100	1	5	6	11	23	26	32	30
27200	1	10	6	4	2	8	10	12
27300	4							
27400	1	8	8	18				
27500	17	19	11	24				
27600	6							
27700	1	6	3	8	17	19		
27800	19	19	14	15	25	26		
27900	5							
28000	1	4	1	5	16			
28100	7	15	17	23	19			
28200	7							
28300	1	10	14	12	3	3	6	
28400	17	20	13	12	14	8	11	
28500	4							
28600	1	6	9	8				
28700	12	19	21	26				
28800	7							
28900	1	6	6	10	7	15	13	
29000	13	22	17	15	12	11	15	
29100	3							
29200	1	3	23					
29300	9	5	18					
29400	2							
29500	32	24						
29600	15	19						
29700	4							
29800	1	4	8	20				
29900	14	11	14	26				
30000	8							
30100	32	29	28	27	30	17	19	14
30200	14	10	13	18	15	19	15	20
30300	2							
30400	1	7						
30500	14	17						
30600	6							
30700	1	8	16	18	15	16		
30800	6	6	7	14	15	25		
30900	7							
31000	32	26	24	16	21	19	18	
31100	12	15	11	17	17	19	20	
31200	4							
31300	1	5	5	19				
31400	9	18	24	21				
31500	4							
31600	32	29	28	23				
31700	14	22	19	15				
31800	5							
31900	32	29	31	29	18			
32000	14	19	21	24	23			

APPENDIX A
THROW-INS

32100	5					
32200	32	25	26	24	21	
32300	18	20	18	14	18	
32400	2					
32500	1	9				
32600	15	21				
32700	6					
32800	1	4	2	2	16	16
32900	14	14	20	22	21	26
33000	4					
33100	1	9	10	6		
33200	12	15	11	22		
33300	5					
33400	1	10	10	12	21	
33500	15	14	10	11	18	
33600	2					
33700	1	9				
33800	18	21				
33900	2					
34000	1	14				
34100	25	26				
34200	2					
34300	1	6				
34400	4	13				
34500	2					
34600	32	14				
34700	14	20				
34800	3					
34900	1	5	14			
35000	8	4	16			
35100	5					
35200	1	7	2	4	9	
35300	9	9	11	12	15	
35400	6					
35500	1	10	10	4	7	1
35600	20	19	18	22	22	24
35700	4					
35800	1	7	13	15		
35900	23	22	22	26		
36000	2					
36100	23	24				
36200	1	11				
36300	3					
36400	1	11	11			
36500	13	17	21			
36600	5					
36700	32	26	24	22	23	
36800	19	19	25	25	26	
36900	6					
37000	32	22	22	23	4	8
37100	19	22	23	24	25	20
37200	6					
37300	1	4	2	14	18	16
37400	20	21	23	23	16	26
37500	5					
37600	32	24	28	18	20	
37700	17	22	24	21	26	
37800	5					
37900	32	23	23	22	22	

APPENDIX A
THROW-INS

38000	18	22	25	25	26					
38100	5									
38200	1	5	3	4	15					
38300	19	14	20	23	24					
38400	7									
38500	32	28	27	22	26	26	11			
38600	18	11	13	18	21	24	22			
38700	10									
38800	1	5	3	7	7	31	21	17	17	18
38900	13	14	11	14	11	16	16	26	22	26
39000	5									
39100	32	28	31	22	19					
39200	13	18	12	15	26					
39300	4									
39400	32	23	22	28						
39500	22	18	19	26						
39600	3									
39700	32	22	16							
39800	19	20	26							
39900	2									
40000	32	22								
40100	19	21								
40200	4									
40300	1	4	4	22						
40400	2	11	24	19						
40500	2									
40600	1	13								
40700	22	24								
40800	4									
40900	32	24	25	17						
41000	14	19	14	26						
41100	2									
41200	1	12								
41300	21	22								
41400	7									
41500	32	26	30	28	30	30	32			
41600	18	18	19	13	15	16	17			
41700	7									
41800	1	9	5	9	5	6	1			
41900	26	20	22	13	15	16	18			
42000	5									
42100	32	24	24	25	7					
42200	14	20	19	17	26					
42300	4									
42400	1	8	12	14						
42500	9	14	15	10						
42600	6									
42700	32	21	15	17	18	17				
42800	21	21	20	26	25	26				
42900	2									
43000	32	21								
43100	16	20								
43200	5									
43300	1	9	5	2	18					
43400	18	11	12	19	22					
43500	7									
43600	1	5	5	13	13	12	22			
43700	8	23	25	22	21	19	26			
43800	5									

APPENDIX A
THROW-INS

```
43900     1   8   6  11  16
44000     2   7  15  24  26
44100     5
44200    32  23  18  15  16
44300    18  20  20  16  26
44400     4
44500    32  30  29  16
44600     6  15  25  25
44700     4
44800     1   4   5  32
44900    12  21  24  19
45000     4
45100    32  26  23  16
45200    15  17  15  26
45300     5
45400     1   6   5  16  17
45500    17  22  25  26  26
45600     6
45700     1   5   6  14  16  14
45800    12  19  25  20  25  26
45900     5
46000    32  30  29  25  19
46100     6  17  22  16  23
46200     4
46300    32  23  25  15
46400    19  19  16  26
46500     5
46600     1   6   7   7   1
46700     4  16  25  25  23
46800     6
46900    32  30  31  29  24  16
47000     4  14  15  13  15  26
47100     3
47200    32  24  25
47300    16  16  17
47400     3
47500    32  23  22
47600    21  23  24
47700     4
47800     1   3   3   4
47900    13  24  25  26
```

(v) Data referring to free-kicks

```
  100  FREE-KICKS
  200   168
  300     6
  400    17   7  12  11  14  11
  500     3  23  22  18  21  26
  600     2
  700    28  15
  800     9  19
  900     4
 1000    13  21  23  17
 1100     6  20  15  24
 1200     2
 1300    30  15
 1400    13  22
 1500     2
```

APPENDIX A
FREE-KICKS

1600	19	13								
1700	8	19								
1800	6									
1900	3	2	19	21	16	19				
2000	11	16	19	13	17	21				
2100	2									
2200	22	15								
2300	11	18								
2400	3									
2500	19	17	12							
2600	14	17	26							
2700	5									
2800	25	7	12	9	26					
2900	5	19	20	12	20					
3000	9									
3100	5	2	2	2	7	11	12	16	16	
3200	3	15	18	22	18	19	18	16	25	
3300	4									
3400	31	22	24	14						
3500	7	18	11	18						
3600	6									
3700	3	23	22	22	17	16				
3800	19	22	20	19	19	26				
3900	4									
4000	13	17	20	22						
4100	15	12	14	20						
4200	3									
4300	30	15	16							
4400	11	20	24							
4500	2									
4600	2	21								
4700	8	18								
4800	7									
4900	26	12	15	3	1	16	17			
5000	14	20	13	14	20	19	26			
5100	7									
5200	11	24	19	19	18	29	32			
5300	7	4	7	10	12	12	15			
5400	2									
5500	15	20								
5600	3	19								
5700	2									
5800	3	19								
5900	21	22								
6000	10									
6100	18	25	31	25	25	5	4	20	12	16
6200	1	1	7	15	6	10	18	19	12	25
6300	3									
6400	10	13	11							
6500	10	21	26							
6600	2									
6700	28	18								
6800	4	20								
6900	3									
7000	31	15	23							
7100	8	18	25							
7200	4									
7300	23	21	21	24						
7400	12	15	12	26						

APPENDIX A
FREE-KICKS

7500	3										
7600	16	21	17								
7700	3	19	23								
7800	4										
7900	1	5	2	2							
8000	1	6	9	16							
8100	6										
8200	5	20	18	13	3	5					
8300	7	18	21	8	11	22					
8400	4										
8500	3	4	5	17							
8600	7	17	21	18							
8700	3										
8800	26	16	18								
8900	15	21	26								
9000	3										
9100	21	12	16								
9200	13	19	26								
9300	4										
9400	5	22	14	17							
9500	29	23	24	26							
9600	2										
9700	6	20									
9800	12	19									
9900	2										
10000	30	16									
10100	7	16									
10200	5										
10300	14	19	27	28	13						
10400	2	17	10	12	20						
10500	2										
10600	25	21									
10700	10	17									
10800	2										
10900	29	12									
11000	16	20									
11100	11										
11200	11	9	4	2	1	8	5	3	7	26	17
11300	7	8	12	19	13	12	15	19	17	21	21
11400	6										
11500	4	4	14	16	17	17					
11600	13	24	21	26	25	26					
11700	4										
11800	8	22	17	17							
11900	10	19	19	26							
12000	3										
12100	31	14	16								
12200	18	23	26								
12300	9										
12400	6	4	6	13	20	22	19	19	19		
12500	11	12	14	17	6	9	10	13	26		
12600	2										
12700	30	22									
12800	17	22									
12900	2										
13000	13	18									
13100	9	18									
13200	2										
13300	2	18									

APPENDIX A
FREE-KICKS

13400	8	20					
13500	3						
13600	26	8	18				
13700	2	19	20				
13800	5						
13900	22	10	15	11	17		
14000	9	22	21	17	26		
14100	2						
14200	25	16					
14300	9	20					
14400	2						
14500	27	15					
14600	8	20					
14700	7						
14800	1	2	4	28	27	18	16
14900	1	10	14	15	11	12	26
15000	5						
15100	23	12	11	12	11		
15200	8	18	22	23	26		
15300	6						
15400	2	8	7	9	21	22	
15500	2	12	16	24	24	26	
15600	4						
15700	12	20	30	16			
15800	10	19	22	26			
15900	3						
16000	31	12	13				
16100	20	25	26				
16200	3						
16300	15	9	18				
16400	1	6	19				
16500	3						
16600	21	23	23				
16700	4	8	18				
16800	2						
16900	25	13					
17000	8	19					
17100	2						
17200	26	14					
17300	9	19					
17400	2						
17500	30	20					
17600	11	20					
17700	4						
17800	2	9	3	16			
17900	19	20	23	22			
18000	4						
18100	5	6	13	22			
18200	16	13	13	26			
18300	2						
18400	31	22					
18500	3	16					
18600	5						
18700	30	19	26	30	22		
18800	2	17	3	15	17		
18900	2						
19000	31	15					
19100	13	23					
19200	2						

APPENDIX A
FREE-KICKS

19300	25	14						
19400	11	22						
19500	4							
19600	2	16	13	24				
19700	9	23	12	26				
19800	2							
19900	32	16						
20000	15	22						
20100	4							
20200	13	4	5	27				
20300	9	14	17	21				
20400	2							
20500	3	20						
20600	6	19						
20700	3							
20800	25	24	27					
20900	12	15	26					
21000	2							
21100	13	14						
21200	13	16						
21300	3							
21400	28	22	18					
21500	2	18	18					
21600	3							
21700	8	19	14					
21800	12	17	19					
21900	8							
22000	17	12	19	29	28	22	23	25
22100	7	9	9	16	19	21	25	24
22200	2							
22300	26	16						
22400	5	17						
22500	5							
22600	25	23	22	21	18			
22700	10	14	13	13	26			
22800	4							
22900	24	15	15	16				
23000	8	16	13	25				
23100	6							
23200	31	23	23	30	29	19		
23300	20	20	9	22	24	25		
23400	5							
23500	25	18	14	13	10			
23600	9	17	13	17	26			
23700	3							
23800	8	22	16					
23900	5	18	26					
24000	5							
24100	28	5	17	7	22			
24200	9	21	21	6	16			
24300	5							
24400	29	11	18	18	23			
24500	10	20	16	21	26			
24600	3							
24700	12	14	16					
24800	12	12	25					
24900	2							
25000	30	14						
25100	19	20						

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25200	6						
25300	25	13	7	7	9	7	
25400	4	15	15	22	22	26	
25500	3						
25600	15	16	16				
25700	14	14	18				
25800	3						
25900	3	17	16				
26000	20	19	26				
26100	4						
26200	2	1	2	13			
26300	13	19	23	18			
26400	3						
26500	30	21	20				
26600	13	19	23				
26700	4						
26800	26	11	18	18			
26900	13	19	25	26			
27000	6						
27100	9	2	2	8	9	17	
27200	1	4	15	9	15	12	
27300	7						
27400	6	11	6	13	9	10	23
27500	8	7	10	9	13	26	20
27600	7						
27700	15	19	15	19	15	15	15
27800	2	4	8	8	13	22	26
27900	3						
28000	18	12	14				
28100	3	18	26				
28200	4						
28300	32	14	15	20			
28400	5	19	12	26			
28500	3						
28600	26	13	10				
28700	13	22	26				
28800	3						
28900	21	5	20				
29000	5	24	22				
29100	3						
29200	10	24	17				
29300	8	13	21				
29400	5						
29500	22	10	21	14	16		
29600	5	12	20	19	24		
29700	4						
29800	29	11	21	18			
29900	6	17	14	26			
30000	3						
30100	20	10	15				
30200	2	17	24				
30300	2						
30400	13	17					
30500	11	26					
30600	4						
30700	29	11	20	16			
30800	6	19	20	26			
30900	3						
31000	21	10	15				

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31100	14	21	25				
31200	3						
31300	30	12	18				
31400	15	19	20				
31500	2						
31600	20	12					
31700	10	21					
31800	3						
31900	3	22	25				
32000	3	18	26				
32100	2						
32200	5	21					
32300	17	19					
32400	3						
32500	1	9	15				
32600	14	20	20				
32700	2						
32800	23	11					
32900	6	26					
33000	2						
33100	11	14					
33200	2	24					
33300	7						
33400	6	15	20	6	6	9	8
33500	14	18	12	17	19	20	26
33600	2						
33700	32	15					
33800	9	19					
33900	4						
34000	8	24	19	18			
34100	8	20	20	26			
34200	7						
34300	11	13	14	23	24	16	16
34400	14	18	13	24	26	25	26
34500	4						
34600	26	22	23	12			
34700	10	19	18	22			
34800	2						
34900	31	16					
35000	11	23					
35100	2						
35200	10	20					
35300	12	26					
35400	2						
35500	29	12					
35600	10	18					
35700	3						
35800	3	18	16				
35900	12	21	26				
36000	3						
36100	17	15	18				
36200	15	15	26				
36300	5						
36400	8	22	15	18	17		
36500	6	16	17	16	25		
36600	2						
36700	21	13					
36800	9	18					
36900	5						

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37000	17	16	12	18	16
37100	8	14	11	15	17
37200	2				
37300	7	20			
37400	13	18			
37500	5				
37600	8	23	14	18	13
37700	3	17	18	16	26
37800	3				
37900	6	20	18		
38000	15	20	26		
38100	2				
38200	10	19			
38300	4	19			
38400	2				
38500	6	17			
38600	10	22			
38700	5				
38800	13	9	15	15	14
38900	10	20	21	25	26
39000	5				
39100	20	20	21	19	13
39200	6	19	20	21	26
39300	4				
39400	7	4	12	12	
39500	5	21	24	26	
39600	4				
39700	27	22	22	25	
39800	5	18	19	26	
39900	5				
40000	2	10	23	22	16
40100	5	12	18	21	26
40200	2				
40300	28	14			
40400	2	26			
40500	2				
40600	2	18			
40700	14	22			
40800	2				
40900	3	18			
41000	13	24			
41100	2				
41200	32	13			
41300	3	17			
41400	2				
41500	7	22			
41600	4	18			
41700	3				
41800	17	25	15		
41900	8	9	17		
42000	2				
42100	30	14			
42200	6	21			
42300	3				
42400	25	8	11		
42500	13	23	23		
42600	2				
42700	29	12			
42800	9	22			

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FREE-KICKS

42900	2					
43000	4	13				
43100	23	23				
43200	2					
43300	32	12				
43400	21	22				
43500	5					
43600	28	25	24	21	18	
43700	2	12	17	18	25	
43800	3					
43900	16	21	19			
44000	9	10	26			
44100	5					
44200	26	22	22	21	22	
44300	4	15	19	21	26	
44400	4					
44500	4	23	16	16		
44600	4	20	23	26		
44700	2					
44800	15	16				
44900	11	26				
45000	2					
45100	31	18				
45200	7	21				
45300	2					
45400	20	12				
45500	6	18				
45600	2					
45700	10	18				
45800	15	26				
45900	4					
46000	3	7	4	16		
46100	3	11	21	25		
46200	5					
46300	28	11	19	18	19	
46400	4	22	23	26	26	
46500	6					
46600	2	7	2	3	5	13
46700	4	8	15	23	14	20
46800	4					
46900	16	24	16	17		
47000	2	21	22	26		
47100	3					
47200	28	24	18			
47300	23	20	26			
47400	3					
47500	10	16	13			
47600	9	17	19			
47700	2					
47800	26	14				
47900	5	17				
48000	4					
48100	17	16	15	17		
48200	7	16	17	26		
48300	5					
48400	2	10	3	19	19	
48500	14	19	22	23	26	
48600	2					
48700	3	17				

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FREE-KICKS

48800	20	22				
48900	6					
49000	3	19	27	25	18	19
49100	9	18	15	15	25	26
49200	3					
49300	8	17	16			
49400	21	26	26			
49500	4					
49600	22	24	22	22		
49700	11	25	25	26		
49800	3					
49900	30	13	16			
50000	8	22	26			
50100	4					
50200	6	12	21	15		
50300	11	20	18	26		
50400	4					
50500	27	6	8	13		
50600	3	13	15	19		

APPENDIX B

+ Tables show the analysis of ordinary attacks and set plays

Table 1 shows the analysis of 381 ordinary attacks

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
1	1	5	1	1	0
2	6	5	1	3	1
3	6	3	0	0	1
4	1	4	1	4	1
5	1	3	1	3	1
6	7	4	1	2	1
7	6	6	2	2	2
8	7	3	2	1	0
9	6	2	3	0	0
10	7	4	1	5	3
11	1	4	2	2	1
12	7	5	1	0	1
13	1	3	1	5	0
14	6	3	1	1	1
15	1	3	1	4	2
16	1	4	1	3	1
17	7	5	0	4	2
18	7	2	0	2	2
19	7	3	1	4	1
20	7	4	1	0	2
21	1	4	1	2	2
22	7	7	2	5	2
23	7	4	1	3	2
24	7	2	2	1	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
25	1	2	1	0	2
26	1	3	1	5	1
27	1	5	1	1	0
28	2	4	1	0	1
29	1	3	2	0	2
30	3	4	4	1	2
31	1	4	2	0	0
32	2	2	1	0	1
33	2	3	0	6	1
34	1	4	0	4	2
35	1	3	1	1	0
36	1	4	2	1	1
37	2	1	1	0	1
38	1	3	1	0	1
39	3	4	2	2	0
40	3	2	2	2	4
41	1	3	0	0	1
42	3	2	0	3	2
43	3	4	3	2	2
44	1	3	1	0	1
45	2	5	2	1	0
46	3	7	2	2	0
47	6	4	4	1	4
48	6	5	3	1	2
49	6	5	2	0	1
50	1	4	2	2	0
51	2	3	1	1	2
52	3	3	2	2	2

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
53	6	5	1	1	2
54	5	4	2	1	1
55	3	1	1	2	0
56	2	4	2	0	1
57	5	1	1	0	1
58	2	5	1	1	1
59	7	4	1	0	1
60	2	4	1	2	1
61	7	4	2	1	3
62	3	3	1	2	0
63	2	4	1	6	0
64	1	4	2	1	0
65	2	7	2	1	0
66	3	4	0	0	1
67	3	4	2	2	0
68	3	4	0	0	1
69	5	4	0	0	1
70	1	3	2	1	1
71	1	4	2	2	2
72	1	4	2	1	3
73	1	2	3	1	1
74	1	4	3	1	1
75	1	2	2	1	1
76	1	4	2	0	2
77	5	5	0	2	2
78	1	4	2	2	0
79	1	4	4	0	1
80	1	2	2	1	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
81	5	4	2	0	1
82	1	5	1	1	2
83	1	3	1	0	1
84	1	4	2	0	2
85	1	5	2	2	1
86	1	3	2	1	2
87	1	4	2	2	2
88	1	4	1	0	1
89	1	4	3	1	1
90	1	3	2	3	2
91	1	3	1	1	2
92	1	5	1	1	2
93	5	5	2	1	1
94	4	4	2	1	1
95	1	4	2	1	0
96	1	4	1	2	0
97	4	4	3	3	4
98	5	4	0	3	3
99	1	2	1	0	1
100	1	1	1	0	1
101	2	5	2	2	2
102	4	7	2	4	3
103	2	4	2	0	1
104	2	2	1	0	1
105	4	4	3	4	3
106	5	4	2	3	2
107	1	1	1	1	2
108	5	4	2	0	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
109	2	1	1	2	1
110	2	5	1	0	0
111	5	4	2	2	2
112	5	4	2	0	0
113	2	3	1	0	1
114	2	5	1	2	0
115	1	4	2	1	1
116	4	5	1	3	3
117	5	4	1	4	0
118	2	7	2	1	1
119	2	7	3	1	1
120	1	3	1	0	0
121	1	3	3	0	1
122	2	4	1	2	1
123	1	5	1	3	1
124	1	4	1	0	1
125	2	4	3	2	0
126	2	4	3	1	1
127	1	4	2	0	1
128	1	4	2	1	1
129	2	4	2	0	3
130	2	7	2	0	0
131	2	4	1	2	3
132	2	1	1	0	1
133	1	4	4	1	0
134	2	4	1	0	1
135	1	4	2	0	0
136	2	3	2	2	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
137	2	5	2	3	3
138	6	3	4	2	1
139	2	5	1	0	1
140	4	5	2	0	1
141	4	4	1	3	1
142	1	4	1	1	2
143	6	4	3	2	0
144	1	4	2	1	1
145	1	3	2	1	2
146	2	5	3	1	1
147	1	4	3	1	2
148	2	5	3	1	1
149	6	1	2	1	2
150	4	5	2	2	1
151	6	4	2	0	1
152	1	4	2	3	1
153	6	3	1	0	1
154	6	1	2	2	1
155	4	4	1	0	0
156	6	2	1	2	1
157	6	4	0	0	1
158	2	4	3	4	2
159	6	4	1	2	2
160	3	6	2	2	0
161	1	4	2	0	2
162	2	4	3	6	2
163	2	4	3	3	5
164	2	1	2	1	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
165	2	4	3	1	3
166	2	1	1	1	0
167	3	4	1	1	0
168	1	3	1	0	0
169	2	3	2	2	1
170	2	4	2	1	2
171	2	5	2	2	1
172	3	7	5	1	1
173	2	5	2	0	1
174	2	1	2	0	1
175	2	5	1	0	2
176	1	1	1	2	3
177	1	3	1	2	1
178	1	1	1	0	2
179	2	3	1	0	1
180	3	4	1	2	3
181	2	1	1	1	1
182	1	3	3	0	1
183	3	4	2	0	1
184	2	4	3	2	0
185	3	4	4	2	1
186	4	6	2	2	0
187	3	4	2	2	1
188	2	4	1	3	2
189	3	3	2	3	1
190	3	6	2	1	2
191	2	6	2	1	2
192	6	2	2	0	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
193	4	4	1	1	1
194	6	4	2	1	0
195	2	7	2	1	1
196	6	3	1	2	1
197	4	4	2	2	0
198	6	1	1	0	1
199	6	4	2	1	1
200	2	7	2	0	1
201	3	5	1	0	2
202	4	5	1	0	1
203	4	3	1	0	2
204	2	4	1	4	3
205	6	4	2	0	1
206	2	4	3	3	0
207	1	4	4	2	2
208	1	5	1	1	0
209	5	7	3	0	1
210	1	2	4	3	3
211	3	4	2	0	2
212	5	4	3	2	1
213	1	3	1	0	1
214	5	4	4	3	2
215	3	4	2	1	2
216	1	1	4	0	2
217	1	4	2	0	2
218	1	3	1	4	1
219	3	5	2	2	1
220	1	3	2	2	4

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
221	1	4	2	0	1
222	1	1	2	0	1
223	3	7	3	1	1
224	1	3	2	0	2
225	1	5	1	0	1
226	1	3	1	0	1
227	1	3	1	1	1
228	3	5	2	1	1
229	1	4	3	1	2
230	1	3	1	2	0
231	5	4	2	0	2
232	1	2	2	0	1
233	3	2	1	1	2
234	5	4	1	1	3
235	1	4	1	1	0
236	1	4	1	0	2
237	5	4	2	3	1
238	1	3	1	0	1
239	1	4	3	0	0
240	2	3	1	0	1
241	5	4	3	0	1
242	5	4	1	0	1
243	1	4	1	0	1
244	1	4	2	2	0
245	2	5	0	0	1
246	1	1	3	2	0
247	2	4	2	0	1
248	1	3	1	3	2

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
249	2	2	2	0	1
250	2	4	2	3	1
251	1	4	1	3	3
252	1	3	1	0	1
253	2	5	1	1	2
254	1	4	2	1	1
255	5	4	2	1	0
256	1	2	2	1	1
257	1	4	2	0	1
258	1	2	3	2	1
259	1	3	1	1	1
260	1	4	1	1	2
261	1	2	1	0	1
262	2	4	2	2	1
263	1	5	2	1	1
264	2	5	0	0	1
265	4	4	2	0	0
266	2	4	0	0	1
267	4	4	1	1	2
268	4	4	2	0	1
269	1	2	2	0	1
270	1	3	1	1	1
271	2	5	1	1	2
272	2	5	0	0	1
273	2	6	0	1	1
274	4	4	1	1	1
275	2	4	2	2	0
276	2	4	2	0	2

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
277	4	2	1	0	2
278	4	4	0	0	1
279	2	1	2	0	2
280	1	1	1	4	1
281	2	4	2	0	1
282	4	5	1	1	2
283	2	3	3	0	1
284	2	6	1	3	2
285	3	4	2	2	0
286	7	4	3	0	2
287	7	4	3	1	3
288	3	6	1	1	2
289	2	4	2	1	2
290	1	2	3	7	2
291	2	2	1	0	2
292	1	2	1	1	0
293	2	3	1	1	0
294	2	5	2	2	1
295	2	4	2	1	1
296	7	4	2	0	1
297	3	4	4	3	0
298	7	3	1	1	2
299	1	3	1	1	1
300	1	7	2	0	0
301	1	4	1	1	2
302	3	3	2	0	2
303	3	4	2	0	2
304	1	2	1	1	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
305	4	5	3	2	2
306	4	4	4	5	3
307	4	4	3	4	1
308	2	5	2	1	1
309	7	3	3	2	1
310	2	4	2	0	1
311	7	4	1	2	0
312	4	4	1	1	1
313	4	1	2	2	1
314	4	6	1	1	1
315	2	3	1	1	0
316	4	3	2	0	1
317	4	4	0	1	1
318	7	4	1	0	1
319	7	4	2	4	2
320	4	3	0	0	1
321	2	2	2	0	0
322	7	4	3	0	1
323	4	4	1	0	1
324	2	4	1	1	1
325	6	3	3	0	1
326	1	4	3	1	0
327	6	3	0	1	2
328	1	4	3	3	0
329	1	3	0	2	2
330	1	4	2	1	1
331	1	4	2	0	1
332	1	5	3	1	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
333	1	3	3	2	1
334	1	4	2	0	1
335	1	4	2	0	2
336	1	5	3	2	1
337	1	2	3	0	0
338	1	3	2	1	2
339	1	2	2	2	0
340	6	4	2	0	1
341	1	4	2	2	2
342	1	4	2	0	1
343	6	2	2	0	1
344	1	5	3	0	1
345	6	3	0	1	1
346	1	1	1	2	1
347	1	3	1	1	1
348	1	1	3	2	0
349	2	4	4	2	0
350	3	3	1	2	1
351	1	2	3	0	1
352	1	1	3	0	1
353	1	1	3	0	2
354	2	5	4	0	1
355	2	3	1	0	1
356	2	3	2	0	1
357	2	4	0	3	2
358	2	5	2	0	0
359	3	2	2	0	1
360	3	4	3	2	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
361	3	4	4	3	0
362	2	7	2	1	0
363	2	4	1	0	1
364	3	4	2	1	2
365	1	1	2	0	2
366	2	1	2	0	1
367	3	5	5	2	2
368	3	4	3	2	2
369	3	4	3	1	1
370	2	2	1	0	1
371	3	5	1	0	1
372	3	2	2	0	2
373	2	5	3	0	1
374	3	4	3	0	1
375	3	2	0	1	2
376	2	2	2	0	1
377	3	2	1	0	2
378	3	5	3	0	2
379	2	4	2	1	1
380	2	4	2	2	1
381	2	5	2	1	1

Table 2 shows the analysis of 174 corner-kicks

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
1	2	4	1	0	0
2	1	3	1	0	0
3	1	3	1	1	0
4	1	2	1	0	0
5	2	1	1	2	0
6	2	4	1	0	0
7	1	7	2	0	0
8	2	4	1	0	0
9	2	4	1	0	0
10	2	4	1	0	0
11	1	5	1	0	0
12	1	4	1	1	0
13	2	4	1	0	0
14	1	4	3	1	0
15	1	3	3	1	0
16	1	4	1	0	0
17	2	4	1	0	0
18	2	4	1	0	0
19	2	4	2	0	1
20	2	4	1	0	0
21	1	3	1	2	0
22	2	5	1	1	1
23	1	4	1	0	0
24	1	4	2	0	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
25	2	4	2	1	0
26	2	4	1	0	0
27	2	4	1	0	0
28	1	4	1	0	0
29	2	3	1	0	0
30	2	4	3	0	0
31	1	4	1	1	0
32	1	3	2	0	1
33	2	6	1	0	1
34	1	3	1	1	1
35	1	3	1	0	0
36	1	4	1	0	0
37	2	4	1	1	1
38	2	4	1	0	0
39	2	3	1	0	0
40	1	3	1	0	0
41	1	4	2	0	0
42	1	4	2	0	1
43	1	4	2	0	0
44	2	4	1	0	0
45	2	3	1	0	0
46	1	4	1	0	0
47	2	4	1	0	0
48	1	2	1	0	0
49	1	3	1	0	0
50	1	5	1	0	0
51	2	4	1	0	0
52	2	4	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
53	1	6	1	1	0
54	2	8	2	0	1
55	1	4	1	0	0
56	1	5	1	0	0
57	1	4	1	0	0
58	1	4	2	0	0
59	2	4	1	0	0
60	1	4	1	0	0
61	1	3	1	0	0
62	1	3	1	1	0
63	1	2	1	0	0
64	1	2	1	0	0
65	2	3	1	0	0
66	2	4	1	0	0
67	1	7	2	1	0
68	1	4	1	0	0
69	1	4	1	0	0
70	2	3	1	0	0
71	2	4	1	0	0
72	2	4	1	0	0
73	2	3	1	1	1
74	1	4	1	0	0
75	2	5	1	0	0
76	2	4	1	0	0
77	1	4	1	0	0
78	1	4	1	0	0
79	2	4	1	0	0
80	2	4	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
81	1	4	1	0	0
82	1	4	1	0	0
83	2	4	1	0	0
84	2	2	1	0	0
85	2	4	1	0	0
86	1	4	1	0	0
87	2	4	1	0	0
88	1	4	1	0	0
89	2	4	1	0	0
90	1	2	1	0	0
91	2	3	1	0	0
92	2	4	1	0	0
93	2	2	1	0	0
94	1	4	1	0	0
95	1	1	1	1	0
96	1	1	1	3	0
97	2	4	1	0	0
98	2	4	1	0	0
99	2	4	1	0	0
100	1	4	1	0	0
101	2	4	1	0	0
102	2	5	1	0	0
103	1	4	1	0	0
104	1	4	1	0	0
105	1	5	1	0	0
106	2	2	1	1	0
107	2	3	1	0	0
108	1	4	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
109	1	4	1	0	0
110	1	4	1	0	0
111	2	4	1	0	0
112	2	2	1	1	0
113	2	4	1	0	0
114	2	3	1	0	0
115	1	4	1	0	0
116	1	9	1	0	0
117	2	1	1	0	0
118	2	3	1	0	0
119	2	4	1	0	0
120	2	4	1	0	0
121	2	4	1	0	0
122	1	2	1	0	0
123	2	4	1	0	0
124	2	4	1	1	0
125	2	5	1	0	0
126	2	4	1	0	0
127	2	4	1	0	0
128	1	4	1	0	0
129	2	2	1	0	0
130	2	4	1	0	0
131	1	4	1	1	0
132	1	4	1	0	0
133	1	4	1	0	0
134	2	4	1	1	0
135	1	4	1	1	0
136	1	4	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
137	2	4	1	0	0
138	2	4	2	0	0
139	1	1	1	1	0
140	2	5	1	0	0
141	2	4	1	0	0
142	2	4	1	0	0
143	1	4	1	0	0
144	1	4	1	0	0
145	1	4	1	0	0
146	2	4	1	0	0
147	1	4	1	0	0
148	2	4	2	0	0
149	1	3	2	1	0
150	2	4	1	1	0
151	2	3	1	0	0
152	1	4	1	0	0
153	1	5	1	0	0
154	2	4	1	0	0
155	1	4	1	0	0
156	2	3	1	1	0
157	1	4	1	0	0
158	2	4	1	0	0
159	2	3	1	0	0
160	1	4	1	0	0
161	1	4	1	0	0
162	2	4	1	0	0
163	2	4	1	0	0
164	2	3	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
165	1	3	1	0	0
166	1	6	1	1	0
167	2	5	1	0	0
168	1	4	1	0	0
169	1	1	1	0	0
170	2	5	1	0	0
171	1	4	1	0	0
172	1	3	1	0	0
173	1	4	1	0	0
174	1	4	1	1	0

Table 3 shows the analysis of 159 throw-ins.

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
1	2	4	2	4	0
2	2	2	2	4	0
3	2	3	1	1	0
4	2	1	1	1	1
5	1	3	1	3	1
6	1	4	2	1	1
7	1	4	3	2	0
8	2	4	3	2	2
9	1	4	1	1	1
10	2	4	1	2	1
11	1	4	1	0	0
12	2	4	1	2	1
13	2	2	1	1	1
14	2	3	1	2	1
15	1	4	1	2	1
16	1	4	0	2	1
17	1	3	2	0	1
18	1	4	2	1	0
19	1	4	2	1	1
20	1	4	1	4	2
21	1	7	2	5	0
22	1	3	1	1	0
23	1	4	2	1	0
24	1	3	2	0	2

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
25	1	4	2	1	1
26	2	3	1	1	1
27	1	3	2	3	2
28	1	3	2	2	3
29	1	4	2	0	1
30	2	4	2	1	2
31	1	1	1	3	2
32	1	4	3	0	1
33	1	4	1	1	1
34	1	4	2	2	1
35	1	4	2	0	2
36	1	7	2	0	1
37	1	4	2	1	1
38	1	4	1	0	0
39	1	4	1	0	0
40	1	3	1	2	1
41	1	4	2	1	2
42	1	4	1	1	0
43	1	3	2	1	0
44	2	4	1	3	2
45	1	3	1	1	1
46	1	4	2	2	1
47	2	4	2	1	2
48	2	4	1	0	0
49	2	4	1	0	1
50	1	4	2	0	0
51	2	4	1	0	0
52	2	5	1	0	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
53	1	4	3	1	1
54	1	3	2	1	2
55	1	5	1	0	1
56	1	2	2	2	2
57	2	5	2	0	1
58	1	3	0	3	1
59	2	4	1	0	0
60	1	4	2	3	3
61	1	4	1	2	0
62	1	4	2	2	0
63	1	4	1	0	0
64	1	5	4	0	2
65	1	4	1	2	0
66	1	5	2	3	0
67	1	5	2	1	0
68	2	4	0	1	1
69	2	4	2	2	0
70	1	5	1	0	1
71	2	4	2	0	1
72	2	2	2	0	0
73	1	5	1	1	1
74	2	4	0	2	1
75	2	1	0	3	0
76	2	5	2	0	0
77	2	3	1	7	0
78	2	4	2	0	0
79	1	4	1	0	0
80	2	5	2	1	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
81	1	4	3	3	2
82	1	5	4	2	2
83	2	4	1	2	0
84	2	4	1	0	1
85	2	4	1	1	1
86	1	4	1	1	0
87	2	4	1	0	1
88	1	4	1	0	0
89	1	4	1	0	0
90	2	4	2	3	2
91	2	4	3	0	0
92	2	5	2	1	1
93	2	4	2	1	1
94	2	4	3	1	2
95	2	5	2	0	0
96	2	4	2	4	0
97	2	4	1	1	0
98	1	4	1	0	0
99	2	3	0	1	1
100	1	3	1	3	1
101	2	4	1	0	0
102	2	2	3	1	0
103	1	8	2	3	1
104	2	4	2	0	1
105	1	4	2	0	1
106	1	4	2	1	1
107	1	4	2	1	1
108	2	4	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
109	2	2	1	2	1
110	2	4	2	1	0
111	2	4	2	1	1
112	2	4	1	0	0
113	2	4	1	0	0
114	2	4	1	0	0
115	1	4	1	0	0
116	2	4	1	1	0
117	2	9	2	1	1
118	2	6	2	0	1
119	2	4	1	2	0
120	1	4	1	0	0
121	2	4	1	0	1
122	1	5	2	0	1
123	1	4	3	1	1
124	2	1	1	2	0
125	1	5	2	1	0
126	1	5	2	0	1
127	2	4	2	1	1
128	1	4	2	2	2
129	2	3	2	4	0
130	1	3	1	2	0
131	1	1	1	0	1
132	1	1	1	0	0
133	1	4	1	0	0
134	2	4	2	0	0
135	2	4	1	0	0
136	1	3	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
137	2	4	1	0	0
138	1	6	1	3	1
139	2	6	2	1	2
140	1	4	2	1	1
141	2	4	2	0	1
142	1	1	1	1	0
143	1	4	1	0	0
144	2	4	3	1	0
145	2	3	2	1	2
146	2	1	1	1	1
147	1	3	1	2	0
148	1	4	2	0	1
149	2	6	2	0	1
150	1	2	1	1	0
151	2	5	2	0	1
152	2	5	2	0	1
153	1	4	2	1	1
154	1	3	1	1	0
155	2	6	2	0	1
156	1	3	1	1	1
157	1	4	1	0	1
158	1	4	1	0	1
159	2	4	1	0	1

Table 4 shows the analysis of 168 free-kicks

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
1	1	4	1	3	0
2	1	4	1	0	0
3	1	4	2	0	0
4	1	4	1	0	0
5	1	6	1	0	0
6	1	7	1	3	0
7	1	4	1	0	0
8	1	5	0	0	0
9	1	4	2	1	0
10	1	2	1	5	1
11	1	4	2	0	0
12	1	1	1	2	0
13	1	3	0	0	1
14	1	2	1	0	0
15	1	6	1	0	0
16	1	1	3	0	1
17	1	4	2	3	1
18	1	6	1	0	0
19	1	4	1	0	0
20	1	4	4	1	2
21	1	5	1	0	0
22	1	4	1	0	0
23	1	4	2	0	0
24	1	4	1	2	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
25	1	4	1	1	0
26	1	4	1	1	1
27	1	4	3	1	0
28	1	4	2	0	1
29	1	2	1	1	1
30	1	7	1	2	0
31	1	3	2	0	0
32	1	4	1	0	0
33	1	4	1	0	0
34	1	4	2	0	1
35	1	4	1	0	0
36	1	4	1	0	0
37	1	4	2	6	2
38	1	1	2	0	0
39	1	3	1	1	0
40	1	3	1	0	0
41	1	3	1	3	2
42	1	7	1	0	0
43	1	4	1	0	0
44	1	4	1	0	0
45	1	7	1	1	0
46	1	3	1	1	0
47	1	4	1	0	0
48	1	7	1	0	0
49	1	5	2	0	1
50	1	5	2	1	1
51	1	5	2	1	1
52	1	1	1	0	1

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
53	1	4	1	0	0
54	1	4	1	1	0
55	1	4	1	1	0
56	1	4	1	0	0
57	1	4	1	0	0
58	1	4	1	0	0
59	1	4	1	2	0
60	1	4	1	0	0
61	1	4	1	1	0
62	1	4	3	0	0
63	1	4	1	0	0
64	1	4	1	0	0
65	1	4	2	0	0
66	1	4	1	0	0
67	1	4	1	0	0
68	1	4	1	0	0
69	1	5	0	0	0
70	1	4	0	0	0
71	1	4	1	1	0
72	1	4	1	1	0
73	1	4	1	4	2
74	1	4	1	0	0
75	1	3	0	1	1
76	1	2	1	0	0
77	1	4	2	0	1
78	1	5	1	2	0
79	1	1	1	0	0
80	1	7	3	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
81	1	5	1	1	0
82	1	4	1	1	0
83	1	4	1	0	0
84	1	5	2	1	1
85	1	2	0	1	0
86	1	4	1	0	0
87	1	4	1	1	1
88	1	4	1	0	1
89	1	1	1	1	0
90	1	4	3	2	0
91	1	4	1	4	1
92	1	3	0	4	1
93	1	3	1	0	0
94	1	4	2	0	0
95	1	4	1	0	0
96	1	4	2	0	0
97	1	4	2	0	0
98	1	4	2	2	0
99	1	3	2	0	0
100	1	4	2	0	0
101	1	2	0	0	0
102	1	1	1	1	0
103	1	4	2	0	0
104	1	4	2	0	0
105	1	4	1	0	0
106	1	5	1	0	0
107	1	4	1	0	0
108	1	4	2	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
109	1	4	1	0	0
110	1	4	1	0	0
111	1	5	3	0	1
112	1	4	1	0	0
113	1	2	1	1	0
114	1	1	2	2	1
115	1	4	2	0	1
116	1	4	1	0	0
117	1	4	1	0	0
118	1	4	1	0	0
119	1	1	1	0	0
120	1	3	0	1	0
121	1	4	2	2	0
122	1	4	1	0	0
123	1	4	1	2	0
124	1	4	1	0	0
125	1	3	2	1	0
126	1	3	1	0	0
127	1	4	1	0	0
128	1	4	1	0	0
129	1	5	1	1	0
130	1	5	2	0	1
131	1	5	2	0	0
132	1	5	2	0	1
133	1	1	2	0	1
134	1	4	1	0	0
135	1	4	1	0	0
136	1	4	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
137	1	4	1	0	0
138	1	4	1	0	0
139	1	4	1	1	0
140	1	4	1	0	0
141	1	4	1	1	0
142	1	4	1	0	0
143	1	4	1	0	0
144	1	4	1	0	0
145	1	2	1	2	0
146	1	3	0	1	0
147	1	5	1	1	1
148	1	5	1	1	0
149	1	3	0	0	0
150	1	4	1	0	0
151	1	4	1	0	0
152	1	3	0	0	0
153	1	4	1	1	1
154	1	5	1	1	0
155	1	4	1	3	1
156	1	1	1	1	0
157	1	1	0	1	0
158	1	4	1	1	0
159	1	4	1	0	0
160	1	2	1	0	1
161	1	5	3	0	0
162	1	4	1	0	0
163	1	5	1	0	1
164	1	3	1	0	0

No.	Type of Pattern	Final Action	Long Pass	Short Pass	Dribbling Section
165	1	5	2	0	0
166	1	3	1	0	0
167	1	3	2	0	0
168	1	4	2	0	1