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EFFECTIVE ATTACKING STRATEGIES IN RUGBY UNION

Attacking Strategies

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Abstract

Evasive change of direction manoeuvres (agility skills) are a fundamental ability in rugby union. This study explored the attributes of agility skill execution as they relate to effective attacking strategies in rugby union. Seven Super 14 games were coded using variables that assessed team patterns and individual movement characteristics during attacking ball carries. Results indicated that tackle-breaks were a key determinant of try scoring ability and team success in rugby union. The ability of the attacking ball carrier to receive the ball at high speed with at least 2 body lengths from the defence line against an isolated defender promoted tackle-breaks. Furthermore, the execution of a side-step evasive manoeuvre at a change of direction angle between 20 to 60° and a distance of 1 to 2 body lengths from the defence, and then straightening the running line following the initial direction change at an angle between 20 to 60° was associated with tackle-breaks. This study provides critical insight regarding the attributes of agility skill execution that are associated with effective ball carries in rugby union.

Keywords: rugby union, agility, match analysis, ball carries, try scoring

Introduction

Notational analysis can be used to determine the key indicators of performance based on measures of skill execution (Taylor, Mellalieu, & James, 2007). Despite this, there is limited published research employing notational analysis to examine skill execution in rugby union. Compared with the extent of available research reporting time-motion analysis of activity patterns and tactical analysis of team patterns of play, the lack of notational movement analysis has been attributed to the complex nature of skill execution (Bracewell, 2003; McKenzie, Holmyard, & Docherty, 1989). It has also been

argued that is difficult to evaluate technical performances reflecting simultaneous and rapid execution of multiple actions (Hökemann, Blaser, Scholz, Plock, & Veit, 2006). Moreover, the published research has typically reported the frequency of event occurrence as an index of skill execution. This broad approach fails to acknowledge the intricate performance parameters associated with skill execution (Borrie, Jonsson, & Magnusson, 2002).

Agility is a skill based movement pattern observed throughout competitive sporting performances. Generalised measures of agility have been included as part of previous notational coding systems that have described the motion and movement characteristics of team sports (Bloomfield, Polman, & O'Donoghue, 2004). For example, the *Bloomfield Movement Classification* has been used to measure agility using a range of variables that examined running motion, performance intensity, directional characteristics and the angle of direction change (Bloomfield, Polman, & O'Donoghue, 2004). However, the *Bloomfield Movement Classification* was based on generalised models of performance, and failed to address the sport specific nature of agility skill execution and the relationship with effective performance.

Sayers and Washington-King (2005) conducted a sports specific examination of attacking ball carries relating to running ability in rugby union. Factors associated with evasive agility skill execution such as the step type and directional running line were coded with reference to the tackle outcome, and compared to ball carries displaying no evasive manoeuvres. It was found that ball carriers who used evasive agility skills when challenging the defence line were more likely to advance the ball beyond the advantage and record positive tackle outcomes (retain possession of the ball) (Sayers &

Washington-King, 2005). Despite this, previous published research has not considered the specific ball carrying movement characteristics and attacking playing patterns that promote phase outcomes and try scoring ability in rugby union. Accordingly, the current study used notational analysis to examine the attacking patterns of play and attributes of agility skill execution that achieve desirable phase outcomes, such as offloading the ball, tackle-breaks and line-breaks. The aim of this study was to describe the specific attacking strategies that are associated with desirable phase outcomes promoting try scoring ability and team success in rugby union.

Methods

Subjects

Notational analysis of match footage was used to code all ball carries (N = 1 372) during 7 games of the 2006 Super 14 rugby union competition. All Super 14 teams were included in data collection and were categorised based on the respective team ranking at the conclusion of the season, consisting top 4, middle 5 and bottom 5 teams. It should be noted that the top 4 teams were chosen as a category because they were the semi-finalists of the Super 14 competition. The outcome of the games analysed were also balanced so that the win-loss ratio of the team categories were distributed.

Match Analysis

Games were recorded by commercial television stations and distributed on the public domain. Footage was stored digitally and analysed using software (Windows Media Player, Microsoft, USA) displayed on a computer monitor (SyncMaster 710N, Samsung Electronics Australia) set at seated eye level (Lacey, Dickson, & Levenson, 1998). Analysis was time-lapsed and the tester could pause and replay video footage when

required. To increase coder accuracy and reliability, coding followed established protocols where a maximum of two hours restricted data collection with a recovery period of at least one hour (Bloomfield, Polman, & O'Donoghue, 2004). Coding was restricted to a single rugby union game within a period of 24 hours (Eaves, Hughes, & Lamb, 2005).

A ball carry occurred when an attacking player in possession of the ball challenged the defence (Sayers & Washington-King, 2005). Available publications and the combined experience of the research team was used to design the variables coded during notational analysis (Jones, Mellalieu, & James, 2004). Specific variables described the attacking and defending patterns of team play and also the evasive properties of the attacking ball carrier. The variables consisted:

Attacking Pattern

Attacking Width. Distribution of the ball along the attacking line when the ball carrier received possession of the ball:

- Immediate – ball reception from the breakdown (e.g. *pick and go*)
- Close – ball reception from the half-back
- Middle – ball reception from the first receiver
- Wide – ball reception from outside the first receiver
- Counter-attack – ball reception from a turn-over
- Phase continuation – ball reception from an offload in the tackle

Attacking Depth. Distance from the ball carrier in the attacking line to the defence when receiving possession of the ball:

- Close – ball reception within 1 body length (BL) of the defence
- Moderate – ball reception 1 to 2 BL from the defence
- Distant – ball reception greater than 2 BL from the defence

Attacking Velocity. Running speed of the attacking ball carrier at ball reception:

- Slow – ball carrier stationary or walking at ball reception
- Moderate – ball carrier jogging or cruising at ball reception
- Fast – ball carrier running or sprinting at ball reception

Attacking Direction. Directional characteristics of the ball carry running in the attacking line when challenging the defence line

- Direct – ball carrier ran directly at the defence line
- Arcing – ball carrier ran a curvilinear line at the defence line
- Lateral – ball carrier ran a lateral line from the defence line (across field)

Agility Attributes

Evasive Step Type. Evasive agility stepping patterns of the ball carrier:

- Straight – ball carrier ran straight at the defence (no evasion)
- Side-step – ball carrier used an evasive agility manoeuvre initiated from the outside leg when challenging the defence
- Crossover-step – ball carrier used an evasive agility manoeuvre initiated from the inside leg when challenging the defence

Change of Direction Angle. Angle that the ball carrier changed directions during evasive manoeuvres (relative to the sagittal plane direction of motion):

- Slight – change of direction angle between 0 to 20°
- Moderate – change of direction angle between 20 to 60°
- Great – change of direction angle greater than 60°

Proximity of Defence at Direction Change. Distance from the ball carrier to the defence at the change of direction step during evasive manoeuvres:

Near – defence within 1 BL of the ball carrier at the change of direction step

Moderate – defence 1 to 2 BL of the ball carrier at the change of direction step

Distant – defence greater than 2 BL of the ball carrier at the change of direction step

Straighten Angle. Angle the ball carrier straightened the running direction following initial evasive step:

- Slight – straighten angle between 0 to 20° following initial evasive step
- Moderate – straighten angle between 20 to 60° following initial evasive step
- Great – straighten angle greater than 60° following initial evasive step

Directional Running Line. Running direction of the ball carrier in relation to the attacking pattern when challenging the defence:

- Straight – ball carrier ran straight at the defence
- Inside – ball carrier ran an oblique line towards the previous tackle
- Outside – ball carrier ran an oblique line away from the previous tackle

Defensive Pattern

Defensive Pattern. Movement characteristics of the defensive line in response to the ball carry:

- Static – defence line was stationary on the advantage line in response to the challenge from the attacking ball carrier
- Rushed – defence line moved forward off the advantage line in response to the challenge from the attacking ball carrier
- Lateral – defence line moved laterally (across field) in response to the challenge from the attacking ball carrier

Defenders at Contact. Number of defenders committed to tackling the attacking ball carrier:

- Single – a single defender committed to tackling the ball carrier
- Double – two defenders committed to tackling the ball carrier
- Many – more than two defenders committed to tackling the ball carrier

Attacking Outcome

Phase Outcome. Result of the attacking ball carry:

- Breakdown loss – attacking team failed to retain the ball at the tackle contest
- Breakdown win – attacking team successfully retained the ball at the tackle contest
- Offload – ball carrier successfully offloaded the ball in the tackle
- Tackle-break – ball carrier successfully penetrated the attempted tackle
- Line-break – ball carrier evaded contact with the defence and advanced the ball

Try Outcome. Immediacy of scoring a try following the ball carry:

- Immediate – the attacking team scored a try within 1 phase of the ball carry
- Direct – the attacking team scored a try within 2 phases of the ball carry
- Indirect – the attacking team scored a try after 2 phases or did not score a try

Data Analysis

The objective of analysis was to reveal the attacking strategies associated with the desirable phase outcomes that promote try scoring ability and team success. The SPSS software package (Version 12.01 for Windows, SPSS, Inc., USA) was used to present descriptive statistics (mean \pm s) and Chi-squared (χ^2) measures of relationship between variables (Brace, Kemp, & Snelgar, 2003). A significance level of $P < 0.05$ was used for all analyses. Chi-squared analysis examined phase outcome and the association between scoring tries, team success as well as attacking patterns, agility attributes of the attacking ball carrier and defensive patterns.

Reliability

Intra-tester reliability was assessed using two international rugby union matches coded on two separate occasions separated by a week (Reed & Hughes, 2006). Kappa test statistics assessed reliability of nominal and ordinal level data types (James, Taylor, & Stanley, 2007). Overall, intra-tester reliability demonstrated good levels of agreement (.93 \pm .06) (Choi, O'Donoghue, & Hughes, 2007).

Results

Agility Attributes

During match-play, 58% of ball carries used a straight running pattern when challenging the defence. In contrast, 37% of ball carries displayed side-stepping evasion and 5% crossover-stepping evasion.

Phase Outcome and Scoring Tries

Tackle-breaks (33%) and line-breaks (23%) resulted in scoring a try within 1 phase of the ball carry ($\chi^2(8)=68.111$, $P<0.001$). In addition, successful offloads in the tackle (26%) resulted in a try within two subsequent attacking phases.

Phase Outcome and Team Success

Tackle-breaks comprised 19% of ball carries from the top 4 teams ($\chi^2(8)=15.582$, $P=0.049$). In contrast, tackle-breaks constituted 16% of ball carries from the middle 5 teams and just 11% of ball carries from the bottom 5 teams. It should also be noted that the percentage of successful offloads in the tackle and line-breaks observed little variation between team rankings. Figure 1 shows the percentage of successful offloads in the tackle, tackle-breaks and line-breaks with respect to team ranking.

(INSERT FIGURE 1)

Attacking Strategies and Phase Outcome

Attacking Pattern

Analysis of phase outcome showed that breakdown wins (73%) were associated with *immediate* attack and breakdown losses (15%) associated with *wide* attack ($\chi^2(20)=93.576$, $P<0.001$). Also, line-breaks were achieved with *counter-attack* (11%) and *phase continuation* (11%).

Further analysis of phase outcome showed that tackle-breaks (42%) and line-breaks (69%) occurred with *distant* depth of attack at ball reception ($\chi^2(8)=102.746$, $P<0.001$). In addition, 62% of tackle-breaks and 72% of line-breaks occurred with *fast* velocity at

ball reception ($\chi^2(8)=50.548$, $P<0.001$). A significant association was then shown between phase outcome and attacking direction where 24% of breakdown losses occurred with *lateral* attacking directions ($\chi^2(8)=27.547$, $P=0.001$).

Agility Attributes

Analysis of phase outcome showed that 47% of breakdown wins were as a result of a *straight* running line, 61% of tackle-breaks displayed an *inside* line and 43% of line-breaks displayed an *outside* line ($\chi^2(8)=153.476$, $P<0.001$). Further analysis demonstrated that 62% of tackle-breaks were achieved through a *direct* inside running line ($\chi^2(8)=137.332$, $P=0.001$).

Notably, of all the tackle-breaks analysed, 72% were a result of an evasive side-stepping attacking strategy ($\chi^2(8)=153.254$, $P<0.001$). It was then shown that side-stepping manoeuvres (84%) that resulted in a tackle-break typically exhibited a *moderate* change of direction angle ($\chi^2(4)=50.226$, $P<0.001$).

Further analysis of ball carries resulting in a tackle-break showed that 46% of this phase outcome were associated with a *moderate* proximity to the defence line at the change of direction evasive step ($\chi^2(8)=160.367$, $P<0.001$). Also, side-stepping manoeuvres that resulted in a tackle-break (59%) displayed a *moderate* proximity to the defence line at the change of direction evasive step ($\chi^2(2)=39.435$, $P<0.001$). Furthermore, side-stepping manoeuvres that resulted in a tackle-break (42%) were also associated with a *moderate* straighten angle ($\chi^2(2)=32.993$, $P<0.001$). Figure 2 illustrates the attributes of the attacking pattern and agility skill execution that promote tackle-breaks.

(INSERT FIGURE 2)**Defensive Pattern**

Breakdown wins (58%) were associated with *rush* defence, whilst line-breaks occurred with *static* (37%) and *lateral* defensive patterns (38%) ($\chi^2(8)=42.169$, $P<0.001$). It was then shown that breakdown wins occurred typically with *double* (54%) and *many* (6%) defenders at contact. Also, 90% of offloads in the tackle and 93% of tackle-breaks occurred with a *single* defender at contact ($\chi^2(8)=329.906$, $P<0.001$). Finally, 93% of side-stepping manoeuvres that resulted in a tackle-break involved a *single* defender ($\chi^2(8)=173.922$, $P<0.001$).

Discussion

Scoring tries is fundamental to success in rugby union (Laird & Lorimer, 2004). The ability to penetrate the defence through tackle-breaks, line-breaks and offloading in the tackle, represent phase outcomes that promote try scoring capability (Bracewell, 2003; Jones, Mellalieu, & James, 2004). The current study demonstrated that tackle-breaks and line-breaks were associated with scoring tries within the next phase of play. Also, offloading in the tackle was associated with scoring tries within two subsequent phases. This finding builds on previous research that demonstrated it was not the number of positive phase outcomes, but the way teams used those outcomes to score tries that determined success (Sayers & Washington-King, 2005).

Interestingly, tackle-breaks and not line-breaks or offloading in the tackle were associated with team success in rugby union. This finding suggests that the defensive structures of high level rugby union teams restrict the space needed to for ball carriers to

avoid any contact with the defence, as characteristic of line-breaks. Similarly, committing greater than one defender at the tackle means that it is difficult for ball carriers to successfully offload the ball. It is recommended that further research focus on specific defensive strategies relating phase outcome and team success in rugby union. Despite this, the current project supports previous research by identifying that the percentage of tackle-breaks is a key determinant of team success in rugby union (Bracewell, 2003; James, Mellalieu, & Jones, 2005; Jones, Mellalieu, & James, 2004; Van Rooyen & Noakes, 2006). Therefore, the percentage of tackle-breaks represents a key determinant of try scoring capability and overall team success in rugby union. Furthermore, it is proposed that the percentage of tackle-breaks as described in this study be used as a key performance indicator of team success in rugby union.

The match-play characteristics of rugby union dictate that evasive agility skill execution is a valuable attacking strategy during ball carries (Duthie, Pyne, Marsh, & Hooper, 2006). The findings of the current study supports Sayers and Washington-King (2005) who found that attacking ball carriers commonly exhibited evasive agility manoeuvres when challenging the defence line. Therefore, evasive agility skill execution is a common and important feature of running movement patterns in rugby union.

The evasive side-stepping manoeuvre represented the most effective attacking strategy in achieving tackle-breaks. Previous research has shown that tackle-breaks are more likely when the attacking ball carrier exhibits an evasive side-stepping agility manoeuvre (Sayers & Washington-King, 2005), and this was confirmed in the current study where 72% of tackle-breaks were achieved through an evasive side-stepping manoeuvre. The movements associated with the side-stepping strategy function to

increase the base of support and as a result, enhance the properties of dynamic stability during skill execution (Andrews, McLeod, Ward, & Howard, 1977; Sayers, 1999). Consequently, the dynamic stability attributes associated with side-stepping manoeuvres no doubt enhance the ability to achieve tackle-breaks.

The change of direction angle associated with side-stepping manoeuvres is an important factor in the determination of phase outcome (Sayers & Washington-King, 2005). The current study demonstrated that side-stepping manoeuvres that resulted in tackle-breaks displayed a change of direction angle between 20 to 60° (Figure 2). In support of this, players who execute an evasive side-stepping manoeuvre that involves predominately forward motion have been shown to be more likely to achieve positive phase outcomes (Sayers & Washington-King, 2005). The kinetics associated with side-stepping indicate that greater braking forces are associated with greater change of direction angles (Schot, Dart, & Schuh, 1995). Therefore, side-stepping manoeuvres with a moderate change of direction angle enable the ball carrier to maintain horizontal momentum, enhancing the ability to penetrate the defensive line (Sayers & Washington-King, 2005).

The proximity to the defence at the execution of the initial evasive side-step was an important factor in the determination of tackle-breaks (Figure 2). This finding is in accordance with previous research that has examined the relationship between anticipation abilities and the recognition of movement patterns in predicting subsequent actions during sporting performance (Abernethy & Russell, 1987). The current study suggests that the execution of the initial evasive manoeuvre at 1 to 2 BL from the defence line may limit predictive visual cues and disrupt defensive decision-making and as a result, enhance the ability of the ball carrier to achieve a tackle-break (McMorris,

2004). Clearly, further research needs to investigate defensive decision-making against an attacking ball carrier displaying evasive agility skills.

The straighten angle following a side-stepping manoeuvre was also shown to be an important determinant phase outcome. Specifically, side-stepping manoeuvres with a moderate straighten angle following initial direction change were associated with tackle-breaks (Figure 2). The straighten step involves the realignment of lateral momentum to forward motion. Evasive manoeuvres displaying a moderate straighten angle enable the ball carrier to overcome lateral moments associated with direction change, whilst maximising horizontal momentum (Sayers & Washington-King, 2005). Consequently, the relationship between straighten angle and acceleration capacity represents a critical factor when attempting to exploit a break in the defensive line created from initial side-stepping evasion.

Conclusion

This study demonstrated that tackle-breaks, line-breaks and offloading in the tackle promote try scoring ability. Of these, tackle-breaks were strongly associated with team success. Evasive attacking strategies were then associated with tackle-breaks. The side-stepping strategy represented the most effective method of evasive agility skill execution during ball carries in rugby union. Tackle-breaks were likely when players received possession of the ball at greater than 2 BL from the defence line with high speed, then executing a side-step on an inside running line at 20 to 60° and 1 to 2 BL from the defence line and followed by a straightening of the running line at 20 to 60°. The desirable features of evasive agility skill execution associated with tackle-breaks facilitate the development of sports specific testing procedures and training programs.

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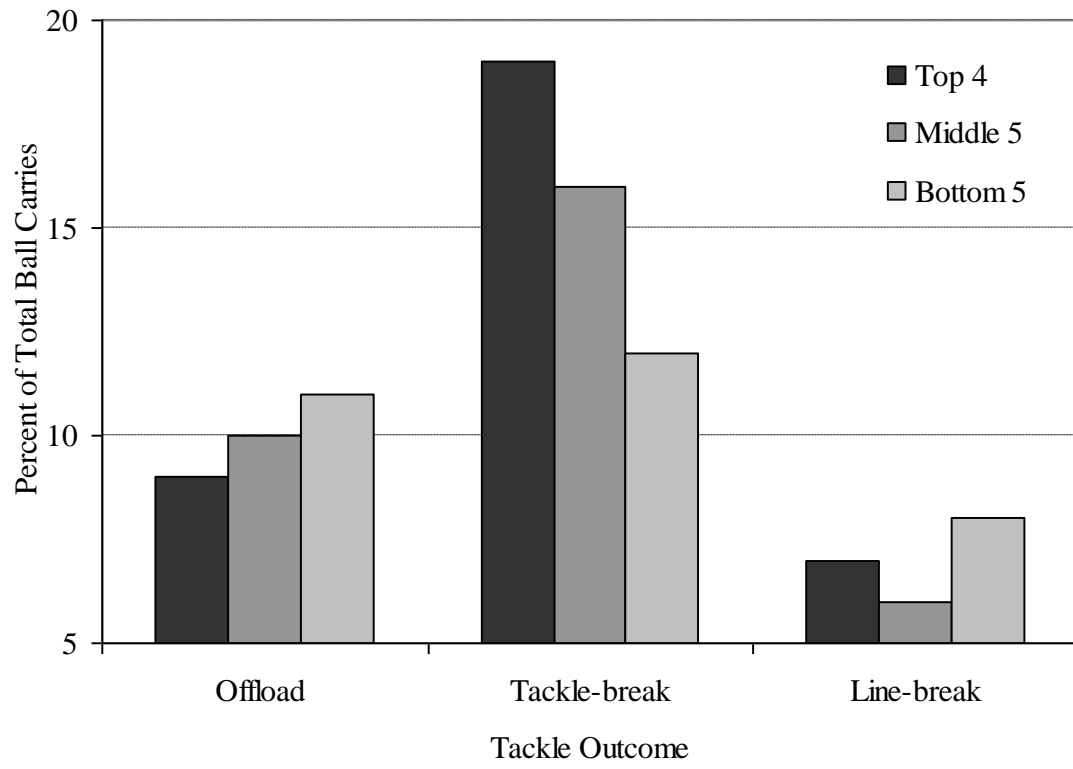


Figure 1: Percentage of tackle outcome with respect to team ranking.

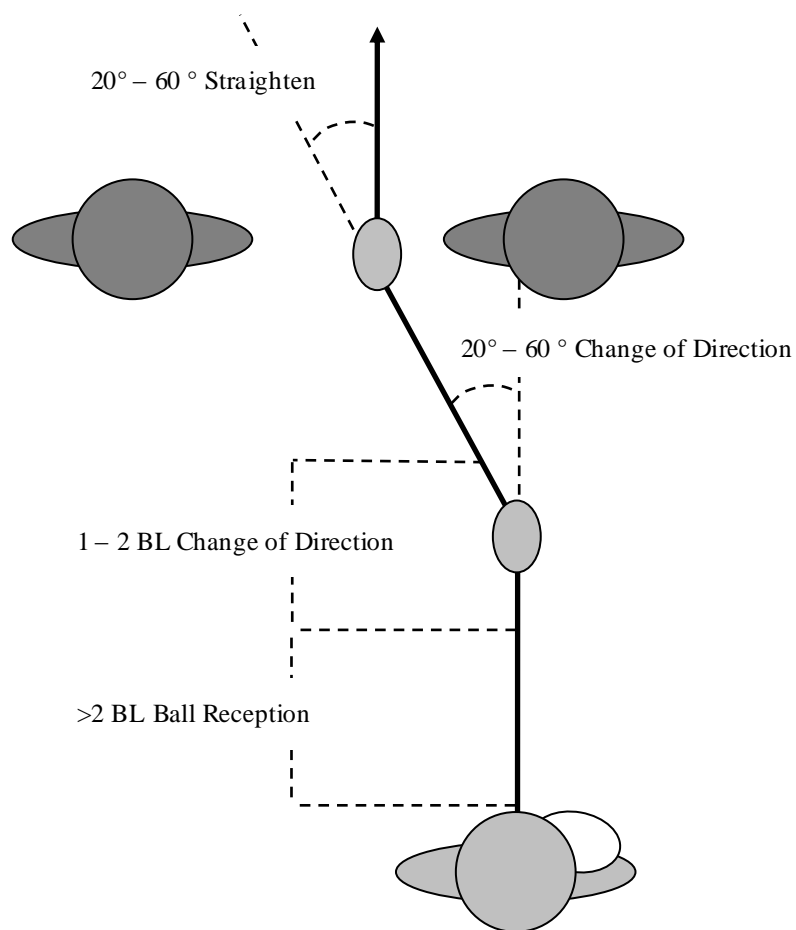


Figure 2: Transverse plane representation of initial direction change and subsequent straightening side-stepping manoeuvre.