

Research article

## Skills Associated with Line Breaks in Elite Rugby Union

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### Abstract

The ability of the attacking team to break through the defensive line is a key indicator of success as it creates opportunities to score tries. The aim of this study was to analyse line breaks and identify the associated skills and playing characteristics. The 2013 Super Rugby season (125 games) was analysed, in which 362 line breaks were identified and coded using variables that assessed team patterns and non-contact attacking skills in the phases preceding the line break. There was an average of 3 line breaks per game, with 39% of line breaks resulting in a try. Line breaks occurred when the ball-carrier was running *fast* [61%,  $\chi^2(4) = 25.784$ ,  $p = 0.000$ , Cramer's  $v = 0.1922$ , weak]. At a *moderate* distance, *short lateral passes* (19%) and *skip passes* (15%) attributed to the highest percentage of line breaks [ $\chi^2(26) = 50.899$ ,  $p = 0.036$ , Cramer's  $v = 0.2484$ , moderate]. Faster defensive line speeds resulted in more line breaks [ $\chi^2(12) = 61.703$ ,  $p < 0.001$ , Cramer's  $v = 0.3026$ , moderate]. Line breaks are associated with overall team success and try scoring opportunities. Awareness of the defenders line speed and depth, fast running speed when receiving the ball and quick passing between attackers to the outside backs creates line break opportunities. During training, coaches should emphasise the movement speed of the ball between attackers and manipulate the speed and distance of the defenders.

**Key words:** Rugby Union, performance, skill, technique, video analysis.

### Introduction

Rugby Union is a high-intensity intermittent sport that involves numerous phases of open play, separated by contact situations. The initial phase of play typically starts from a set-piece (e.g. scrum, lineout or kick-off), where the defensive team arranges itself in a horizontal line called the defensive line. The arrangement of the defensive line and the movement of this line during play is often in response to the movement and alignment of the attacking line (Hendricks et al., 2013). The ability of the attacking team to break through the defensive line is a key indicator of success as it creates opportunities to score tries (Bracewell, 2003; Wheeler et al., 2010; Diedrick and van Rooyen, 2011).

A study by Wheeler et al. (2010) identified three effective attacking strategies to break through the attacking line - tackle breaks, offloads and line breaks. A coordinated set of skills need to be executed effectively to achieve these attacking strategies. The set of skills associ-

ated with tackle breaks and offloads have been documented (Wheeler and Sayers, 2009; Wheeler et al., 2010). Similarly, effective defensive skills and tackle techniques have also been identified (Hendricks et al., 2014). However, not much is known about the skills associated with line breaks.

In an analysis of 58 Six Nations Rugby games between 2003 and 2007, Ortega et al. (2009) observed that successful teams break the line more frequently than unsuccessful teams. This suggests that line breaks are a key performance indicator of successful teams. Logically, the next step would be to describe the events, technical skills and situation in which line breaks occur. This will assist coaches in designing attacking drills to improve player's skills and increase their chances of breaking the line in matches. Analysing the technical skill requirements for a line break, in addition to the events leading up to the line break and the situation in which the line break occurs provides a better understanding of the conditions for successful match performances (Mackenzie and Cushion 2013). Therefore, the primary aim of this study was to analyse the technical skills and match situations that led to line breaks in Rugby Union. A secondary aim was to determine which technical skills and situations influenced the outcome of the line break.

### Methods

#### Procedure

All matches ( $n = 125$ ) of the 2013 Super Rugby competition were analysed. The 2013 Super Rugby competition was a professional men's Rugby Union competition played between 15 franchises from Australia, New Zealand and South Africa. The footage was obtained from publically broadcasted matches that were recorded and saved onto a database. The study was ethically approved by the University of Cape Town Faculty of Health Sciences Human Research Ethics Committee (HREC REF: 559/2014). The recorded matches were analysed using Sports Code Elite Version 6.5.1 on an Apple iMac (Apple, USA) displayed at eye level. The analysis software allowed for the control of time lapse during the recorded match and the recording and saving of each event into a database. The analyst was able to pause, rewind and watch the footage in slow motion. The highest frequency at which the analyst could slow down the footage was 25 frames per second (25 Hz).

Line breaks were identified using the following criteria. Note, all of the criteria described below had to be fulfilled for an event to be classified as a line break.

The player in possession of the ball (i.e., ball-carrier) needed to visibly move through a straight line between two defenders in the defensive line or between a defender and the touchline, regardless of the shape and a defender and the touchline, regardless of the shape and movement of the defensive line, and without being physically contacted by a defender (Gilmore, 2006; Wheeler et al., 2010; Hendricks et al., 2013).

The defensive line needed to consist of at least two players moving in unison. After an attacker penetrated the defensive line, at least one defender from the defensive line was required to turn toward the ball-carrier, in an attempt to chase the ball-carrier. This criterion allowed for the distinction between half breaks and complete line breaks (Burt et al., 2013).

The ball-carrier needed to receive the ball from a teammate before he breached the line. This criterion excluded interceptions and offloads from the analyses. When the starting phase was a turnover or loose ball, the line break could not occur in that phase of play, as it was deemed the defensive line would not have sufficient time to form.

A total of 362 line breaks were identified, with an average of 3 (SD = 2) line breaks per match. Thereafter, each line break was coded for match, situational and technical descriptors that preceded the line break. The analysis of the line break began at the first set-piece, or change in possession, preceding the line break and ended if possession of the ball was lost, a break in open play after the line break occurred, when the ball went into touch, an infringement occurred or if a try was scored.

### Descriptors

The purpose of the descriptors was to adequately describe the technical skills which led to a line break. The descriptors needed to possess objective metric properties and a valid means of interpretation (O'Donoghue, 2010). The list of descriptors used to code the line breaks was created through the use of previous peer-reviewed published literature (Hendricks et al., 2014; Wheeler et al., 2010) and by identifying and describing characteristics required specifically for this study. The list was then reviewed by a panel of coaches, sports scientists and rugby administrators to assess the validity and relevance of the performance indicators, and the clarity of their definitions.

In line with the purpose of the study, the variables were divided into five categories: match situation, pre-line break characteristics, final phase characteristics, skills and post line break outcomes (Tables 1-3). The match situation descriptors described factors related to the teams playing in the match. The pre-line break characteristics described the events that occurred in the phases leading up to the line break, and final phase characteristics, the events in the phase that the line break occurred. Post line break outcomes described the results of the line break, in terms of possession and tries scored. The list of descriptors selected for this study was inclusive to account

for any factor which may be relevant. However, for the purpose of this paper, only the variables which were found to be influential will be discussed.

### Reliability

For intra-coder reliability, five randomly selected matches were coded twice using the variables and definitions described above. The coding of the same match was separated by a week (Wheeler et al., 2010). Kappa statistics ( $\kappa$ ) were used to test the intra-reliability of the coder for each group of variables, each category and the overall agreement between all the variables between each set of matches combined. The overall agreement between the two sets of matches was  $\kappa = 0.81$ . Kappa values between 0.81 and 0.99 represent an almost perfect agreement between repeated measures (O'Donoghue, 2010).

**Table 1. Operational definitions of match characteristics and pre-line break phase characteristics and corresponding descriptors**

Operational Variable	Descriptions
<b>Match characteristics</b>	
<b>Team strength:</b>	Relative strength of the attacking and defensive team, determined by final log position of the 2013 Super Rugby season (Wheeler et al. 2010)
Group 1	Teams finishing 1-5 on the log
Group 2	Teams finishing 6-10
Group 3	Teams finishing 11-15
<b>Pre-line break phase characteristics</b>	
<b>Starting phase:</b>	The initial set-piece or change in possession preceding the phases which lead to the line break (defined by then the International Rugby Board)
	Scrum
	Line-out
	Line-out maul
	Tap-kick
	Kick-off
	Drop-out
	Turn-over at ruck
	Loose ball
	Kick

### Statistical analysis

The purpose of the statistical analyses was to determine the skills and match situations associated with line breaks. To achieve this, the first level of analyses was descriptive. The purpose of this was to describe and compare the frequency of occurrence. The second level of analyses tested the association between the skills and match situations variables that led to line-breaks using the Pearson's Chi-squared test and Cramer's V test. A Pearson's Chi-squared P value of less than 0.05 was regarded as a significant association between the variables (Brace et al. 2003). Cramer's V is a measure of the strength of the association between two variables, giving a value of 0 to 1. A Cramer's V value that was less than 0.20 was observed as having a weak association, between 0.20 and 0.49 as a moderate association, and values above 0.49 as a strong association (Acock, 2012).

The purpose of the final analyses was to determine the likelihood of skills and situational variables on post

line break outcomes. Relative risk ratio (RRR), the ratio of the probability of an outcome occurring when a characteristic was observed (versus the non-observed characteristic) was determined using multinomial logistic regression. All statistics were done using STATA 11.1.

## Results

The top five teams in the log, *group 1*, made 39% of the line breaks over the course of the season, with 17% of those line breaks against the bottom five teams (Figure 1).

**Table 2. Operational definitions of final phase characteristics and corresponding descriptors.**

Final phase characteristics	
Operational Variable	Descriptions
<b>Position of line-breaker:</b>	Position of ball-carrier who breached the line
<b>Position of inside defender:</b>	Position of the opposing player, on the side of the line-breaker closest to the starting position of the phase, as he breaches the defensive line
<b>Outside Defender:</b>	Position of the opposing player, on the side of the line-breaker furthest from the starting position of the phase, as he breaches the defensive line
<i>Tight Forwards</i>	Prop, Hooker, Lock
<i>Loose Forwards</i>	Flank, Eighthman
<i>Inside backs</i>	Scrumhalf, Flyhalf, Inside Centre
<i>Outside backs</i>	Outside Centre, Winger, Fullback
<i>Touchline</i>	Vertical outline on each side of field
<b>Attacking line shape:</b>	The formation of the attacking team at the start of the phase preceding the line break (Wheeler et al. 2010)
<i>Flat</i>	Attacking players were positioned in a horizontal line
<i>Deep</i>	Attacking players were positioned in a diagonal line
<i>Wide</i>	Attacking line is spread across the width of the field
<i>Narrow</i>	Attacking line is bunched, close to the break-down
<b>Defensive speed:</b>	Speed of the defence in response to the attacking line, when the first ball-carrier in the final phase receives possession of the ball (Hendricks et al. 2013)
<i>Slow</i>	Stationary or walking (No locomotor movement). Slow forwards, backwards or sideward movement. One foot in contact with ground at all times and no arm drive
<i>Moderate</i>	Jogging or a slow run with low knee lifts and little arm drive
<i>Fast</i>	Running with high knees and rapid arm movement or sprinting at ball reception
<b>Defensive distance:</b>	Distance of defence in relation to the attacker who receives the ball from the break-down/set-piece/kick (Wheeler et al. 2010; Hendricks et al. 2013)
<i>Close</i>	Attacker receives ball within one body length of defence
<i>Moderate</i>	Attacker receives ball one to two body lengths from defence
<i>Distant</i>	Attacker receives ball more than two body length from defence
<b>Attacker vs. Defender ratio:</b>	The ratio of the number of players in the attacking line compared to the defence line at the start of the phase (Hendricks et al. 2013)
<i>Man on man</i>	Same number of defenders and attackers
<i>One man overlap</i>	One more attacker in the attacking line compared to the defensive line
<i>Two man overlap</i>	Two more attackers in the attacking line compared to the defensive line
<i>Multiple overlap</i>	More than two attackers in the attacking line compared to the defensive line
<i>One man underlap</i>	One more defender in the attacking line compared to the defending line
<i>Two man underlap</i>	Two more attackers in the attacking line compared to the defending line
<i>Multiple underlap</i>	More than two attackers in the attacking line compared to the defending line
<b>Defensive shape and movement:</b>	Configuration and movement pattern of defenders (Hendricks et al. 2013)
<i>Up and In</i>	Defenders approach the attacking line in a straight line formation followed by the outer players (players furthest away from the ball) advancing ahead of the line towards the ball
<i>Up and Out</i>	Defenders approach the attacking line in a straight line formation followed by inner players (players closest to the ball) following the movement of the ball towards the touch line
<i>Push/Rush</i>	The defenders approach the attacking line at a fast speed and are in a straight and direct line
<i>Lateral Shift</i>	Initial movement of the defenders is towards the touch line without challenging attacking line/attacker
<b>Advancing Runner:</b>	One defender shoots rapidly from the defensive line ahead of the other defenders towards attacking line/attacker
<i>Straight Line</i>	Defenders are in a straight line while approaching the attacking line
<i>Static Line</i>	Defenders are in a straight line with no movement toward the attacking line/attacker
<i>Arrow Head</i>	Defenders approach the attacking line in a triangle shape formation, i.e., one defender is followed by other defenders besides and behind him on each side

**Table 3. Operational definitions of skills, field position and outcomes characteristics and corresponding descriptors.**

Operational variable	Descriptions
<i>Skills</i>	
<b>Types of pass:</b>	The final pass played to the ball-carrier who broke the defensive line
Short lateral pass	Standard pass to the next player in the attacking line, within a 5m radius
Long lateral pass	Standard pass to the next player in the attacking line, further than a 5m radius
Skip Pass	Ball is transferred past the closest player to another further away
Flat Pass	Ball is transferred horizontally, so that the receiving player runs onto the ball when catching it
Double-around	Ball is passed to a player who moved from the inside of the passer to their outside channel
Inside ball	Ball is passed to a player running on the inside channel of the passer
Lob Pass	High looping pass
Pop Pass	Short pass initiated from the wrists, rather than the arms, to a player in the immediate proximity of the ball-carrier
Quick-hands	Ball is received and passed in one rapid movement
Switch Pass	Ball is transferred in the opposite direction of the previous pass
<b>Number of passes:</b>	Number of times the ball is transferred between attacking players in each phase (n)
<b>Pick and go:</b>	Ball-carrier gathers the ball directly from the set-piece or break down
<b>Running speed</b> (Wheeler et al. 2010)	
Slow	Stationary or walking (no visible foot movement)
Moderate	Jogging (low knee lift)
Fast	Running or sprinting (high knee lift)
<b>Running angle:</b>	Running line or direction of ball-carrier towards defence (Wheeler et al. 2010)
Straight	Ball-carrier runs straight at defence
Arcing	Ball-carrier runs in a wavy line at defence
Lateral	Ball-carrier runs laterally, from touchline to touchline
Diagonal	Ball-carrier runs in a straight angled line at defence
<b>Change in speed</b>	
Acceleration	Ball-carrier increases running speed
Deceleration	Ball-carrier decreases running speed
<b>Change in angle</b>	
Straighten	Ball-carrier changes running angle from any angle to vertical (relative to touchline)
Turn	Ball-carrier changes running angle from any angle to an angle that is not vertical
<b>Evasion:</b>	Evasive agility step patterns of the ball-carrier (Wheeler et al. 2010).
Side-step	Agility manoeuvre initiated from the outside leg
Crossover-step	Agility manoeuvre initiated from the inside leg
<b>Deception</b>	
Dummy pass	A feigned pass
Dummy kick	A feigned kick
Decoy runner	Non ball-carrier runs passed the ball carrier at defensive line, feigning reception, and drawing a defensive player
<b>Field Position</b>	
Zone 1	Between the attacking 22m line and attacking try line
Zone 2	Between the half way line and attacking 22m line
Zone 3	Between the defensive 22m line and half way line
Zone 4	Between the defensive try line and defensive 22m line
Right	Between right hand touchline and the right 15m line
Centre	Between the two 15m lines
Left	Between left hand touchline and the left 15m line
<i>Outcomes</i>	
<b>Possession</b>	
Retained	The attacking team maintained possession of the ball in the phase following the line break
Lost	The attacking team were unable to maintain possession of the ball in the phase following the line break
<b>Try</b>	The attacking team were able to score a try within two phases of the line break

Thirty-nine percent of line breaks resulted in a *try* being scored within two phases of the line break. Furthermore, possession was *retained* in 40% of line breaks where no try was scored.

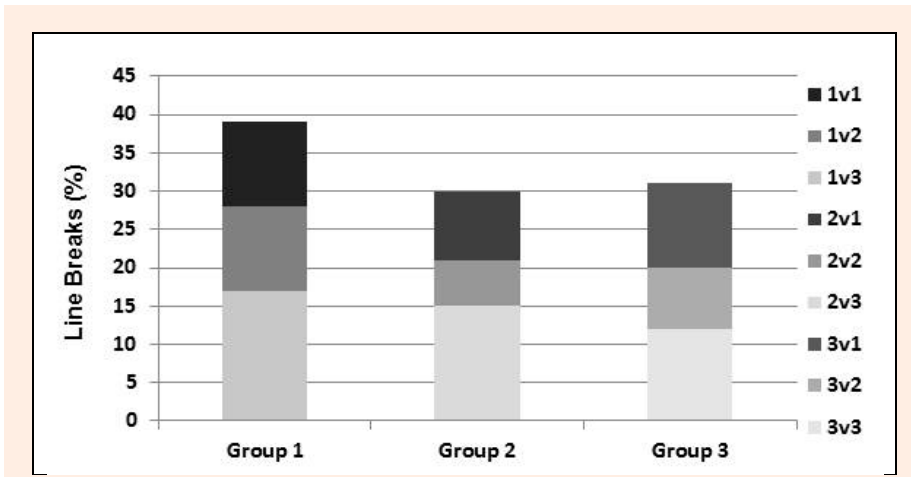
The most common types of passes received by the line breaker were a *short lateral pass* (20%), *long lateral pass* (16%), or a *skip pass* (17%), and one-third of all line breaks were made when there were 2 *passes* in the final phase. The highest percentage of line breaks occurred when the ball-carrier ran *straight* (48%) or *diagonal* (44%), and at a *fast* speed (54%). Sixty-three percent of line breaks occurred when there was *no change* in running

angle by the ball-carrier, *no deception* (70%) and *no evasive movements* by the ball-carrier (87%). The field position where the line breaks occurred is represented in Figure 2.

#### Final phase characteristics

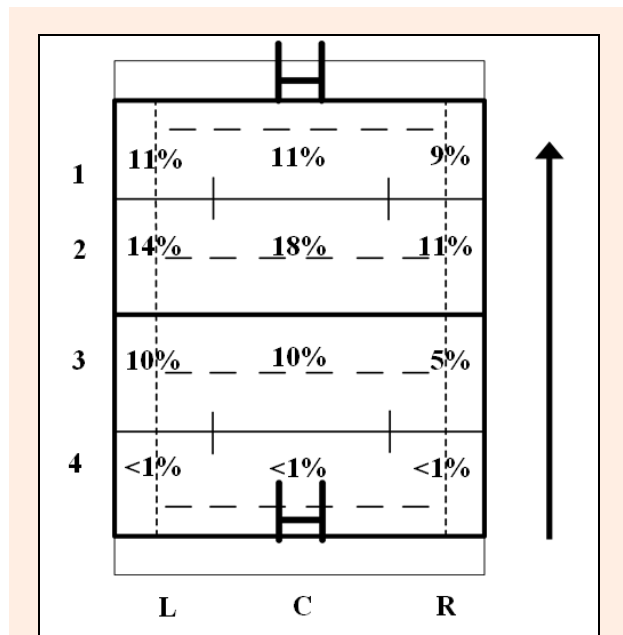
The attacking line shape with the highest frequency was *deep and wide* (30%). When the attacking line was *deep and wide*, 33% of line breaks occurred when 2 passes were made in the final phase [ $\chi^2(42) = 71.875$ ,  $p = 0.003$ , Cramer's  $v = 0.2080$ , moderate].

The majority of line breaks occurred when the



**Figure 1.** Percentage of line breaks made by teams in each group. Different shadings represent the relative strength of the opposition the line break was made against. Teams were grouped based on their final log position; Group 1 represent teams finishing 1-5 on the log, Group 2 teams finishing 6-10 and Group 3 11-15.

ratio of attackers to defenders was an overlap of attackers, *one man overlap* (34%) and *multiple overlap* (30%). Line breaks occurred more frequently when the defensive line was *distant* (65%), and when players in the defensive line *shifted laterally* (25%) at a *moderate* running speed (50%).



**Figure 2.** Field positions where the line breaks occurred. Numbers express percentages of line breaks. Arrow denotes direction of attacking play.

The distance of defence was significantly associated with the number of passes, type of pass, running speed, and running angle of the ball carrier. *Pick and go's* (25%), *1 pass* (25%) or *2 passes* (36%) in the final phase resulted in line breaks when the defensive distance was *close* at ball reception. Similarly, one out of three line breaks occurred when *2 passes* were made when the defence was *distant* [ $\chi^2(12) = 30.348$ ,  $p = 0.002$ , Cramer's  $v$

$= 0.2085$ , moderate].

Passing the ball *laterally* (short or long) resulted in 42% of line breaks when the defensive line was *distant* at ball reception. At a *moderate* distance, *short lateral passes* (19%) and *skip passes* (15%) attributed to the highest percentage of line breaks [ $\chi^2(26) = 50.899$ ,  $p = 0.036$ , Cramer's  $v = 0.2484$ , moderate].

Line breaks occurred when the ball-carrier was running *fast* [61%,  $\chi^2(4) = 25.784$ ,  $p = 0.000$ , Cramer's  $v = 0.1922$ , weak], *diagonal* [50%,  $\chi^2(6) = 15.463$ ,  $p = 0.017$ , Cramer's  $v = 0.1488$ , weak] and *straightening* [31%,  $\chi^2(8) = 17.765$ ,  $p = 0.023$ , Cramer's  $v = 0.1595$ , weak] at a defensive line that was distant.

Faster defensive line speeds resulted in more line breaks [ $\chi^2(12) = 61.703$ ,  $p < 0.001$ , Cramer's  $v = 0.3026$ , moderate], especially when the ball-carrier was running fast (63%). Thirty-three percent of line breaks occurred when the speed of the defensive line was fast, and 35% when the speed was *moderate*, and two passes were made [ $\chi^2(12) = 61.703$ ,  $p < 0.001$ , Cramer's  $v = 0.3026$ , moderate].

The use of deception was found to be positively associated with the speed of defence [ $\chi^2(10) = 21.814$ ,  $p = 0.016$ , Cramer's  $v = 0.1802$ , weak]. When the speed of the defensive line was *fast*, 19% of line breaks occurred using a *decoy runner*. When the speed of the defensive line was *slow*, 23% of line breaks occurred using a *dummy pass*. When the defensive line shifted *laterally*, 31% of line breaks occurred using *2 passes* [ $\chi^2(42) = 99.948$ ,  $p = 0.000$ , Cramer's  $v = 0.2271$ , moderate].

**Playing position**

Line breaks were achieved most frequently by *outside backs* (60%) and *inside backs* (27%). *Inside backs* broke the line through *pick and go's* (29%) or *long lateral passes* (24%), and *outside backs* broke the line upon receiving a *skip pass* (21%) or a *short lateral pass* (20%) [ $\chi^2(39) = 86.502$ ,  $p = 0.000$ , Cramer's  $v = 0.2822$ , moderate]. Further, *backs* are accelerating [ $\chi^2(6) = 14.877$ ,  $p = 0.021$ , Cramer's  $v = 0.1433$ , weak] and running *faster* when

receiving the ball [ $\chi^2(6) = 17.753$ ,  $p = 0.007$ , Cramer's  $v = 0.1566$ , weak] and attacking the defensive line diagonally (57%, inside backs) or straight (52%, outside backs) when breaking the line [ $\chi^2(9) = 29.204$ ,  $p = 0.001$ , Cramer's  $v = 0.1640$ , weak]. For inside backs, when the inside defender was a *tight forward* line breaks occurred more frequently [ $\chi^2(12) = 78.329$ ,  $p < 0.001$ , Cramer's  $v = 0.2686$ , moderate].

### Line breaks and tries

The likelihood of a line break resulting in a *try* was significantly increased when the final pass was a *flat pass* (RRR 29.78, 95% CI 1.39-635.60,  $p < 0.05$ ) compared to *no pass* being made. A *central* initial field position significantly reduced the chance of scoring a *try*, relative to the *right* side of the field (RRR 0.43, 95% CI 0.19-0.98,  $p < 0.05$ ). Field position *zones* 2 (RRR 0.05, 95% CI 0.09-0.29,  $p < 0.05$ ) and 3 (RRR 0.04, 95% CI 0.04-0.34,  $p < 0.05$ ) significantly increased the likelihood of *retaining* possession relative to *zone 1*. Further, line breaks that occurred in *zone 3* were 94% more likely to result in the attacking team *retaining* possession post line break (RRR 0.06, 95% CI 0.01-0.58,  $p < 0.05$ ).

### Discussion

This study showed that line breaks were associated with overall success in the Super Rugby competition and scoring tries. The technical attacking skills identified for line breaks were wide and deep positioning, receiving the ball at speed within 3 passes from the breakdown, and using passes that promote quick facilitation of the ball to outside backs. Furthermore, more line breaks were observed when these attacking technical skills were executed when the defensive line was further away and approaching quickly. In which case, the addition of a decoy or dummy runner proved useful to breach the defensive line untouched. Also, the skills associated with line breaks differed between playing positions.

The top five teams in the competition (based on final log position) created the most line breaks, compared to the middle five or bottom five teams. In contrast, Wheeler et al. (2010) reported little variation between a team's overall success and line breaks. Note, there was a large difference between the sample size of the two studies, Wheeler et al. (2010) analysed seven matches compared to 125 in this study. Line breaks were also associated with tries scored in matches. Throughout the season, there was an average of 3 line breaks per match, with 39% of line breaks resulting in a try. This averages to one try per match resulting from a line break. This finding is in accordance with previous studies describing the effectiveness of line breaks in promoting try scoring opportunities in Rugby Union (Diedrick and van Rooyen, 2011; Wheeler et al., 2010). In 66% of the cases where a line break did not result in a try, possession was retained by the attacking team in the subsequent phase. Therefore, from an attacking territorial point of view, line breaks are also useful in moving the ball closer to the opposition's try-line while still maintaining possession.

Ball-carrier speed as a key technical requirement

for line breaks is not surprising. In an emerging environment like rugby, defenders (or a defender and the touch-line) will inevitably close a wide gap in the defensive line to reduce opportunities to break the line. However, if the ball-carrier is able to identify the gap soon enough and accelerate and sprint through the gap faster than the defenders are able to close it, the ball-carrier will succeed in breaking the line (Correia et al. 2011). What this study adds though is that in addition to ball-carrier speed, movement speed of the ball between attackers creates line break opportunities. Quick facilitation of the ball to outside backs using either short, long or skip passes creates a high tempo attack which may afford defenders less time to organise themselves which results in more gaps between defenders. However, if defenders have organised themselves, adapting the tactics to add a decoy runner or dummy runner based on the speed and distance of the defence promotes line breaks. From a coaching perspective, coaches should emphasise the movement speed of the ball between attackers when training passing, and manipulate the speed and distance of the defenders.

The closer the initial, final phase or line break field position was to the try line, the more likely the team was to lose possession of the ball in the phase following the line break. Diedrick and van Rooyen (2011) reported little influence of the vertical field position on the post line break outcome. However, Diedrick and van Rooyen (2011) did not specify if contact was an exclusion criterion when identifying line breaks and the study included interceptions. Also, tackle breaks and offloads may influence the number of support players around the ball-carrier post line break increasing the likelihood of a team maintaining possession.

A limitation of the study was the absence of comparison phase outcome for line breaks. The lack of a comparator meant more sophisticated probability statistics could not be applied. Seemingly, tackle contact may be an appropriate comparator. However, all tackle contact events are not necessarily an unsuccessful line break, therefore tackle contact would have been invalid. Furthermore, the main purpose of this study was to describe non-contact skills that created line breaks, since effective contact have been described before (Wheeler & Sayers 2009; Wheeler et al. 2010). Lastly, the footage used in this study was obtained from publically broadcasted matches, which meant that the view of the match during analysis was restricted by the camera view. This was particularly apparent with the analysis of the attack-defence configuration.

### Conclusion

Line breaks are associated with overall team success and try scoring opportunities. Awareness of the defenders line speed and depth, fast running speed when receiving the ball and quick passing between attackers to the outside backs creates line break opportunities. During training, coaches should emphasise the movement speed of the ball between attackers and manipulate the speed and distance of the defenders.

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## References

- Acocck, A.C. (2012) *A Gentle Introduction to Stata* Revised 3r., Texas: Stata Press.
- Brace, N., Kemp, R. and Snelgar, R. (2003) *SPSS for psychologists : a guide to data analysis using SPSS for Windows*, New York: Palgrave Macmillan.
- Bracewell, P.J. (2003) Monitoring meaningful rugby ratings. *Journal of Sports Sciences* **21**(8), 611-620.
- Burt, E., Hughes, M.D. and James, N. (2013) Scoring team performance in rugby union. In: *Performance Analysis of Sport IX*. Eds: Peters, D.M. and O'Donoghue. Routledge. 79-87.
- Correia, V., Araujo, D., Craig, C. and Passos, P. (2011) Prospective information for pass decisional behavior in rugby union. *Human Movement Science* **30**(5), 984-997.
- Diedrick, E. and van Rooyen, M.K. (2011) Line Break Situations in International Rugby. *International Journal of Performance Analysis in Sport* **11**(3), 522-534.
- Gilmore, J. (2006) *Analysis of Linebreaking*, Available from URL: [http://www.rugby.com.au/Portals/18/Files/Coaching/Level3Papers/Linebreak\\_Analysis-J\\_Gilmore\\_2006.pdf](http://www.rugby.com.au/Portals/18/Files/Coaching/Level3Papers/Linebreak_Analysis-J_Gilmore_2006.pdf).
- Hendricks, S., Roode, B., Matthews, B. and Lambert, M. (2013) Defensive strategies in rugby union. *Perceptual & Motor Skills: Exercise & Sport* **117**(1), 65-87.
- Hendricks, S., Hendricks, S., Matthews, B., Roode, B. and Lambert, M. (2014) Tackler characteristics associated with tackle performance in rugby union. *European Journal of Sports Science* **14**(8), 753-762.
- International Rugby Board. (2011) *Statistical review and match analysis*. Available from URL: [http://www.irbplayerwelfare.com/pdfs/gameanalysis/RWC\\_Analysis\\_2011.pdf](http://www.irbplayerwelfare.com/pdfs/gameanalysis/RWC_Analysis_2011.pdf).
- International Rugby Board. (2007) *Statistical review and match analysis*. Available from URL: [http://www.irb.com/mm/document/newsmedia/0/071026ctirbanalysirwc2007report\\_3830.pdf](http://www.irb.com/mm/document/newsmedia/0/071026ctirbanalysirwc2007report_3830.pdf).
- Mackenzie, R. and Cushion, C. (2013) Performance analysis in football: A critical review and implications for future research. *Journal of Sports Sciences* **31**(6), 639-676.
- O'Donoghue, P. (2010) *Research methods for sports performance analysis*. Illustrated, edition. Oxon: Routledge.
- Ortega, E., Villarejo, D. and Palao, J.M. (2009) Differences in game statistics between winning and losing rugby teams in the six nations tournament. *Journal of Sports Science and Medicine* **8**(4), 523-527.
- Wheeler, K.W., Askew, C.D. and Sayers, M.G.L. (2010) Effective attacking strategies in rugby union. *European Journal of Sports Science* **10**(4), 237-242.
- Wheeler, K.W. and Sayers, M.G.L. (2009) Contact Skills Predicting Tackle-Breaks in Rugby Union. *International Journal of Sports Science and Coaching* **4**(4), 535-544.

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**Key points**

- Line breaks are associated with overall team success and try scoring opportunities.
- Awareness of the defenders line speed and depth, fast running speed when receiving the ball and quick passing between attackers to the outside backs creates line break opportunities
- During training, coaches should emphasise the movement speed of the ball between attackers and manipulate the speed and distance of the defenders.

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