
22. PENALTY KICK

O-127 Photogrammetric analysis of penalty kick in soccer

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OBJECTIVES Penalty kick has always been the most exciting moment of the soccer game. Many cups have been won and lost with the penalties. Some players choose focusing on goal keepers movements; some however decide at the shooting point while waiting for the referees whistle. However, the most important factor is the technique of the player. A perfect technique should be executed in order to put the ball in the goal. Thus, the aim of this study was to investigate the kinetic and kinematic features of the penalty kicking technique of professional soccer players.

METHODS Five professional soccer players participated in this study. Markers were placed on the thigh, knee and the ankle of the players. Each player executed 10 instep penalty kicks to the targets. Each kick was recorded on two digital cameras with 60 fps. The cameras were placed approximately 90 degree to each other. Photogrammetric analyses of the pictures were done by Pictra Software.

RESULTS The results revealed that for a successful penalty kick a perfect kinetic chain was needed. The analysis showed that players flexed their knees approximately 60 degrees and laterally rotated their ankles approximately 70 degrees and a follow through were executed by the players.

DISCUSSION In conclusion, in order to execute a perfect penalty kick, body segments should be in a perfect coordination. Players should be aware of their body segments and use technology to analyse their techniques.

KEY WORDS Soccer, penalty kick, motion analysis, photogrammetric.

O-128 Alternatives to penalty shoot-outs

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OBJECTIVES Recent research into penalty shoot-outs indicates that they are not a pure lottery. For example, it is known that younger players are more effective than older ones during penalty shoot-outs (Jordet et al, 2006). Also there are concerns that individuals decide a team sport and that FIFA is considering alternatives (Blatter, 2006). The purpose of this paper was to discover, by drawing on tie-breaks in other sports, key differences in the nature of alternatives that might form a typology for their categorisation. In addition, this paper outlined the criteria that a replacement to penalty shoot-outs should satisfy in order to be a realistic alternative. The criteria were used to evaluate potential alternatives.

METHODS After an analysis of the impact of penalty shoot-outs on the nature of football in major international tournaments, conclusions for the acceptance criteria of alternatives were drawn. Experience in other sports on acceptable tie-breaks was also drawn. Following this, a range of alternatives compared to the acceptance criteria was conceptually categorised.

RESULTS Analysis of other sports shows that there are three distinct forms of tiebreakers (assessment of prior performance, assessment of game performance, and post-game lotteries) and some hybrids. We advocate ten different criteria that a replacement to the penalty shoot-out should satisfy. Our assessment of alternatives suggests that prior performance methods should be tested.

DISCUSSION The analysis suggested that determining the result of the tiebreak before the game starts (e.g. best goal difference, highest number of goals scored in the competition) may improve the quality of the football both in the tied game and in previous games in the tournament. Awarding a minor score to 'woodwork hits' also looks fruitful. These alternatives should be tested.

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KEYWORDS: Football, penalties, goal difference, goals scored, woodwork, alternatives.

O-129 Emotions at the penalty mark: an interview analysis of players performing in international penalty shootouts

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OBJECTIVES: Recent research has demonstrated that stress is closely related to the outcomes of penalty shootout kicks. Knowledge about ways in which football players respond emotionally to penalty shootouts may be used to assist players in coping with stress under such circumstances. This can produce better kicks and ultimately help teams win more matches. An exploratory study was conducted to learn more about manners in which football players experience the minutes leading up to their shots when performing in major international tournament penalty shootouts. The exact objective was to identify the emotions that players experience, their intensity and direction and the specific points in time that they occur.

METHODS: Retrospective video stimulated recall interviews were done with 8 players who took a shot in the penalty shootout between the Netherlands and Sweden in the 2004 European Championship. A 22-item emotion checklist and open-ended interview questions were used to collect quantitative and qualitative data, respectively. Member checking and prolonged engagement served to increase the trustworthiness.

RESULTS: On the checklist, the players indicated experiencing a wide range of intense emotions, both positively and negatively toned, interpreted as facilitative and debilitating to performance. 'Anxious' was most common, reported by all eight players, then 'determined' and 'motivated'. The qualitative data showed that the anxiety peaked in the mid circle.

DISCUSSION: Combined with knowledge about the link between stress and penalty shootout outcomes, the present results highlight the importance of coping with anxiety to achieve success at the penalty mark. Anxiety in the mid circle may come from the powerless feeling of merely watching others perform. Players should include the mid circle when simulating penalty shootouts in practice.

KEYWORDS: Football, penalty, stress, emotions, anxiety.

O-130 "What's the hurry?": A temporal analysis of pre-shot behaviour in international penalty shootouts

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OBJECTIVES: Kicks from the penalty mark (official term for the "penalty shootout") are regularly featured in major football tournaments to determine the outcome of tied matches. Recent research has suggested that players' anxiety in these situations may come from low perceptions of competence and the general belief that outcomes in penalty shootouts are uncontrollable (Jordet et al., 2006). A natural next step for scientists can be to discover ways in which these psychological processes are manifested in players' behaviours. Also, it is important to identify means with which players can increase their odds of coping with these situations. Thus, the objective of this study was to learn about the relationships between stresses, players' pre-shot preparation times and shot outcomes.

METHODS: The data consisted of television images of 251 shots from 26 penalty shootouts held in the World Cup and the European Championships between 1976 and 2006. Preparation times were registered in the period from a player receives the ball to the time of the shot itself ($M = 18.32$ s, $SD = 7.07$). Stress was inferred from variables specifying match or shot importance.

RESULTS: The more important a shot was, the less time the players prepared for them. This was demonstrated for tournament ($F = 5.04$, $p < .05$), penalty number ($F = 14.76$, $p < .01$) and shot consequence ($F = 4.41$, $p < .05$). The players with the shortest times also scored less goals (odds ratio = 2.78, $p = .08$), with scoring percentages as low as 58%, compared to 75% for both intermediate and long times.

DISCUSSION: The results suggested that short preparation times could be a sign of stress. It could be that some players tried to escape the stress of the situation by ending it as quickly as possible (avoidance coping). Hurried pre-shot

behaviour also seemed to affect shot outcomes negatively, possibly due to insufficient shot planning. Players are advised to spend a few extra seconds preparing their shots.

REFERENCES

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KEY WORDS: Football, penalty, anxiety, coping.

O-131 Are penalty shoot-outs racist?

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OBJECTIVES The acceptance of penalty shoot-outs in the knockout stages of international football tournaments is based on the belief that they have face validity by involving a football skill, that they have a clear and quick decision criterion that settles the result shortly after the end of the game, and that they do not offer any in-built advantage to either of the competing nations. Following events in the 2006 World Cup, we decided to investigate whether there are grounds to believe that the results of penalty shoot-outs are predetermined. Specifically, we considered whether characteristics of national cultures explain the results of penalty shoot-outs and whether penalty shoot-outs offer an advantage to any nation.

METHODS We gathered data from every competitive international penalty shoot-out (n=182). We included countries who had (1) competed in at least 5 shoot-outs, (2) taken at least 20 penalties, and (3) been involved in at least 2 penalty shoot-outs in major tournaments. Win/lose data from 16 countries were analyzed using the raw national culture scores of Hofstede (1980, 2006).

RESULTS One of Hofstede's four national cultural dimensions – individualism/collectivism – strongly correlated with nations' win/loss record ($r = -.600$, $\text{sig} = .014$, $N = 16$). A regression analysis produced an R^2 of .395 indicating that this national cultural dimension explains almost 40% of the variance in the results of penalty shoot-outs with collectivism being favoured over individualism.

DISCUSSION These results demonstrated a strong national culture bias in favour of collectivist nations. One explanation is that players from individualist nations are more anxious and under greater stress due to the blame they will attract if they miss. Other explanations are associated with support and self-image. Some may consider that these results indicated that penalty shoot-outs were racist.

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KEYWORDS Football, penalty shoot-outs, iIndividualism, cCollectivism, fairness, racism.
