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DISSERTATION ASSESSMENT PROFORMA:
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Comments	**Section**
	Title and Abstract (5%) Title to include: A concise indication of the research question/problem. Abstract to include: A concise summary of the empirical study undertaken.
	Introduction and literature review (25%) To include: outline of context (theoretical/conceptual/applied) for the question; analysis of findings of previous related research including gaps in the literature and relevant contributions; logical flow to, and clear presentation of the research problem/ question; an indication of any research expectations, (i.e., hypotheses if applicable).
	Methods and Research Design (15%) To include: details of the research design and justification for the methods applied; participant details; comprehensive replicable protocol.
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CARDIFF METROPOLITAN UNIVERSITY
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CARDIFF SCHOOL OF SPORT

DEGREE OF BACHELOR OF SCIENCE (HONOURS)

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Are English Penalty Taking Footballers Less Successful than Top Elite Players from Around the World?

(Dissertation submitted under the Performance Analysis area)

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ARE ENGLISH PENALTY TAKING FOOTBALLERS LESS SUCCESSFUL THAN TOP ELITE PLAYERS FROM AROUND THE WORLD?

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Acknowledgments

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Abstract

In recent history, penalty shoot-outs have become a difficult hurdle to overcome for the England football team and has become a widely talked about problem that English football cannot seem to escape. The aim of the study was to assess whether players from the England International squad penalty performances are less successful than performances by top elite players from around the World. The study investigated ten players (five from England and five from the Rest of the World). Footage of penalties from the start of the 2010/2011 season to the end of the 2014 World Cup in Brazil were analysed and input into a hand notation system with eighteen penalty related indicators. No significant association between type of team and success was found ($\chi^2 = 0.59$, $P = 0.472$). Results show that the England players are equally as successful as top elite players from around the World, therefore previous penalty shoot-out failure can be attributed to other external factors such as the Environment or player Psychology.

Chapter One
Introduction

“When a famous sports writer refused to attach the same importance to scoring penalties as scoring goals in open play, I insisted his failure to understand the skill and nerve required to take penalties was borne out of the fact that he had never taken one” (Crooks, 2015)

1.0 Introduction

When two teams are evenly matched after 120 minutes of a football game, a penalty shoot-out becomes the way of distinguishing a winning side. In recent history this process has become a difficult hurdle to overcome for the English National team and has become a widely talked about problem that English football cannot seem to escape.

Some Authors have suggested that “structured and representative practice is the key to helping players to prepare for one of the most highly pressurised situations in World sport. It is only in the absence of such preparation that the “lottery” truly begins” (Wood, Jordet and Wilson, 2015)

Wood, Jordet and Wilson (2015) referred to the penalty shoot-out as “One of the Most highly pressurised situations in World sport”. Thus understanding the intricacies of the penalty skill is of paramount importance. Furthermore, Lyttleton (2014) discovered that a player’s likelihood of scoring a penalty for a team whose last two shoot-outs ended in defeat, decreased considerably to 57%, even if that player was not part of the team at the time of those defeats. It was also suggested that the chance of scoring for a side that has won its last two shoot-outs increases to 89%. This highlights the fact that a penalty shoot-out can indeed be a psychologically challenging experience and as such, requires in-depth analysis. Previous Literature has researched into the effects of past team success in a penalty shoot-out and its future consequences or specific aspects of performance (the Goalkeeper, Technique, Psychology and Physiology), but rarely has it focused on a specific team.

1.1 Analysis of Penalties in Football

Academic research into the penalty skill or the penalty shoot-out has been undertaken to provide knowledge about how a player's skill level can be improved to produce more successful outcomes or to widen awareness of the effects of penalty taking. Some authors have analysed the effect of the goalkeeper on success rate of penalty shot technique (McMorris and Colenso, 1996; Kim and Lee, 2006 and Masters, Van der Kamp and Jackson, 2007), whilst others have focused purely upon technical aspects of the shot (Scurr and Hall, 2009; Bar Eli and Azar, 2009; Kerwin and Bray, 2006 and Van Der Kamp, 2006). A wide variety of literature has investigated the Psychology of penalty taking and its effects on penalty kick performance (Jordet, Hartman and Vuijk, 2012; Moll, Jordet and Pepping, 2010 and Ramsey, Cumming, Edwards, Williams and Brunning, 2010). Furthermore, certain physiological factors relating to penalty taking have also been investigated. Jordet, Hartman, Visscher and Koen (2007) investigated into this to conclude whether Physiology played an important role in penalty kick success or failure.

1.2 Aim of the Study

The aim of the study is to assess whether players from the England International squad penalty performances are less successful than performances by players from around the World, whom are considered to be highly skilled penalty taking players, and if so how or why they differ. The study will investigate ten players (five from England and five from the Rest of the World) Club and International level performances from the start of the 2010/2011 season to the end of the 2014 World Cup in Brazil. A conclusion will bring together the findings of the study and aim to answer whether English football players have the skill to compete with the World's most elite players.

1.3 Limitations

It was not possible to record any original footage to be used in the study. Therefore, the required footage had to be accessed via a public access database (YouTube, San Bruno, California) or recorded from Television as a legal subscription is owned by the researchers.

1.4 Delimitations

As the study is an undergraduate dissertation it was not possible to conduct any questionnaires or interviews with the chosen players to identify any psychological strengths or areas for improvement.

1.5 Definitions of Terms

When the term ‘Deception’ has been used this refers to any penalty that includes a stutter or stop in the players run-up.

To be grammatically correct the study uses the terms ‘England’ or ‘the Rest of the World’ to describe the groups as a whole. The terms ‘English player’ or ‘Rest of the World player’ have been used to describe players individually.

The term ‘Penalty’ has been used to describe a singular event or scenario and the term ‘Penalties’ has been used to describe multiple events or scenarios.

The term ‘Elite’ refers to a player that is of a professional standard.

The term ‘Intermediate’ refers to a player that is of a semi-professional standard.

The term ‘Goalkeeper-Independent’ refers to the penalty technique of picking a direction pre-kick and sticking to that choice.

The term ‘Goalkeeper-Dependent’ refers to the penalty technique of waiting to see which direction the goalkeeper moves and kicking the ball in the opposite direction. This technique involves deception.

A table of operational definitions for the notation system indicators has been included in the method section.

Chapter Two
Literature Review

2.0 Literature Review

The following review will provide an insight into some of the research that has explored penalty kick taking. The literature focuses on three primary areas, including the Goalkeeper, player Psychology and Physiology and Technique. Examples of Performance Analysis of penalties will also be presented.

2.1 Real World Performance Analysis of Penalties

Prior to a penalty shoot-out in 2009, the Manchester United goalkeeper Ben Foster was shown video clips and data of his opponents previous penalties to help him guess which direction they were most likely to strike the ball. Manchester United beat Tottenham Hotspur in the penalty shoot-out with Ben Foster making multiple saves (Sunday People, 2011). This method was also used by Joe Hart while playing for England during the Euro 2012 penalty shoot-out against Italy. In the break between extra-time and the penalty shoot-out, Hart watched video clips using an IPad (Price, 2012). Unlike Ben Foster, Joe Hart was not part of the winning team. Before hand-held devices were available, goalkeepers would have folders of penalty kick data on paper. Nottingham Forest's Mark Crossley was known to use this method and was the only goalkeeper to stop a Matt Le Tissier penalty kick (Price, 2012).

2.2 Goalkeepers

McMorris and Colenso (1996) attempted to distinguish whether a goalkeeper could anticipate a penalty kick better from either a right footed or left footed player. A temporal occlusion paradigm was used with every penalty being presented at three occlusion points; two frames before contact, two frames on contact and two frames after contact. By using a 2-way (foot x occlusion point) analysis of variance (with repeated measures) results showed that goalkeepers anticipated right footed players better using the angle of approach, foot position and hip position at the time of

contact. However the small sample size (N=20, N=10 right foot, N=10 left foot) could have affected the results and is a limitation of the study.

Moreover, Kim and Lee (2006) investigated elite goalkeeper's gaze during a penalty and assessed their ability to recognise pre performance cues and correctly guess the direction of a penalty shot. This study was limited by its relatively small sample size (N=6). The analysis of elite performers provides evidence of how top athletes perform. This can be used by lower standard athletes as an example of the performance levels that they must reach to become elite.

Building on the previous work of Masters, Van der Kamp and Jackson (2007), Piras and Vickers (2011) used intermediate level goalkeepers to investigate the success of different techniques used during penalty kicks and to discover which techniques had a higher percentage saved. A mobile eye tracker and an external camera were used to collect the gaze and motor behaviours of the goalkeeper and also the penalty takers' motor behaviours as well as the flight of the ball. For an instep technique the percentage of saves were higher (28%) than the use of an inside foot technique (12%). However some differences were identified in fixation frequency, location, duration or transitions that could be attributed to the type of technique used. Mean fixation duration was lower on saves (1000ms) than on goals (1400ms) and the type of foot contact did not affect mean fixation viewing time. During the final phase of the kicking action, the goalkeeper's quiet eye was positioned on the visual pivot which was longer during saves than goals. Once the final fixation on the ball exceeded approximately 1,100 ms, the results hypothesised that the probability of a goal improved. Not using elite performers could be viewed as a limitation as an elite performer may be able to fixate for longer than 1,100 ms and still produce a successful outcome.

Kropp and Trapp (1999) looked into the amount of penalties saved in the Bundesliga and stated only 18% of penalties had been saved. Results showed a positive correlation for the goalkeeper allowing one side of the goal to be more open and the resulting penalty more likely to be aimed for the open side of the goal. The goalkeeper could then have an improved chance of diving the correct way and

increase the chances of saving the penalty. A limitation to the research is that if a player has a good technique and can put the ball in the far sides of the goal then a keeper is at a disadvantage as they have to cover more ground to save the ball.

2.3 Psychological and Physiological Aspects

Player Psychology could be considered a key aspect during a penalty scenario. A study by Peiyong and Inomata (2012) researched cognitive strategies used for the performance of penalty kicks. Twelve male university goalkeepers and twelve male university outfield players were required to watch videos made by three different penalty takers preparing a penalty kick, then twelve following moments; before impact of the takers' foot with the ball to 267ms and after impact to 200ms. Three different types of kick (instep, front of foot, inside of foot) directed at three different possible positions within the goal (left, right, centre) were used. As a response, participants were required to move their body to intercept the oncoming ball. Results indicated that players were more successful in guessing the correct direction when responding after ball contact compared to responding pre ball contact while using pre performance cues.

Jordet, Hartman, Visscher and Koen (2007) created a study that took into account the roles of physiological and psychological factors and how it attributed to a player taking a penalty in a shoot-out. Data was collected from football statistics websites on all penalty shoot-outs (N=41) and penalties (N=409) taken in the World Cup, European Championships, and Copa America between 1976 and 2004. The results showed that the importance of the penalty was negatively related to the outcome whereas skill and fatigue were less, or not related to outcome. It was concluded that the most influential factors for the outcome of penalty kicks is the psychological components. Zandi and Masomi (2010) investigated the effect of anxiety and the use of positive imagery on intermediate level players' penalty performance. Forty male footballers between 18 and 35 years of age were randomly selected to participate in the study. Perceived anxiety levels were recorded using the SCAI2 (Social-

Communication Anxiety Inventory 2). The forty players followed an imagery programme for ten weeks. Four days out of each week a comparison of the players pre-test and post-test perceived anxiety levels was undertaken. The results concluded that imagery practice had a positive effect on reducing perceived levels of anxiety when combined with penalty kick training.

Preparation is a key psychological aspect of the penalty kick skill. Furley, Dicks, Stendtke and Memmert (2012) researched player preparation prior to penalty taking and also assessed the issue of players hastening their approach to a penalty. The study employed an experimental research design investigating the link between gaze behaviour and preparation time. Analysis of players perceptions of non-verbal hastening and hiding behaviour (using the point-light technique) during a penalty kick was conducted on intermediate goalkeepers (N=20) and outfield players (N=29). Furthermore, they analysed how the individual penalty preparation strategies influenced the behaviour of elite goalkeepers (N=12) in a performance scenario. Results indicated that penalty takers showing hastening and hiding behaviours are perceived more negatively by both goalkeepers and outfield players. They are considered to possess less positive attributes such as accuracy and are likely to perform worse in penalty situations. The further work with elite goalkeepers provided new evidence that goalkeepers initiate their movement later following an observation of hastening and hiding behaviours in approaching outfield players. It was identified that further research was required to know how anxiety and preparation behaviour impacts upon interpersonal perception and action.

Even though a player may never have been part of a winning or losing team when it comes to a penalty shoot-out, they can still be judged in accordance with their teams' history in both a positive or negative way. Jordet, Hartman and Vuijk (2012) investigated the effects of previous penalty shoot-outs on recent penalty shoot-out results. Penalty Kick footage was used from two International tournaments (European Championships and the World Cup) between the years of 1976 and 2006 (N=309). The results showed that players from teams with negative penalty shoot-out history were less successful and would on average rush their penalties more

than the players from teams with previous success. These differences were also found in players who had not been involved in any previous losses.

When the emotions of a penalty shoot-out are running high it is common for players to be overjoyed at the success and relief of scoring. A study by Moll, Jordet and Pepping (2010) asked the question of whether celebrating after scoring would have an effect on the overall result. Using Chi-Square analysis on penalty shoot-outs from World Cups and European Championships (N=151) they investigated behaviours associated with winning a penalty shoot-out, an example of one of the behaviours would be throwing both arms into the air in celebration. When the score between the teams involved was equal, the study found that players who engaged in certain celebratory behaviours were more likely to be part of the team that would win the penalty shoot-out. The results showed that it was more likely that the next penalty taken by an opponent was missed after a player had displayed these behaviours than when they did not. When the *P* value was ≤0.05, the celebration had a significant association to the resultant penalty being missed. Both Arms Raised above the Head (*P* = 0.011), Two Hands Made into Fists (*P* = 0.011), Chest Expanded (*P* = 0.044) and Both Arms Extended out Below Head Height (*P* = 0.044) were found to have a significant association. One limitation of the study was that the results were based on the opponents who missed the resulting penalty being affected by the celebratory behaviours and not potentially by their own personal psychological barriers, their technique or the goalkeeper.

Roskes, Sligte, Shalvi and De Dreu (2011) searched into the possibility of whether approach motivated goalkeepers tended to dive towards a certain direction more than avoidance motivated goalkeepers. In a task in which goalkeepers had to divide a box on a piece of paper into two equal parts by drawing a line, approach motivated goalkeepers would draw a line further to the right than the avoidance motivated goalkeepers but only when they were forced to act under high time pressure. The

research concluded that approach motivation was used by goalkeepers when they were facing a penalty and their team was currently behind. In these situations goalkeepers were found to be two times more likely to dive to their right than their left. It was found that players aimed their penalties on average each side equally so the approach motivated goalkeepers would be more likely to concede when placed into approach motivated scenarios.

A limitation to the study is that it doesn't show whether approach motivated goalkeepers were involved in more penalty shoot-out loses than avoidance motivated goalkeepers when not solely placed under high time pressure situations.

The penalty spot can be a place where emotion and environment can grip even the most mentally hardy of players. Ramsey, Cumming, Edwards, Williams and Brunning (2010) investigated the effect of PETTLEP (Physical, Environment, Task, Timing, Learning, Emotion, Perspective) based imagery interventions and how it could help combat emotion in a performance environment. Two six-week PETTLEP-based imagery intervention groups were compared to a control group. Both imagery interventions (skill based and emotion based) were facilitative and only their emotional content changed. Participants' penalty performance, self-efficacy and interpretations of anxiety were measured before and after an intervention period. Past-intervention performance scores for both skill based and emotion based groups were significantly greater than the control group. However, there were no differences between the two imagery groups. The study went onto propose that the addition of emotional content into imagery practices may be more influential in a competitive environment rather than a practice one. The study doesn't fully conclude that the technique is more suited to a competitive situation, so for elite athletes it may not be credible enough to trust when it comes down to high performance situations in which success and failure is even more vital.

2.4 Technique

A player's technique is arguably the most significant indicator of success of a penalty kick. Zhou and Inomata (2009) compared the use of a Goalkeeper-Independent

approach of picking a direction and staying with it or a Goalkeeper-dependent technique of seeing which way the goalkeeper moves before kicking the ball. Twenty-four university male students were split into two groups: twelve experienced football goalkeepers and twelve experienced football outfield players. Participants were asked to watch videos made by three different kickers preparing a penalty, then twelve following moments.

Three different kicking techniques were identified (instep, front of foot, inside of foot) and directed at three different possible goal positions (left, right, centre). In response to the videos, participants were required to move their body to intercept the oncoming ball. Results indicated that the goalkeeper group and the outfield player group could not use the advance visual cues to predict the direction of the incoming ball when they began a response before the moment of impact. However, both groups were successful when the response was instigated after impact. The goalkeeper group had a significantly faster response-initiation time than the outfield player group. It was concluded that the goalkeepers were more likely to implement a strategy of relying on situational probabilities in a scenario when the speed of response is critical.

Scurr and Hall (2009) researched into the effects of approach angle on the success rate of penalty kicks. Seven male amateur football players who were right foot dominant kicked penalties at a 0.6m x 0.6m target in a full size goal from their chosen approach angle of either 30°, 40° or 60°. Kicking accuracy and three-dimensional kinematics were recorded. Results revealed that there was no significant difference in kicking accuracy (P = 0.27) or ball velocity (P = 0.59) between the approach angles. It was concluded that changing a player's self-selected approach angle at amateur level did not improve kicking accuracy or ball velocity despite modifying aspects of fundamental technique. A future development for the study would be using elite performers to find out whether the higher skill level has an effect on the original key findings. Bar Eli and Azar (2009) investigated the use of strategy in penalty kick taking. Data from penalty kicks (N=311) from top leagues and championships, for example The English Premier League, La Liga, The Bundesliga, were collected and analysed. Results found that penalty shots were

more successful when aimed at the top corners of the goal as goalkeepers find it more difficult to reach these positions. However, when elite goalkeepers undertook a survey it was revealed that when a penalty aimed towards the top corner was saved that it would give the goalkeeper more self-confidence but if they failed to save it then confidence was not affected. It was suggested that players aim toward the top corners more when taking a penalty but sufficient training should be undertaken to build competence and confidence in this skill.

A limitation to the study was that it failed to find the percentage of penalties missed when aimed for the top corners and as a result did not present a figure to represent the higher risk strategy.

Players can use a deceptive movement strategy to try and trick a goalkeeper into diving the wrong way. Smeeton and Williams (2012) revealed that using pre performance cues was the best technique to anticipate penalty direction when deception was involved. Conversely, players who were over confident would produce a less accurate penalty. They examined anticipation in football players ranging from high to low skill level. Participants viewed temporarily obstructed (−240 ms, −160 ms, −80 ms, 0 ms, +80 ms) deceptive, non-deceptive, and non-deceptive exaggerated penalty kicks. Kinematic analysis was used to determine whether the kicking actions changed under different conditions. The accuracy of guessing the direction of an opponent's kick in addition to response confidence was also recorded. Significant correlations were found between less skilled players' confidence ratings and their accuracy 80 ms before ball contact in the deceptive (P = 0.588) and non-deceptive-exaggerated (P = 0.544) conditions. The results proposed that exaggerated movements in a deceptive penalty takers action at 80 ms before ball contact could provide an explanation as to why a pre performance cue technique prevails when anticipating deceptive kicks at this time point.

Kerwin and Bray (2006) analysed areas of the goal that were deemed to be un-reachable even when the goalkeeper has correctly guessed the direction of the ball strike. They calculated the average time it takes for the ball to get to the goalkeeper after being kicked (500 – 700 ms), the dimensions of the goal in which the goalkeeper has to defend (7.32m x 2.44m) and also the average jumping ability of a

goalkeeper (which was found using ground reaction force and anthropometry). It was discovered that 28% of the goal could not be protected by a goalkeeper. This gives a player a guaranteed success rate if they are able to hit these target areas in the goal. This is key information for any football player who has or will take a penalty. In elite performance the skill level should be high enough that the players can hit these target areas.

Players can either pick a spot then stick to their decision pre penalty or can wait to see what the goalkeeper does before they decide on a direction. Van Der Kamp (2006) investigated these approaches to find out which technique produced the most successful outcome. Ten intermediate-level football players shot at one of two visually specified targets to the right and left side of the goal. In the Goalkeeper-Independent technique (Pick a spot and stick to it) participants were told that the visually specified target would not change. In the Goalkeeper-Dependent technique (Wait to see what the goalkeeper is doing) participants were told that in half of the trials the visually specified target would change side at different times before ball contact, this suggests that the direction of the kick may need to be changed. The results showed that the Goalkeeper-Dependent technique was less successful than the Goalkeeper-Independent technique. Having less time to alter kick direction resulted in a higher risk of the penalty being incorrect or inaccurate towards the specified target. It was concluded that trying to guess a goalkeeper's movement may reduce penalty kick performance, mainly due to the insufficient time to alter the kicking action. It could be argued that elite level athletes that use a Goalkeeper-Dependent technique have a higher skill level so should still be able to produce an accurate shot at the target even if they change their decision late on. A future improvement to the study could be that it uses elite level athletes instead of intermediate level athletes to find out the results when skill level isn't as big a factor in hitting a changing target.

2.5 Aim of the Study

The aim of the study is to assess whether players from the England International squad penalty performances are less successful than performances by players from around the World, whom are considered to be highly skilled penalty taking players, and if so how or why they differ.

Chapter Three

Method

3.0 Method

3.1 Participants

The sample selected for the study included two groups; English players and players from the Rest of the World. The English players selected were all members of the 2014 World Cup Squad and are also penalty takers for their Club team and the England National team when required. The Rest of the World players that were selected are regarded as some of the most elite players in the World who also took penalties for their Club team and National team. As a minimum requirement, all of the players selected had to have taken penalties between the 2010/2011 season and the 2013/2014 season.

3.2 Video Footage

The video footage for each player was accessed from a variety of sources. Firstly, each game result since the start of the 2010/2011 season (both Club and International) was found via the players Club website or via the National website. This was done in order to find every game in which the player had scored a penalty and also the scenario in which it had been taken, for example if the penalty was to win a game. Every penalty the player had taken was noted down accompanied by the date of the game so it could be easily found for when the visual analysis took place. Once all 10 players' penalties had been found and had been thoroughly checked, the data could be collected. For the analysis of each penalty a video of that penalty was accessed via YouTube (San Bruno, California). Most of the videos were

from match highlights but on some occasions it was only possible to use videos from behind the goal by means of a fans mobile phone.

3.3 Pilot Study

Developing a coding system enables the efficient collection of information relating to performance. This requires an iterative process of development (O'Donoghue, 2014). As such, a Pilot study was undertaken to test the efficiency of the proposed notation system. This consisted of eighteen penalty related questions that had been chosen from research in the topic area (See in appendix A). For the purpose of the Pilot study sixteen penalties by one of the chosen Rest of the World players were analysed. After a review it was decided that the data should be collected on a tangible paper notation system and then the data would be copied into Microsoft Excel 2013 (Redmond, Washington). It was discovered that the original notation system was too random due to the selected questions not having any type of order which made data collection a longer and more difficult process. Therefore, the system required editing so that the data collection could be done in a more efficient and sequential way.

3.4 Notational Analysis System

The final system design was a sequential hand notation system. Variables were organized into sub groups (Run Up, Ball Strike, Goalkeeper and External Influencing Factors and Other Potential Outcomes) that made data collection more efficient and manageable. Figure 1 illustrates the system that was used.

As well as the sequential system, a representation of the goal was used to assess a goalkeeper's ability to access the ball. For the analysis of this aspect, the goal was

broken down into eight sections and then each section was deemed to either be easily reachable or not easily reachable for the goalkeeper (As seen in Figure 3).

Pen Number	Scored or missed	Direction Of penalty	Foot used	Technique Of strike	Run up technique	Did ball roll or bounce	Did ball hit post or crossbar	Keeper go the right way	Keeper touch the ball	How big a touch and body part used	Time in game pen taken	To be Winning Drawing Losing	Does it bring team back to within 1 goal	To complete a hat-trick	Could it have been saved easily if keeper goes the right way	Is pen in a shoot-out	Is pen to win a shoot-out	Is pen to stay in a shoot-out
1																		
2																		
3																		
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8																		
9																		
10																		
11																		
12																		

Figure 1. The Final Notational Analysis System.

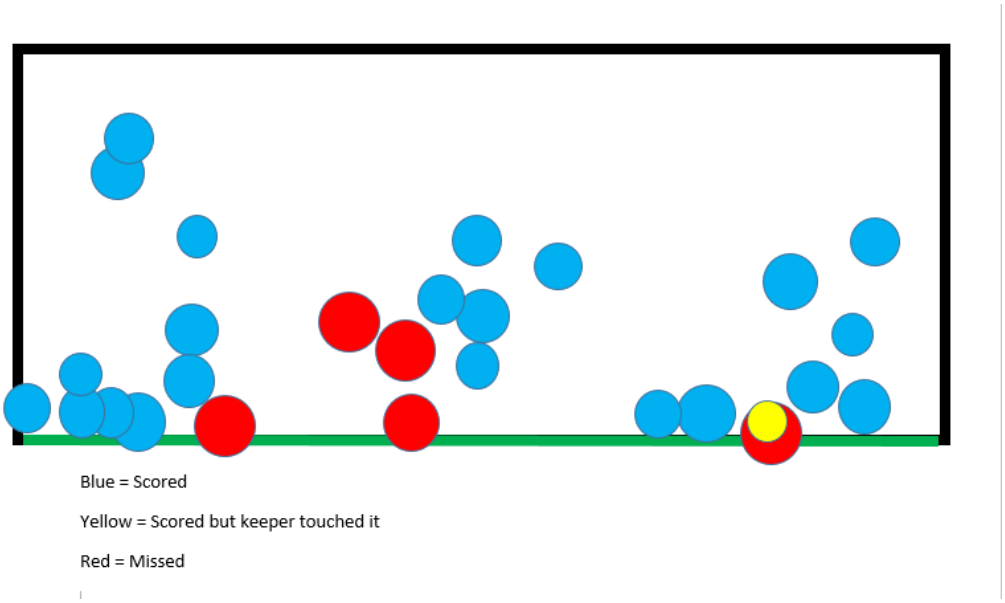

Figure 2. Example of Goal Placement Data.

Operational definitions were produced for each variable included in the final system design. This information was essential to ensure that the process of analysis of each variable was repeatable and hence, reliable.

Table 1. Operational Definitions of the Notation System Questions

Question	Operational Definition
1. Scored or Missed	Whether the player scored the penalty or missed. If the goalkeeper saves the ball but it hits a post or crossbar back onto the goalkeeper and goes in then this is defined as a miss.
2. Which Direction was the Ball Hit	Whether the ball was hit left, right or down the middle.
3. Which Foot was used	The foot that was used to strike the ball.
4. Technique of Strike	Can be either a laces technique or side foot technique
5. Technique of Run-Up	A short run up consists of two strides or

	less. A moderate run up starts from the edge of the box (not the D line) or involves more than 2 strides. A long run up is anything that starts from minimum outside the edge of the box. A non-stutter run up means there was no stutter at all whereas a stutter run up involves a stutter at some point during the run up.
6. Did the Ball Hit the Post or Crossbar	Whether the ball hit a post or the crossbar from the penalty kick.
7. Did the Ball Bounce or Roll Before the Line	Whether the ball bounced or rolled before the goal line. If the ball bounces on the goal line then it is recorded as a 'No'.
8. Did the Goalkeeper go the Correct Direction	Whether the goalkeeper dived in the same direction as the penalty was struck. If the penalty is down the middle and the goalkeeper stays in the middle then this also counts as guessing the correct direction.
9. Did the Goalkeeper Touch the Ball	Whether the goalkeeper got any touch to the ball.
10. How Big a Touch did the Goalkeeper get and What Body Part was used	A small touch would be the ball just getting a small glancing touch that does not deviate the balls path. A moderate touch would be getting finger tips, edge of a boot or body to the ball that creates a small deviation of the balls path. A large touch would be anything that takes a large deflection off from the goalkeeper and changes the balls path significantly. The body part that was

	used (the Hand or Foot) is then recorded also.
11. When in the Game was the Penalty Taken	The time in the game the penalty is taken, for example the 90th Minute. If the penalty recorded is from a shoot-out then 'Extra Time' is recorded as the time in game and then the latter question 'Is the Penalty in a Shoot-Out?' will also be selected as 'Yes'.
12. Is the Penalty to be Winning, Drawing or Losing	If the penalty is scored, do the team who scored the goal then still be Losing (if losing already), be Drawn Level or be Winning.
13. If Losing Does it Bring the Team Back to Within 1 Goal	If the team are losing by more than one goal, does the penalty draw them back to within one goal of the opposing team if it is scored
14. Is the Penalty to Complete a Hat-Trick	Whether the player taking the penalty completes a hat-trick if they score the penalty. This does not apply in a penalty shoot-out scenario.
15. If the Goalkeeper Went the Correct Direction Could it have been Easily Saved	As defined by Figure 3. If the Ball went wide , hit the post, hit the crossbar or went over then this is noted down instead of Yes or No.
16. Is the Penalty in a Shoot-Out	Whether the penalty recorded is from a shoot-out.
17. Is the Penalty to win a Shoot-Out	If the penalty being recorded is scored then that player's team wins the shoot-out.
18. Is the Penalty to Stay in a Shoot-Out	Whether the penalty being recorded must be scored to stay in a shoot-out. If it is missed then the penalty taking

	players' team loses.

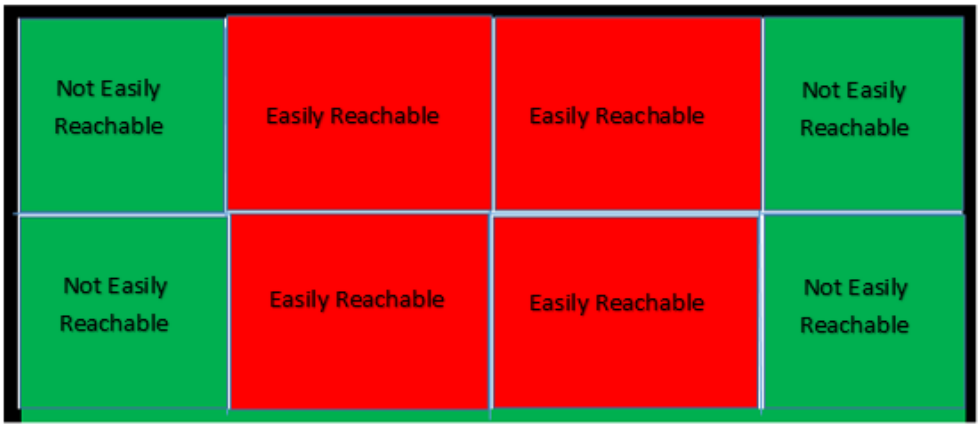

Figure 3. Definition for Whether the Penalty was Easily Reachable or Not Easily Reachable.

3.5 Video analysis

The video footage of each penalty was accessed individually for the purpose of analysis. The data was initially hand notated using the finalised sequential system (As seen in Figure 1) and was then input into a Microsoft Excel 2013 (Redmond, Washington) spreadsheet. Some of the questions required a subjective opinion (*Would the Goalkeeper have saved it if he went the correct direction?)* so to ensure the data would still be reliable and consistent some operational definitions were decided upon (As seen in Table 1). This approach has been used by several authors (Nevill, Atkinson, Hughes and Cooper, 2002; Hughes and Robertson, 2002; O'Donoghue and Liddle, 1998). The chosen process was to collect the factual objective variables first as they did not require subjective analysis (*Time in game, Foot used, Scored or Missed*) and then the subjective data was collected in a sequential order starting from the run up and ending with the goalkeepers variables. For the analysis of each player, a diagram of shot placement including success was also used (Seen in Figure 2). Along with the video, a written review of the game was found online to record the objective data that didn't require any analysis, for example

the *Time in Game*. In accordance with the decided analysis process, the analysis of each penalty was undertaken and recorded.

3.6 Data Analysis

After descriptive data had been compiled and illustrated appropriately, all data was analysed statistically using SPSS 22.0.1. (Statistical Package for the Social Sciences) (Armonk, New York). Due to the nature of the data, a series of Chi Square tests were conducted to assess any significant effects. Significant effects were reported for *P* values of ≤0.05. This was undertaken to establish tactical associations and outcome associations within the two groups to then make comparisons between them.

3.7 Reliability testing

An intra-observer reliability test was undertaken to test the procedure of the data collection method. This process was undertaken in order to offer a greater level of confidence in the reliability of the new system. One of the players series of penalties was analysed twice (N=30 recorded twice) by a single observer. In each case, the two timed sequences of events were combined so as the kappa statistic could be applied to each aspect of the penalty kick. Where one observation recorded an event but the other observation did not, values of “none” were used for the observation that did not recognise an event.

Chapter Four

Results

4.0 Results

This chapter includes the descriptive and inferential statistics produced as a result of the notational analysis and subsequent statistical analysis process undertaken. All of the statistical results will be reported as significant effects if represented by a *P* value of ≤0.05.

4.1 Reliability

A kappa reliability score was not undertaken. Differences were investigated using two independent observations of the footage. Following the independent observations, only three errors in judgement were found. Therefore, the investigator deemed the process to be reliable and it was unnecessary to generate the kappa statistic

4.2 Team Comparison

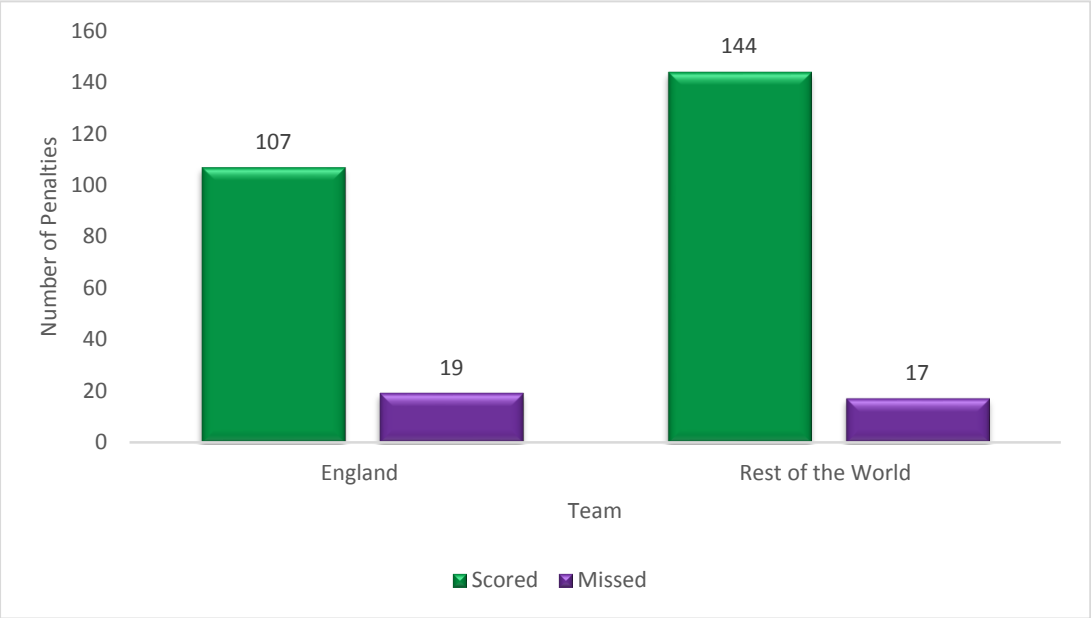

Figure 4. Frequency Distribution of Penalties Scored and Missed

Figure 4 represents the frequency distribution of penalties *Scored and Missed* by the English and the Rest of the World players. The success overall between the two groups was assessed in a single Chi Square test. This showed no significant association between type of team and success ($\chi^2 = 0.59$, $P = 0.472$).

4.3 Quality Indicators

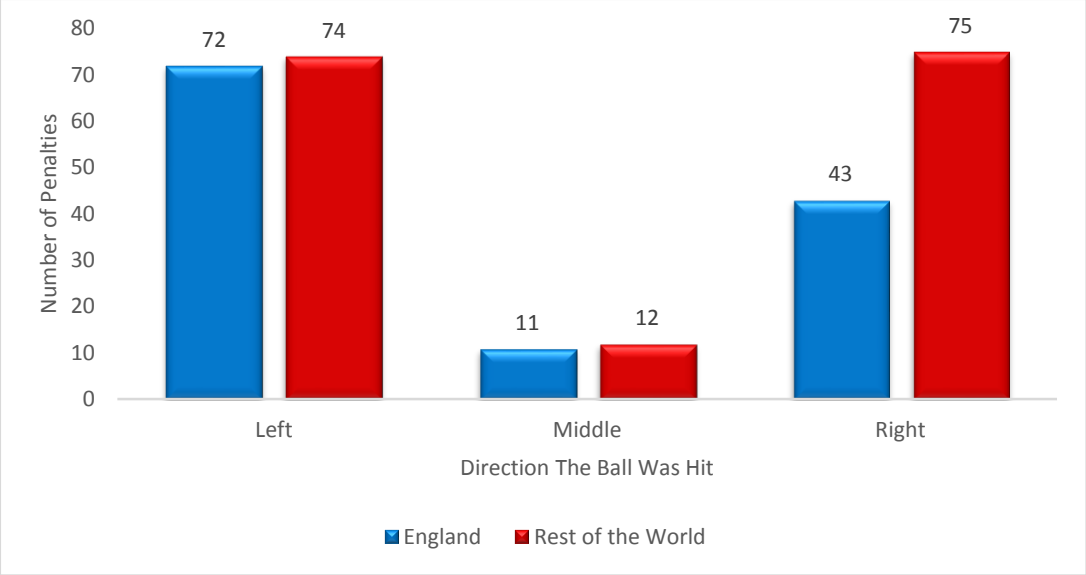

Figure 5. The Direction in Which the Ball Was Hit.

Figure 5 shows the direction the penalties by England and the Rest of the World were struck. There was a significant association with *The Direction the Ball Was Hit* and the team. England preferred to hit the ball to the left (57%) and the Rest of the World preferred to hit the ball to the right (47%). (χ^2=11.78, P = 0.003).

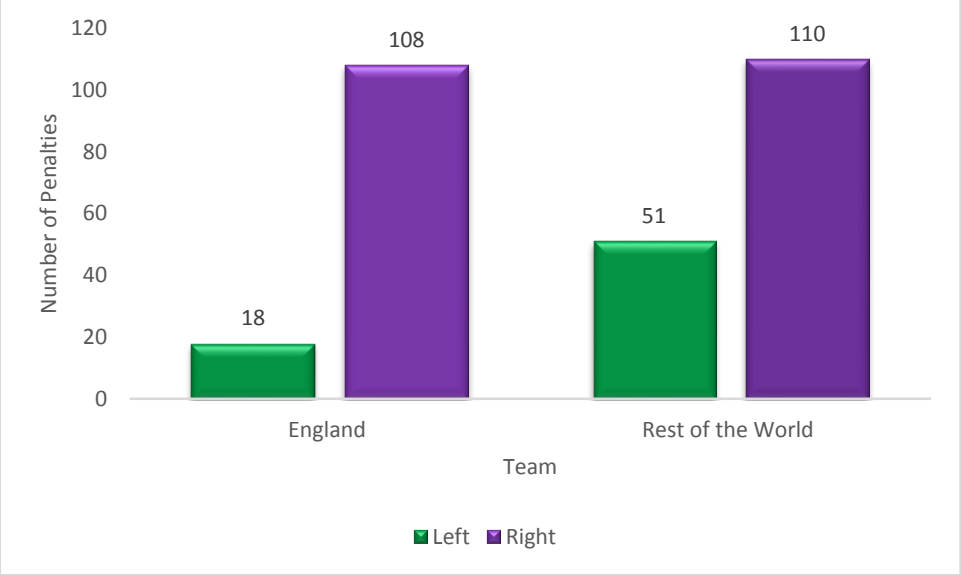

Figure 6. The Foot Used to Strike the Penalty.

Figure 6 displays the amount of penalties that were taken by right footed and left footed players for both England and the Rest of the World. There was a significant association between the *Foot Used* to produce the penalty and the team. England preferred to use the right foot (86%) as did the Rest of the World (68%) (χ^2= 46.1, *P* = 0.000).

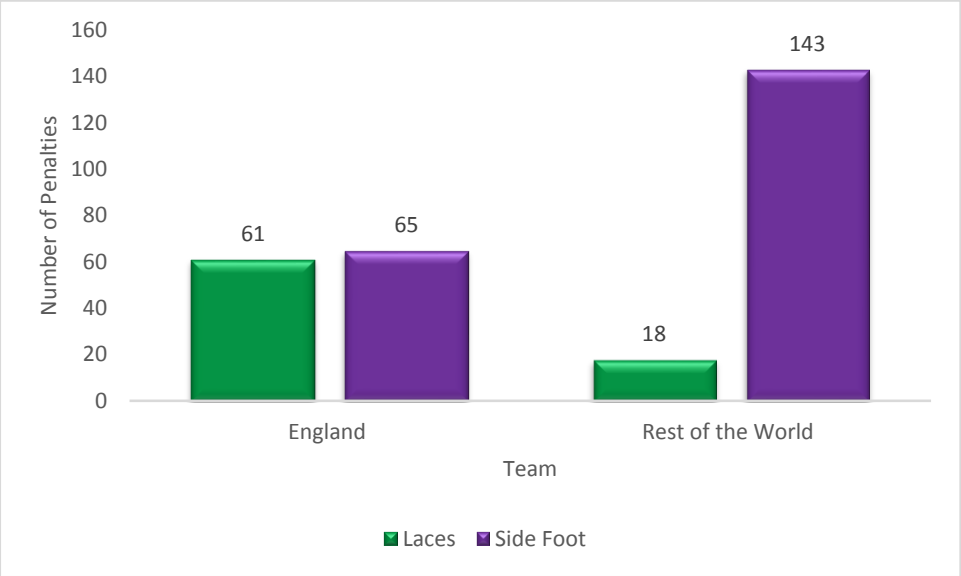

Figure 7. The Technique of the Ball Strike.

Figure 7 shows the amount of penalties by England and the Rest of the World that used either a *Laces* technique or *Side Foot* technique. There were 143/161 penalties (89%) taken by the Rest of the World players using the *Side Foot* technique. This was significantly greater than the 65/126 attempts (52%) taken by the England players using the *Side Foot* technique. (χ^2= 34.35, *P* = 0.000).

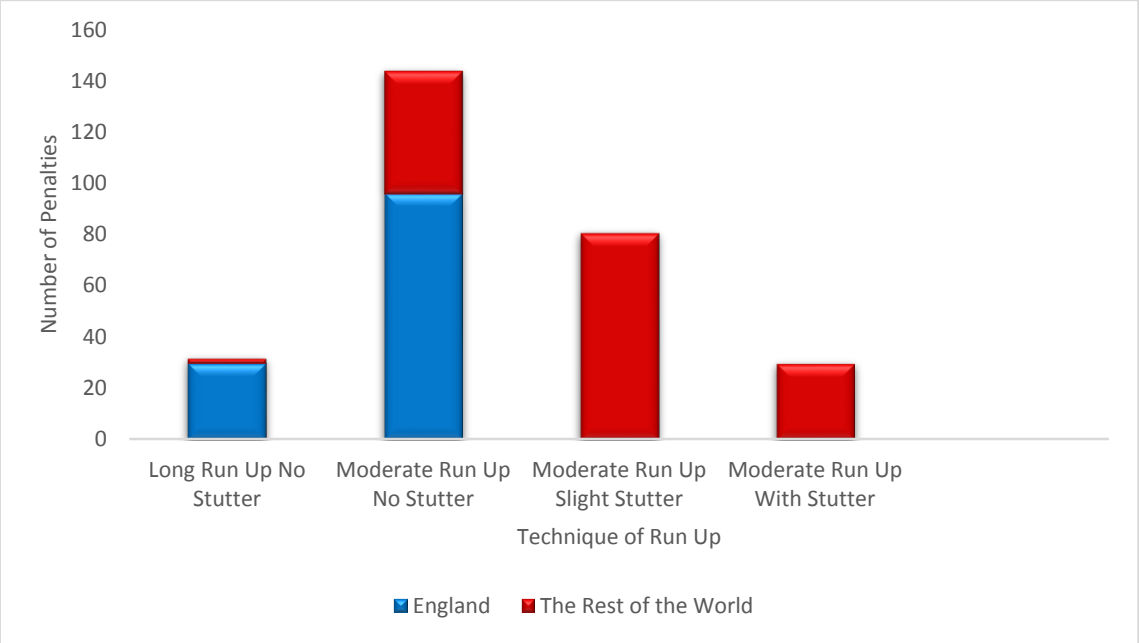

Figure 8. The Technique of a Players Run Up.

Figure 8 displays the various run up techniques displayed by England and the Rest of the World. There was a significant association between the technique of a players run up and the team (χ^2=108.84, *P* = 0.000). England used the *Moderate Run Up with No Stutter* on 96/126 occasions (76%). the Rest of the World used a wider range of techniques, *Moderate Run Up with a Slight Stutter* (50%) being the most used followed by *Moderate Run Up with No Stutter* (30%) then *Moderate Run Up with a Stutter* (19%) and finally *Long Run up with No Stutter* (1%).

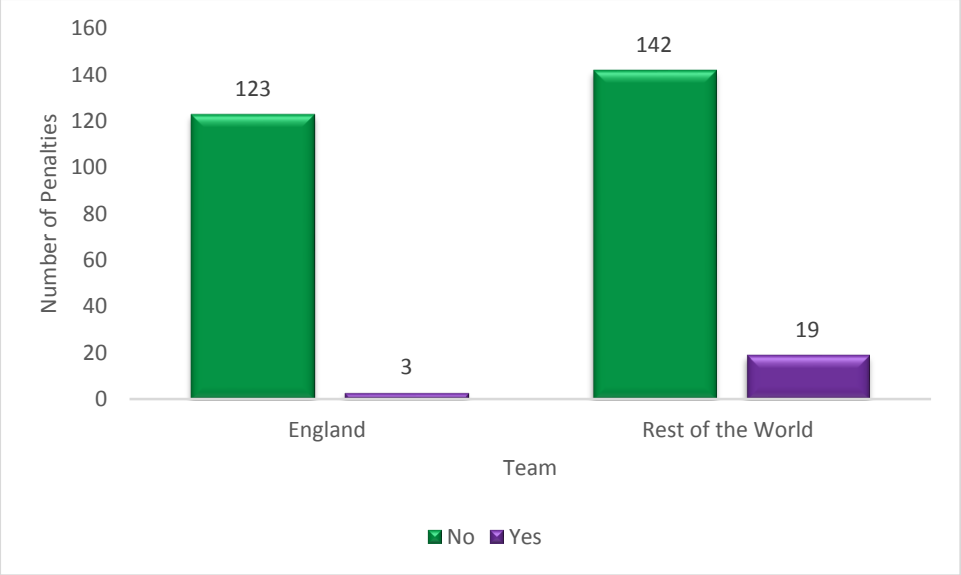

Figure 9. Did the Ball Hit the Post or Crossbar.

Figure 9 illustrates the number of penalties that *hit the Post or Crossbar* or did not by both England and the Rest of the World. The Rest of the World players *hit a Post or Crossbar* on 19/161 occasions (12%), this was significantly greater than the 2% by England players (χ^2= 18.20, *P* = 0.000).

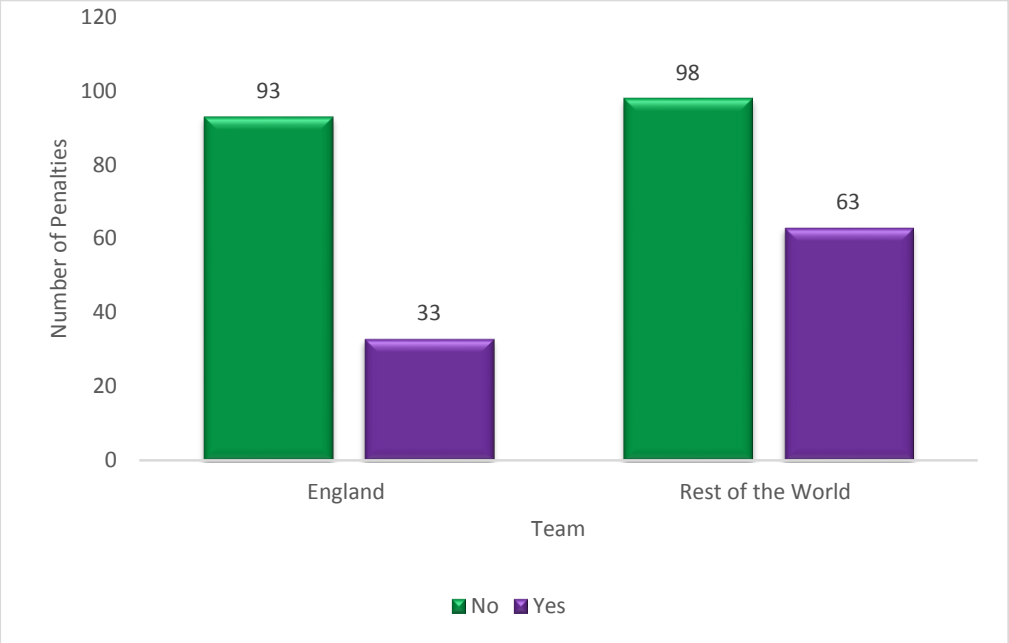

Figure 10. Did the Ball Roll or Bounce Before the Goal Line.

Figure 10 displays the amount of penalties that *Rolled or Bounced before the Goal Line* or did not. England players rolled or bounced the ball before the goal during 26% of their penalties while the Rest of the World players did so during 39% of their penalties. However, this was not a significant association (χ^2= 0.76, *P* = 0.442).

4.4 Goalkeeper Actions

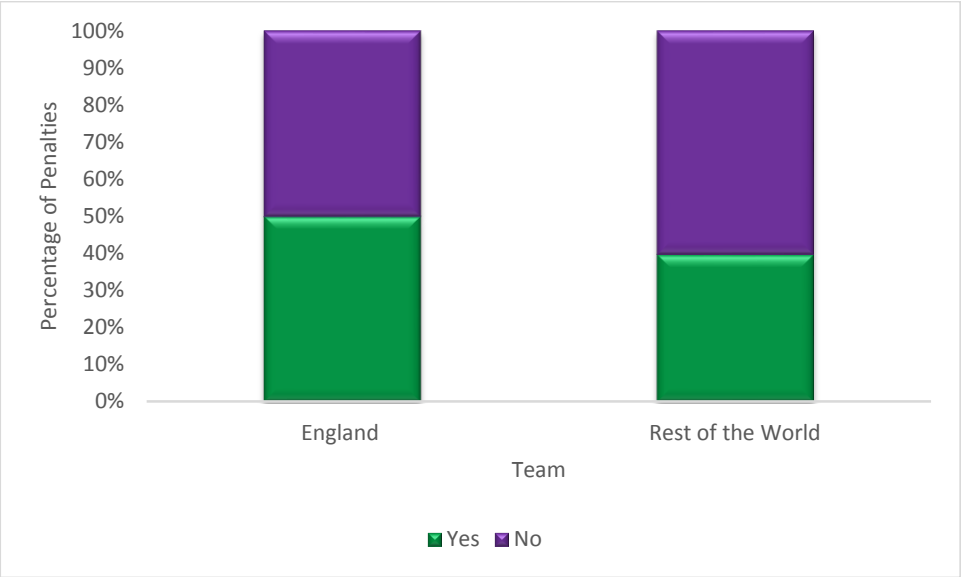

Figure 11. The Percentage of Penalties in Which the Goalkeeper Guessed the Correct Direction

Figure 11 represents the divide of P*enalties in which the Goalkeeper Guessed the Correct Direction*. For England, the goalkeeper guessed the correct direction during 63 penalties and did not during 63 penalties. For the Rest of the World, the goalkeeper guessed the correct direction during 64 penalties and did not during 97 penalties. If the goalkeeper went the correct direction for England, this was a significant association to missing the penalty (χ^2= 10.47, *P* = 0.002). If the goalkeeper went the correct direction for the Rest of the World then there was also a significant association to missing the penalty (χ^2= 18.66, *P* = 0.000). 23% of the penalties were missed by England and 29% by the Rest of the World when the goalkeeper guessed the correct direction.

There was a significant association between the goalkeeper guessing the correct direction and the team ($\chi^2 = 7.66$, $P = 0.007$). The goalkeeper was more likely to save a penalty taken by a Rest of the World player than an England player when guessing the correct direction.

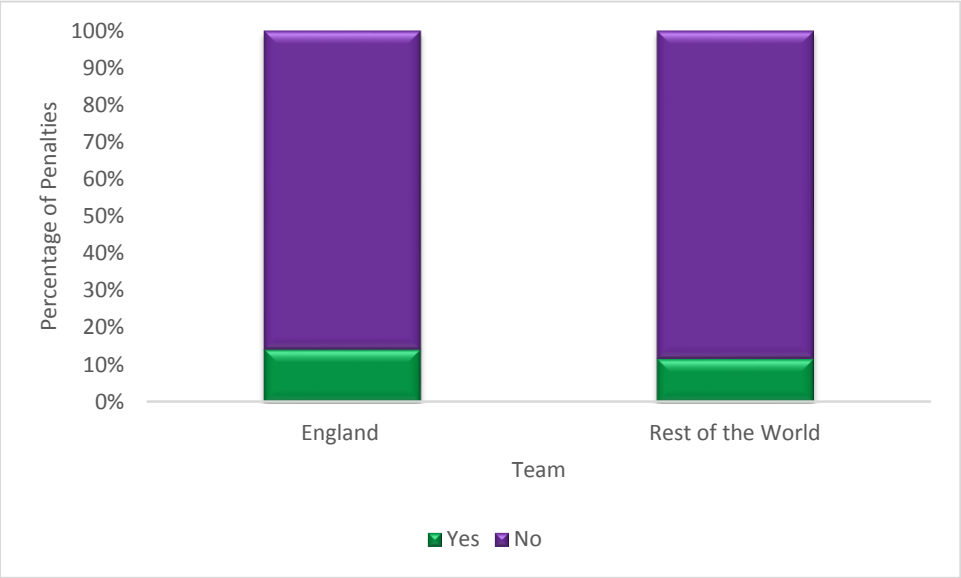

Figure 12. Percentage of Penalties in Which the Goalkeeper Touched the Ball.

Figure 12 shows the percentage of penalties that were touched by the goalkeeper. For England, 14%. For the Rest of the World, 12%. There was no significant association between the goalkeeper touching the ball and the team ($\chi^2 = 0.29$, $P = 0.719$).

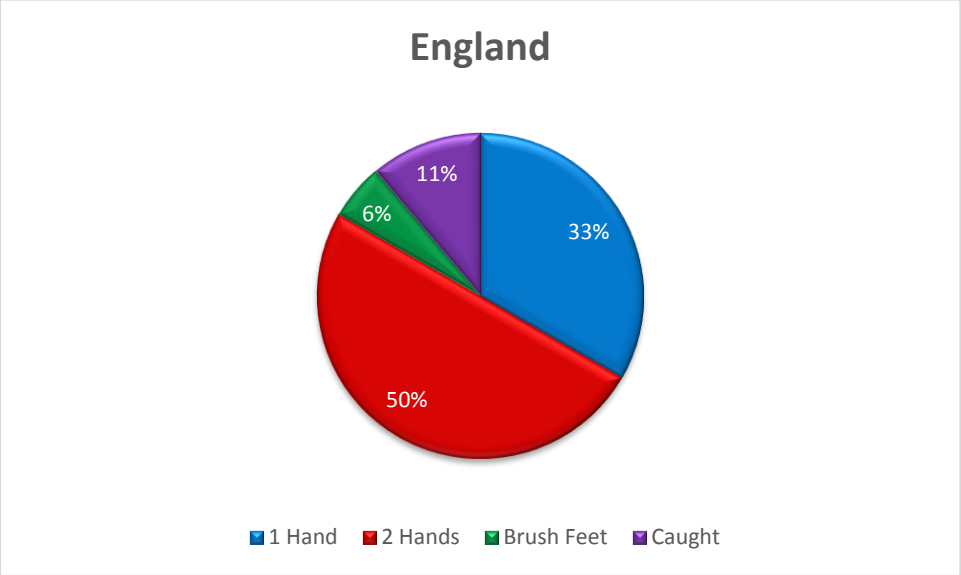

Figure 13. Distribution of What Body Part Was Used When the Goalkeeper Did Touch the Ball for Penalties Taken by an England Player.

Figure 13 shows the divide of body parts that touched the ball when the goalkeeper had managed to reach any penalties taken by an England player. The most dominant body part used to save penalties taken by an England player was 2 Hands (50%).

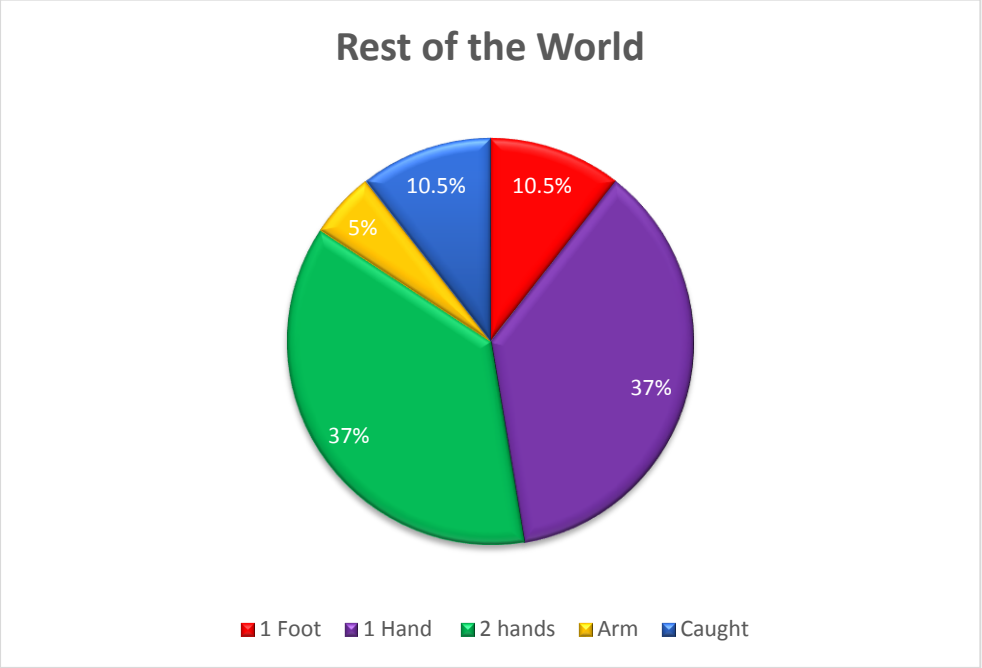

Figure 14. Distribution of What Body Part Was Used When the Goalkeeper Did Touch the Ball for Penalties Taken by a Rest of the World Player.

Figure 14 shows the divide of body parts that touched the ball when the goalkeeper had managed to reach any penalties taken by a Rest of the World player. The most dominant body part used to save penalties taken by a Rest of the World player was either 2 Hands (37%) or 1 Hand (37%).

There was no significant association between *What Body Part was used to touch the ball* and the team (χ^2=3.34, *P* = 0.766).

4.5 Scoring Indicators

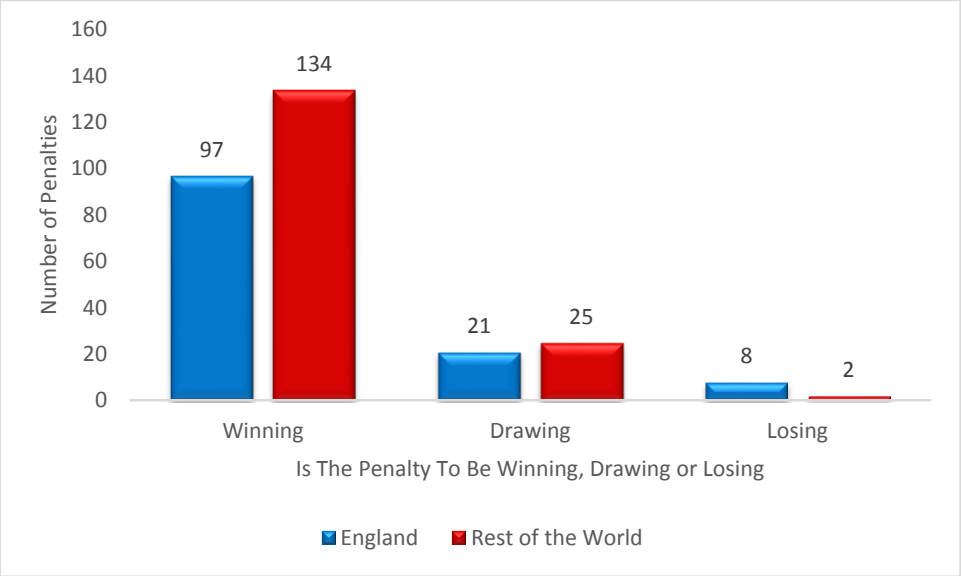

Figure 15. If Scored, Is the Penalty to be Winning, Drawing or Losing.

Figure 15 displays the amount of penalties that would result in the England or Rest of the World player's team to be Winning, Drawing or Losing if they were scored. There was no significant association between *If Scored, Is the Penalty to be Winning, Drawing or Losing* and the team ($\chi^2 = 2.38$, $P = 0.498$). England player's penalties were 77% to be Winning, 17% to be Drawing and 6% to be Losing. The Rest of the World players penalties were 83% to be Winning, 16% to be Drawing and only 1% to be Losing.

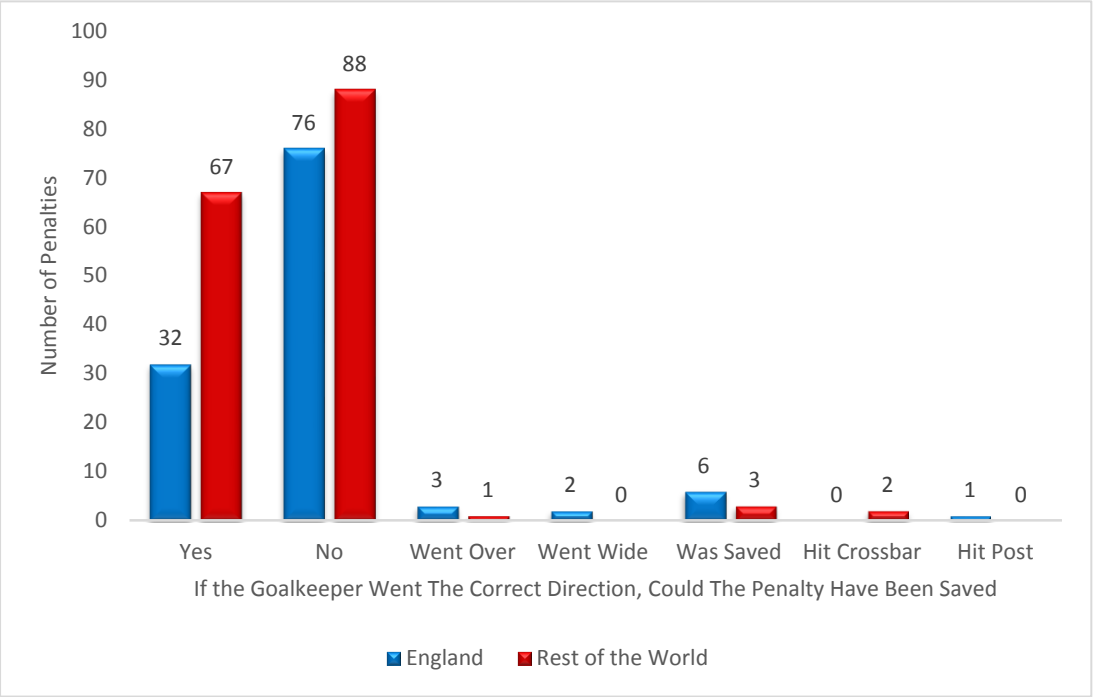

Figure 16. If the Goalkeeper Guessed the Correct Direction, Could the Penalty Have Been Saved.

Figure 16 represents whether the goalkeeper could have potentially saved the England or Rest of the World player's penalty if they had guessed the correct direction. There was a significant association between *If the Goalkeeper Guessed the Correct Direction, Could the Penalty Have Been Saved* and the team (χ^2= 19.85, *P* = 0.006). 42% of the Rest of the World player's penalties could have been saved compared to 25% for English player's penalties had the goalkeeper guessed the correct direction.

4.6 Period of the Match

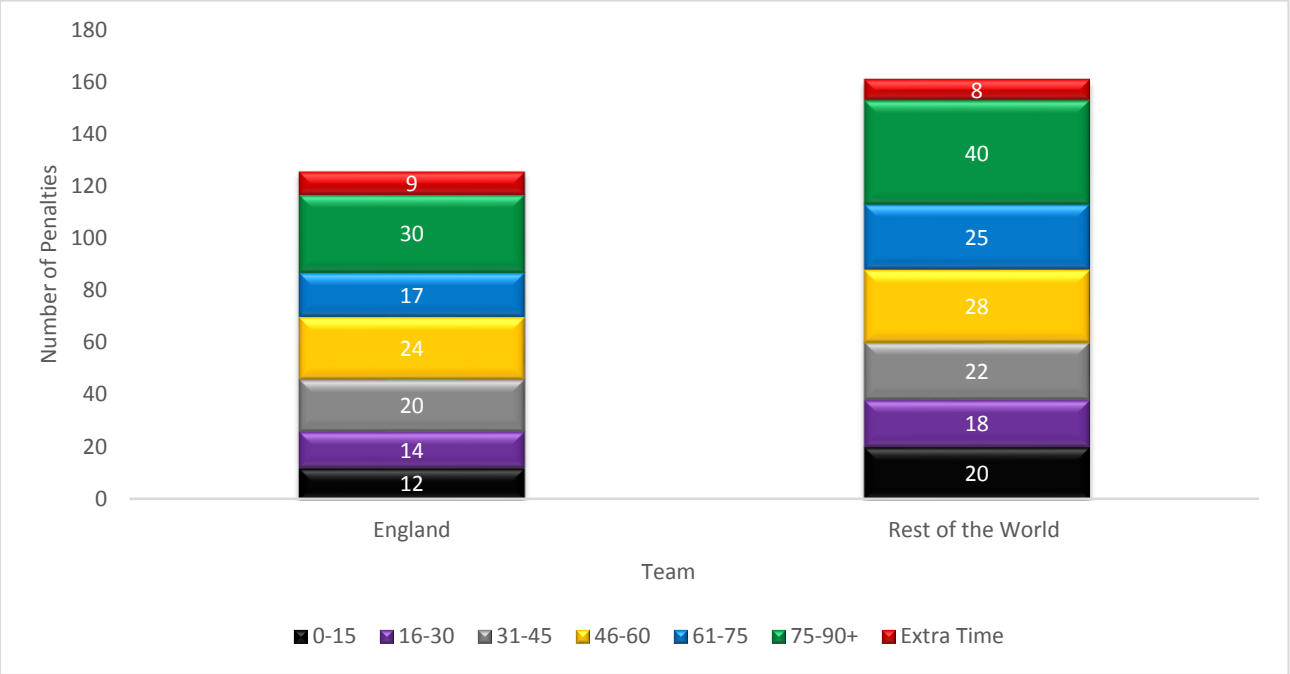

Figure 17. Distribution of Game Periods That the Penalties Were Taken Within

Figure 17 shows the distribution of game periods that the England and the Rest of the World players took their penalties within. The Game periods are split into 15 minute periods and then the final period includes all extra time penalties and penalty shoot-outs. There was no significant effect for different match periods ($\chi^2 = 3.12$, $P = 0.793$). Both teams had the highest proportion of penalties in the 75-90+ minute time period with England having 24% of their penalties and the Rest of the World having 25% of their penalties during that time frame.

Chapter Five

Discussion

5.0 Discussion

5.1 Aim of the Study

The aim of the study is to assess whether players from the England International squad penalty performances are less successful than performances by players from around the World, whom are considered to be highly skilled penalty taking players, and if so how or why they differ. The study investigated ten players (five from England and five from the Rest of the World) Club and International level performances from the start of the 2010/2011 season to the end of the 2014 World Cup in Brazil. The study hypothesised that English football players would not have the skill to compete with the World's best players. The England National football team has had a torrid history of not succeeding in penalty shoot-outs when it matters most. Therefore, finding answers to assist in solving this issue is a key determinant of facilitating a change and increasing success.

5.2 Team Comparison

The overall success rate between the two groups was assessed initially and showed no significant association between type of team and success ($\chi^2 = 0.59$, $P = 0.472$). The Chi-Square results show that the England team are equally skilled compared to their highly skilled counterparts. Their failure in penalty shoot-outs can therefore be attributed to other contributing factors such as environmental issues or psychological barriers. A representation of each team's penalty direction success can be seen in Appendix B.

5.3 Quality Indicators

An investigation into the quality of the penalty shot technique highlighted that there was a significant association with *Direction the Ball was Hit* and the team. England preferred to hit the ball to the left (57%) and the Rest of the World preferred to hit the ball to the right (47%) ($\chi^2 = 11.78$, $P = 0.003$). According to Scurr and Hall (2009) the approach angle had no significant effect on penalty outcome. Therefore, should the players change their approach angle it is unlikely that the intended direction will be affected and no additional risk will be attached. Roskes, Sligte, Shalvi and De Dreu (2011) found that if a goalkeeper was right-handed, they were more likely to dive to their right. England players favoured the left-hand side of the goal (57%) (Goalkeepers right) whereas the Rest of the World favoured the right-hand side of the goal (47%) (Goalkeepers left). Consequently, the England players' penalties would favour a right-hand dominant goalkeeper. Olson (2013) reported that only around 10% of the World is left-handed. As such, with goalkeepers most likely to be right-handed, the English players should use a more balanced distribution to counter-act the results found by Roskes et al (2011). Together, Olson (2013) and Roskes et al (2011) findings would explain why right-footed players penalties are anticipated more so than the left-footed players. Therefore, England players' penalties were more likely to be anticipated due to their higher percentage of right-footed penalties.

When the goalkeeper guesses the correct direction it is still possible to ensure that the penalty has a positive outcome. Bar Eli and Azar (2009) found that goalkeepers struggled to reach penalties that were aimed towards the top corner of the goal. Kerwin and Bray (2006) discovered that 28% of the goal was un-reachable for the goalkeeper. When combined, the results from both studies show that players can train and develop the skill to place penalties in either un-reachable areas or areas that are much more difficult for the goalkeeper. This increase in skill would most likely lead to more successful outcomes.

There was a significant association between the *Foot Used* to produce the penalty and the team. England preferred to use the right foot (86%) as did the Rest of the World (68%) (χ^2= 46.1, *P* = 0.000). McMorris and Colenso (1996) found that goalkeepers anticipated right-footed players better using the angle of approach, foot position and hip position at the time of contact.

A total of 89% of the penalties taken by the Rest of the World players were taken using the *Side Foot* technique. This was significantly greater than the 52% taken by the England players using the *Side Foot* technique. (χ^2= 34.35, *P* = 0.000). Piras and Vickers (2011) found that the percentage of penalties saved was higher when using a *Side Foot* technique (28%) than when using a *Laces* technique (12%). Although, these results demonstrate a significant effect based on one specific technique, there still remains a 12% chance that the penalty would be saved when using a *Laces* technique. This would favour England as their players used the *Laces* technique (48%) more than the Rest of the World (11%). Had the goalkeeper guessed the correct direction on every penalty then the Rest of the World players would potentially have missed on 71% of their attempts compared to the English players missing 48%. Bar Eli and Azar (2009) and Kerwin and Bray (2006) both found that there were areas of the goal that goalkeepers found hard to reach or could not protect at all. Currently when the goalkeeper dives in the correct direction, a high percentage of penalties are producing negative outcomes with the potential to grow even more should the goalkeeper dive in the correct direction more frequently. Although neither study stated which technique is the most successful, the players should practice aiming for the areas stated by Bar Eli and Azar (2009) and Kerwin and Bray (2006) to become competent at the skill and maximise their chances of scoring from the penalty even when the goalkeeper guesses the penalty direction correctly.

There was a significant association between *the Technique of a Players Run Up* and the team (χ^2=108.84, *P* = 0.000). England favoured the *Moderate Rup Up with No Stutter* for 76% of penalties and the *Long Run Up with No Stutter* for the further 24%. The Rest of the World used a wider range of techniques, *Moderate Run Up with a Slight Stutter* (50%) being the most used followed by *Moderate Run Up with No Stutter* (30%) then *Moderate Run Up with a Stutter* (19%) and finally *Long Run up with No Stutter* (1%). These results indicate that the Rest of the World players used deception in their run ups whereas England did not. Van Der Kamp (2006) suggested that using a Goalkeeper-Independent technique (Pick a spot and stick to it) was more successful than using a Goalkeeper-Dependent technique (Wait to see what the goalkeeper is doing). This would propose that the England players would have more successful penalties than the Rest of the World as using deception and reacting to the goalkeeper was a more high risk strategy. In fact results indicated that the Rest of the World's high risk strategy had a higher percentage of penalties missed when the goalkeeper went the correct direction (29%) aswell as having a higher percentage of penalties being reachable had the goalkeeper guessed the correct direction (42%). However, the Rest of the World players had a higher overall success percentage (89%) compared to England (85%) which could be attributed to their skill at using deception during the run up.

Peiyong and Inomata (2012) found that players guessed the correct direction of penalties more when using an after impact technique whereas Smeeton and Williams (2012) proposed that watching for pre performance cues, such as exaggerated movements 80ms before contact, was the best way to guess the correct direction when deception was involved. The results found by Smeeton and Williams (2012) would suggest that goalkeepers would find it easier to guess the correct direction of the Rest of the World players penalties when watching for pre performance cues due to their use of deception in 69% of penalties compared to 0% by the English players.

The Rest of the World players *hit a Post or Crossbar* on 12% of shots played, which was significantly greater than the 2% by England players ($\chi^2 = 18.20$, $P = 0.000$). Kerwin and Bray (2006) proposed that 28% of the goal was un-protectable and Bar Eli and Azar (2009) suggested that goalkeepers struggle to reach the top corners of the goal. Due to the Rest of the World hitting a post or crossbar on more occasions (12%), it could be suggested that they were less accurate at aiming towards the harder to reach areas, compared to the England players, and were taking more of a chance with scoring the penalty via the goal frame. Therefore, in training the Rest of the World players should aim for these un-reachable areas without hitting a post or crossbar hence lowering the potential risk involved.

5.4 Goalkeeper Actions

The goalkeeper guessed the correct direction during sixty-three penalties for England and sixty-four for the Rest of the World. If the goalkeeper dived in the correct direction for England, there was a significant association with players missing the penalty ($\chi^2 = 10.47$, $P = 0.002$) with a total of 23% of the penalties being missed. If the goalkeeper went the correct direction for the Rest of the World then there was also a significant association to missing the penalty ($\chi^2 = 18.66$, $P = 0.000$) with 29% of the penalties being missed. There was a significant association between the goalkeeper guessing the correct direction and the team ($\chi^2 = 7.66$, $P = 0.007$). Kropp and Trapp (1999) found a positive correlation for the goalkeeper standing slightly off-centre, subsequently leaving more space on one side of the goal to encourage players to shoot in that direction. For the percentage of penalties that were missed it could have been due to goalkeepers using this technique and still being able to reach the resultant penalty.

Bar Eli and Azar (2009) found that goalkeepers find it much harder to reach penalties that are aimed towards the top corners, whereas Kerwin and Bray (2006) found that 28% of the goal could not be protected by a goalkeeper. If a goalkeeper left more room to one side then the chances of them reaching the top corners will be further reduced or the 28% of the un-reachable areas will become larger. As alluded to previously, players should then be aiming for this area to nullify the goalkeepers' tactics. Smeeton and Williams (2012) found results to suggest that using pre performance cues was a key technique when deception was involved. England did not have any penalties that involved deception, however some of the Rest of the World players did use deception in their run up. Goalkeepers could have watched the Rest of the World players for pre performance cues, leading to this technique being a contributing factor to 29% of their penalties being saved.

5.5 Scoring Indicators

There was a significant association between the goalkeeper guessing the correct direction of the shot and the possibility of the penalty being saved (x2= 19.85, *P* = 0.006). A further 42% of the Rest of the World player's penalties could have been saved if the goalkeeper had guessed the correct direction, whereas only 25% of the England player's penalties could have been saved. When combined with the results from *did the Goalkeeper Go the Correct Direction*, this would suggest that the England players penalties were harder to save for the goalkeeper. When the goalkeeper guessed the correct direction, England missed 23% of penalties compared to 29% by the Rest of the World. If the goalkeeper had guessed the correct direction on every penalty then potentially England would have had 48% of their penalties saved or missed, while the Rest of the World would potentially have had 71% of their penalties saved or missed.

For both teams it would be suggested that they follow the advice of Bar Eli and Azar (2009) and Kerwin and Bray (2006) to strike their penalties towards the areas that are less likely to be saved even when the goalkeeper guesses the correct direction. Piras and Vickers (2011) found that *Side Foot* technique penalties were saved 28% of the time compared to a *Laces* technique penalty being saved 12% of the time. Due to the Rest of the World predominantly using the *Side Foot* technique (89%), Piras and Vickers (2011) findings could suggest why the Rest of the World player's penalties were more reachable for goalkeepers when they guess the correct direction. Investigations by Van Der Kamp (2006) and Smeeton and Williams (2012) both failed to suggest whether the more elite athlete's higher skill levels meant that they could still produce success even when the goalkeeper tried to read them or guess the correct direction. Due to their high skill level, the Rest of the World players that use deception or a Goalkeeper-Dependent technique may still be able to be successful even when the goalkeeper guesses the correct direction. Therefore, the results for *If the Goalkeeper Guessed the Correct Direction, Could the Penalty Have Been Saved* may not fully represent those penalty outcomes correctly.

5.6 Practical Implications

England players struck the ball predominantly to the left side of the goal (57%) which consequently may lead to opposing goalkeepers premeditating this and diving the correct direction more frequently. It is then vital for the England players to become adept at hitting the ball equally to both sides and occasionally down the middle so that the goalkeeper has less of an idea on where the ball will be potentially placed, hence making success more likely.

Bar Eli and Azar (2009) suggested that goalkeepers found it harder to reach penalties aimed towards the top corners. Aswell as mixing up the direction of the penalty it is also important that the players can kick the ball into the harder to reach areas so that if the goalkeepers become more proficient at guessing direction, then the penalty will still produce a successful outcome. This can be achieved through constant practice to increase skill and competency levels.

The Rest of the World adopted a wider range of run up techniques which two out of the four techniques included deception during the run up phase. England only adopted two techniques of which neither included deception during the run up. It could benefit the England players to improve this skill as the addition of deception has been proven to be successful in this study. The England players used both the *Side Foot* (52%) and *Laces* (48%) techniques near equally. In Comparison, the Rest of the World used the *Side Foot* (89%) technique far more than the *Laces* (11%) technique. Using a dominant *Side Foot* technique has produced a higher success percentage for the Rest of the World, therefore may be considered a more useful technique to produce successful and accurate penalties. However, the England players may argue that as they are elite athletes they do not need to change an already high achieving technique and that any change may disrupt them and lead to less successful results.

Chapter Six

Conclusion

6.0 Conclusion

The aim of the study was to assess whether players from the England International squad penalty performances were less successful than performances by top elite players from around the World. Due to a poor recent history, it has been hypothesised that the England football team are less successful than other top football nations at the penalty taking skill. No significant association between type of team and overall success rate was found. Additionally, there was a significant association found to suggest that the England player's penalties were more difficult to save than the Rest of the World players penalties when the goalkeeper dived the correct direction. However, the Rest of the World produced a higher success percentage to that of England so it would be advised that the England players continue training to maintain and improve successful penalty outcome.

The current study highlights that English penalty taking players are equally as successful as top elite players from around the World. Therefore, previous penalty shoot-out failure can be attributed to other external factors such as the Environment or player Psychology. Due to penalty success producing no significant association, the study provides evidence that future research should focus on the external factors highlighted aswell as continuing to improve English players penalty skill. Undertaking further research may finally produce an answer as to why England have been unsuccessful at penalty shoot-outs and provide pathways to facilitate a change.

6.1 Limitations

The nature of the study meant that public access footage could be used to gather and analyse all of the required data. This means that the study can be replicated by anybody and there are no copyright issues when viewing match highlights. The footage that was used came from YouTube (San Bruno, California). Unfortunately not all of the footage available was in high definition and at times the video was pixilated. Pixilated footage lead to the analysis becoming a more difficult process. When no other option was present, footage from fans mobile devices had to be used to analyse the penalties. The fan footage was low quality, always moving or shaking and often taken away from the point of interest in celebration. Like the pixilated footage, the low quality fan made videos made precise and accurate analysis much more difficult.

Much like Kim and Lee (2006) the study involved a small sample size (N=10). When conducting the results, some tests found significant results but due to low expected count in data these results could not be considered significant. However, a penalty shoot-out has five designated players that are either the most skilled penalty taking players or players that have been willing to be included. The five players from England and the Rest of the World were purposefully chosen to replicate how England's first five penalty taking players compare to a highly skilled Rest of the World collection. The study used a time bracket of four football seasons between the start of the 2010/2011 season and the recently passed World Cup in 2014. The data presented is all relevant to the current players and represents how the England players compare at this present time. Nevertheless, the study could have included a more longitudinal range of seasons similar to the research conducted by Jordet, Hartman, Visscher and Koen (2007) and Jordet, Hartman and Vuijk (2012). A longer time bracket could have shown how the past and present England players have compared to the most elite Rest of the World players aswell as possibly show any progression or decrease in skill acquisition.

As the study is an undergraduate dissertation it was not possible to conduct any questionnaires or interviews with the chosen players to identify any psychological strengths or areas for improvement. Player Psychology is a factor of penalty taking and therefore should always be considered as an external contributing influence.

6.2 Future Research

Psychology is one of many contributing factors to a penalty shoot-out scenario. Future research in the Psychology field could investigate into the many different pathways that could have an effect on penalty performance. For example, the effects of Anxiety or the perceived levels of Pressure combined with athlete's Anxiety direction. Another piece of research could look into the effects of using pre performance routines. This could help to stop rushing, increase focus and to boost confidence prior to performance or during the long walk from the halfway line in a penalty shoot-out. Player Hardiness, Mental Toughness or Coping could also be key topics. Players could develop the psychological skills to handle any situations they may not have previously been able to.

The use of Performance Analysis can help players and coaches to understand data and develop training practices that can advance skill levels. Finding out the success of penalties aimed towards the top corners and how to develop the skill could be a key research question. As a result, players could maintain success even when the goalkeepers are guessing the correct direction. Educating the players on how goalkeepers try to read them and guess what they are thinking could potentially help players to tactically mislead the goalkeeper and increase success rates. Investigating into the goalkeepers could also be another pathway to English success. Analysing the England goalkeepers and their success in penalty situations could be

a pivotal area in assisting the National team further. Increasing the goalkeepers skill could potentially lead to more opposing player's penalties being saved. The study could also be re-created to incorporate any or all of the limitations that have been identified to further research into the penalty taking ability of English players.

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Appendix

Appendix A

Penalty Questions

1. Scored or Missed?
2. Which Direction was the Ball Hit?
3. Which Foot was used?
4. Technique of Strike?
5. Technique of Run-Up?
6. Did the Ball Hit the Post or Crossbar?
7. Did the Ball Bounce or Roll Before the Line?
8. Did the Goalkeeper go the Correct Direction?
9. Did the Goalkeeper Touch the Ball?
10. How Big a Touch did the Goalkeeper get and What Body Part was used?
11. When in the Game was the Penalty Taken?

12. Is the Penalty to be Winning, Drawing or Losing?

13. If Losing Does it Bring the Team Back to Within 1 Goal?

14. Is the Penalty to Complete a Hat-Trick?

15. If the Goalkeeper Went the Correct Direction Could it have been Easily Saved?

16. Is the Penalty in a Shoot-Out?

17. Is the Penalty to Win a Shoot-Out?

18. Is the Penalty to Stay in a Shoot-Out?

Appendix B

Successful and Unsuccessful Penalties

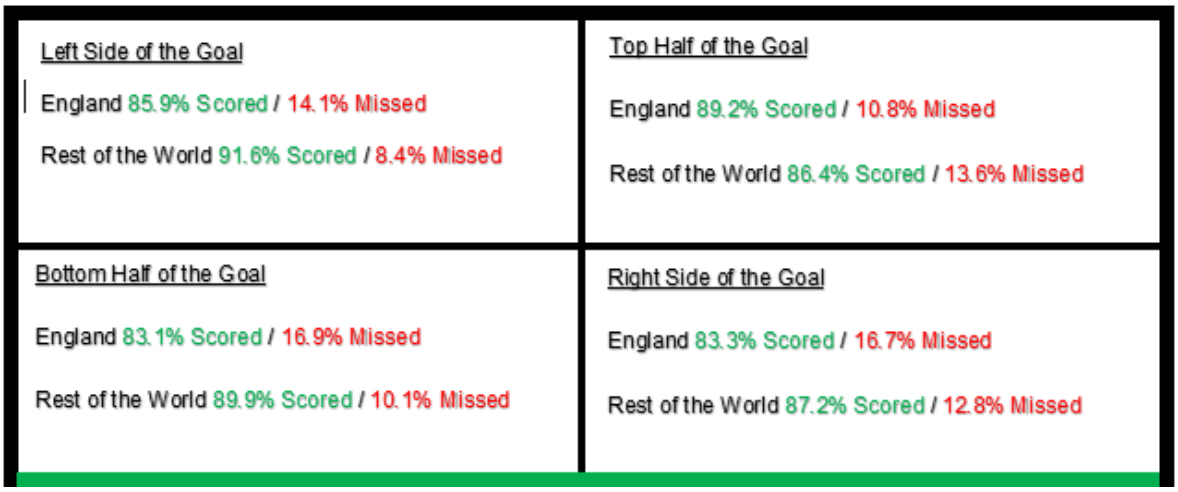

Figure 18. Percentage of Successful and Unsuccessful Penalties