Materials : Football (Soccer)

Comparison of Attacking Plays in Soccer Games between Japanese and Spanish U12 Players

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This study investigated aspects of attacking plays inside and around the penalty area in soccer games. Notational analysis was employed to compare U12 Japanese and Spanish players. The games were from U12 Junior Soccer World Challenge 2015, of which 14 games from 8 Japanese teams and 10 games from 2 Spanish teams (24 games in total) were analyzed.
The results indicated a significantly higher percentage of penetration (9.1%) into the penalty area (PA) by Spanish teams compared to Japanese teams (4.4%). Spanish teams appeared to penetrate from the side (right: 23.4%, left: 28.6%) and central line (48.0%) of the PA, whereas 75.3% of the penetrations by Japanese were through the central line. In terms of attacking plays prior to PA penetration, the majority of Japanese attacking plays were toward the central line. Compared to the Japanese tendency, Spanish attacking plays seemed to involve a greater amount of dribbling and passing from deep wide area before penetrating the PA. Furthermore, Japanese teams tended to make more shots off target compared to Spanish teams. In order to increase the number of shots on target, it may be beneficial to dribble and maintain possession after PA penetration.

Keywords: notational analysis, attacking plays, Japanese and Spanish U-12

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1. Purpose

The Japan Football Association (JFA) dispatches technical study groups to FIFA World Cup games and other international championships for each age category to analyze the global trend and the current position of Japanese football performance. Analyses revealed that Japanese teams excel at passing plays, but not at penetrating the goal area, which reduces shot opportunities (JFA, 2015a). In relation to these analyses, JFA U12 Coaching Guidelines 2010 (JFA, 2010) recommended that U12 players work on increasing their awareness of the goal and on improving their approach to penetration and ability to penetrate the penalty area.

Suzuki et al. (2002) pointed out, however, that while the analyses by specialists in Japanese football provide a comprehensive evaluation for football, they fail to eliminate analyst subjectivity and arbitrariness. Franks and Miller (1986) reported that the accuracy of the coaches' observation of games remains at about 30%. The above makes clear the necessity of employing quantitative and objective evaluations to examine aspects of Japanese football.

Nakayama et al. (2015) conducted a quantitative comparison of Japanese and world football, analyzing attacks in the world's top leagues, J-League, and university leagues, and provided objective evidence in support of the evaluations. However, these comparative studies on Japanese and overseas football employing quantitative indices are as yet insufficient, and it is necessary to accumulate more data while expanding research targeting not only adult players, but also players in youth categories.

However, Japanese players in youth categories, especially U12, have infrequent opportunities to participate in international games, making data collection difficult. The advent of U12 international games in Japan in 2013 by the Tokyo Football Association, etc. has improved opportunities for comparative studies on Japanese and overseas players. In 2015, two club teams from Spain, one from Argentina, and one from Vietnam were invited to a tournament, in which nine J-League teams,

two from other leagues, and the Tokyo U12 team also participated. RCD Espanyol from Spain won first place. In the past two tournaments, Spain's FC Barcelona won, which means that Spanish teams won first place in all three games.

Modern football developed in Europe, with Spain being especially well known as one of the top countries. Spain took the 2010 FIFA World Cup and the 2012 European Football Championship. Domestic league team FC Barcelona always ranks high in European championships, and top players cultivated by Barcelona include Messi and Xavier. In addition, the Spain U17 team participated in the FIFA U17 World Cup eight out of 15 times. Spain also placed eighth at Danone Nations Cup 2012, which is for players aged 10 to 12, and fifth in 2015, which shows that the Spanish U12 football team is one of the world's top teams. Comparing a Spanish league club U12 team and a J-League U12 team belonging to J-League in Japan would help to clarify the current state of football player cultivation in Japan.

For this reason, we carried out notational analysis to quantitatively compare the attacking plays around the penalty area, one of the challenges for Japanese U12 players, between Japanese and Spanish U12 football players on teams participating in U12 Junior Soccer World Challenge 2015 held in Tokyo.

Table 1 Match list

Team	score	Team	Match Date
FC Barcelona	3–1	Kawasaki Frontare U–12	Aug.27.2015.
RCD Espanyol	2–0	Yokohama F･Marinos Primary	Aug.27.2015.
Deportivo Camioneros	2–3	Kasiwa Reisol U–12	Aug.27.2015.
RCD Espanyol	1–0	Granscena Niigata FC Junor	Aug.27.2015.
U–12 Vietnam	2–1	Tokyo Verudy Junior	Aug.28.2015.
FC Barcelona	2–1	Nagoya Granpus U–12	Aug.28.2015.
RCD Espanyol	0–0	Urawa Red Diamands Junior	Aug.28.2015.
Deportivo Camioneros	2–0	Cerezo Osaka U–12	Aug.28.2015.
FC Barcelona	3–1	Urawa Red Diamands Junior	Aug.29.2015.
Kawasaki Frontare U–12	0–4	Yokohama F･Marinos Primary	Aug.29.2015.
Nagoya Granpus U–12	1–4	RCD Espanyol	Aug.29.2015.
Urawa Red Diamands Junior	1–1	Kasiwa Reisol U–12	Aug.29.2015.
Yokohama F･Marinos Primary	0–2	Kashima Antlers Junior	Aug.29.2015.
FC Barcelona	1–1	Tournament selection Team	Aug.29.2015.
FC Barcelona	1–1	Tokyo U–12	Aug.30.2015.
RCD Espanyol	1–0	U–12 Vietnam	Aug.30.2015.

Subject teams are underlined.

2. Method

2.1. Games Analyzed

We analyzed 14 games from 8 Japanese teams and 10 games from 2 Spanish teams from U12 Junior Soccer World Challenge 2015 held from August 27 to 30, 2015 in Tokyo, Japan.

Each game had 11 players on each side. Preliminary league and final tournament games consisted of two halves, each lasting 25 minutes in duration, and tournament games for lower ranked teams to decide the ranking consisted of two halves, each running 20 minutes in duration. The results of the analyzed games are shown in **Table 1**.

The two Spanish teams analyzed in this study were subordinate organizations of club teams located in Barcelona, Cataluna, both of which are highly regarded for their cultivation of players (U12 Junior Soccer World Challenge 2015, 2015). Furthermore, all of eight Japanese teams have ranked high in domestic games, and can be counted as top-level teams in Japan. This study, therefore, targeted U12 players on the top-level teams in Japan and Spain.

2.2. Data Recording

Games were recorded using two video cameras (HDR-CX720V SONY, GZ-E241 JVC) placed around the penalty areas on both sides (**Fig.1**). Camera angles were changed to identify individual plays such as dribbles, passing, and shooting with a focus on the ball and the location of players on the pitch. Videos of plays before and after penetration into the penalty area were extracted using video editing software (EDIUS3.5 Grass Valley). Then, one analyst extracted attacking plays in accordance with the operational definition of attacking.

Extracted attacking plays were analyzed, and the number of penetrations into the penalty and side areas were recorded in accordance with the definitions. Penetrated side, penetration method, and plays in the penalty area were classified, and the frequency of each was recorded. The outcome after shooting was also classified, and the frequency of each outcome was recorded.

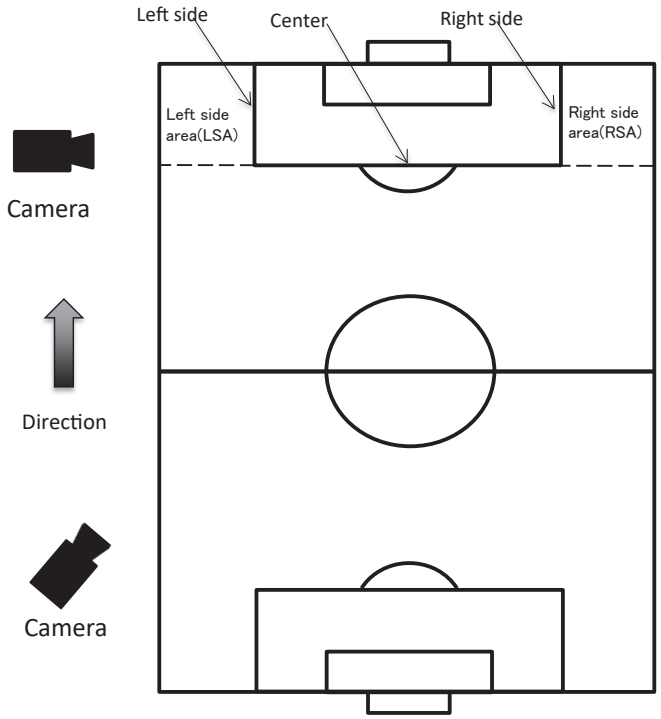

Fig 1 Camera position and definition of lines and side areas

2.3. Analysis Items

As described above, JFA (JFA, 2010) recommended that U12 players work on increasing their awareness of the goal and on improving their approach to penetration and ability to penetrate the penalty area. Based on these goals, we analyzed penetration into the penalty area while attacking and other plays in the penalty area by classifying them into the following items:

2.3.1. Number of Attacking Plays and Penetrations into the Penalty and Side Areas

An attack was recorded when one team touched the ball more than once or the game was restarted with the ball possessed by the opposing team, or when the opposing team touched the ball more once. A continued attack was recorded when the ball the opposing team touched once during the attack play moved outside the touch or goal line, or when the attack was restarted with the ball possessed by the attacking team. For example, a ball passed by the offensive side (a) that hit the foot of a player on the defensive side (b) once, but was possessed by the offensive side (a) again, was counted it as one attack. A ball hitting the foot of the player on the defensive side (b) that was touched by the defensive side (b) again in succession was judged to be the end of the attack by the offensive side (a) and the start of the attack by the defensive side (b). Furthermore, when a ball passed by the offensive side (a) was touched by the defensive side (b) once and a shot resulting in a turnover to the offensive side was attempted (a), we did not count it as an attacking play. Although this can be counted as an attacking play, we prioritized the base definition of this study, which is that attacking means more than one touch of the ball on one side.

Next, we recorded the number of penetrations into the penalty area, excluding set plays. This study defined penetration into the penalty area as the ball and more than one player on the offensive side remaining in the penalty area, and a player on the offensive side touching the ball in the penalty area. Therefore, a ball or a player on the offensive side entering the penalty area alone was not counted as penetration into the penalty area.

Furthermore, the two areas between the penalty area and the sideline were defined as the left side area (LSA) and right side area (RSA) (**Fig.1**), and the number of the penetrations into each area while penetrating into the penalty area was also recorded. However, the number of penetrations into the LSA and RSA from the penalty area was excluded.

2.3.2. Side Penetrated in the Penalty Area and the Penetration Method

The side that players passed over when they penetrated into the penalty area were defined as left side, center, and right side.

The methods of penetrating into the penalty area were classified into dribble, which is a player possessing the ball and carrying it into penalty area, and passing, which is a player receiving a pass to the penalty area from another player on the same team.

2.3.3. Plays in the Penalty Area

We also recorded plays in the penalty area as dribbles, passes, and shots. First, two analysts classified the first ball touch in the penalty area a s shot or pass. Second, they classified the second ball touch as a shot or pass, and other plays as dribbles. Third, they classified the third ball touch as a shot or pass, and other plays as continued dribbling. When two analysists' judgment differed as to the classification of dribbling, they checked videos, determined the classification, and recorded it. Successful shots were recorded as a "goal" and others were recorded as a "failure." Even when the attacking

play continued, successful and failed shots were recorded in accordance with this definition. When the result of passing and dribbling ended the attack, it was counted as a "failure."

We classified the outcome of shots into four categories, "goal, "off target," "GK save, and "DF block."

2.4. Reliability of Analysis

The two analysts were graduate students engaged in football research. Both had greater than 10 years' experience playing football and about two years' experience teaching. The rate of concordance and Cohen's kappa (degree of consistency between two raters) for each item between the two analysts was calculated.

For data that differed between the two analysts, they reexamined the video, made a judgment, and recorded it.

2.5. Data Processing

Because the Spanish team won a number of the games targeted in this study, we examined the ratio of penetration into the penalty area for wins, draws, and losses using chi-squared test to clarify the influence of game results.

Following this, we applied chi-squared test to compare the number of attacking plays and penetration into the penalty area, side penetrated and methods, number of penetrations into side areas, plays in the penalty area, success rate of plays in the penalty area, and outcome of shots between the Japanese and Spanish teams. The statistical significance level was set at less than 5%.

3. Results

3.1. Influence of Game Results (Wins, Draws and Losses)

The ratio of penetration into the penalty area in the games between Japanese teams was 3.0% in wins (7 penetrations out of 236 attacking plays), 2.6% in draws (5 penetrations out of 196 attacking plays), and 3.0% in losses (4 penetrations out of 132 attacking plays). Chi-squared test revealed no significant difference ($\chi 2 = .09$, $df = 2$, $p = .956$). Therefore, we determined that game results would not have a significant influence on the data obtained in this study.

3.2. Reliability of Recorded Data

The reliability of the number of penetrations into penalty and side areas, and the results of plays and shots in the penalty area was 100%. In addition, the concordance rate and coefficient of the side penetrated were 96.5% and 0.94, respectively, those of penetration method were 99.0% and 0.98, and those of plays in the penalty area were 97.5% and 0.93.

3.3. Number of Attacking plays and Penetration into the Penalty Area

The number of attacking plays by the Japanese team during the 14 games was 1,675. The number of penetrations into the penalty area was 73, and the rate was 4.4%. The number of attacking plays by the Spanish team was 1,004 in the 10 games. The number of penetrations into penalty area was 98, and the rate was 9.1%. The rate of penetration into the penalty area of the Japanese team was significantly lower than that of the Spanish team ($\chi 2 = 24.99$, $df = 1$, $p < .001$).

3.4. Side Penetrated in the Penalty Area and Penetration methods, and Number of Penetrations in the Side Area

Of the 73 penetrations by the Japanese team, 10 were from the left side (13.7%), 55 were from the center (75.3%), and 8 were from the right side (11.0%), which revealed that the Japanese team penetrated most frequently from the center. Among 98 penetrations by the Spanish team, 28 were from the left side (28.6%), 47 were from the center (48.0%), and 23 were from the right side (23.4%). A significant difference was observed in the side penetrated between the Japanese and Spanish teams ($\chi 2 = 13.04$, $df = 1$, $p = .001$) (**Table 2**)

In regard to the penetration method (dribbling and passing), the Japanese team dribbled 37 times (50.1%) and passed 36 times (49.1%) while the Spanish team dribbled 57 times (57.1%) and passed 39 times (42.9%), which did not reveal a significant difference between the Japanese and Spanish teams ($\chi 2 = 0.16$, $df = 1$, $p = .215$).

Table 2 Ratio of side and area penetrated in the penalty area

	side penetrated						area penetrated			
	left		center		right		left side area		right side area	
Japanese team	10	(13.7)	55	(75.3)	8	(11.0)	10	(10.9)	8	(13.7)
Spanish team	28	(28.6)	47	(48.0)	22	(23.4)	23	(23.5)	19	(19.4)

times (%)

Furthermore, the number of penetrations into the side area by the Japanese team was 10 times to the LSA and 8 times to the RSA, which accounted for 24.6% of the total number of penetrations into the penalty area, while the number of penetrations into the side area by the Spanish team were 23 times to the LSA and 19 times to the RSA, which accounted for 42.9% of the total number of penetrations into the penalty area (**Table 2**). The comparison between two teams showed that the Spanish team penetrated into side area significantly more than the Japanese team did ($\chi 2 = 6.08$, $df = 1$, $p = .014$).

3.5. Plays in the Penalty Area and Success Rate

The 78 plays in the penalty area by the Japanese team consisted of 19 dribbles (24.3%), 21 passes (27.0%), and 38 shots (48.7%), while the 122 plays in penalty area by the Spanish team consisted of 25 dribbles (20.5%), 48 passes (39.3%), and 49 shots (40.2%). Plays in the penalty area did not show a significant difference ($\chi 2 = 0.96$, $df = 2$, $p = .197$) (**Table 3**).

The success rate of each play (dribbles, passes, shots) of the Japanese team was 52.6% for dribbles, 28.6% for passes, and 15.8% for shots while the rate for the Spanish team was 92.0% for dribbles, 35.4% for passes, and 20.4% for shots. As a result, the success rate of dribbles by the Spanish team was significantly higher than that of the Japanese team ($\chi 2 = 8.92$, $df = 1$, $p = .003$). However, the success rate for passes ($\chi 2 = 0.04$, $df = 1$, $p = .57$) and that of shots ($\chi 2 = 0.03$, $df = 1$, $p = .581$) revealed no significant difference between the two teams (**Table 3**).

Table 3 Plays in the penalty area and ratio of success and failure after each play in the penalty area (dribble, pass, shot)

	dribble					pass					shot				
		success		failure			success		failure			success		failure	
Japanese team	19 (24.3)	10	(52.6)	9	(47.4)	21 (27.0)	6	(28.6)	15	(71.4)	38 (48.7)	6	(15.8)	32	(84.2)
Spanish team	25 (20.5)	23	(92.0)	2	(8.0)	48 (39.3)	17	(35.4)	31	(64.6)	49 (40.2)	10	(20.4)	39	(79.6)

times (%)

Table 4 Ratio of outcome after shots

	goal	off target	GK save	DF block
Japanese team	6 (15.8)	11 (28.9)	18 (47.4)	3 (7.9)
Spanish team	10 (20.4)	4 (8.2)	23 (46.9)	12 (24.5)

times (%)

In regard to the outcome of shots, the Japanese team scored 6 goals (15.8%), was off target 11 times (28.9%), had 18 GK saves (47.4%), and 3 DF blocks (7.9%), while the Spanish team scored 10 goals (20.4%), was off target 4 times (8.2%), had 23 GK saves (46.9%), and 12 DF blocks (24.5%) (**Table 4**), revealing a significant difference between the two teams ($\chi 2 = 8.06$, $df = 3$, $p = .029$).

4. Discussion

4.1. Penetrations into the Penalty Area

The Spanish team showed a significantly high rate of penetration into the penalty area. Among the three sides in the penalty area, the Japanese team had the highest rate of penetrations from the center in the penalty area while the Spanish team showed relatively similar results between penetrations from the center, and from the left and right sides. The Spanish team was thought to have attacked from both the center and both sides in a well-balanced manner.

The Spanish team's number of penetrations into the side area in the opponent's territory was significantly high, indicating that the Spanish team penetrated deeply into the side area (LSA, RSA) in the opponent's territory (close to the opponent's goal) and penetrated into the penalty area by passing and dribbling more than the Japanese team did.

Among the 73 goals scored by build-up plays in FIFA World Cup 2014, 35 goals were scored by penetration into the center and 38 goals were scored by the penetration into the side (Barez, 2014). This suggested that penetration into the penalty area from the side is effective in destroying defense formations because scoring by penetration into the center is where the defense side is fully prepared for the offense.

Furthermore, the JFA suggested the effectiveness of attacking from the side, stating that when the side DF attempted an overlapping run and a pull-back cross from a deep position close to the goal line in the penalty area, the defense made mistakes in defending against players who possessed the ball and in marking in front of the goal, which resulted in lost goals or critical situations (JFA, 2015b). This also suggested that penetration into the deeper side area in the opponent's territory is an effective attacking play to produce an opportunity to score, and the Japanese team needs to improve its ability to do this.

4.2. Plays in the Penalty Area

Comparison of the plays in the penalty area between the Japanese and Spanish teams showed no significant difference. The plays in the penalty area by the Japanese team were composed of 24.3% dribbles, 27.0% passes, and 48.7% shots. Shooting showed the highest, which did not match the general opinion about the Japanese team; namely was that the Japanese team does not use chances for shooting, but passing to others. This suggested that the Japanese team also selected plays in the penalty area with a consistent awareness of the location of the goal and taking the chance to shoot.

Comparison of the success rate of plays in the penalty area between the Japanese and Spanish teams showed that dribbling was highly successful for the Spanish team. This suggested that the Spanish team continued to possess the ball after penetrating into the penalty area.

In addition, comparison of the four shooting styles (goal, off target, GK save, and DF block) between the Japanese and Spanish teams showed significant difference. In particular, Japan's off target shots accounted for 28.9% of all shots, while the Spanish team's off shots accounted for only 8.2%, suggesting that the Japanese team needed to reduce the number of off target shots.

4.3. Limitation of the Study

This study analyzed games at one international competition held in Japan, limiting subjects to the Japanese and Spanish teams. Therefore, the results of study cannot be considered applicable to U12 players of other countries. However, because there are also few chances for Japanese U12 teams to participate in international competition or play against world-class club teams such as the Spanish team, this provided data that allowed us to clarify problems faced by Japanese U12 football players as a first step toward future studies.

4.4. Future Tasks

We believe that further study will enable the objective identification of problems faced by the Japanese U12 team and that discussion of measures to

address those problems will be useful for individuals involved in the development of young players.

Furthermore, penetrations into the penalty area must be analyzed with a focus not only on the location from which penetration is directed, but also the location at which the penetration begins. It is also necessary to identify the causes of differences between Japanese and Spanish teams.

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