

# Change in Ball Continuity Situations in Breakdown in World-Class Rugby — Focusing on the Number of Players Involved and Time Required to Get the Ball out —

Tatsuya Shimasaki\*, Go Chiba\*\*, Takuo Furukawa\* and Akira Nakagawa\*

\*Faculty of Health and Sport Sciences, University of Tsukuba

\*\*School of Liberal Arts and General Education, National Defense Academy

1-1-1 Tennodai, Tsukuba, Ibaraki 305-8574, Japan

shimasaki.tatsuya.gf@u.tsukuba.ac.jp

[Received June 8, 2016; Accepted August 4, 2017]

The purpose of this study was to clarify the change in ball continuity in breakdown in world-class rugby. We analyzed the number of offensive and defensive players involved in breakdown, and the time required to get the ball out from breakdown. To visualize the changes in 2012 and 2014, 24 games were sampled from the Six Nations and the Rugby Championships. The results between 2014 and 2012 were compared. The main results were as follows:

- 1) Breakdowns with two and three players including both offense and defense increased, and breakdowns with five or more players decreased.
- 2) Breakdowns with two offensive players increased, and breakdowns with four or more offensive players decreased.
- 3) Breakdowns with one defensive player increased.
- 4) Breakdowns within two and three seconds increased, and breakdowns within six or more seconds decreased.

These results from the two years examined suggest that the majority of breakdowns occur with a smaller number of players and within two to three seconds. Therefore, there is a need to increase speed in breakdowns.

**Keywords:** Game performance analysis, Breakdown, Ball out, Continuity

[Football Science Vol.14, 24-33, 2017]

## 1. Purpose

The Rugby World Cup has been held since 1987, and the 8<sup>th</sup> Rugby World Cup took place in England in 2015. Among the eight cups, countries from the southern hemisphere, including New Zealand, Australia, and South Africa, won seven times; and the top four countries at the 2015 World Cup were from the southern hemisphere. Since the Rugby World Cup began allowing the involvement of both amateur and professional players in 1995, games have changed dramatically with significant changes seen in game styles (International Rugby Board: IRB, 2005). Along with IRB revisions in the rules of play designed to increase the speed and continuity of play (Nonomura, 2005) rugby rules have been revised with the goal of

increasing the continuity of play and entertainment value to provide more exciting TV viewing. As a result, ball-in time increased (IRB, 2011). Along with this, the amount of contact and rucks increased (IRB, 2011), and the importance of the breakdown, which means the contest for possession of the ball between tackle and ruck, increased (Jones, 2009).

According to the World Rugby Playing Charter, the basic principles of the game include contest and continuity (World Rugby, 2015). As mentioned above, recently, the rules have undergone significant changes; and these changes work to increase offensive play continuity. For example, limitation of the contest for possession of the ball in the tackle area (World Rugby, 2015), permission for support (lifting) to a jumper associated with changes in lineout rules

(Nakagawa, 2002), and the ruling on holding (Ri, 2010). Meanwhile, due to these changes in rules, another principle of rugby, the contest for possession of the ball, tends to be neglected (Nonomura, 2005; Matsushima, 2011).

In rugby, the contest for possession of the ball occurs during contact, general play, scrum, lineout, and restart of play after kick-off (World Rugby, 2015). Regarding the contest for possession of the ball and continuity during contact, the IRB (2011) reported that the ball possession rate during ruck/ maul averaged 95% during the 2011 RWC final game, and 92% during the 2007 World Cup final game (IRB, 2007). These ball possession rates suggest that the plays incline to continuity rather than contest for possession of the ball. At the 2011 World Cup, the ball possession rate during throws by the offense into the scrum was 89%, and the rate during throws into the line-out was 82%. These results show that the contest for possession of the ball during rucks is the most difficult for the defense.

Shimasaki (2014) reported that in domestic university matches 14% of rucks use no defensive players in the contest for possession of the ball during rucks, reflecting the difficulty of defense success in the contest for possession of the ball during rucks. If the defense is not involved in the contest for ball possession, the number of players that are engaged in defense does not decrease, preventing the offensive players from penetrating the defense and decreasing broad movement of the ball. According to research on the origin of the try, scrum (18%) and lineout (29%) account for the majority (IRB, 2011). It is thought that eight players from both sides, 16 in total, often are involved in the contest for ball possession in scrum and lineout, which leaves space for offensive players. In addition, Jones (2015) argued the desirability of having all 14 players standing after a tackle. The offensive player is required to get the ball out before the defensive player stands up and prepares for defense. In other words, attacking before the defensive player stands up is one indicator of ball continuity in a ruck.

There is little research on the contest for ball possession and continuity during breakdown. Shimasaki et al. (2009) targeted rucks and clarified changes in the number of players in the contest for ball possession in rucks by position. Shimasaki et al. (2012) also clarified the number of offensive players used in the contest for ball possession in rucks, and

Matsumura (2001) clarified the number targeting the defense. However, neither clarified the number of players involved in the contest for ball possession in rucks and the continuity of play independent of side, or the number of defensive players involved in these plays compared with the number of players involved in rucks. Murakami et al. (2001) reported the mean time of ruck and maul during breakdown to clarify the speed used to take the ball out from breakdown. However, this targeted games played in 2000 and 2001, and reported only mean time of the ruck and maul without clarifying the time required to get the ball out or the frequency in rucks and mauls from breakdown in recent years of rugby.

Therefore, this study was carried out to analyze the number of both offensive and defensive players involved in the breakdown and the time required to get the ball out targeting world-class rugby games. Through investigation of the tendency of ball continuity during breakdown in world-class teams, we sought to examine ball continuity in the breakdown in current rugby games and provide suggestions to those engaged in coaching.

## 2. Method

### 2.1 Samples

In this study, we analyzed the matches of eight teams that participated in the Six Nations and the Rugby Championship to understand the present situation and compare it with ball continuity in breakdowns in world-class rugby games in 2012 and 2014. The eight teams were England, Ireland, Wales, France, New Zealand, South Africa, and Australia. In regard to the Six Nations, we examined six matches in both 2012 and 2014, in which the England, Ireland, Wales, and France teams played. In regard to the Rugby Championship, we examined six matches in both 2012 and 2014, in which the New Zealand, South Africa, Australia, and Argentina teams played. We examined a total of 24 matches. The reason for selecting matches played in 2012 and 2014 was the desire to avoid matches played in the year of the World Cup, which may have been influenced by unusual factors. The details of the matches are shown in **Table 1**.

**Table 1** The Details of Matches used for Sample

| Number | Date      | Convention             |         | Match        |   |              | Score |      |
|--------|-----------|------------------------|---------|--------------|---|--------------|-------|------|
| 1      | 2012/2/5  | Six Nations            | Ruond 1 | Ireland      | v | Wales        | 21    | v 23 |
| 2      | 2012/2/25 | Six Nations            | Round 3 | England      | v | Wales        | 12    | v 19 |
| 3      | 2012/3/4  | Six Nations            | Round 3 | France       | v | Ireland      | 17    | v 17 |
| 4      | 2012/3/11 | Six Nations            | Ruond 4 | France       | v | England      | 22    | v 24 |
| 5      | 2012/3/17 | Six Nations            | Ruond 5 | Wales        | v | France       | 16    | v 9  |
| 6      | 2012/3/17 | Six Nations            | Ruond 5 | England      | v | Ireland      | 30    | v 9  |
| 7      | 2012/8/18 | The Rugby Championship | Ruond 1 | Australia    | v | New Zealand  | 19    | v 27 |
| 8      | 2012/8/25 | The Rugby Championship | Ruond 2 | Argentina    | v | South Africa | 16    | v 16 |
| 9      | 2012/9/8  | The Rugby Championship | Round 3 | New Zealand  | v | Argentina    | 21    | v 5  |
| 10     | 2012/9/8  | The Rugby Championship | Round 3 | Australia    | v | South Africa | 26    | v 19 |
| 11     | 2012/9/15 | The Rugby Championship | Ruond 4 | New Zealand  | v | South Africa | 21    | v 11 |
| 12     | 2012/9/15 | The Rugby Championship | Ruond 4 | Australia    | v | Argentina    | 23    | v 19 |
| 13     | 2014/2/1  | Six Nations            | Ruond 1 | France       | v | England      | 26    | v 24 |
| 14     | 2014/2/8  | Six Nations            | Ruond 2 | Ireland      | v | Wales        | 26    | v 3  |
| 15     | 2014/2/21 | Six Nations            | Round 3 | Wales        | v | France       | 27    | v 6  |
| 16     | 2014/2/22 | Six Nations            | Round 3 | England      | v | Ireland      | 13    | v 10 |
| 17     | 2014/3/9  | Six Nations            | Ruond 4 | England      | v | Wales        | 29    | v 18 |
| 18     | 2014/3/15 | Six Nations            | Ruond 5 | France       | v | Ireland      | 20    | v 22 |
| 19     | 2014/8/16 | The Rugby Championship | Ruond 1 | New Zealand  | v | Australia    | 12    | v 12 |
| 20     | 2014/8/24 | The Rugby Championship | Ruond 2 | South Africa | v | Argentina    | 33    | v 31 |
| 21     | 2014/9/6  | The Rugby Championship | Round 3 | Australia    | v | South Africa | 24    | v 23 |
| 22     | 2014/9/6  | The Rugby Championship | Round 3 | New Zealand  | v | Argentina    | 28    | v 9  |
| 23     | 2014/10/5 | The Rugby Championship | Ruond 6 | South Africa | v | New Zealand  | 27    | v 25 |
| 24     | 2014/10/5 | The Rugby Championship | Ruond 6 | Argentina    | v | Australia    | 21    | v 17 |

## 2.2 Notational Analysis of Game Performance

### 2.2.1 Basic Method

We analyzed data utilizing Gamebreaker game performance analysis software (Sportstec Limited, 1997). We recorded matches broadcast on TV for analysis. The analysis was carried out by the author, who had experience coaching rugby players and was engaged in scientific research on rugby games.

### 2.2.2 Analysis Subjects

Subjects of this study were plays in which breakdown was formed and the offense continued to possess the ball. The ruck, which is formed when the ball is on the ground and one or more players from each team who are on their feet close around it, was a subject of analysis. If the offense is involved in the breakdown when there was only a tackler on the defense-side who remained as he fell, it was deemed a breakdown and included as a subject of analysis. Recently, this phenomenon in which a ruck not formed after a tackle is called a Tackler Only. In this case, there is no offside line, and a ruck is not

formed; however, the situation is similar to a ruck and handled in the same way tactically. Therefore, it was also included as a subjects of analysis. Similarly, if offensive players involved when the defensive players remained as they fell to the ball on the ground (world rugby, 2015), it was also deemed a subject of analysis.

### 2.2.3 Items Analyzed

(1) Number of offensive and defensive players involved in breakdowns

We recorded the number of offensive and defensive players involved in breakdowns. Numbers in excess of seven were classified as “7 or more.”

(2) The number of offensive players involved in breakdowns

We counted the number of offensive players involved in breakdowns. If the number exceeded six, we classified it as “6 or more.” Offensive players involved in breakdowns were defined as those who fell under any of the following requirements from the time a tackled player had contact with a defensive player to the time when the ball was brought out from the breakdown:

- a) Either being in contact with a tackled player or being on the tackled player;
- b) Being in contact with a player involved in a breakdown and being in front of or on the ball; or
- c) Being in contact with a defensive player in a breakdown.

However, if those who met requirements for ruck participants returned to the rear of the ball before the ball was brought out from the ruck, they were excluded as ruck participants. Due to the characteristics of rugby games, players in front of the ball are offside players. We used the location of the ball as the base.

- (3) The number of defensive players involved in breakdowns

We counted the number of defensive players involved in breakdowns. Defensive players involved in breakdown were defined as those who fell under any of the following requirements by the time the ball was brought out from the ruck:

- a) Being in contact with an offensive player in a breakdown;
- b) Being in contact with a defensive player who was in contact with an offensive player in a breakdown; or
- c) Fell on the ground or fell to his knees after being in contact with an offensive player.

However, those who were in contact with an offensive or a defensive player in breakdown, but only placed their hands on the player involved in a ruck were excluded. Those who were in contact with players involved in a ruck with body parts other than hands were counted as participants in defense.

- (4) Time required to get the ball out from breakdown

The time required to get the ball out from breakdown was measured from the time the upper half of the tackled player's body fell on the ground to the time the player who got the ball out from the breakdown took the ball from the ground, or held the ball up from the breakdown. Recorded times were rounded to the first decimal place. Times between 0 and 1.4 seconds were classified as 1 second, 1.5 and 2.4 seconds were classified as 2 seconds, 2.5 and 3.4 seconds as 3 seconds, 3.5 and 4.4 seconds as 4 seconds, 4.5 and 5.4 seconds as 5 seconds, and 5.5 seconds or more were classified as 6 seconds or more. These rough classifications were designed to enable easy return of results to coaching staff. For cases in which the ball could not be seen due to player position, we recorded from the time the upper half

of the tackled player's body fell on the ground to the time at which the arm of the player who eventually got the ball out from the breakdown was raised.

- (5) Balance of offense and defense involvement in breakdowns

We counted the number of offensive and defensive players involved in breakdowns. When the number of offensive players involved in the breakdown was greater than the number of defensive players, we classified it into "Offense > Defense breakdown." When the number of offensive and defensive players involved in the breakdown was equal, and when the number of defensive players involved in the breakdown was greater than the number of offensive players, we classified it into "Offense  $\leq$  Defense breakdown."

#### 2.2.4 Data Processing Method

We calculated the annual rate of seven items: Total number of players involved in breakdowns; Number of offensive players involved in breakdowns; Number of defensive players involved in breakdowns; Time required to get the ball out from breakdowns; Balance of offensive and defensive players involved in breakdowns; and Time required to get the ball out from two types of breakdown according to the balance of involvement. We used Fisher's exact test to verify significant difference in the ratios. The significance level was set at 5% (two-sided test).

#### 2.2.5 Examination of Reliability

To examine the reliability of the analyzed data used in this study from the perspective of consistency among analyzers (James et al., 2007), the author and an individual with experience playing and coaching rugby who was engaged in scientific research on rugby analyzed the same game to calculate the error ratio using the method developed by Hughes et al. (2002).

### 3. Results

#### 3.1 Reliability of Analyzed Data

We calculated the error ratio of the data analyzed by author and the above-mentioned individual. As a result, the error ratio was less than 5%. This indicated that the data analyzed in this study had sufficient reliability (Hughes et al., 2002).

### 3.2 Frequency and Ratio of Breakdowns by the Total Number of Offensive and Defensive Players Involved

**Table 2** shows the frequency and ratio of breakdowns by the total number of offensive and defensive players involved. Examination of the differences in ratios by the number of players involved in breakdowns in the matches played in 2012 and 2014 revealed that the ratios significantly increased from 3 to 5% in breakdowns with two participants, and from 15 to 20% in breakdowns with three participants. Meanwhile, a significant decrease was observed in breakdowns with five participants from 28 to 24%, in those with six participants from 15 to 12%, and in those with seven or more participants from 8 to 6%.

### 3.3 Frequency and Ratio of Breakdowns by the Number of Offensive Players Involved

**Table 3** shows the frequency and ratio of breakdowns by the number of offensive players involved. Examination of the difference in ratios by the number of offensive players involved in breakdowns in the matches played in 2012 and 2014 showed that the ratio significantly increased in

breakdowns with the involvement of two offensive players from 23 to 31%. Meanwhile, a significant decrease was observed in breakdowns with the involvement of four offensive players from 20 to 17%, in those with the involvement of five offensive players from 9 to 5%, and in those with the involvement of six offensive players from 2 to 1%.

### 3.4 Frequency and Ratio of Breakdowns by Number of Defensive Players Involved

**Table 4** shows the frequency and ratio of breakdowns by the number of defensive players involved. Examination of the difference in ratios by the number of defensive players involved in breakdowns in the matches played in 2012 and 2014 showed that the ratio increased significantly in breakdowns with the involvement of one defensive player from 43 to 47%. However, other numbers of defensive players involved in breakdowns revealed no significant changes.

### 3.5 Frequency and Ratio by Time Required to Get the Ball Out from Breakdowns

**Table 5** shows the frequency and ratio of the time required to get the ball out from breakdowns.

**Table 2** Frequency and Ratio of Breakdown with Offensive and Defensive Player

| Year                                       | 1 player | 2 players | 3 players | 4 players | 5 players | 6 players | 7 players or more | Total |
|--|----------|-----------|-----------|-----------|-----------|-----------|-------------------|-------|
| 2012                                       | 3        | 58        | 247       | 525       | 471       | 249       | 136               | 1689  |
| 2014                                       | 5        | 96        | 349       | 593       | 417       | 204       | 104               | 1768  |
| 2012                                       | 0%       | 3%        | 15%       | 31%       | 28%       | 15%       | 8%                |       |
| 2014                                       | 0%       | 5%        | 20%       | 34%       | 24%       | 12%       | 6%                |       |
| Significant difference between both groups | n.s.     | *         | *         | n.s.      | *         | *         | *                 |       |

\* : p<0.05

n.s. : non significant

**Table 3** Frequency and Ratio of Breakdown with Offensive Player

| Year                                       | 1 player | 2 players | 3 players | 4 players | 5 players | 6 players | 7 players or more | Total |
|--|----------|-----------|-----------|-----------|-----------|-----------|-------------------|-------|
| 2012                                       | 74       | 393       | 678       | 341       | 154       | 40        | 9                 | 1689  |
| 2014                                       | 74       | 547       | 722       | 304       | 91        | 23        | 7                 | 1768  |
| 2012                                       | 4%       | 23%       | 40%       | 20%       | 9%        | 2%        | 1%                |       |
| 2014                                       | 4%       | 31%       | 41%       | 17%       | 5%        | 1%        | 0%                |       |
| Significant difference between both groups | n.s.     | *         | n.s.      | *         | *         | *         | n.s.              |       |

\* : p<0.05

n.s. : non significant



**Table 4** Frequency and Ratio of Breakdown with Defensive player

| Year                                       | 0 player | 1 player | 2 players | 3 players | 4 players | 5 players | 6 players | Total |
|--|----------|----------|-----------|-----------|-----------|-----------|-----------|-------|
| 2012                                       | 174      | 723      | 642       | 130       | 17        | 2         | 1         | 1689  |
| 2014                                       | 173      | 833      | 627       | 116       | 16        | 3         | 0         | 1768  |
| 2012                                       | 10%      | 43%      | 38%       | 8%        | 1%        | 0%        | 0%        |       |
| 2014                                       | 10%      | 47%      | 35%       | 7%        | 1%        | 0%        | 0%        |       |
| Significant difference between both groups | n.s.     | *        | n.s.      | n.s.      | n.s.      | n.s.      | n.s.      |       |

\* : p&lt;0.05

n.s. : non significant

**Table 5** Frequency and Ratio of Time for Ball out from Breakdown

| Year                                       | One second | Two seconds | Three seconds | Four seconds | Five seconds | Six seconds or more | Total |
|--|------------|-------------|---------------|--------------|--------------|---------------------|-------|
| 2012                                       | 60         | 478         | 443           | 247          | 133          | 328                 | 1689  |
| 2014                                       | 64         | 547         | 547           | 251          | 127          | 232                 | 1768  |
| 2012                                       | 4%         | 28%         | 26%           | 15%          | 8%           | 19%                 |       |
| 2014                                       | 4%         | 31%         | 31%           | 14%          | 7%           | 13%                 |       |
| Significant difference between both groups | n.s.       | *           | *             | n.s.         | n.s.         | *                   |       |

\* : p&lt;0.05

n.s. : non significant

Examination of the difference in ratios of the time required to get the ball out from breakdowns in the matches played in 2012 and 2014 revealed that the ratio significantly increased in two-second breakdowns from 28 to 31%, and in three-second breakdowns from 26 to 31%, while the ratio significantly decreased in six-second or longer breakdowns from 19 to 13%.

### 3.6 Frequency and Ratio of Two Types of Breakdowns Seen from the Balance of Offense and Defense Involvement

**Table 6** shows the results of analysis on the balance of involvement in breakdowns for both offense and defense. “Offense  $\leq$  Defense breakdown” means more participants from defense than offense or the same number of participants from offense and defense. “Offense  $>$  Defense breakdown” means more participants from offense than defense. We compared the difference of ratios in both cases in matches played in 2012 and 2014. As a result, both revealed nearly equal ratios.

**Table 6** Frequency and Ratio of Breakdown in Two Types (Offense  $\leq$  Defense, Offense  $>$  Defense)

| Year                                       | “Offense Number $\leq$ Defense Number” breakdown | “Offense Number $>$ Defense Number” breakdown | Total |
|--|--|---|-------|
| 2012                                       | 352  | 1337  | 1689  |
| 2014                                       | 365  | 1403  | 1768  |
| 2012                                       | 21%  | 79%   |       |
| 2014                                       | 21%  | 79%   |       |
| Significant difference between both groups | n.s.   | n.s.  |       |

n.s. : non significant

### 3.7 Frequency and Ratio of Two Types of Breakdowns by the Balance of Offense and Defense Involvement and by Time Required to Get the Ball Out from Breakdowns

**Table 7** shows the frequency and ratio of two types of breakdowns by the balance of offense and defense involvement and by the time required to get the ball out from breakdowns. Examination of the difference of ratios obtained from the matches played in 2012 and 2014 showed that “Offense  $\leq$  Defense breakdown” had a significant increase in ratios for three-second breakdowns from 22 to 31%. Meanwhile, “Offense  $>$  Defense breakdowns” showed a significant increase in ratios for two- and three-second breakdowns from 24 to 29% and 27 to 31%, respectively, while they showed a significant decrease in ratios in six-second or greater breakdowns from 23 to 15%.

## 4. Discussion

### 4.1 Changes in the Number of Players Involved in Ball Continuity in Breakdowns

In terms of the total number of players involved in breakdowns, the ratio of breakdowns with the involvement of two and three players showed a significant increase while the ratio of breakdowns with the involvement of five or more players showed a significant decrease. In terms of breakdowns with the involvement of four or fewer players, the number

of total players involved in breakdowns significantly increased from 49 to 59% between 2012 and 2014.

The ratio of breakdowns increased with two participants from offense, and the ratio decreased with four, five, and six participants from offense. The ratio of breakdowns with one participant from defense significantly increased between 2012 and 2014. The involvement of both offensive and defensive players tends to decrease. At the university and world top levels, the number of offensive players involved in breakdowns has been decreasing each year (Shimasaki, 2012; Shimasaki, 2014). Due to the decrease in the number of participants from offense in breakdowns, the remaining offensive players can remain in the offensive line. Therefore, involvement of defensive players in breakdowns causes a numerical disadvantage for defense. This was seen in the use of the term “reload” from 2012. Reload means to recover and be involved in the next play (Ito, 2012). As Jones (2015) stated that it is desirable to have 14 players standing, the quickness of standing up after a tackle was considered to be and taught as an important skill by coaches. It suggested that clarification of the roles of players involved in breakdowns through the defining of a tackler and clarification of the obligations of a tackler (Lee, 2016), and the ruling on holding (Lee, 2010) have had an influence on both offense and defense.

The ratio of breakdowns with one or no participants from defense increased from 53 to 57% between 2012 and 2014. This suggested that one or no defensive players were involved in the majority of breakdowns.

**Table 7** Frequency and Ratio of Time for Ball out from Breakdown of Two Types (Offense  $\leq$  Defense, Offense  $>$  Defense)

| Pattern of the Breakdown                         | Year                                       | One second | Two seconds | Three seconds | Four seconds | Five seconds | Six seconds or more | Total |
|--|--|------------|-------------|---------------|--------------|--------------|---------------------|-------|
| “Offense Number $\leq$ Defense Number” breakdown | 2012                                       | 36         | 153         | 77            | 40           | 22           | 24                  | 352   |
|  | 2014                                       | 29         | 147         | 113           | 41           | 16           | 19                  | 365   |
|  | 2012                                       | 10%        | 43%         | 22%           | 11%          | 6%           | 7%                  |       |
|  | 2014                                       | 8%         | 40%         | 31%           | 11%          | 4%           | 5%                  |       |
|  | Significant difference between both groups | n.s.       | n.s.        | *             | n.s.         | n.s.         | n.s.                |       |
| “Offense Number $>$ Defense Number” breakdown    | 2012                                       | 24         | 325         | 366           | 207          | 111          | 304                 | 1337  |
|  | 2014                                       | 35         | 400         | 434           | 210          | 111          | 213                 | 1403  |
|  | 2012                                       | 2%         | 24%         | 27%           | 15%          | 8%           | 23%                 |       |
|  | 2014                                       | 2%         | 29%         | 31%           | 15%          | 8%           | 15%                 |       |
|  | Significant difference between both groups | n.s.       | *           | *             | n.s.         | n.s.         | *                   |       |

\* :  $p < 0.05$

n.s. : non significant

If application of the current rules continues, it is likely that the ratio of breakdowns with one or no participants from defense will continue increasing. However, we only examined continued breakdowns in this study. If we target all breakdowns in the games, it is assumed that participants from defense would increase in the breakdowns which the defense wins the ball.

#### 4.2 Time Required to Get the Ball Out for Ball Continuity in Breakdowns and the Balance of Offense and Defense Involvement

In order to examine ball continuity states in breakdowns in which offense has the advantage, we analyzed data focusing on the time required to get the ball out from breakdowns and the balance of the number of offensive and defensive players involved in breakdowns. The goal of the team that possesses the ball is to avoid relinquishing possession of the ball to the opponent, maintain ball continuity, move forward by skillful plays, and score goals (World Rugby, 2015). In order to move forward without losing possession of the ball, or to score a try, it is important to take the ball out before the defensive players recover. If a ruck or maul is formed after a breakdown, an offside line is also formed. As the rules of play require, players that are not involved in a ruck must return to behind the offside line (World Rugby, 2015). Therefore, the speed of getting the ball out from a breakdown would be an important factor in offense.

In fact, Jones, E (2016) stated that from the perspective of defense it is important for the players to position themselves within three seconds after breakdown. Hayashi (2012) stated that being able to move to the next offensive play within three seconds would increase the advantage of offense or defense. They pointed out the necessity of quickness after a breakdown. Actually, between 2012 and 2014, the ratio of breakdowns that required two and three seconds to get the ball out increased, and the ratio of breakdowns that required six or more seconds to get the ball out decreased. This suggested that prioritizing the continuation of play influenced a shift to a shorter period of time, within two to three seconds, to get the ball out from breakdowns and increased the speed of play.

However, even if the ball is brought out very quickly, more defensive players remain for defense,

which makes harder for offensive players to move forward in breakdowns in which more offensive players are involved than defensive players. Therefore, we analyzed the number of offensive and defensive players involved in breakdowns in response to the time required to get the ball out from breakdowns. Compared with “Offense  $\leq$  Defense breakdown” and “Offense > Defense breakdown,” 79% of the breakdowns were “Offense > Defense breakdowns” in both 2012 and 2014. “Offense  $\leq$  Defense breakdown” remained at 21% in both years and showed no difference. Due to the characteristics of both offense and defense in contests for ball possession during breakdowns, the offense must be prepared to be involved in the contests for ball possession from breakdown to prepare for defense involvement in contests for ball possession. However, defense can choose not to be involved in the contests for ball possession, which may lead to these situations. Approximately 80% of ball continuity in breakdowns in games played by world-class rugby teams involved more offensive players. In the case of attacking from such breakdowns, offensive players involved in breakdowns are in front of the ball. As a result, players on the side possessing the ball who are in front of the ball become offside (World Rugby, 2015). Therefore, offensive players are always attacking in situations with more defensive players. However, breakdowns focusing on the balance of offense and defense involvement showed no differences between 2012 and 2014.

Next, we classified breakdowns into “Offense  $\leq$  Defense breakdown” and “Offense > Defense breakdowns” to analyze the frequency and ratio of the time required to get the ball out from breakdowns. It was assumed that the quicker the ball was brought out from a breakdown, the more time they required to be prepared to defend in the “Offense  $\leq$  Defense breakdown” (Warrick, 2012). This also prompted the assumption that the ratio of shorter time required to get the ball out would increase in the “Offense > Defense breakdown.” In fact, **Table 7** shows that “Offense  $\leq$  Defense breakdown” tends to require a shorter period of time to get the ball out compared with “Offense > Defense breakdown.” The ratio of breakdowns requiring one, two, and three seconds to get the ball out accounts for a large percentage; namely, 75% in 2012 and 79% in 2014. The ratio of “Offense  $\leq$  Defense breakdowns” requiring three seconds to get the ball out significantly increased



over the two years. However, “Offense>Defense breakdowns” also showed a significantly high ratio of two and three seconds required to get the ball out. This also shows that even in the case of quickly getting the ball out, the number of defensive players involved in breakdowns tends to decrease and the number of offensive players involved in breakdowns tends to increase. This suggests that defense has become quicker getting up after tackling and has increasingly been uninvolved in breakdowns.

As was described above, the shorter the time required to get the ball out becomes between two and five seconds, the more “Offense  $\leq$  Defense breakdown” increases, which is more advantageous for the offense. However, from 2012 to 2014, “Offense>Defense breakdowns” requiring two or three seconds to get the ball out also increased. This suggested that getting the ball out quickly is not always advantageous for the offense. Ball continuity in breakdowns allowed a wide range of offense and defense activities such as getting up quickly after tackling or coming out from breakdowns within two or three seconds. These results showed that world-class rugby team plays in breakdowns advanced over these two years.

## 5. Conclusion

The purpose of this study was to clarify the change in ball continuity at breakdown in world-class rugby to examine effective continuity of breakdowns and to provide effective suggestions for coaching. Therefore, we focused on the number of offensive and defensive players involved in breakdowns and the time required to get the ball out from breakdowns. Breakdown continuity in world-class rugby games in 2012 and 2014 showed the following changes:

- (1) Breakdowns with two and three players including both offense and defense increased, and breakdowns with five or more players decreased.
- (2) Breakdowns with two offensive players increased, and breakdowns with four or more offensive players decreased.
- (3) Breakdowns with one defensive player increased.
- (4) Breakdowns within two and three seconds increased, and six or more seconds decreased.
- (5) Breakdowns with the involvement of an equal number of offensive and defensive players, and the involvement of more defensive players than offensive players involved accounted for 21%,

and breakdowns with the involvement of more offensive players than defensive players accounted for 79%, revealing no differences between the two years.

- (6) Among breakdowns with the involvement of the equal number of offensive and defensive players, and the involvement of more defensive players than offensive players, those requiring three seconds to get the ball out significantly increased. Among breakdowns with the involvement of more offensive players, those requiring two and three seconds significantly increased, and six or more seconds significantly decreased.

## Reference

- Hayashi, M. (2012). Low first tackle. *Rugby clinic*, 26(5):10-15.(in Japanese)
- Hughes, M., Cooper, S-M., and Nevill, A. (2002). Analysis procedures for non-parametric dete from performance analysis. *International Journal of Performance Analysis in Sport*, 2:6-20.
- Ito, S. (2012). Breakdown of Japan way, *Rugby clinic*, 27(4):7-13. (in Japanese)
- IRB. (2005). Changes in the playing of international rugby over a 20 year period. *IRB Game Analysis*, p.2.
- IRB. (2007). Rugby world cup 2007 statistical review and match analysis. *IRB Game Analysis*, p.42.
- IRB. (2011). Rugby world cup 2011 statistical review and match analysis. *IRB Game Analysis*, pp. 20,28,32,41.
- James, N., Taylor, J., and Stanley, S. (2007). Reliability procedures for category date in performance analysis. *International Journal of Performance Analysis in Sport*, 7:1-11.
- Jones, E. (2008). The modern breakdown navi. *Rugby clinic*, 23(2):7-11. (in Japanese)
- Jones, E. (2015). Teaching of the Japan. *Rugby clinic*, 29(5):6-13. (in Japanese)
- Jones, E. (2016). Wining coaching. *Rugby clinic*, 30(2):6-11. (in Japanese)
- Lee, S. (2010). Focus on laws of the Game. *Rugby Clinic*, 24(4):53-58. (in Japanese)
- Lee, S. (2016). *Rugby wo himotoku [Read rugby]* (pp. 177-188). Tokyo: Shueisya. (in Japanese)
- Matsumura, K. (2001). Game analysis on the defense form in rugby football –Mainly in the comparison between the top level of world and Japan-. *Bulletin of Sport Methodology, Department of Sport Methodology, Institute of Health and Sport Sciences, University of Tsukuba*, 17:29-35. (in Japanese)
- Matsushima, T. (2011). A study on the standardization of rugby in the late 1990s, focusing on correction of the laws of the game for perfect rugby products implemented by the International Rugby Board. *Japan Journal of Physical Education, Health and Sport Sciences*, 56:61-74. (in Japanese)
- Murakami, J., Shimozone, H., Katsuta, T., Sasaki, K., Furukawa, T., and Kono, I. (2001). Game analysis in domestic of society, university and supur12. *Japanese Journal of Rugby Science*, 13:43-49.
- Nakagawa, A. (2002). The interaction between the alterations of rule and the changes of play regard line out in rugby football

- in recent years. *Journal of Training Science for Exercise and Sport*, 13(3):137-148. (in Japanese)
- Nakagawa, A. (2011). A review of studies using notational analysis of game performance in rugby union football. *The Bulletin of Faculty of Health and Sport Sciences, University of Tsukuba*, 34:1-16. (in Japanese)
- Nonomura, H., Okamoto, M., and Fukui, T. (2005). The globalization in sports -The actualities of globalization in rugby football-. *Journal of Osaka University of Economics*, 55(6):29-46. (in Japanese)
- Shimasaki, T., and Nakagawa, A. (2009). Change of breakdown play on the attack side in the rugby union game - Transitions in the game of top-level rugby between 1991-2007 -. *The Bulletin of Faculty of Health and Sport Sciences, University of Tsukuba*, 33:35-45. (in Japanese)
- Shimasaki, T., Chiba, G., and Nakagawa, A. (2012). Attack aspects from ruck in rugby game of world top-level in recent years. *The Japan Journal of Coaching Studies*, 26(2):133-143. (in Japanese)
- Shimasaki, T., Furukawa, T., Chiba, G., Washiya, K., Koyanagi, R., and Nakagawa, A. (2014). Transitions of ruck aspects in university of Tsukuba rugby team - 2012 in comparison with 2010 and 2011 -. *The Bulletin of Faculty of Health and Sport Sciences, University of Tsukuba*, 37:85-92. (in Japanese)
- Warrick, H. (2012). Wining stats. *Rugby clinic*, 27(4):51-54. (in Japanese)
- World Rugby. (2015). *Laws of the Game*. pp.17,75,99,105.

**Name:**

Shimasaki Tatsuya

**Affiliation:**Faculty of Health and Sport Sciences,  
University of Tsukuba**Address:**

1-1-1 Tennodai, Tsukuba, Ibaraki, 305-8574 Japan

**Brief Biographical History:**

- 2009–2011 Physical Education and Art Support Office, University of Tsukuba
- 2011–Faculty of Health and Sport Sciences, University of Tsukuba

**Main Works:**

- Shimasaki, T., Nakagawa, A. (2009). Change of breakdown play on the attack side in the rugby union game - Transitions in the game of top-level rugby between 1991-2007 -. *The Bulletin of Faculty of Health and Sport Sciences, University of Tsukuba*, 33:35-45. (in Japanese).
- Shimasaki, T., Chiba, G., Nakagawa, A. (2012). Attack aspects from ruck in rugby game of world top-level in recent years. *The Japan Journal of Coaching Studies*. 26(2):133-143. (in Japanese)
- Shimasaki, T., Furukawa, T., Chiba, G., Washiya, K., Koyanagi, R., Nakagawa, A. (2014). Transitions of Ruck Aspects in University of Tsukuba Rugby Team - 2012 in Comparison with 2010 and 2011 -. *The Bulletin of Faculty of Health and Sport Sciences, University of Tsukuba*, 37:85-92. (in Japanese)

**Membership in Learned Societies**

- The Japan Society of Coaching Studies
- Japan Society of Physical Education, Health and Sport Sciences
- Japanese Society of Science and Football