# Influence of rule changes on shooting performance in balanced matches between two European Water polo Championship

**Abstract**

The aim of this study was to compare the influence of rules changes on shots performance in balanced matches considering two male European Championship with different rules. All shots made in matches with a final score with differences of three goals or less in 27th European Championship in 2006 (Belgrade, Serbia) and 34th European Championship in 2020 (Budapest, Hungary) were analysed in the present study. The total sample was composed of 2,493 shots (1,115 in Belgrade Championship and 1,378 in Budapest). The study was developed with an observational design. The reliability between the observers was verified using the kappa agreement index, ensuring that in all cases this value was greater than .85. There are differences in the number of shots taken between the two championships. There is a lower number of shots after a foul, as well as drive shot with rebound on short post and large post in inequality situation. There are fewer shots in the counterattack and more shots in inequality. In both micro situations, there are more shots from the left side and less shot with feint or center shots.

## 1. Introduction

Water polo is an aquatic cooperation-opposition sport that emerged in 1869, classified as a highly complex sport due to its nature or energy requirements, which combines anaerobic and aerobic capacity (Lozovina & Lozovina, 2009; Smith, 1998), which requires players to have speed, strength, endurance, agility, tactical intelligence and mental speed; the anaerobic phase predominates (Lozovina, Pavičić, & Lozovina, 2007, 2011).

On a historical level, it stands out for being the first team sport admitted in an Olympic Games, making its debut in Paris 1900 (Madera, Tella, & Saavedra, 2017). However, matches are generally decided by very small differences, given their situational nature that makes it difficult to interpret and analyse physiological, technical, tactical and psychological performance profiles (Lupo, Capranica, & Tessitore, 2014). There is a certain complexity: the differentiation or delimitation of a team's performance through classical analysis, due to the lack of statistical significance (Lames & McGarry, 2007).

Like many other sports, regulatory changes have been introduced since their origin and throughout their history due to the evolution of the sport itself. In this sense, the concern for modifying the conditions of the game has increased in the last two decades, using as the most common measure the modification of the rules, as these provide the unique and differentiating character of the game (Lagardera & Lavega, 2003; Parlebas, 1999) and specify the game action requirements. According to Parlebas (1999), the rules determine four types of relationships of the participants that cause the action of the game to emerge: (a) with other participants, (b) with the space of the game, (c) with the equipment, and (d) with how they should adapt to the time of the game.

Arias, Argudo, & Alonso (2011) analyse these regulatory changes in team sports and conclude that the changes made were not always supported by studies showing that the changes will produce what is intended. Therefore, and referring to the cases in which there has been a previous study of the modifications, it can be seen that in recent years 70.21% of the studies did not mention whether the modifications introduced were previously analysed by the organizations that proposed them. Thus, these modifications of rules have had to be modified again because they did not conform to what was being developed or because of pressure from sports leaders.

These authors (Arias, Argudo & Alonso, 2011) analysed the regulatory changes developed in recent years in team sports. They found that 74.46% of the articles that studied the normative changes analysed a previous modification, 21.28% proposed modifications and 4.25% analysed previous regulations and proposed new modifications. It should be noted that almost one third (31.91%) of the studies did not mention the purpose of the modifications, while all studies reported the purpose of the analysis of such modifications. Thus, they concluded that in many of the situations, the changes were developed with the intention of adapting the sport to the children's possibilities (Thomas & Wilson, 2015). Both to modify the rules and to carry out the studies (21.28%), as well as in the least of the cases (6.38%) it was to attract athletes to practice a sport, and/or with the intention of attracting spectators and attending to commercial pressures and interests (8.51%). However, Steen-Johnsen (2008) identified commercial interests as one of the main sources of rule change.

In relation to the normative changes, it can be stated that the modification of the rule causes indirect changes in: (a) game conditions (Hammond & Hosking, 2005; Hammond Hosking, & Hole, 1999). (b) Energy demands (Ben Abdelkrim et al., 2007; Cormery et al., 2008; Platanou & Geladas, 2006). (c) Players' conditions (Carter et al., 2005; Ekstrand et al., 2006). (d) Their motivation (Chase et al., 1994; Pellett & Lox, 1998). Thus, noting

that 68% of the studies used only one type of recording data. It´s considered necessary to use more than one type of data, to allow for confirmation of the results.

Specifically, water polo, like all sports throughout its history, has undergone several regulatory changes (Lozovina & Lozovina, 2009), highlighting three phases according to Lloret (1998): (a) physical predominance (1949). (b) Technical predominance (1966). (c) Tactical Predominance (1976). Adding during these last years a last phase that can be called of economic/spectacle predominance (Lozovina & Lozovina, 2009). However, other authors such as Hraste, Bebić, & Rudić (2013) propose up to six phases.

In this sense, the rule changes produced during the last 17 years have sought to improve the structure of the game in order to establish a balance between the attack and defence phases. The aim is to reduce the roughness of the game and the number of fouls sanctioned, since it has been found that 60% of the fouls in elite matches are provoked with the intention of losing time during the transition phase. Therefore, according to the interpretation made by Lozovina & Lozovina (2009), the regulatory modifications do not allow the game to develop its true and full potential.

Therefore, these modifications, in some cases supported by previous studies, have focused on identifying the characteristics of high-performance teams by analysing the results of water polo matches (Enomoto et al., 2003). Graham & Mayberry (2014) and Lupo, Minganti, et al. (2012), analyse the behaviours to achieve inequality situations and/or scoring efficiency, finding that these playing micro situations a preponderant role in the achievement of sporting success. Other studies such as those by Canossa et al. (2020); Escalante et al. (2013); Lozovina, Pavičić, & Lozovina (2011); Lupo et al. (2010); and Pérez (2018) have been interested in the influence on the outcome of centre forward. And the systematic studies of Argudo et al. (2020) carrying out a notational analysis of different offensive and defensive technical-tactical actions used in elite water polo competitions (World and European Championships), have tried to corroborate the effectiveness of the regulatory changes developed.

In this sense, some of these studies have proposed to adapt some rules to different contexts, highlighting the adaptation of the rules to different categories carried out by Argudo & García (2017). They propose to reduce the size of the field, goal and ball, the duration of the match and some playing situations, to facilitate their understanding and promote learning in young water polo players. On the other hand, Lozovina & Lozovina (2019ab) make other suggestions by finding no difference in the relationship between the number of possessions and the match result. Although they do appreciate, differences in the number of ordinary fouls (47-137) and expulsions sanctioned.

Lozovina & Lozovina (2019a) propose that every 7 ordinary fouls in a quarter should be followed by a penalty (similar to basketball bonus free shots), estimating that only a third of the fouls are really useful and are done with a reasonable tactical intention. Similarly, recent studies such as Graham & Mayberry (2016), which apply a possession-based approach, attempt to address the issue of referee bias in water polo. Other recent studies use statistical models to predict performance (Saavedra, Pic, Lozano, Tella, & Madera, 2020), correctly ranking 83.9% of teams with the variables GB shots, action goals, time outs and steals. These findings show the importance of the goalkeeper in match results, equality shot effectiveness, the coach's decision-making and the anticipation in the game.

Hraste, Bebić, & Rudić (2013) and Lozovina & Lozovina (2019ab) propose modifying some of the lines on the shot: returning to the 4-metre line for penalty shots and including a 6-metre line from which you can shot directly into the goal after a foul. Introduce a "Bonus" when receiving more than seven fouls per quarter and include "flying substitutions" on the side of the field. As well as allowing two-handed shots to be blocked

and adding that, the midfield must be passed within 20 seconds, with a penalty shot being taken if the ball returns to the goalkeeper.

The effectiveness of shots has been studied because it is the technical action that allows a goal to be achieved and contributes to the result (Takagi et al., 2005; Tucher et al., 2014; Vila et al., 2011). Thus, Argudo, Ruiz, & Abraldes (2010) and Vila et al. (2011) concluded, by relating shooting to situational frameworks, that numerical equality and counterattacks were the most influential situational frameworks for discriminating between winners and losers.

Performance has also been analysed in terms of match and championship results. Considering the successful teams those fighting for medals (García & Argudo, 2017ab), shooting speed (Alcaraz et al., 2011, 2012; Vila et al., 2011), technique (Lupo et al., 2014), goal scoring areas (Özkol et al., 2013) and shooting result (Escalante et al., 2011, 2012; Tucher et al., 2014). In turn, it has been found that approximately one in three shots results in a goal, although the effectiveness varies for each situational frame (Escalante, Saavedra, Mansilla, & Tella, 2011; García-Marín & Argudo, 2015; Özkol et al, 2013; Tucher et al., 2014), and similarly, penalties (73-80%) have the greatest effectiveness, followed by counterattack (51.3-79.21%), superiority (31.3-50.6%) and equality (21.9-32.2%) (Escalante et al., 2011; García-Marín & Argudo, 2015; Özkol et al., 2013).

The main rules changed between both championships are: (a) the 7-metre line goes to 5 metres. (b) Ball possession is obtained if the goalkeeper deflects a shot and goes off the goal line. (c) The possibility of shooting after a foul, even if it is not directly. (d) The time for a second attack is reduced to 20". (e) The goalkeeper is allowed to cross the midfield line. (f) Substitutions by a side of the field are incorporated.

For all of these reasons, the aim of this study was to compare the influence of rules changes on shots performance in balanced matches considering two male European Championship with different rules.

## 2. Method

This was an observational study (Anguera, 2003) that analysed all shots performed in 45 matches with a final score with differences of three goals or less, 21 from the 27th European Championship in 2006 (Belgrade, Serbia) and 24 from the 34th European Championship in 2020 (Budapest, Hungary).

### 2.1. Match analysis and participants

The total sample comprised 1,115 shots (2006), and 1,378 (2020). As it is public, event and its participants are of legal age, as well as having been authorized by the different committees and agencies, did not proceed to request the approval of the ethical committee.

### 2.2. Procedures

The matches of the analysed championship were recorded with a video camera (JVC, GZ-MG50E, JAPAN) that was placed on one side of midfield of the pool, at a height and distance greater than 10m. Video broadcasts, available online from the Spanish Radio Television, were also obtained. Both resources made it possible to combine horizontal plane images obtained with the video camera with those of the frontal plane provided by the television operator. In the entire ball possessions examined, the shooter and the goalkeeper could be clearly seen.

The match analysis was performed with the field format (Table 1) designed using the software LINCE (Gabin, Camerino, Anguera, & Castañer, 2012).

**Table 1**. Field format.

**Figure 1**. *Shot positions, goal zones and shot directions*.

Subsequently, various observers who were not involved in this research and who had previously received training in observational categorisation analysed all shots. The reliability of the observers was verified using the kappa agreement index, ensuring than in all cases this value was greater than .85.

### 2.3. Statistics

First, the influence of the rules of the championships analysed (IV) (Belgrade-2006 and Budapest-2020) on the frequencies of the shots in each situational framework (equality, counterattack, inequality and penalties) was verified (DV). Subsequently, for each situation, the effects of the change of rules (IV) on the following variables of the shooting were checked: position, feint, technique, foul, direction and result (DV).

To respond to the objectives, a multivariate analysis of the MANOVA variance was carried out. Initially, the effect of the IV on all the DVs was evaluated. The choice of the most robust multivariate test was determined from the Box test. Wilks' Lambda was applied when the assumption of homocedasticity was met and the covariances of the groups were equal. Otherwise, the test used was Pillai's Trace. In the multivariate tests that rejected the null hypothesis, the effect size ($f2$) and power ($1-\beta$) were calculated using the Pillai V approximation and the O'Brien and Shieh algorithm. The effect size in multivariate tests was considered small .02, medium .15 and large .35 (Cohen, 1988). Subsequently, the analysis of the ANOVA variance was applied to identify the technical-tactical variables of the set of DVs of the multivariate model influenced by the IV. The effect size ($f$) in the univariate analysis was considered small .10, medium .25 and large .40 (Cohen, 1988).

The analyses of variance were carried out with the IBM SPSS Statistics 20 software assuming a 95% confidence level ($p < .05$). In the ANOVA, in addition, the Bonferroni adjustment ($p = .05/nVD$) was applied to determine the significance level. The calculations of effect size and power were carried out with the G*POWER software.

### 3. Results

The rules of each championship influenced the frequency of shots of the analysed situational frameworks ($F_{(4.39)} = 7.819$; $p < .001$; $1-\beta = .988$; $f^2 = .801$) (Table 2). Differences were found in counterattack ($F_{(1.42)} = 17.739$; $p < .001$; ; $1-\beta = .511$; $f^2 = .534$) and inequality ($F_{(1.42)} = 18,177$; $p < .001$; ; $1-\beta = .532$; $f^2 = .543$). In the European of 2020, counterattack shots decreased ($2006 = 9.7 \pm 3.2$; $2020 = 6.2 \pm 2.3$) and inequality increased ($2006 = 16.4 \pm 4.2$; $2020 = 21.8 \pm 4.2$).

Table 2. Frequency of shots per match according the situational framework.

Table 3 presents the results of the technical-tactical variables analysed for each situational framework in both European Championships.

Table 3. Frequency of technical-tactical variables of shots per match according the situational framework between the two championships.

The regulatory change influenced the shooting positions in numerical equality ($F_{(3.40)} = 3.410$; $p = .027$; $1-\beta = .852$; $f^2 = .256$), counterattack ($F_{(3.40)} = 6.875$; $p = .001$; $1-\beta = .877$; $f^2 = .515$) and inequality ($F_{(3.40)} = 5.854$; $p = .002$; $1-\beta = .853$; $f^2 = .438$).

Differences were found in shots from the center in equality ($F_{(1.42)}$ = 7.287; $p$ = .010; 1-β = .688; $f^2$ = .481), counterattack ($F_{(1.42)}$ = 18.224; $p$ < .001; 1-β = .999; $f^2$ = 1.049) and inequality ($F_{(1.42)}$ = 6.528; $p$ = .014; 1-β = .671; $f^2$ = .453). In the European of 2020 the shots from the center decreased in equality (2006 = 15.4 ± 3.6; 2020 = 12.5 ± 3.5) and counterattack (2006 = 4.4 ± 1.6; 2020 =2.3 ± 1.6). Conversely, they increased in inequality (2006 = 6.9 ± 2.6; 2020 =9.6 ± 4.2).

The feint variable was also affected by regulatory changes in counterattack ($F_{(2.41)}$ = 12.063; $p$ < .001; 1-β = .928; $f^2$ = .587) and inequality ($F_{(2.41)}$ = 16.009; $p$ < .001; 1-β = .985; $f^2$ = .779). Differences were found in shots made without a feint, both in counterattack ($F_{(1.42)}$ = 24.070; $p$ < .001; 1-β = .977; $f^2$ = .854) and in inequality ($F_{(1.42)}$ = 31.772; $p$ < .001; 1-β = .828; $f^2$ = .683). In the 2020 championship, the number of shots without a feint in counterattacks decreased (2006 = 7.9 ± 2.8; 2020 = 4.4 ± 1.8) and increased in inequality (2006 = 10.1 ± 2.6; 2020 = 15.5 ± 3.6).

The type of shot variable was influenced by regulatory change in the counterattack situation ($F_{(5.38)}$ = 5.799; $p$ < .001; 1-β = .983; $f^2$ = .763) and inequality ($F_{(4.39)}$ = 5.799; $p$ = .001; 1-β = .944; $f^2$ = .620). Significant differences were found in drive shots with rebound in inequality ($F_{(1.42)}$ = 7.220; $p$ = .010; 1-β = .435; $f^2$ = .378). Differences were also found in other types of counterattack shots ($F_{(1.42)}$ = 14,359; $p$ < .001; 1-β = .423; $f^2$ = .498) and inequality ($F_{(1.42)}$ = 11.943; $p$ = .001; 1-β = .343; $f^2$ = .465). Other types of counterattack were less frequently used in Budapest-20 (2006 = 1.2 ± .9; 2020 = .3 ± .5). In contrast, in inequality drive shots with rebound (2006 = 2.8 ± 1.6; 2020 = 4.2 ± 1.8) and other shooting techniques were more frequently used (2006 = 1.4 ± 1.4; 2020 = 3.3 ± 2.0).

Regulatory changes also influenced the foul variable in equality ($F_{(2.41)}$ = 3.557; $p$ = .038; 1-β = .731; $f^2$ = .173) in counterattack ($F_{(2.41)}$ = 9.130; $p$ = .001; 1-β = .801; $f^2$ = .445) and in inequality ($F_{(2.41)}$ = 8.900; $p$ = .001; 1-β = .788; $f^2$ = .434). Differences were found in shots after foul in equality ($F_{(1.42)}$ = 6.817; $p$ = .012; 1-β = .438; $f^2$ = .564). In counterattack ($F_{(1.42)}$ = 14.087; p = .001; 1-β = .415; $f^2$ = .495) and inequality ($F_{(1.42)}$ = 14.087; $p$ = .001; 1-β = .530; $f^2$ = .542) were found in the shots without previous foul. In the last European, the number of shots after receiving a foul in equality decreased (2006 = 4.1 ± 2.5; 2020 = 2.5 ± 1.3). In addition, the frequency of shots without a previous foul was lower in counterattack (2006 = 9.3 ± 3.5; 2020 = 6.0 ± 2.3) and higher in inequality (2006 = 16.4 ± 4.2; 2020 = 21.8 ± 4.2).

Shot directions were influenced by regulatory changes in counterattack ($F_{(3.40)}$ = 6.570; $p$ = .001; 1-β = .855; $f^2$ = .492), and in inequality ($F_{(3.40)}$ = 6.570; $p$ = .001; 1-β = .988; $f^2$ = .805). Differences were found in shots aimed at the counterattacking long post ($F_{(1.42)}$ = 10.514; $p$ = .002; 1-β = .373; $f^2$ = .442). In inequality, differences were found in shots aimed at the short post ($F_{(1.42)}$ = 8.519; $p$ = .006; 1-β = .430; $f^2$ = .405) and long post ($F_{(1.42)}$ = 23.792; $p$ < .001; 1-β = .654; $f^2$ = .594). In the 2020 championship, there was a decrease in counterattacking long post shots (2006 = 3.3 ± 1.7; 2020 = 1.8 ± 1.5). On the other hand, there was an increase in both short post (2006 = 7.5 ± 2.4; 2020 = 9.7 ± 2.6) and long post shots (2006 = 4.7 ± 1.9; 2020 = 8.3 ± 2.7) in inequality.

The different rules influenced the outcome of shots in counterattacks ($F_{(5.38)}$ = 4.086; $p$ = .005; 1-β = .966; $f^2$ = .538) and inequality ($F_{(5.38)}$ = 3.720; $p$ = .008; 1-β = .963; $f^2$ = .490). Differences were found in shots that ended in a goal in counterattack ($F_{(1.42)}$ = 4.086; $p$ < .001; 1-β = .518; $f^2$ = .537) and in goalkeeper stops in inequality ($F_{(1.42)}$ = 7.915; $p$ = .007; 1-β = .421; $f^2$ = .393). In the European of 2020, the number of goals scored in the counterattack decreased (2006 = 4.1 ± 1.8; 2020 = 2.2 ± 1.2) and the number of shots stop in inequality increased (2006 = 3.7 ± 2.0; 2020 = 5.6 ± 2.4).

## 4. Discussion

Numerous studies have analysed the influence of different parameters (swimming distance, shooting speed, etc.) and game-related statistics (percentage of goals scored depending on the shots number, percentage of blocks depending on the shots number received, etc.), as well as the match result (Saavedra et al. 2020). However, considering the comparison of the shots made in two European Water polo Championships (Belgrade, 2006 and Budapest, 2020) with a different regulation (Championship), taking into account, the situational framework (equality, counterattack, inequality and penalty).

The results show how there are differences in the number of shots made in the Championships studied and their importance in sports performance. Similar results to those were found by previous studies (Argudo, Ruiz, & Abraldes, 2010; García & Argudo, 2017ab) who found that the winners commit fewer offensive fouls, and use less time in possession (Escalante et al. 2013; Saavedra et al. 2014); shooting more and more effectively (Sabio, Cabedo, Guerra-Balic, & Argudo, 2020).

This study, has found fewer shots in the counterattack in the Championship of 2020, which demonstrates the equality both physical and technical-tactical that avoids this situation. Similarly, there is a greater number of shots in inequality, despite the fact that there is less time to finish the play with the current regulatory change, which suggests that the regulatory change made has fulfilled its purpose (trying to achieve a higher number of goals per game and, therefore, more spectacle). However, we should compare two tournaments with the same regulation to see the adaptation of the teams to it (Arias, Argudo, & Alonso, 2011). It´s also noted that sport success following the new regulatory changes was in line with generating a greater number of penalty situations and obtaining greater efficiency in these situations in order to become winners (Argudo, et al. 2016). Therefore, the importance of the effectiveness in situations of inequality in the result of the match and competition reduced in sports success, when comparing the success data with those found in studies with 2013-2017 regulations (Saavedra et al. 2020). Once it´s proven that, the number of ball possession during one game is not crucial for the match result; it can still contribute and significantly affect the outcome (Lozovina & Lozovina 2019a).

It seems that the prediction of sports performance and success, like the studies by Hraste (2018) and Lupo et al. (2010, 2012), is conditioned by the level of competition, the shooting speed and the goalkeeper's efficiency: GB shots (ES = 1.61), GB counterattack shots (ES = 0.90), and GB action shots (ES = 0.86). As they find, in the case of the women's competition, Ruiz-Lara, Borges-Hernández, Ruiz-Barquín, & Argudo-Iturriaga (2018), who conclude that these differences are influenced by the state of the match at that time, by the period being played and previous numerical inequalities. Finally, it seems relevant to consider steals as an indicator of sports success, appearing after the normative change as a relevant variable to predict the result (Saavedra et al., 2020). One of the recent regulatory changes is to be able to shot at goalpost after receiving a foul beyond 5 metres line (without having to do as directly as required by the previous regulations). However, there are fewer shots after the foul, as players take advantage of these situations to feint and/or approach the goalpost, rather than trying to surprise the goalkeeper with a direct shot. Future studies that objectively and subjectively analyse how this change is affecting the competitive dynamics of the teams and the creation of dangerous situations that become goals are relevant, since future normative changes will be aimed at reducing the number of sanctioned fouls (Lozovina & Lozovina, 2019).

Likewise, the most abundant shots, both with this regulation and with the previous one, continue being drive shot. Also finding that they are the ones that achieve the highest scoring efficiency (Argudo, García, Borges, & Sillero, 2020). Similarly, there are fewer

reverse shots (classic centre-forward shot). Although the normative changes seek to reduce the importance of the game in this position, it is still a guarantee of success to have good centre forwards, who score goals or generate situations of inequality or penalties.

As for the situations of inequality, there is a greater number of drive shots without feint and drive shots with rebound on short and large post, motivated by the reduction of the playing time of a second attack, which seeks to mobilize the goalkeeper and to shot fast after 3-4 passes in this micro situation.

Future studies should analyse the duration and networks of passes that occur in this type of play, in order to know the weight of the different players individually in obtaining a greater collective performance. However, it is necessary to mention the increase in the number of shots stopped by the rival goalkeeper, which end up outside, and therefore, and yet more goals are scored in situations of inequality.

## 5. Conclusions

Coaches analyse the matches and the performance of their teams and their opponents to obtain useful data for training (Hughes & Franks, 2008). Today, the training process, its organisation and the teaching methodology need more knowledge about the quantitative (Ruano, Serna, Lupo, & Sampaio, 2016) and qualitative aspects of sports performance (Schmidt & Wrisberg, 2008). Therefore, it seems very appropriate to analyse and study the regulatory changes in order to get an idea of how sport has evolved over the years. In turn, the results of the analysis represent a tool for coaches, in order to improve learning/training process and confirm that the game model is being adapted to the new regulations and water polo sporting demands. In this sense, the results of this study confirm the need to develop a common methodology to teach water polo through tactics (Raiola, Di Tore, Napolitano, & Izzo, 2012) adapted to the new needs of the sport.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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**Table 1**. Field format.

| VARIABLES |
| --- |

**INDEPENDENTS**

**(1)** Championship rules: Belgrade 2006 and Budapest 2020

**DEPENDENTS**

**(1)** Situational framework (Argudo, Alonso, García-Marín, & Ruiz, 2007):
   1. Equality: Both teams have the same number of players, and they play on one of the two sides of the field
   2. Counterattack: Numerical advantage of the attacking team originated by a change in ball possession and swimming to the other field
   3. Inequality: Numerical advantage of the attacking team originated by one or more defenders being temporarily removed for a serious foul
   4. Penalty: Shot from 5 m against the goalie due to a serious foul by a defender

**(2)** Position (Figure 1): Field zone from which the shot comes

**(3)** Feint: Presence or absence of fakes in the shot

**(4)** Technical gesture:
   1. Drive shot: The ball follows a trajectory parallel to the water
   2. Drive shot with rebound: The ball follows a descending trajectory and then ascends after bouncing off the water
   3. Lob shot: The ball follows a parabolic trajectory, first ascending and then descending
   4. Reverse shot: The player with their back to the goal performs a turn in place and releases the ball at the same time
   5. Others: Gestural forms distinct from those previously described and that appear with lower frequency in the game

**(5)** Free shot: Shot from behind the 4-5 m line as a consequence of an ordinary foul by a defender

**(6)** Direction (Figure 1): Determined by taking as reference the shooter's position, the goal zones, and, when the shot produces from the central zones of the field, the executing arm (left or right): short post, centre and long post

**(7)** Result: Goal, post, saved, blocked and outside
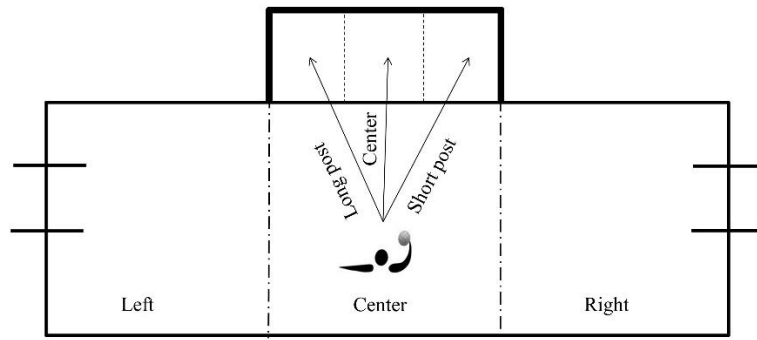
**Figure 1**. *Shot positions, goal zones and shot directions.*

**Table 2**. Frequency of shots per match according the situational framework.

|  | 2006 | 2020 |
|---|---|---|
| Equality | 28.7±5.2 | 27.0±4.9 |
| Counterattack | 9.7±3.2 | 6.2±2.3* |
| Inequality | 16.4±4.2 | 21.8±4.2* |
| Penalty | 1.0±.9 | 2.4±2. |

* Differences between both championships 2006 and 2020 ($p < .05$/n variables).

**Table 3**. Frequency of technical-tactical variables of shots per match according the situational framework between the two championships.

|  | Equality | | Counterattack | | Inequality | | Penalty | |
|---|---|---|---|---|---|---|---|---|
|  | 2006 | 2020 | 2006 | 2020 | 2006 | 2020 | 2006 | 2020 |
| **Position** | | | | | | | | |
| Left | 6.4±2.1 | 7.3±1.8 | 2.7±1.6 | 2.3±1.3 | 5.5±2.2 | 7.1±3.1 | | |
| Center | 15.4±3.6 | 12.5±3.5* | 4.4±1.6 | 2.3±1.6* | 6.9±2.6 | 9.6±4.2* | | |
| Right | 6.9±2.9 | 7.1±2.0 | 2.5±1.9 | 1.6±1.4 | 4.1±1.9 | 5.1±1.8 | | |
| **Feint** | | | | | | | | |
| With feint | 6.9±2.7 | 6.8±3.1 | 1.8±1.1 | 1.8±1.2 | 6.4±2.3 | 6.3±2.1 | | |
| Without feint | 21.8±4.4 | 20.2±4.8 | 7.9±2.8 | 4.4±1.8* | 10.1±2.6 | 15.5±3.6* | | |
| **Technique** | | | | | | | | |
| Drive shot | 18.3±4.2 | 17.2±4.2 | 4.4±2.4 | 3.3±1.6 | 12.1±3.5 | 14.1±4.1 | .6±.6 | 1.5±2.0 |
| Drive shot with rebound | 6±2.6 | 5.8±1.8 | 3.1±1.8 | 1.9±1.5 | 2.8±1.6 | 4.2±1.8* | .4±.7 | .9±1.1 |
| Lob shot | 1.7±1.5 | 1.1±1.2 | 1.0±1.0 | .5±.7 | .2±.5 | .1±.3 | - | - |
| Reverse shot | 1.4±1.2 | 1.2±1.3 | .2±.4 | .1±.2 | - | - | - | - |
| Others | 1.3±1.5 | 1.7±1.5 | 1.2±.9 | .3±.5* | 1.4±1.4 | 3.3±2.0* | - | - |
| **Foul** | | | | | | | | |
| After foul | 4.1±2.5 | 2.5±1.3* | .4±.9 | .2±.5 | - | - | - | - |
| Without foul | 24.6±5.5 | 24.4± | 9.3±3.5 | 6.0±2.3* | 16.4±4.2 | 21.8±4.2* | - | - |
| **Direction** | | | | | | | | |
| Short post | 11.1±3.2 | 11.2±3.5 | 4.0±2.3 | 3.0±1.9 | 7.5±2.4 | 9.7±2.6* | .6±.7 | .9±.9 |
| Centre | 6.8±2.4 | 5.0±2.6 | 2.4±1.8 | 1.4±1.2 | 4.3±2.4 | 3.9±2.3 | .1±.2 | .1±.3 |
| Long post | 10.8±3.6 | 10.8±2.7 | 3.3±1.7 | 1.8±1.5* | 4.7±1.9 | 8.3±2.7* | .4±.6 | 1.4±2.2 |
| **Result** | | | | | | | | |
| Goal | 7.3±2.8 | 6.4±2.6 | 4.1±1.8 | 2.2±1.2* | 7.8±2.7 | 9.4±3.2 | .6±.7 | 1.8±2.3 |
| Post | 2.9±1.7 | 3.1±1.6 | .7±.9 | .5±.8 | 1.7±1.2 | 2.5±1.9 | .1±.2 | .2±.4 |
| Stop | 11.3±3.6 | 10.6±3.2 | 3.8±1.8 | 2.5±1.6 | 3.7±2.0 | 5.6±2.4* | .3±.5 | .4±.7 |
| Outside | 3.2±1.6 | 3.4±1.8 | .8±.9 | .7±.9 | 1.0±1.3 | 1.7±1.1 | .1±.2 | .0±.0 |
| Block | 4.1±2.2 | 3.3±1.8 | .4±.6 | .3±.6 | 2.3±1.4 | 2.6±1.7 | - | - |

* Differences between both championships 2006 and 2020 ($p < .05$/n variables).