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**A SCIENTIFIC ANALYSIS
OF RUNNING LINES IN RUGBY**

by

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DEDICATION

This dissertation is dedicated to Leta, Oupa, Nanna, Michelle, my family, and all my friends who have supported me during the last two years.

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“I have strength for all things in Christ who empowers me, I am ready for anything and equal to anything through Him; I am self-sufficient in Christ’s sufficiency.”

Philippians 4:13

SYNOPSIS

TITLE	A scientific analysis of running lines in rugby
CANDIDATE	Ashley Evert
PROMOTER	Prof. P.E. Krüger
CO-PROMOTER	Prof. M. Spamer
DEGREE	MA (HMS)

The game of rugby has been played for over a century and yet its intricacies are still not fully understood. The key ingredient coaches are seeking is what can be added to a team's make-up that will result in an increase in that teams level of playing success.

The objective of this study is the exploration of the biomechanical aspects of movement in a rugby context specifically looking at the stages before, during and after contact. The hypothesis is that the optimal use of running lines in rugby union will lead to more successful breaches in the opposition's defensive lines thus an increase in linebreaks will occur.

In order to make a comparison based on scientific research principles, nine matches played during the 2001 season was compared with nine matches played during the 2002 season. For each match played in the 2001 and 2002 seasons the total number of linebreaks achieved in a match was calculated. In addition the total number of linebreaks achieved in the 2002 season was further subdivided into the specific categories of intervention in order to determine which intervention had the biggest impact on the total number of linebreaks achieved.

By means of video footage of the matches played notational analysis was performed and information was gathered in order to gain data for further evaluation. The actions regarding the execution of the linebreaks were evaluated manually in respect of the intervention that was imposed during the coaching of the team during the 2002 season.

Without exception a comparison between similar teams played during both seasons indicated that the total number of linebreaks achieved during the 2002 season was much higher than when the team competed against similar opposition during the 2001 season. The aggregate numbers indicated a significant increase in linebreaks from the 2001 to 2002 season.

This conclusion was achieved by means of a simple T-test. Firstly an applied F-test test was done to determine whether the two samples had equal variances or not. Under the null hypothesis we assume that the variances of the two samples are equal, while the alternative states that the two samples have different variances. A value for the test statistic that is greater than the critical value will lead to a rejection of the null hypothesis.

The test statistic was calculated and evaluated against the $F_{(8,8)} = 2.59$ critical value on a 5% level of significance. The value of 15.921 is greater than the critical value of 2.95 and therefore the null hypothesis cannot be accepted, concluding that the two samples do not have equal variances. We then proceeded to test whether the 2002 average linebreaks are significantly higher than the average linebreaks achieved in the 2001 season.

Under the null hypothesis the two sample averages are equal. Under the alternative, the 2002 average is higher than the 2001 average. In contrast to normal T-tests this specific test was a one-sided upper or right hand test due to the fact that we are testing whether the one average is greater and not equal to the other. Therefore, we would only reject the null hypothesis of equal sample averages if the test statistic were greater than the appropriate critical value.

The calculated test statistic is 4.4827 and was evaluated against the $t_{0.05,9} = 1.833$ critical value. Once again we cannot accept the null hypothesis. Therefore we can conclude that the average of the total linebreaks made during the 2002 season is statistically greater than the average of the total linebreaks made during the 2001 season.

The results of this study therefore indicate that the new techniques incorporated into the coaching of the team in 2002 did positively influence the number of linebreaks when compared to the 2001 season.

KEY WORDS: Rugby, coaching, biomechanics, running lines, defensive lines, linebreaks, video footage, notational analysis, null hypothesis.

SAMEVATTING

TITEL	‘n Wetenskaplike analise van hardloopleyne in rugby
KANDIDAAT	Ashley Evert
PROMOTOR	Prof. P.E. Krüger
MEDE-PROMOTOR	Prof. M. Spamer
GRAAD	MA (MBK)

Rugby word reeds vir langer as ‘n eeu gespeel dog word die fyner aspekte van die spel nog nie heeltemal verstaan nie. Die belangrikste uitvindsel waarna afrigters strewende is dit wat sal veroorsaak dat daar ‘n verbetering is in die gehalte spel wat ‘n span kan speel.

Die doelwit van hierdie studie is die strewende na daardie biomeganiese aspekte van beweging in ‘n rugby konteks, en meer in besonder die verskillende fases voor, gedurende en na-kontak situasies. Die hipotese is dat die optimale gebruik van hardloop lyne in rugby sal veroorsaak dat daar meer suksesvolle breuke in die verdedigings lyne sal wees en dus sal daar ‘n hoër getal lynbreuke wees.

Ten einde ‘n vergelyking te kan maak wat gebaseer is op wetenskaplike beginsels, is nege wedstryde wat gedurende die 2001 seisoen gespeel is, vergelyk met nege wedstryde gedurende die 2002 seisoen. Vir elke wedstryd wat gespeel is gedurende die 2001 en 2002 seisoene is die totale lynbreuke in elke wedstryd geïdentifiseer en bymekaar getel. Daarna is die lynbreuke van 2002 verder opgedeel in spesifieke kategorieë van intervensie ten einde te bepaal welke intervensie die grootste invloed gehad het op die totale getal lynbreuke wat suksesvol was.

Deur middel van video opnames van die wedstryde wat gespeel is, was daar statistieke geneem en inligting bymekaar gemaak ten einde data te versamel vir verdere evaluasie. Die aksies wat gedurende die uitvoering van die lynbreuke

toegepas was, is met die hand gevalueur om vas te stel watter van die intervensies toegepas was in wedstrydsituasies gedurende die 2002 seisoen.

Sonder twyfel bewys 'n vergelyking waar spanne wat gedurende die twee seisoene gespeel het, dat die totale hoeveelheid lynbreuke wat suksesvol bereik was gedurende die 2002 seisoen beduidend meer was as in die gevalle waar daar teen dieselfde opposisie gespeel is gedurende die 2001 seisoen. Die somtotaal toon 'n beduidende verhoging in lynbreuke sedert die 2001 tot 2002 seisoen.

Hierdie aanname was bereik deur middel van 'n eenvoudige T-toets. Eerstens was daar gebruik gemaak van 'n toegepaste F-toets om vas te stel of die twee steekproewe gelyke afwyking het al dan nie. Onder die nul hipotese word daar aangeneem dat die afwyking van die twee steekproewe gelyk is, terwyl die alternatief toon dat die twee steekproewe verskillende afwykings het. 'n Statistiese waarde vir die toets wat groter is as die kritiese waarde sal beteken dat die nul hipotese verwerp word.

Die toets statistiek is uitgewerk en gevalueur volgens die $F_{(8,8)} = 2.59$ kritiese waarde op 'n 5% vlak van beduidendheid. Die waarde van 15.921 is meer as die kritiese waarde van 2.59 en dus die onaanvaarbaarheid van 'n nul hipotese, met 'n gevolgtrekking dat die twee steekproewe nie dieselfde afwyking het nie. Daarna is voortgegaan om te toets of die gemiddelde lynbreuke vir 2002 beduidend hoër is as die gemiddelde lynbreuke wat in 2001 bereik was.

As die nul hipotese gebruik is moet die twee gemiddelde steekproewe gelyk wees. In die geval van die alternatief, was die 2002 gemiddeld hoër as dié van 2001. In kontras met die normale T-toetse was hierdie spesifieke toets 'n een kant regter hand toets as gevolg van die feit dat daar getoets word welke die een gemiddeld groter en nie gelyk is aan die ander nie. Derhalwe sou ons die nul hipotese van gelyke steekproef gemiddeldes verwerp indien die toets statisties groter was as die toepaslike kritiese waarde.

Die berekende statistiek is 4.4827 en was vergelyk met die $t_{0.05,9} = 1.833$ kritiese waarde. Weereens kan ons nie die nul hipotese aanvaar nie. Daar kan derhalwe tot die

gevolgtrekking gekom word dat die gemiddeld van die totale aantal lynbreuke wat gedurende die 2002 seisoen gemaak is, statisties beduidend groter is as die gemiddeld van dié wat gedurende die 2001 seisoen gemaak is.

Die resultate van hierdie studie het dus aangetoon dat die nuwe metodes wat toegepas is in die afrigting van die span in 2002 'n positiewe invloed gehad het op die aantal lynbreuke in vergelyking met die 2001 seisoen.

SLEUTEL WOORDE: Rugby, afrigting, biomeganika, hardloop lyne, verdedigings lyne, lynbreuke, video opnames, statistiese analise, nul hipotese.

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A SCIENTIFIC ANALYSIS OF RUNNING LINES

CHAPTER 1

INTRODUCTION

1.1 THE DEVELOPMENT OF RUGBY FOOTBALL

The early history of rugby football has been researched by a South African teacher, writer and rugby administrator and is described in two books which show the history of rugby in South Africa and at a Cape Town private school for boys (Noakes & Du Plessis, 1996).

According to Dobson (1989), the origin of all ball games, being played between two teams on a field with two goal posts for example rugby, soccer and hockey, can be traced back to the Middle Ages in England. In these “games” the inhabitants of two neighbouring villages would meet halfway between the two villages on an open piece of ground. The goal of the game was to get a ball or a similar like object through the poles of the house owned by the opposition’s town “chief”.

There are many accounts of these games being very gruesome as the game Brigand was played with the heads of Danish Vikings, which was unceremoniously kicked through the streets by the local towns’ people. The game began as soon as the ball was let loose in the middle of the two teams. Thereafter anything was acceptable as there were no rules concerning clothing, equipment, the number or the age of players taking part. These games were often so savage that Royal Proclamation banned them 30 times in three centuries (Noakes & Du Plessis, 1996).

Later in the 19th Century in the English Public Schools, especially Rugby, Westminster, Eton, Marlborough, Winchester, Charterhouse and Cheltenham a form of the game of rugby developed. The schools accepted these “manly” games as an opportunity for their pupils to relax and to prepare the “muscle Christians” physically, in order to take the British values to the far corners of the British Empire.

The football games that developed in these famous schools each had different characteristics and there were no fixed rules. The reason for this was that each school developed their own particular rules based on the facilities available to them. The playing area at Rugby School was much larger than the others, therefore it allowed for the ball to be able to be carried. Eton school had a much smaller area available and they therefore developed a form of “dribbling” game (Noakes & Du Plessis, 1996).

When these pupils left school to attend the University of Cambridge, the first rugby club in 1839 was founded by an old boy from Rugby School. The old boys from Eton got upset when in the middle of games the players from Rugby School picked up the ball instead of kicking it. Thereafter a new set of rules was set up in 1846 at a meeting of the University of Cambridge. There were more old boys from Eton, therefore the rules favoured the “dribbling” game. In 1863 these Cambridge rules formed the basis of the rules developed for football (soccer) (Noakes & Du Plessis, 1996).

It therefore happened that in 1863 the differences between rugby and soccer became more defined. Teams in these early days of rugby consisted of up to 300 players per side, obviously to ensure no goals were scored! The ball was kicked downfield towards the opposition’s goal posts and players then moved by means of dribbling and scrums, which were called *hots*. Lineouts were formed if the ball landed outside the field of play. Handling of the ball was first allowed at Rugby School and only if the ball was cleanly caught. Out of a historical perspective William Webb Ellis was the first person to take a clean catch and then ran forwards with the ball in possession. Rugby School then introduced a rule that a player could only run forwards if he was trying to score a goal himself. At this stage he still wasn’t able to pass the ball to another player (Noakes & Du Plessis, 1996).

On the 26 January 1871, a meeting was ordered for the 21 rugby-playing clubs in London and the surrounding areas in the Pall Mall Restaurant. At this meeting the Rugby Football Union was founded and 59 laws were set out for the playing of the game rugby (Noakes & Du Plessis, 1996).

In 1875 the number of players was limited to 15 a side for the match between Cambridge and Oxford and in 1877 international teams also had teams of 15 players.

These 15 players consisted of 10 forwards, two attacking halves and three defending backline players. From here the play developed through changes in the scrum formations to what we see in modern day rugby, a 3-5-1 formation. The positions also became specialised and lately the laws have been adjusted in order to make the game more exciting so that viewer audiences can increase (Noakes & Du Plessis, 1996).

It is obvious that rugby has had to adapt to the needs of players and in so doing has developed into the spectacle that we are able to experience now two centuries later.

Today's Rugby Coaches are better prepared, better organised and more understanding of the needs of their athletes in their care. They are skilful, resourceful, confident and caring in their role as responsible coaches (Levy & Ponissi, 1993).

1.2 PROBLEM SETTING

This study is aimed at exploring aspects pertinent to the success of attacking play in rugby situations. The attacking situation will be looked at in isolation, so that the specifics of optimal, all encompassing running lines can be examined with the view of honing them to such an extent, that every possible advantage can be given to the attacking team, so that a linebreak can be nominated and then be executed successfully.

Previous research in respect of the Tri-nations series of 2000 was used in order to collect data so that assumptions could be made regarding the influence of the level of attack and possession on the outcome of a rugby match. (Evert, 2001b)

The conclusion was made that the quality of attacking play resulted in greater success than what the quantity of attack was able to achieve (Evert, 2001b).

The results looked as follows:

Table 1: Results of hypothesis testing regarding the mean values of various indicators of attack and possession in the Tri-Nations rugby series of 2000.

	H₀: $\mu_1 > \mu_2$	
Variable	Calculated T – value	Result
Total passes	1.558279	Accepted
Phases	1.210856	Accepted
Tries	-1.18517	Accepted
Rucks	1.924835	Rejected
Mauls	1.924835	Rejected
Final score	-1.56195	Accepted
Attacking ratios	0.940582	Accepted
Mean values of attacking variables (Table T – value = 1.86)	0.240805	Accepted

μ_1 = Average of losing team

μ_2 = Average of winning team

$\alpha = 0.05$

t-Table value = 1.782

(Evert, 2001b).

From the results of the hypothesis testing it is noticeable that the values of the losing team in the following categories; total passes, phases, tries and the final score, is significantly higher than that of the winning team at a 5% level of significance. The mean values of rucks and mauls on the other hand are not significantly higher than that of the winning team at a 5% level of significance.

The attacking ratio of the losing team is also significantly higher than that of the winning team.

Looking at the mean values of the attacking and possession variables, the mean value of the losing team is significantly higher than that of the winning team at a 5% level of significance. It can thus be assumed that the losing team on average has a significantly higher level of attacking play and possession than that of the winning team.

When evaluating the difference between the mean values of performance amongst the individual teams it should be noted that it was only possible to work with the values of the New Zealand team's variables. This was due to the fact that this team was the only team who had won and lost sufficient matches in order to be able to perform statistical tests on the values.

The following situations arose after evaluation of the competition:

When Australia played against New Zealand

→ The team with the fewest passes and phases won.

When South Africa played against New Zealand

→ The team with the fewest passes and phases won.

When Australia played against South Africa

→ The team with the most passes and phases won.

This information creates confusion as a team can only score tries if they have the ball in their possession. The important aspect is that it is not merely the quantity of attack that will result in success, but more likely the quality of the attack.

By passing the ball and setting up phases, the attacking team is trying to breakdown the opposition’s defensive lines in order to create opportunities to play through (McIntosh, 2000; Tuyenman, 2000).

The aim of a team should therefore be to be highly skilled at first phase attacks in order to break the defensive line of the opposition. The object of pursuing success from first phase attacks is that the opposition is immediately placed on the back foot and thus liable to create more “spaces” through which the attackers can play through (Evert, 2001a).

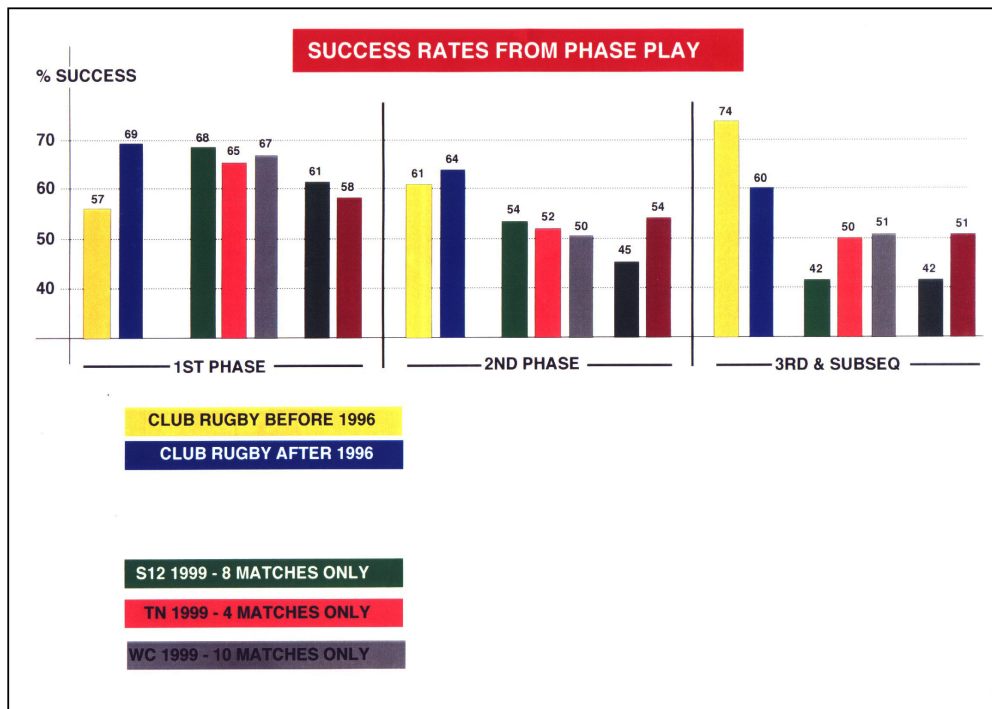


Figure 1: Success rates from phase play

(Honan, 1999b).

1.3 HYPOTHESIS

With this information available, an empirical method of research will be used whereby the author will be calling on his personal experience as well as information

collected from available literature in order to fully investigate the contributing factors to successful linebreaks and attacking play.

Due to there being vast amounts of information regarding coaching aspects, yet minimal regarding such specific and isolated situations such as the moments leading up to the contact area, this study will rely on his interpretation of the information available and thereby set up concepts and guidelines in order to define the factors necessary for this specific field of study.

According to Thomas & Nelson (1996), a danger of such a study is that relying too much on personal experience may be a pitfall as one's own experience may be limited, furthermore, one's retention depends substantially on how the events agree with one's past experiences and beliefs, on whether things "make sense," and on the state of one's motivation to remember.

This is most certainly a valid statement as the "player's mix" of a team ultimately influences the team's attacking capabilities. The key function of a coach is to identify the player's individual as well as the team's collective strong points, and then to combine that into the successful attacking play situations.

For this reason, the research will be primarily philosophical in nature. The aim is to establish a hypothesis, to examine and then analyse the existing facts and to finally synthesize the information into a workable theoretical modal (Thomas & Nelson, 1996).

Due to the dynamic and complex nature of the sport, it will not be possible to lay down any specific rules. The key aspect involved is that each attacking situation involves a complex event where prediction and control is difficult to pinpoint as this prediction involves a thinking human being under extreme mental and physical pressure, being influenced by other variable factors, all taking place in a dynamic environment rather than an isolated physiological system in a controlled laboratory setting.

For this reason, the object of this study is to identify specific principles that have been identified in the literature research and to attempt to apply these principles to the pre – contact and contact situations. In order to achieve this there will be an incorporation of Newton’s scientific laws of movement, as well as aspects associated with momentum, impulses and collisions as the basis for formulating and testing the research hypothesis.

Biomechanical analysis will form the reference point of the study as its importance in elite level coaching has been evident in all sporting codes and rugby union is no exception. Biomechanics is a comprehensive science that includes every system in the body. Biomechanics and practical coaching science work together to assist the coach in accomplishing assignments during competition. Biomechanical analysis of gross and fine movements also provides sound guidelines for the coach to follow in skill training sessions. Using this science greatly increases the chances that you will achieve your highest levels of performance in the most energy-efficient manner (Dintiman et al, 1998).

Once possible links have been identified, there will be a reflection on movement, ideas, ideals, lived experiences, logical relationships, and reasons in order to shed more light on the success of running lines in the sport (Thomas & Nelson, 1996).

1.4 METHOD

The goal of this study is to examine running lines metaphysically, i.e., trying to explain reality including the nature of knowledge, reality, and the universe and its laws (Thomas & Nelson, 1996), by using reflective procedures and not the empirical tools of science.

The research problem will be analysed using inductive reasoning. This implies that the line of thought will move from a limited number of specific observations to general conclusions about the thing or class of thing that was observed. The power of reason to identify common elements or similarities will be relied on at an abstract level (Thomas & Nelson, 1996).

This implies that the running lines will be discussed in the light of attacking principles as well as the most common defensive lines used. Each running line will then be evaluated in the light of these previously mentioned factors in order to establish its effectivity and in which circumstances it will be most effective. This form of reasoning is a procedure that is not mystical as the data to be used is readily available and everyone can reflect upon it (Thomas & Nelson, 1996).

The core aspect of the study will involve the explanation of how the “playing mix”, which will be explained making use of references from renowned coaches and students of the game, will be used to measure the outcomes of the strikes that occurred, and the specific running line that was used to execute it.

Finally this technique is useful as it will distinguish what are the essential elements involved in the execution of successful running lines and which aspects bare no bearing on their success.

1.5 FORMULATING THE RESEARCH PROBLEM

1.5.1 The Unit of Analysis

The research will follow a structure, which will set the boundaries of the study. The discussion will take place in an ordered fashion beginning with the introduction to the finer insights of the defensive systems used from organised phases of play, and then proceeding on to 2nd, 3rd and subsequent phase defensive play. There will also be a discussion concerning defensive concepts, which serve as guidelines to the optimal defensive capabilities of a team.

Thereafter, an introduction to the attacking principles associated with rugby will be explored. This will give a thorough background to the concepts involved in all attacking plays as well as the objectives that are sought after in these attacks.

This will lead to a discussion taking place exploring certain scientific laws of movement, as well as aspects associated with momentum, impulses and collisions

as the basis for formulating and testing the research hypotheses. There will be correlations drawn between these concepts and rugby situations in attempt to give further understanding into the reason why running lines should be successful or not.

Finally, a thorough description, explanation and evaluation of the types of running lines will be done. They will be evaluated in the light of alignment, angle, speed and penetration. This will also include an all-encompassing description of all the players involved in each attack. The value of a running line is only realised once the subsidiary players {i.e., the ball carrier, decoy runners and trailers (strikers, supporters and cleaners)}, have played their part in order to either add attackers or subtract defenders within the striking area.

Included in this section will be an explanation of the supportive lines to be used once the strike has been executed.

1.5.2 The Research Goal

The research goal is to gain a better understanding of the factors that play a part in the successful strikes that take place during contact situations in rugby. The hypothesis is that if a team is able to make use of effective running lines, combined with specific decoy runners, and a striker who is able to either play through a hole created by these running lines, or to play in behind a defender who is not in a suitable position to make the tackle, then the quality of attack of that particular team will be increased through achieving more and easier linebreaks.

There will be an in depth look taken at the analysis of the running angles of the players involved in each attack. The hypothesis is that depending on where the defender's centre of mass is, will affect the defender's ability to make the tackle in the first place or to realign and get back into a position to be able to defend effectively.

The mechanical strong and weak points will then be understood and thus will a hypothesis be able to be formed which will indicate what must be achieved in each attacking situation to be able to give a striker a “mechanical advantage”, and what will result in a defender having a “mechanical disadvantage”.

1.5.3 The Research Strategy

In order to fully give value to this study, the specific running lines will be taught, according to the principles laid out in the discussion. In the coaching of the Blue Bulls U21 team, the author will be using these above-mentioned principles as the basis for his coaching of attacking play. The key aspect of this study is that this form of research does not fit clearly into one of the true experimental designs. This implies that the control of the research design is difficult (Thomas & Nelson, 1996).

For this reason a quasi-experimental design will be used. The purpose of this experimental design is to apply it to settings more like the real world while still controlling as many threats to internal validity as possible (Thomas & Nelson, 1996).

A time series design will be used over the course of two rugby seasons. This will be achieved by making use of notational information gathered during the Blue Bulls U21 teams statistics from the 2001 season, and information that will be gathered from the 2002 season, after the treatment (T), has been administered.

Due to the experiment being a time series design, it implies that the design will only use one group and the author will try to show that the change, i.e., an increase or decrease in the number of linebreaks, that occurred when the treatment was interjected differs from when it was not.

i.e., O_{2001} T O_{2002}

The basis for claiming that the treatment causes the effect is that a rate of change varies between O_{2001} and O_{2002} where T has been administered (Thomas & Nelson, 1996).

The next step in the research process will be to analyse and discuss the implications of the findings on the research question that was stated earlier.

In order to cover a full spectrum of data collection in order to understand the findings, there will also be interviews with some of the coaches involved at the Blue Bulls for 2002. Thereafter a philosophical comparison and discussion will take place.

The key of the study is to follow the discussion in an ordered fashion in order to ultimately be able to make one's own deductions at the end of the study. The hope is that basic principles can be identified and is able to be used in a broad and general manner in all coaching environments.

CHAPTER 2

LITERATURE REVIEW

2.1 DEFENSIVE SYSTEMS

Defence starts with the battle for possession – when you have the ball, you do not have to defend (Pool, 1997).

The object of this section is to discuss in detail the workings of defensive patterns and to identify shortcomings in their structure. In order for one to understand running lines and their effectiveness, it is important to first have a fuller understanding of defensive patterns and alignment so that weaknesses in the opposition's defensive systems can be identified and taken advantage of.

For an attacking running line to be effective, it must manipulate the immediate defender as well as the opposition's defensive lines. This scrambling up of the defensive wall will result in a disruption of how the defenders will be able to reorganise their defence and be able to recreate the structure they had at the beginning of the opposition's attack on their defensive wall.

One must take cognisance of the fact that first phase set-up attack is extremely important as it disorganises the opposition's defensive wall. The attacking team wants to create attacking situations where after 2nd and 3rd phase, their backs strike on the opposition's forwards and their forwards attack on the opposition's backs. This will be referred to as a "mismatch".

This "mismatch" is extremely important as it gives the attacking backs an opportunity to beat a forward on the outside or inside in a one-on-one confrontation by using their superior footwork skills. The forwards are also able to run onto the defending backs who, due to their defensive body positioning are mechanically weaker, thus the forwards momentum advantage can be made full use of.

With this in mind it is important to note that defence from first phase is slightly easier to manage, as the defenders know exactly who is defending next to them and this allows for better communication, nomination and execution (Marks, 1998). It is after first phase that the defence becomes more complex due to a greater number of variables being involved.

The term “attacking without the ball” is an extremely apt definition for the mindset needed to be successful in defence as most teams spend about 50 per cent of their time attempting to regain the ball held by the opposition (Robilliard, 1997), and this regaining of possession can be achieved by either:

1. dominating the tackle i.e., the attacker loses the ball in contact, or it is turned over at the subsequent ruck through effective poaching skills by the defensive support players (Pool, 1997; Muggleton, 2001) or,
2. pressurising the defence by forcing them backwards or across the width of the field without getting over the advantage line, until the attacking team is forced into an error or tackled out over the touchline (Evert, 2001a).

With all these aspects as background, the finer intricacies of effective defensive play will be discussed in the light of the following factors.

2.2 THE PILLARS OF DEFENCE

The effectiveness of a team’s defensive abilities is largely reliant on nine important factors namely:

1. defensive organisation;
2. the defensive shape;
3. the defensive zones;
4. defensive spacing;
5. the execution line;
6. attitude (Kiss, 2002);
7. drift defence as a concept;
8. second phase defence; and
9. third and subsequent phase defence (McFarland, 2002).

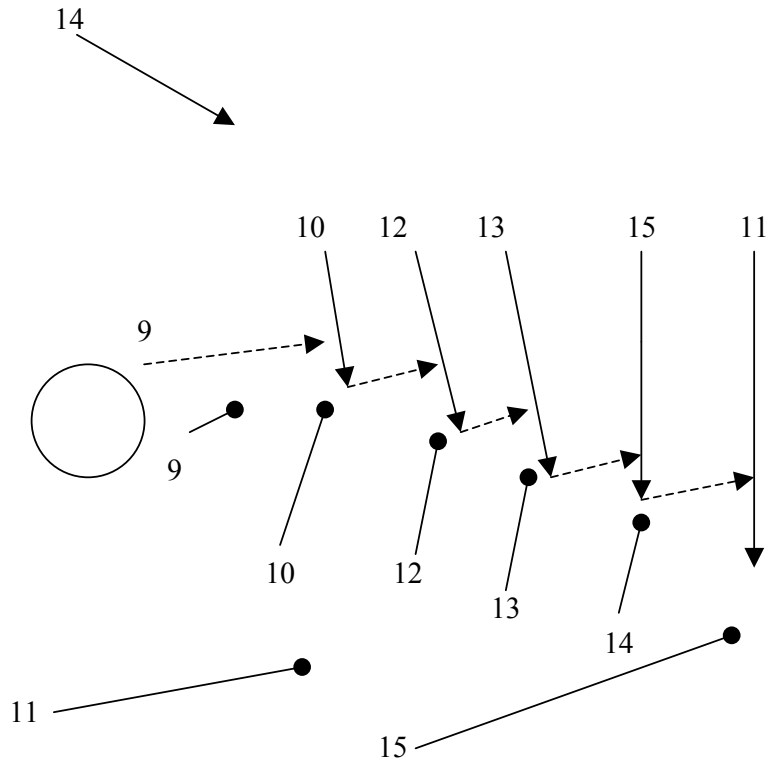
2.2.1 Defensive Organization

Defensive organisation will be discussed in the form of the three basic defensive “techniques” from primary phases of play, the first being:

2.2.1.1 Man-to-Man Overlap Defence

This system of defence identifies the ball carrier. When the attacking team brings in an extra attacking player into the backline it forces the defenders on the outside to adjust (i.e., move in one), allowing the overlap to be created on the wing (Pool, 1992; Williams et al, 1994; Robilliard, 1997; Pool, 1997; Marks, 1998).

In this case the cover would be directed to the touchline and the job of taking the last runner would fall to the fullback. This is not such a difficult task if the extra man comes in outside the outside centre. It does however create problems if the overlap occurs through a run around, because to take the player with the ball, the outside defender then has to turn rather drastically. If they don't make that turn well enough and a linebreak occurs, it makes it difficult for the fullback who is basically set on reaching the touchline to be able to correct himself so to be able to make the tackle on the player coming through in the midfield. It is therefore important that in this situation the fullback as well as the blindside wing who is moving across has to be conscious of trying to stay inside the ball and then shifts across as needed (Johnson, 1993; Marks, 1998).

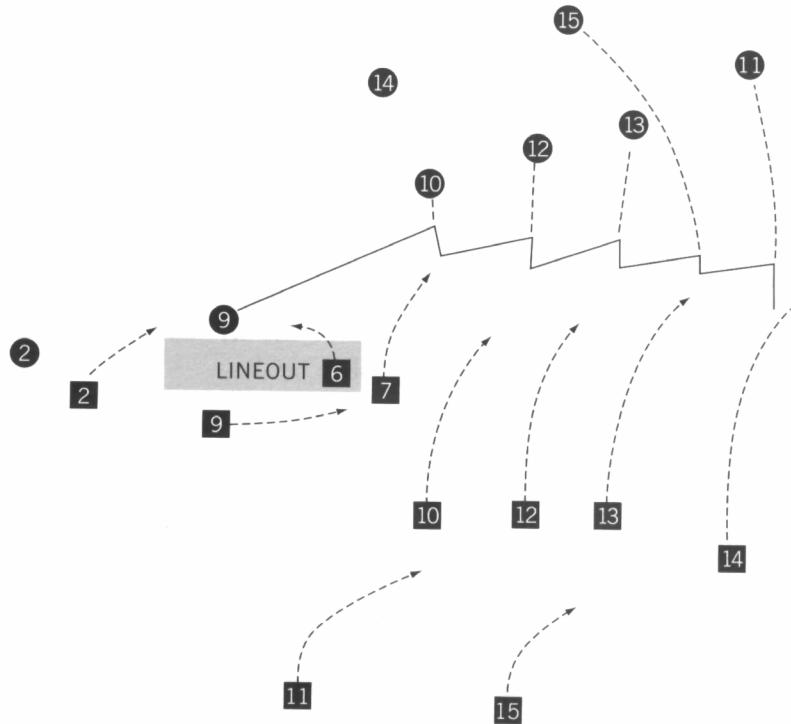


Adapted from: Robilliard (1997).

Figure 2: Man-to-Man overlap defence

2.2.1.2 Man-to-Man Isolation Defence

This pattern identifies the target runner and the defence then isolates the “extra” man with the ball by having the defensive openside wing stay with this attacking player. The main objective is to isolate the ball carrier from his support, both on the inside and the outside (Pool, 1992; Johnson, 1993; Marks, 1998).



Adapted from: Marks (1998).

Figure 3: Man-to-Man isolation defence

It is the responsibility of the designated player (usually the blindside wing or fullback) to tackle any extra man who comes into the line from a lineout. The positioning of the blindside wing is extremely important when using this pattern. From a scrum the same winger or the fullback can accomplish the task. This defender should only be a few metres from the scrum, lineout, ruck and maul situation if it is to be effective (Johnson, 1993; Marks, 1994; Robilliard, 1997).

There are two important concerns when defending in such a manner:

- the defender must isolate and nullify his opposite number, and
- the defender must get between the ball carrier and the inside support which is the attacking teams most valuable weapon (Pool, 1997).

When looking at these two concerns the first takes priority, however, where the ball is shifted quickly, the defenders have to shift quickly onto a lateral run. In this situation, the defenders should anticipate where the attackers should run in support and then try

to beat them to that position. In other words, where a defensive line can anticipate where a space is going to open up, they should lead their opposite numbers to that position rather than following them to it (Marks, 1998).

Once this has been achieved, the attacking options will have been reduced fairly well in the midfield, however, the real danger is likely to occur wider out with the entry of an extra man between the outside centre and the openside wing. It is in this situation that the openside wing should be on his guard. It was mentioned earlier that in this situation the defender should stick to his opposite number. The reason for this being that it makes certain that the opposition wing is shut out so that:

- the fastest opponent is not able to get out into the clear, thus resulting in the cover defence not having to stretch itself to the limit in order to stop this player (Robbiliard, 1997).

This defensive philosophy is effective as, by leaving the directly opposite attacker in that situation rarely results in having to make a tackle or stop a pass. A good defensive wing will however also be able to:

- position himself so that if the pass comes, his opposition winger can be tackled, and the opposition wing is given the impression that there is a threat that he will be caught which will require him to pass the ball. This is a secondary concern as, whether the pass is thrown or not, the support player has to be isolated and covered from being able to break the defensive wall (Kiss, 2002).

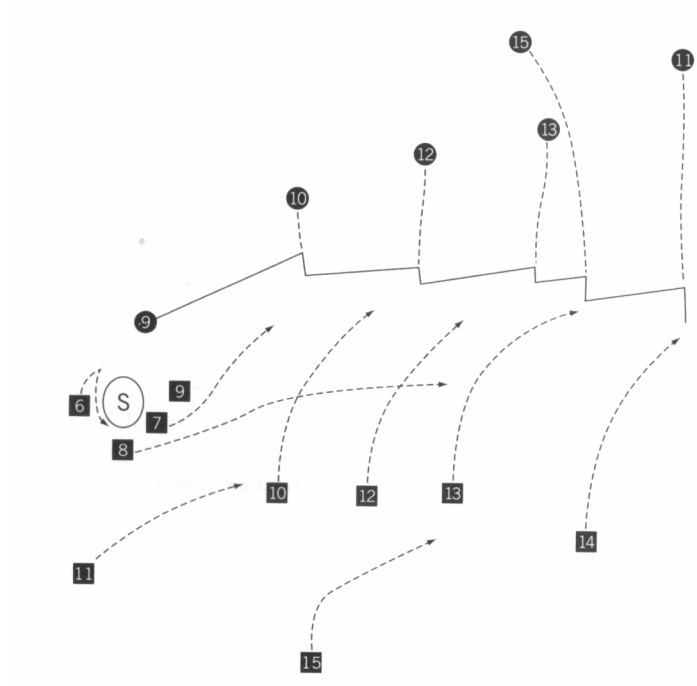
The most important factor in the defender's role is the running path. This can only be optimally executed by anticipating the two versus one situation. If this situation arises it can be managed in the following way:

- a) the defenders must stand narrow in relation to the attackers;
- b) the defender must turn and shift outwards as the inside player receives the pass;
- c) the defender must run across the face of that player to encourage him to concentrate on the retention of the ball, i.e., put him under intense pressure, i.e., the possibility of being tackled by the defender; and

- d) once this has been achieved the defender must aim to and concentrate on his own opposite number with a view to making contact with him just as his hands go out to take the ball (Marks, 1998).

2.2.1.3 One-Out Defence

This pattern requires excellent communication skills between players. It identifies the ball carrier so that the attacking flyhalf is tackled by the defending flank at the scrum or the last man in the lineout (Pool, 1997; Kiss, 2002). The attacking inside centre is covered by the defensive flyhalf, the attacking outside centre is covered by the defensive inside centre, the attacking fullback is covered by the defensive outside centre, and the attacking wing is covered by the defensive wing (Johnson, 1993; Robilliard, 1997).



Adapted from: Robilliard (1996).

Figure 4: One-Out defence

The following points should be noted.

- One-out or drift defence is easier to employ from a lineout as the blindside wing is in a better position to be able to cover a break from that defensive position than from a scrum. This is because there is a bigger area to cover from a scrum than from the lineout.
- It is however most effective from a scrum on the left hand side of a field as:
 - a) from a scrum you are closer to the opposition, making it difficult for the defenders to detect the positioning of the wing; and
 - b) on the left hand side of the field it is easier to cover the attacking flyhalf by the open side flanker (Pool, 1997).
- If drift defence is used on the right hand side of the field, the openside flanker has the difficult job of watching both the scrumhalf and the flyhalf (Robilliard, 1992).
- The blindside wing still takes the “across, up and across” line to cover any break in that big box from their outside centre in. If no extra man comes in from there out, the openside wing takes his opposite attacker, leaving the outside centre free to capture possession after the tackle (Marks, 1998).

If the fullback does enter in this situation, the defending wing still stays with the attacking wing because the slide of the outside centre will cover this option. If the fullback should come in very wide, the centre will slide onto the wing and the wing will slide onto the fullback (Johnson, 1993; Robilliard, 1997).

With this defence it is better to line up inside your opposite number. Standing outside makes the slide easier but it also alerts the opposition. If, however, the attack is spread, this outside option is necessary so to be able to get to the striking attacking player (Marks, 1998).

Once primary phase defensive play has taken place, the following key aspects play an important part in defensive play.

2.2.2 The Defensive Shape

A team's defensive shape is an important key in building a defensive wall that can absorb and nullify various attacking threats. What is important for a defensive line to concentrate on is a commitment to keeping this "shape". The key rule is that a defender must under no circumstances advance ahead of the man inside of him. Each defender should preferably position himself half a meter laterally behind his fellow defender inside of him (Muggleton, 2001; Kiss, 2002).

Once the ball passes the defenders "zone" he should continue to push forward into the space inside the ball. By maintaining this "shape" at least two "zones" inside the ball it is possible to guard against any attempted inside passes or switches which the attacking team may use to strike our defensive wall. The defenders must defend the spaces inside the ball (Anderson, 2000).

The defenders closest to the facet play an important role in leading and developing the "shape". Once they have addressed the immediate threat in front of them their next duty is to lead the defensive line forward in order to develop good "shape" early and to assist the midfield in edging the outside defenders into their specific role in defence.

Attacking systems are continually being developed to create situations that will lure defenders out of their line in order to disrupt and break their defensive "shape" and thus create the holes they then wish to exploit with their strike and support runners. This "lure" is aimed at the ball carrier and also inside and outside the ball carrier through decoys, deceptive plays and exploitive running lines.

In order to prevent linebreaks taking place in this fashion, the defensive line must be maintained and there has to be a commitment to keeping the "shape".

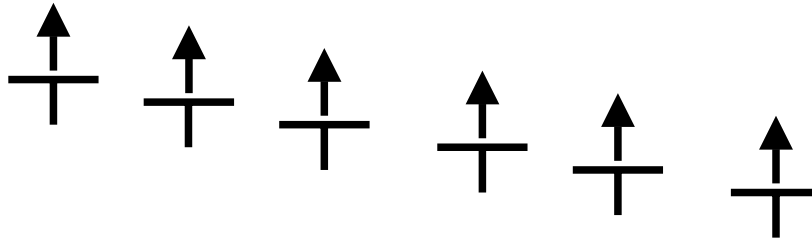


Figure 5: Defensive shape

2.2.3. The Defensive Zones

A “zone” can be described as the space or area a defender is responsible for. The key “zones” are the ball and the two spaces or “zones” on either side of the ball carrier (Marks, 1998; Kiss, 2002).

Defenders at the ball and the outside “zones” must stay strong and square in their “zones”. The rule is that a defender should not slide or drift off their “zone” of responsibility before the ball has passed their defensive “zone”. Only under certain circumstances will an inside defender be able to release the inside defender from his “zone” early, e.g., when the attack shifts the ball wider early, and when the defensive line are using a holding pattern due to the attack having a greater number of players available than the defence has (Kiss, 2002).

While discussing the aspect of defensive “zones”, the concept of tracking needs to be understood. When tracking an attacker, the objective of the defender is to position himself for his own advantage and strength, i.e., this implies that the defender presents himself to the contest with a strong body positioning and a correct shoulder presentation (Muggleton, 2001; Kiss, 2002).

The defender’s positioning should be a body width at least inside the attacking player in your “zone” or on the directly opposite attacker who is about to be tackled. By having this starting position as with the initial tracking position it reduces or prevents a possible opportunity for the ball carrier from being able to change his angle and then

run at a weak shoulder of the defender. The defender also has good vision of his “zone” and of the defensive “zone” of the supporting defensive player on his outside. While the approach is taking place, it is important that the defender stays strong and square in his “zone” (Robilliard, 1992; Muggleton, 2001; Kiss, 2002).

2.2.4. Defensive Spacing

“Spacing” refers to the appropriate distances between defenders in order to attain the ideal field coverage that:

1. will suit the defensive style and pattern of the team;
2. will suit the defensive abilities of the players in the team;
3. is appropriate to the field position; and
4. gives the best awareness and coverage of possible attacking threats and patterns possibly executed by the opposition (Muggleton, 2001; McFarland, 2002).

Maintaining good equal “spacing” is vital particularly when the defensive line is in movement forwards and sideways. Equal “spacing” does not necessarily imply that every space between the defending players is the same. The players nearer to the facet will obviously have a closer more compressed “spacing”. As one moves along the defensive line outwards towards the midfield defenders, the “spacing” will become gradually wider (Larder, 1992; Kiss, 2002; Hedger, 2002).

It is important to note that the important “spacings” are the “zones” inside and outside of the ball carrier. The “spacings” inside the ball carrier should not be closed up too quickly or early, as those “zones” need to be defended. A vital component in effective “spacing” and maintaining good “spacing” is the defensive lines starting position. Being fully prepared in the line with scanning and awareness, talk and urgent “reload” will ensure that the defensive line begins with the appropriate “spacing” (Anderson, 2000).

The most important aspect of “spacing” is communication and for the defenders to work effectively in “3’s”. This implies that a defender should be continually communicating with the defender on either side of him so to ensure the “spacing” is appropriate.

2.2.5. The Execution Line

This refers to the “critical” point or line of pass of the attacking play. When discussing the “execution line” the most important component is awareness and judgement in the defence’s line application. The art is to avoid being pulled out of “shape” while pressing forward and therefore being made redundant in the defensive line especially at the “critical” point where a defensive decision has to be made, e.g., a run-around or looping play.

Awareness and judgement is required here to ensure that the key point of the defensive line does not overextend to the “critical” line. The defence line speed and tempo is determined at this stage, usually by the flyhalf and inside centre as well as the defender inside the flyhalf. It must be noted that the lines speed of advancement is also affected by the “shape” rule, i.e., no player should advance ahead of the defending player on his inside (Kiss, 2002; Hedger, 2002).

In these “critical” points and situations a forward motion, “holding” pattern is to be applied with the intention of letting the play evolve without interference to the defensive structure and “shape” (Kiss, 2002; Hedger, 2002).

By achieving the defending team can “influence” the pass and play to their own terms rather than being dictated to by the attacking team. The defensive team is then able to:

- a) observe;
- b) orientate;
- c) decide; and
- d) act (OODA method) (Kiss, 2002).

This results in the defending team being able to defend the evolving attacking threat with the defensive lines “shape” and structure still in place.

The control of the “execution line” and the application of this method effectively and consistently, can and will frustrate the attacking team and in particular the key ball players and supporters. This is because they are not able to do what they plan to do, i.e., to lure and pull a defender out of shape or make a key defender redundant and ineffective by committing him to a point resulting in him being unable to assist his outside defenders (Anderson, 2000).

This method is very useful when the opposition have more numbers in attack than what the defending team have defenders. By making use of good scanning any possible attacking threats can be overcome by means of thorough analysis of the opposition followed by communication between the defenders. This is essential for successful defence in these situations (Williams et al, 1994; McFarland, 2002).

2.2.6. Attitude

This is by far the most important aspect of defence as without commitment to these factors no amount of technique will be sufficient to stop any form of attacking play!

- There must be a commitment made to these principles irrespective of any interference within the defensive structure or fatigue among the defenders.
- There must be a commitment to maintaining the defensive shape despite possible interference within the defensive structure or fatigue among the defenders.
- There must be a commitment to stay strong and square in each defenders defensive zone irrespective of any interference within the defensive structure or fatigue among the defenders.
- There must be urgency on the “reload” irrespective of any possible situations that may arise or fatigue among the defenders.
- There must be exceptional off the ball work ethic and awareness by all the defenders.

- Any opportunity for presentation of oneself for a defensive contest must be taken advantage of irrespective of any possible circumstance or fatigue.
- Every defensive player must be prepared for / or alert of any possible quick taps, turnovers or any attacking kicks (Larder, 1992; Kiss, 2002).

This explains the alignment and techniques necessary for a team defending and the attempt to turnover the opposition's possession by means of solid well-orchestrated defensive lines and tackling techniques. As mentioned earlier, the challenge presents itself when defensive lines are made up of a combination of forwards and backline players.

The key to any backline attack is based on manipulation of the defence's organisation, and to "strike" in an area perceived as vulnerable in order to breach the defensive line. Alternatively to successfully defend lies in the ability to organise defensive lines from 2nd and subsequent phases. It must be noted that an attacking team will continue probing until either there is a linebreak or an extra man on the outside has been created.

2.2.7. Drift Defence as a Concept

"Drift defence" is not a pattern, but a concept and isn't specific to phases of defence. Drift defence does not identify a definite target for the tackler but works on shepherding the attacking backline across the field. One must note however that the words "drift" or "slide" indicate that something will occur later (Larder, 1992; Johnson, 1993; Williams et al, 1994; Marks, 1998).

Defence occurs now – not later, and this links up with the first rule regarding defence (Robilliard, 1992).

The first basic rule regarding defence is to deny the opposition time and space, which subsequently reduces attacking options. This can only be achieved if the team not in

possession advances forward quickly and pressurises the ball carrier (Robilliard, 1997).

The second basic idea of “drift” or “slide” defence is a concept of “wait and see” which is commonly used in rugby league. The idea is to organise the defensive lines to try and “herd” the attacking team towards the side of the field in order to force them to have to try and beat the defence around the outside. This tends to eliminate the possibility that the attacking team is able to break through the defensive line in the midfield, which could be disastrous (Muggleton, 2001).

In order to achieve these ideas it is important for the defender to align on the opponent’s inside shoulder, thus pushing the attacker towards the sideline. It is important to move forward towards the target quickly, allowing the opponent only an outside opportunity. In moving forward, defensive players should not get ahead of teammates inside them as this will create a crooked defensive shape (Anderson, 2000; Muggleton, 2001; Kiss, 2002; Hedger, 2002).

It is important that while approaching the attacker that the defender slows down slightly and balances himself so that if the player cuts inside, the defender can adjust his line according to what the ball carrier does. It is vital that the defensive line is kept, and that there is a slight “hockey stick” defensive line angled towards the touchline. Once each defender’s attacker has passed the ball, he should move into a position between the ball carrier and his immediate opponent (Robilliard, 1997; McFarland, 2002).

It will become evident that as the opposition are forced across the field, their options become limited and time is “bought” for the second line of defenders to move across the field in defensive support. It is also easier for the defender to tackle the opposition striker as it makes for an easier side-on tackle (Larder, 1992).

2.2.8. Second Phase Defence

The key to defence at 2nd phase is to get as many players as possible to the breakdown first. The reason for this is that there are two possible outcomes that may occur,

- either the ball can be turned over and won, or
- the ball can be slowed sufficiently (without giving away a penalty), so that the defensive lines can reorganise creating a situation where there are more defenders than what there are attackers (Anderson, 2000; McFarland, 2002).

(This is due to the attacking team having to commit more cleaners to a ruck so to ensure that they, the attacking team, recycle their possession)

What is important to understand when defending after the first ruck or maul is that the principle of drift defence is still executed, it is merely the organisation around the contact area which is adapted (Muggleton, 2001; Kiss, 2002).

After a tackle has been made and the subsequent ruck or maul is formed, the players not committed to the ruck should align themselves on either side of the facet. The player closest to the facet is the “marker”. This player must align half a body width overlapping the ruck and behind the last mans feet. The next player next to the “marker” is called “one” (Anderson, 2000; Kiss, 2002; McFarland, 2002).

The “marker” and “one”, known as “guards”, cover the pick and drive around the ruck, a quick break by a fringe player, the inside pass from the flyhalf, the reverse pass from the scrumhalf or a pass with a run-around offloading to a striker in the inside channel. These two “guards” are defending the channel closest to the ruck. It is therefore important that they hold the position until the opposition flyhalf passes the ball outwards (Evert, 2001a; Kiss, 2002; McFarland, 2002).

The “marker” and “one” play an important role in the organisation of the defence. They firstly set the mark as to where the offside line is, and secondly set the position from where the supporting defenders begin their “hockey stick” defensive line shape. This results in the “drift” defensive lines being in place and ready to press forward onto the attackers (Anderson, 2000; McFarland, 2002).

It is also important to note that the backline players marshal the forwards who are present in the backline inwards towards the ruck / maul if there is sufficient time to do so. The fanned players should aim to get the tight forwards nearest the facet, followed by the loose forwards as this will keep the line organised on the outside where possible “strikers” can begin their attacks. It is also necessary due to most of the probes (using the bigger forwards), will be played off the flyhalf. If however the attack is too highly pressured, the defenders should align as they reach the facet and concentrate on keeping their “hockey stick” shape (Marks, 1998; Muggleton, 2001; Kiss, 2002; Hedger, 2002).

The next stage in the defensive system begins as the ball is passed out towards the flyhalf. The term “shoot” and “shift” then becomes apparent. This is explained as where the rate of advance is set (Anderson, 2000; Kiss, 2002; McFarland, 2002).

The “marker” and “one” press hard from the inside i.e., they “shoot” forward cutting down the space available to the opposition before they reach the gain line so that the opposition forwards, or “striker” are caught behind the advantage line. This forces the support runners to move backwards in order to get in the clean that will arise from the tackle situation (Anderson, 2000).

The role of “captain” in defence is vital as he communicates with the rest of the defenders who is being covered and thus sets the rate of advance. This role is fulfilled by the player just out from the “marker” and “one” as he covers the flyhalf and is not focussed on the play on the inside which is being covered by the guards (Muggleton, 2001).

For the defence to be successful it is important that no player gets in front of the next inside player as they advance, this will keep the “hockey stick” defensive line shape and thus the opposition will be shifted outwards. This formation makes it difficult for the attacking team to breach the line as the striking line is towards the defenders and any pass that can possibly send a runner back towards the forwards will be stopped by the 2nd wave of defenders who are moving across the field (Marks, 1998; Anderson, 2000; Muggleton, 2001; Kiss, 2002; McFarland, 2002).

2.2.9. Third and Subsequent Phase Defence

When 3rd phase is set up, the next important aspect of defence becomes apparent. If a team continually attacks in the same direction, a situation will arise where there will be a “pooling” of players on the side from which the attack originally came, and therefore too few defenders on the side where the next wave of attack is to be launched.

In order to guard against such a situation, the term “far side” is brought into the defensive communication. The term refers to a situation where when a ruck or maul is created, two defenders automatically move over to the far side of the facet and fulfil the role of “marker” and “one”. What this does is that it prevents the defenders on the outside from having to commit to the area next to the facet. This allows them to be able to optimally protect the outside space, which would invariably be exposed if they had to move inwards towards the facet area. Another important reason for the “far side” is that if the players on the outside were forced to maintain their defensive width, and did not move in towards the ruck or maul, a short pass to a forward striking in the channel next to the facet would lead to a linebreak which would be a difficult situation to salvage (Anderson, 2000; Kiss, 2002).

2.3 ATTACKING BACKLINE PLAY

An attack by the backline is the culmination of all the running and passing skills that have been developed in the many hours of training. It is what the crowds largely come to watch, and certainly they come alive when a linebreak is successful and a player is on his way towards the try line. The success of a backline attack is achieved by thorough planning, taking the right option at the right time, using decoy ploys and having players running the right lines from the appropriate depth (Williams et al., 1994).

If one were to ask what seems to be the enigma concerning attacking play, the term “breaking the wall” and “achieving a linebreak” would come up as the most highlighted topic of discussion (Townsend, 2000).

Since concentration of effort with the professional development of defensive patterns, coaches have been in search of that aspect of play, which, if mastered, would give their team the greatest edge over the opposition, and the ability to break the opposition’s defensive line at will (Bird, 1998).

Coaches have looked at aspects such as physiological development, strength and conditioning, postural and biomechanical development, nutrition, psychology, game analysis and play networking, vision development and communication skills, decision-making, and stress management, (on and off the field) as a means of individual and team development. What has however become obviously clear is that none of these factors can be seen as individual units. For success each aspect needs to be combined within the “team mix” in order for optimal performance on the rugby field to take place.

The object of this study is to look at newer aspects of coaching and alternative ways of breaking down the defensive wall. This could be viewed as an attempt at stimulating creativity in coaching so to achieve new heights in rugby performance.

“Creative rugby is not a vague concept; it is a concrete concept that is available to every player and coach. Without creativity outstanding success is just no longer possible”

(Neethling & Botha, 1999:10).

There are various schools of thought on this specific subject each having merits, with the common question being, how does the number of phase balls recycled affect the possibility of breaking down the “wall” and the importance of running lines and angles on the quality of attack?

In order to attempt to answer this and many other questions, a study will be made of those aspects that play a part in attacking play so to establish some form of idea of how to achieve optimal attacking backline play.

Running lines are found in three main aspects of the game of rugby namely:

1. attacking play;
2. defensive play; and
3. support play.

2.3.1 Attacking Running Lines

In order for a full and complete understanding of running lines and their workings to be understood, an in depth look at the following aspects is required. This specific section will be looking at all the aspects involved in the build-up and finally the execution of these lines in their entirety.

Later in this section, the different running lines will be evaluated according to these principles ultimately to establish for what reason and in which circumstances they will be most effective.

2.3.2 The Aim of Backline Play

The aim of backline play is:

- a) to create enough space for one of the attacking players to beat his individual opponent (Johnson, 1993; Bayly, 2001); and
- b) to produce superior numbers in attack so that a ball carrier can break the line as an unmarked player (Marks, 1998; Hedger, 2002).

2.3.3 Key Factors

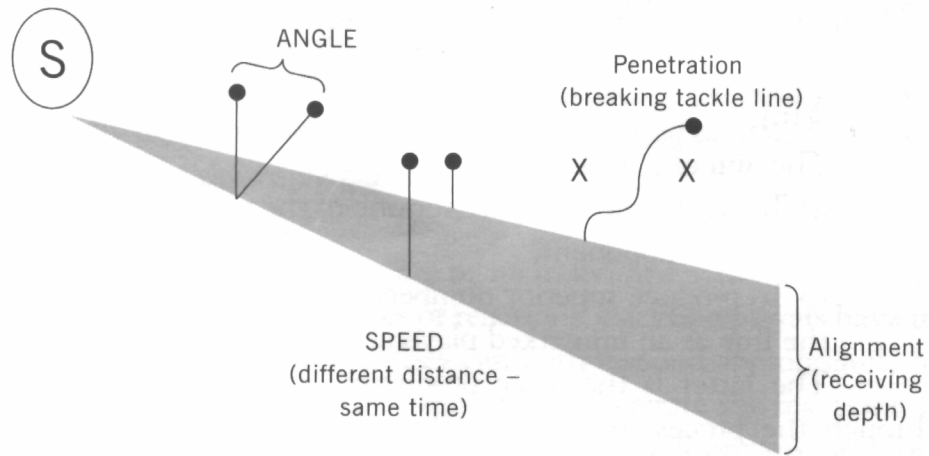
In order for backline play to be effective, it is important for a backline to have some common aim. If individual backline players have different objectives, it makes synchronisation of attack difficult. There is however one universal concept that is imperative for any form of backline attack to be successful and that is that the first priority is to get over the gain line (Macintosh, 1997; Bird, 1998; Shaw, 1998; Townsend, 2000).

With this in mind the next step is to examine the factors that influence our ability to attack with precision and success in order to get over the gain line.

The following factors all play an important role in achieving this goal:

- a. distance. This will vary according to both the attacking backline's receiving position and the angle at which the players choose to run;
- b. speed. This is determined by the player's forward running speed, and ball handling speed across the field; and
- c. obstacles. This will occur when the opposition's tackle line gets between the attacking backline and the gain line through the defenders pressing forward towards the attacking backline. To reach the target in this case will require a "strike" on an individual player by our attacking unit (Marks, 1998; Hedger, 2002).

The four key factors of backline play can thus be shown as follows:



Adapted from: Marks (1998).

Figure 6: Alignment, angle, speed and penetration in attack

None of these factors can be discussed in isolation. Different alignment will allow for different speeds of running and an earlier or later penetration.

What needs to be emphasised is that the ability to create time and space are the qualities we are endeavouring to achieve and it is imperative that all backs are aware of the need to think and act quickly.

2.3.4 Attacking Backline Play Philosophy

When one looks further at important aspects of attacking play the following principles come to the fore:

1. attacking alignment;
2. attacking width;
3. angles of running;
4. timing;

5. manipulation of the opposition through numbers;
6. trailers (support);
7. communication; and
8. decision-making (Greenwood, 1993; Bayly, 2001; Hedger, 2002).

In order for these aspects to have value, a description is necessary in order to highlight the key aspects involved, which will ultimately influence the attacking capabilities of the team.

2.3.4.1 Attacking Alignment

When discussing the major determining factor in deciding how deep an attacking backline should lie, be it at first, second, third or even fourth phase is the level of skill the players possess (Shaw, 1998).

The core skills needed in order to penetrate with the ball in hand and that need to be automatic behaviours are:

- catching the ball at pace;
- passing a variety of passes at pace;
- reading the defence in front; and
- making the appropriate decision (Hedger, 2002).

These key core skill concepts have been widely researched however specifically orientated skill acquisition research in rugby has been lacklustre to say the least.

When one observes the development research regarding skill acquisition by (Gabbard 1992), it seems that there is a large scope for future research in this area. He states the following: “the dynamical systems perspective seeks to provide an understanding of “how” movement and control emerges or unfolds developmentally”.

Based upon highly complex principles from theoretical physics, theoretical mathematics, and ecological psychology. The theory of Bernstein (1967) proposes that qualitative changes in motor behaviour emerge out of the naturally developing

dynamic properties of the motor system and coordinative structures (Kugler et al., 1982).

Using the dynamical systems perspective on motor behaviour, recent enquiries have begun to unfold the developmental picture of “how” interlimb coordination emerges in such early motor tasks as kicking (Thelen, 1985), stepping patterns (Ulrich, 1989), hopping (Robertson & Halverson, 1998), and independent walking (Clark et al., 1998).

“This line of developmental research, which uses biomechanical principles and tools to study the dynamics of motor development, shows great promise for providing a more comprehensive understanding of motor control and performance across the life span”

Gabbard (1992).

With this in mind the development of the necessary skills required in attacking backline play can be nurtured and developed so to give the backline every opportunity to break the defence’s wall at will.

If one was to give a very basic definition of what a backline will try to achieve when attacking this defensive wall it could be summarized as follows.

- An attacking backline will aim to make use of a flat or steep, / shallow or deep line of alignment concept, using angles of running lines with trailers, in order to create gaps in the defensive line, or to force the opposition into making side on tackles, from which the team in possession can offload the ball to a support runner (Bayly, 2001).

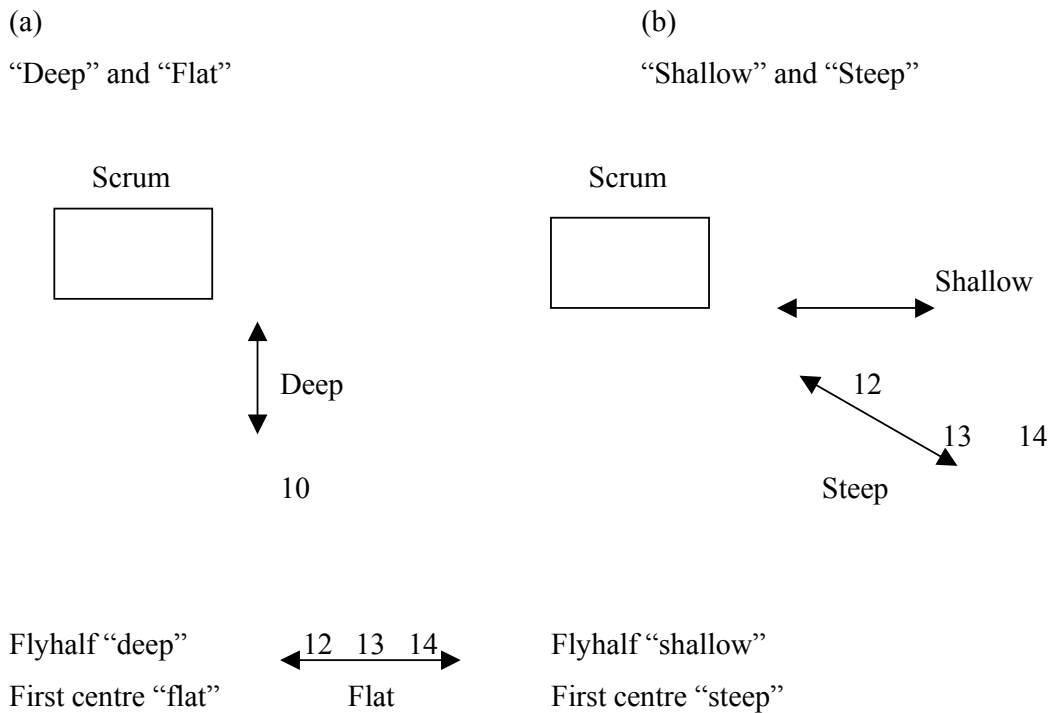
When looking at this definition it is important that one is able to distinguish between the following types of alignment:

- “flat versus steep alignment” ; and
- “shallow versus deep alignment” (Honan, 1999a).

Honan (1999a), widely regarded backline specialist, has been instrumental in his research into the finer intricacies of specialist backline play. In his dissertation “10

Commandments of Attacking Backplay”, he paid close attention to the critical principles and definitions for successful backline play.

Although the emphasis of the study was on how to get over the advantage line as quickly as possible and to have sufficient time and space on the outside so to be able to make use of the extra man, the importance of the two concepts mentioned above also have an influence on the quality of attack and is explained and shown diagrammatically as follows (Honan, 1999a):



Adapted from: Giles (2000).

Figure 7: “Deep” and “Flat” alignment versus “Shallow” and “Steep” alignment

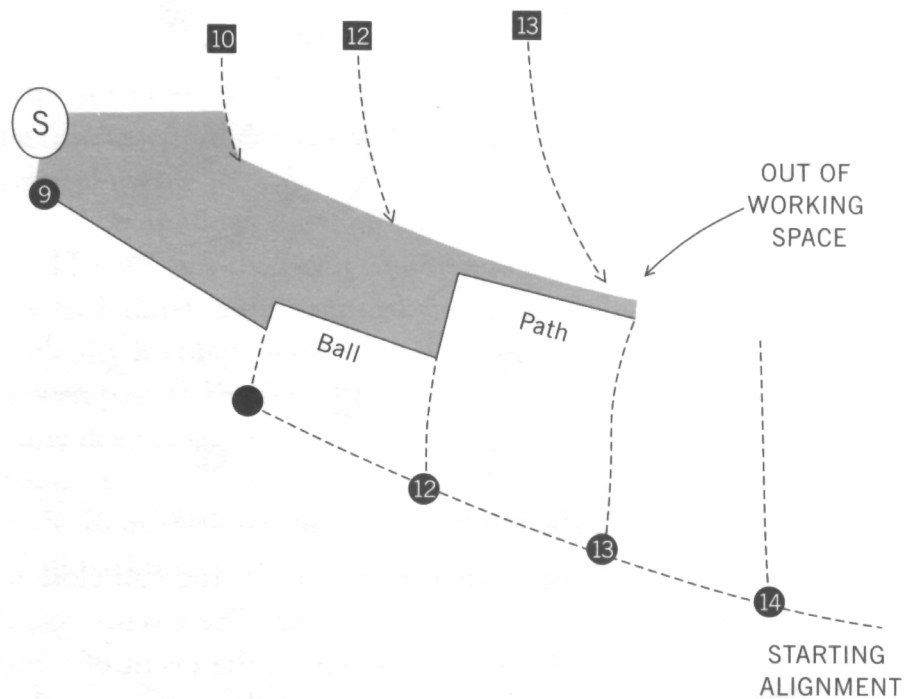
A “steep” alignment will not often be successful due to the attacking backline being further away from the advantage line and that with each pass the attacking team moves further away. There is also the danger that when contact is made it takes place behind the advantage line thereby making it difficult for the forwards of the team in possession to get to the point of breakdown as they will have to run backwards in order to do so (Honan, 1999a).

What will also play an important part in the alignment of the attacking backline is where the striker is going to attack. This responsibility will lie in the hands of the flyhalf who will align in the appropriate position according to the nominated set-up move, this implies that the further out the strike takes place, the steeper the alignment will be, i.e., an attack can take place in zone 1, 2, 3 or wide off the facet. It is also important to realise that this alignment will vary according to whether it is taking place from 1st phase possession or after 2nd or consequent phase possession.

There are two distinct components of alignment:

- a) working space; and
- b) angle of the ball, transfer line (Marks, 1998).

Working space is the decision made by the backline as to how far away it wants to operate from the opposition. This distance is that between the ball path and the defence line. This space will reduce as the ball is transferred along the line, as both backlines will be moving towards each other.



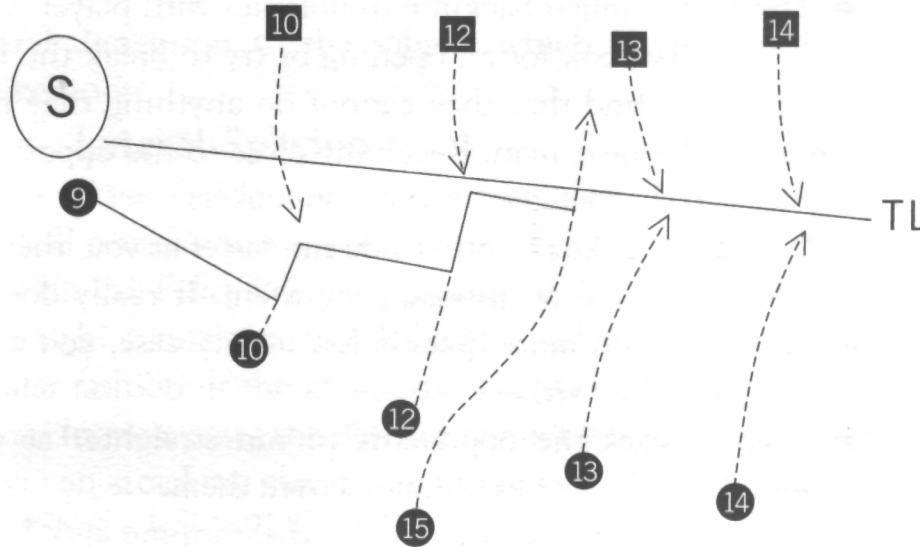
Adapted from: Marks (1998).

Figure 8: Working space in attacking play

The ideal distance is largely dependant on the following:

- a) where the attacking backline wants to attack the defensive line; and
- b) what level of skill the players have (Jevon, 1997).

The more skill the players have and the closer in you want to plan your “strike”, the closer you can stand to the opposition (Levey & Palin, 1993).



Adapted from: Marks (1998).

Figure 9: The way to hit a space in attacking play

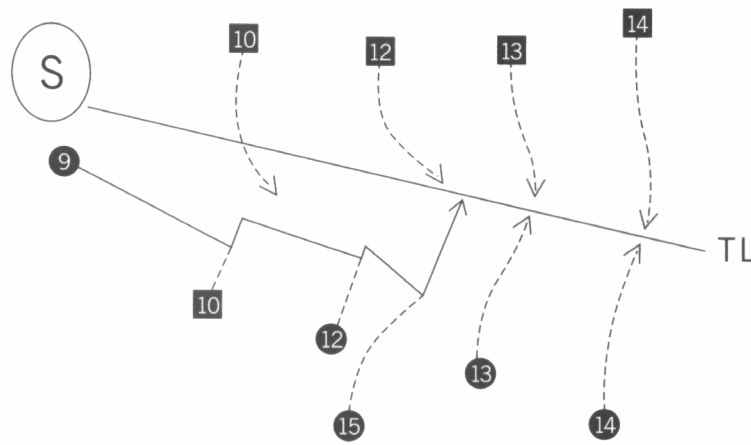
A simple way to determine the working space required and the angle of the ball transference can be to determine the number of passes involved in transferring the ball to the “striking” player in any pre-planned sequence, and then adjust the depth so this can be achieved with the striker receiving the ball almost on the tackle line. If the attack is structured that the receiver receives the pass too far back, any gap that might have existed will disappear (Evert, 2001a).

If the attack is planned close in, the team will need only two or three passes. The attacking line can then confront the opposition by standing up on the defence. If the attack is more complicated and wider out, the final transfer might be the fifth pass, therefore, the backline will require greater working space.

Three facts are vital to understand:

1. you can't pass a defensive line until you meet it;
2. the closer you are to a defender when you receive the ball the quicker and more definite the opposition's response will be (Marks, 1998); and
3. a team must first put themselves under pressure in order to put the opposition under pressure (Dwyer, 1992).

The result of these factors is that it is useless doing switches or bringing in an extra player metres away from the tackle line because the defence will adjust accordingly. These ploys have to be carried out on the tackle line and the flatter the passing alignment is the further forward the tackle line becomes, which will be to the advantage of the attacking backline (Marks, 1998).



Adapted from: Marks (1998).

Figure 10: Pass to an extra player too early and too far back

It can also be observed that if you receive the ball close to an opponent, that player can only do one thing. There is no second chance of recovery in the event of a bad decision. The crux of the matter is that if you receive the ball close to an opponent you absorb, involve and commit his defensive attention. If you are not successful in committing him then the tackler is released from his duty and he can become an extra defender further along the line (McFarland, 2002).

Because backline play is very much a numbers game where you are trying to preserve and improve the ratio of attackers against defenders, a too large a working space will make defence by the opposition easier (Honan, 1992; Marks, 1998).

Here follows a few further advantages that occur if the close attacking policy is followed:

- if a linebreak occurs, it will tend to put you in behind the opposition before their cover defence has had time to make their way across the field and therefore come into play;
- the biggest mistake attacking players make is that they run too far. They first look for an opening or try to break the line and then when they find they cannot do anything they pass the ball on to the next man. By receiving the pass close to the opposition it forces the players to become better decision makers; and
- it tends to induce the defenders to rush onto you thereby disorganising their defensive lines and therefore making them more vulnerable to linebreaks (Smith, 2001).

Finally, it is important to note that alignment is only a starting point; it's where the backs run from, not where they actually get to. It is only important in so far as it enables the backs to carry through their projected manoeuvre successfully. The alignment must enable the attacking backs to make the "telling" pass to the striker runner as he cuts through and beyond the tackle line (Ashton & Meier, 2002).

2.3.4.2 Attacking Width

The preservation and creation of space also has a lot to do with the ball carrier's own spacing i.e., if the attackers line up or run in a tight formation, the defenders will tend to mark them in a similar fashion. If the attack spreads, then so will the defence and so on. In most cases the defence doesn't have a choice because if they leave an attacking player open who can receive the ball unmarked, then the defensive line will be broken (Marks, 1998; Smith, 2001).

When one speaks of width on the attack, Garth Giles, Director of Coaching for the Natal Sharks makes an interesting comment. “If one considers that a rugby field is 70 metres wide and that at a scrum there are 18 players (two packs of forwards and two scrumhalves) that are fixed in a small rectangle, possibly 3m x 5m, there would appear to be acres of width space for four three quarters (flyhalf, two centres and a wing) in which to manoeuvre!” (Giles, 2000).

His belief is that South African teams in general are good at using the length of the field (i.e., “length space”) but are not good at using “width space”, and this is the essence of the “expansive” game (Giles, 2000).

Ashton & Meier (2002), agree and further expand on this idea of players committed in a confined space when they state that a similar situation to the scrum exists at a lineout situation with up to 18 players confined within 15m of the touchline, allowing 55m of lateral space that can be exploited. Added to this the enforced 20m space between the two backlines and one can see the attacking possibilities available.

As mentioned earlier, it remains the flyhalves responsibility to be either “shallow” or “deep” and the first centre to be “steep” or “flat”. The advantage that these alignment systems bring is that depth is created in the midfield and “space” on the outside. The “roving” unmarked players, i.e., the uninvolved wing and the fullback can be brought into play in any area (Giles, 2000).

The vital aspect of playing in expansive channels is that the objective of manipulating the defence as much as possible, in order to create “holes” in the required “strike channels” and thus being able to put players into these spaces becomes possible (Giles, 2000).

The important aspect in terms of success from attacking play is largely reliant on how the space on the field is used. The gaps will become more apparent and the optimal use of them should result in a more successful attack.

Gary Nucifora, makes an interesting comment.

“...Most of the space on the field is to be found outside the open winger, why not place the attackers at the phase at varying distances and depths prior to the balls emergence from the ruck or maul. Defenders will still mark up on their opposing man, but now natural gaps in the defensive wall will occur because of the spacing of the attackers. It could be argued that this will make it less necessary to run intricate angle-changing plays as the gaps will test the defences confidence and allow individual skills of attackers to shine through; either by running and attacking these gaps or there being “areas of concern” for the defenders on which the attackers can capitalise on, if their attack is good enough. Defenders will now position themselves on attackers with less confidence because they cannot adequately cover a defender as well as a 10m space in the line”

(Nucifora, 1999).

Chris Hickman, New South Wales U21 Assistant Coach has some interesting views on wide alignment attack. In his view the flyhalf must be wide and flat, the reason for this is that by aligning in such a position the following is achieved:

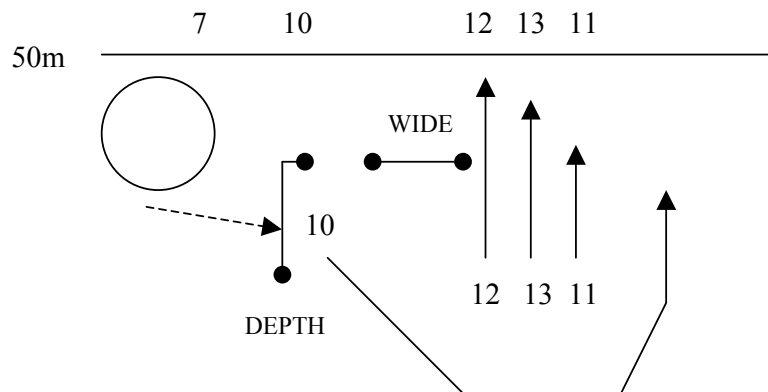
- by aligning wider the flyhalf prevents players who were committed at a ruck or scrum from being able to tackle him on his inside shoulder, this results in him only being able to be tackled by a player in the defensive line; and
- by taking the ball flatter the flyhalf is able to draw a defender so that the defender cannot leave him to drift outwards on his preferred defensive line (Hickman, 1999).

The inside centre must be deeper and wider:

- by being deeper the centre gives himself greater space to work in; and
- with the extra width he is able to take away the inside pressure of players attempting to drift across in defence (Hickman, 1999).

The players outside these two should be able to run straight at the defence in a normal pass position. This alignment can be used in the following situations:

- from rucks and scrums when the defence is close and each defender can be committed, this prevents the defenders from being able to initiate their drift defence option, as they have to assess that which is taking place near to them;
- when you have an overlap. Defenders can be committed man-to-man and running straight at them gives the overlap player on the outside maximum space to work in. It also creates space on either side of the ball carrier – which is an optimal situation; and
- the attacking team are able to achieve quick ruck ball going forward. The defenders are on the back foot and attackers can organise a one-on-one confrontation where they hold the maximum advantage (Hickman, 1999).



Adapted from: Hickman (1999).

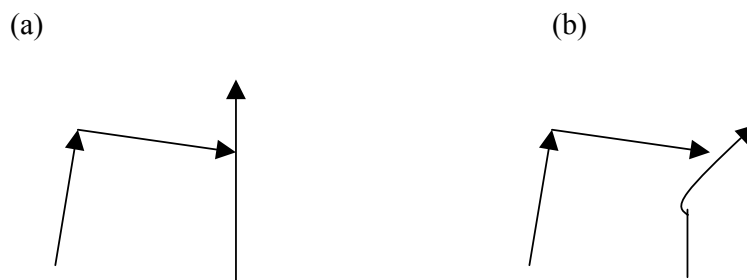
Figure 11: Wide alignment attack

It is important to note that this alignment is not suitable for all situations. It will have advantages in certain situations, however it does have certain limitations. One of the dangers is that if running and passing is too far apart it may encourage across the field movement, i.e., because the passers feel that the pass may just be out of his range, he moves laterally so to shorten the distance he may have to pass. Another danger is that because the time travel of the ball increases with the width of the pass, the receiver may have to either:

1. start the run on to the ball later;
2. approach it more slowly; and
3. stand further behind the receiving point (Marks, 1998).

This is why wide spacing usually produces a steeper starting alignment. The key for successful attack is that spacing is varied and adjusted according to the situation, i.e., if the attacking formation remains close all the time, it can expect the defence to follow, this will result in the holes in the defence to be more difficult to attack and the attacking team will find it more difficult to stretch the cover defence.

The last important aspect of this section is the importance of ensuring that players in the line maintain and use their position's space responsibly, and as such, respects and preserves the space of the players on the outside. This ability to maintain the width in attack is ultimately related to the player's ability to make very long accurate spin passes off both the right and left hands equally well. These passes should be at least 12m preferably between 15m and 18m, travelling as near to horizontal as possible. The accuracy of the pass should be flat, at right angles to the touchline, so that the receiver, running parallel to the touchline does not break pace at all on the receiving of the pass (Ashton & Meier, 2002).



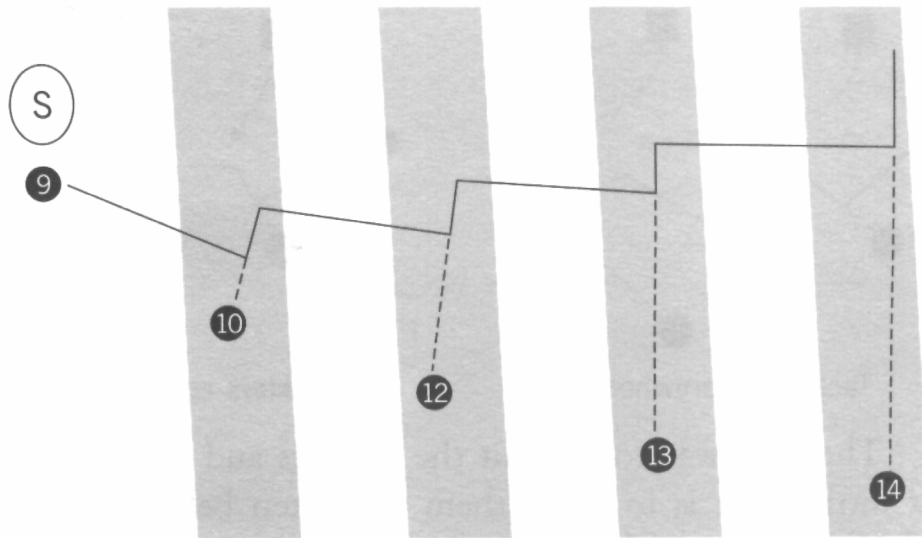
Adapted from: Ashton & Meier (2002).

Figure 12: (a) Necessary accuracy for a wide pass, (b) poor accuracy of a wide pass

This can be explained as a form of channel running i.e., each runner remains in his own territory until he has transferred the ball. After this, that player is responsible to

follow play and “resurface” and enter the line in one of the “space” channels on the outside or further along in play. If this ball carrier leaves his channel and starts running towards his outside players, then it should be a signal for a special action such as a switch pass in order to straighten up the attacking line again (Jevon, 1997; Marks, 1998).

It is important that running serves a purpose and is not merely instinctive. These running channels are not very wide and are fairly straight. This ensures that the defence is committed and creates areas through which the trailers can run.



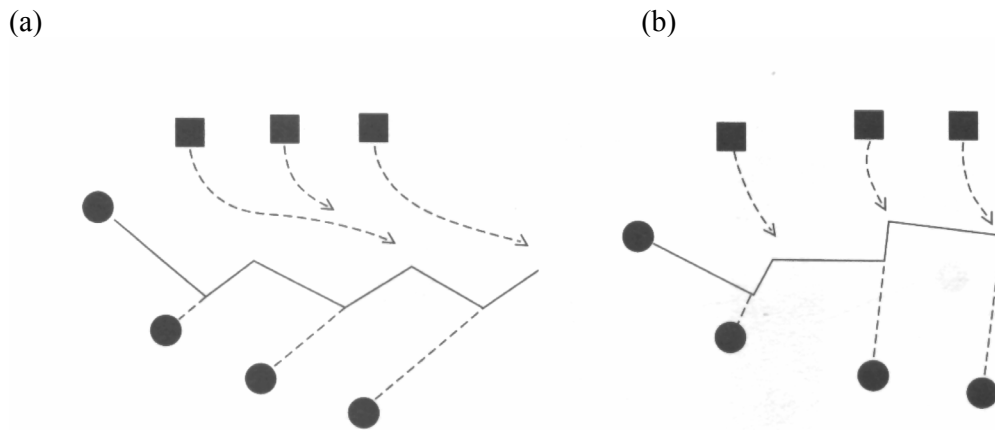
Adapted from: Marks (1998).

Figure 13: Channel running in attacking play

2.3.4.3 Angles of Running

At this stage of the discussion, emphasis has been on the work done before the receiving of the ball. Factors such as working space and lateral spacing are both key factors in “setting up” the defenders so that when the attack is launched, that they are manipulated into a mechanically weak defensive position.

The angle with which a line approaches the defence, followed by the sudden veering off in different directions, (with a multitude of offloading options), and finally the pass made to a player attacking space, is the ultimate objective of an attacking backline. Running and passing angles have the largest influence on the preservation and creation of space. A simple explanation of running angles is that if players with the ball run across the field, the inside defenders can run up to the ball carrier on such a complimentary angle, that they can move onto a good tackling line further out which will result in the backline attack being stopped. The only way to commit the tacklers and to prevent this threat further out is to make them straighten before the ball is passed. Running straight or veering in before the pass is made can achieve this. This straight run will not only “fix” the immediate defender but also to a certain extent those defenders who are moving across the field on their drift as cover (Marks, 1998; Nucifora, 1999; Evert, 2001a).

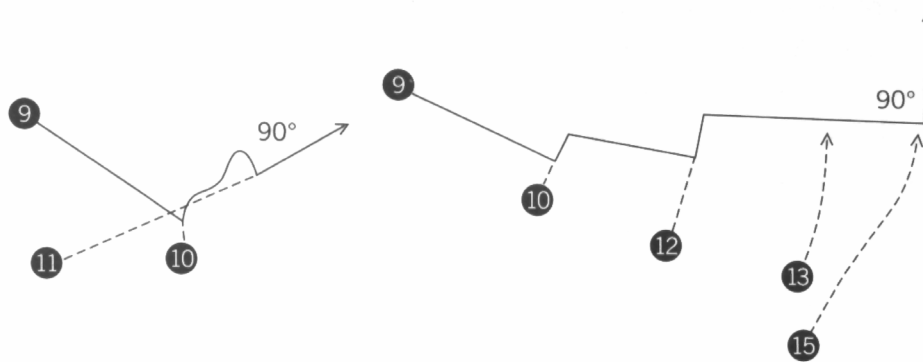


Adapted from: Marks (1998).

Figure 14: (a) Tacklers everywhere and (b) tacklers contained

When discussing the angle of the pass it is important to note the natural 90° angles that exist between the ball path and the receiving line. This relationship helps reduce the pressure on the transfer. In terms of its ability to “fix” the opposition, a deep pass will tend to produce a “following across the field” pass, while a flat pass will require the receiver to take it on a straight run (Honan, 1992; Ashton & Meier, 2002).

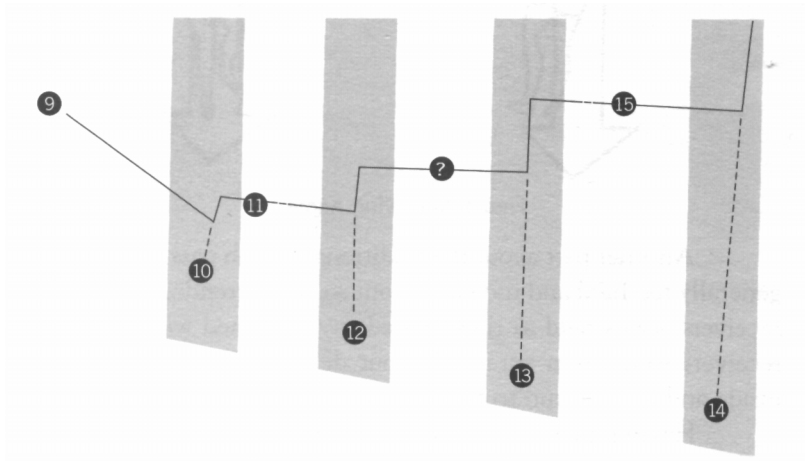
There are two examples of these two options. If a player is entering on a strike from the side of the field, (a blindside wing), he will usually need to receive the ball on a diagonal run. If the entry is more from behind then the player will want to run straight on to the pass to receive the ball and enter the space simultaneously, (i.e., a full back coming in on a cut pass from the inside centre) (Marks, 1998; Robilliard, 1998).



Adapted from: Marks (1998).

Figure 15: The 90° passing rule

It is important to understand the link between the angle of run and the peripheral vision “available” to the ball carrier. If the ball carrier runs across the field in search of space, he diminishes his available options due to him not being able to see them. If however the ball carrier moves in his channel he is able to open up the full 180° of vision of what is in front of him. He is thus able to pass the ball in various directions even back inwards, if necessary, to a support player in depth as a second line of attack (Jevon, 1997).



Adapted from: Marks (1998).

Figure 16: Stair passing showing the full peripheral vision for all the attackers

If one looks at the diagrammatical representation, there is great emphasis on a flat transfer as well as the action of advancing the ball beyond the receiving point. The important aspect of the pass is that the ball doesn't travel backwards to any degree other than to avoid making a forward pass. The reason for this is that it is pointless to pass a ball back in depth to a player who then has to carry the ball forward some distance before he makes any net gain on the initial position (Marks, 1998; Ashton & Meier, 2002).

There are two important benefits from this means of attack. By following this form of running line, the team maintains forward momentum. This results in supporting players being in a better position to support the ball carrier. This aspect of play, namely support will be discussed in depth at a later stage, however in order to understand the reason for its importance, it will be briefly touched upon.

By advancing the ball forward, it makes the supporting players more effective as their path of run is forward. It is very difficult to re-enter play if you're chasing a ball that's going backwards. If a supporter can follow a ball forward and across, you can reach it

on a suitable receiving line and thus a re-entry into play becomes easier (Royall, 2000).

As we near the crux of this paper it is necessary to touch on a few elementary aspects concerned with running lines. If the attacking team are going to be successful in confusing the opposition, then they are not going to merely pass the ball up and down the line, but are going to bring in variations such as having the ball travel back in the opposite direction, around and diagonally along the attacking line.

As mentioned earlier, running and passing angles have a big influence on the preservation and creation of space. When one speaks of angles of running there are five important role players that are directly involved in the execution of these lines. They are:

- a. creators (ball carriers);
- b. decoy runners;
- c. strikers;
- d. supporters; and
- e. cleaners (Hedger, 2002).

The combination of how these players are used plays a major role in whether or not the opposition's line is broken or not.

a. Creators

These are the ball carriers who distribute the ball to the strikers (Pool, 1997; Nucifora, 1999).

b. Decoy Runners

These are support players who are aligned either laterally or behind the creator. They are not intended to receive the pass however are in a position to do so if an open space was to present itself in their line of run. Their objective is to manipulate the defenders and commit or "fix" a defender / or defenders (Robilliard, 1998; Evert, 2001a).

c. Strikers

This player receives the ball from the creator. The decoy runners have “fixed” the opposition in a specific area and the striker thus attempts to break the line where the defensive line is weakest.

It is important to note that with each organised strike there must be more than one option to off-load to, i.e., a decoy runner and striker function as a unit where any of the players involved are able to receive the pass on the strike. This means that decision making by the creator is important, as a change in plan at the last second may be necessary if full advantage is to be taken during a specific attack (Burkett, 1998; Evert, 2001a).

d. Supporters / Trailers

If the attack is efficiently planned the players who performed the role of decoy runners will be able to fulfil this secondary role of being a supporter or trailer. These player’s objective is to receive an off-load in the tackle, or, if the ball carrier goes to ground, to make the clean at that specific facet. Another effective option as a supporter is to make use of the second player outside the decoy runner. This creates a situation where he comes in on an inside run and is best able to support, receive an off-load or clean (Evert, 2001a).

e. Cleaners

If an attack is stopped and a ruck or maul results, then the players in lateral support need to be committed to clean at the resultant ruck or maul. This is an important aspect of play as if this possession is not quickly and efficiently recycled, the advantages of quick recycled ball and disorganised defensive lines cannot be taken advantage of (Hickey, 1998).

All these aspects are vital in the attacking teams armoury to break or slow down the defender’s drifting defence. The most important contributing factor however is how the attackers change the angle of run during the attack. This is a major weapon for the

attackers as the later the change of angle takes place the better, as the defender has less time to take in the information and thus has less time to react accordingly. For this change in angle at the last minute to be of maximum effectiveness the following factors could of value:

- the striker must come from a position outside of the defenders range of vision; and
- the striker must come in at pace and cut the angle as late as possible

2.3.4.4 Timing

This aspect is vital as the timing of the pass to the “striker” largely determines whether the line will be broken or not. What is important to note is that even though the hole has been created through which should be played, if the timing of the pass is poor, the “striker” will be stopped by a defender who has been able to adjust his defensive line. The receiver should be receiving the ball at pace, running in a straight line and receive the ball at the right moment (Marks, 1994; Bayly, 2001).

The timing of the decoy runners is also an important part in determining the success of the attack. A very important aspect of timing has to do with kinaesthetic awareness. Kinesthetic awareness refers to the “feel” associated with the body and its movements as well as the summing up of a situation. It involves sensory input from muscles, joints and the inner ear, and includes our sense of the tension or relaxation in the muscles, joint actions, movement patterns and balance (DigiCricket, 2000), which are all important aspects of timing a strike (Evert, 2001a).

Proprioceptors in the muscles and tendons play a key role in providing the brain with sensory data on pressures, position and stretching within the body. Data passing to the brain from the kinesthetic receptors is analysed and responded to largely at the subconscious level unless it is attended to consciously in order to enhance a player’s ability to perform, react and act on impulse and on “autopilot”. As a player’s kinaesthetic awareness develops so does his ability to “feel” where his body parts are in relation to each other and respond faster and more accurately in pre-contact situations (DigiCricket, 2000).

The key to optimal performance is how the brain interprets these sensory inputs and how they affect the decision-making on the field concerned with the strike taking place. This implies that although every effort is made to create an optimal striking situation, there exists a certain “feel” which is instrumental from rugby players in order to achieve success in rugby (DigiCricket, 2000).

2.3.4.5 Penetration

A backline with superior speed has an enormous advantage over its opponents. It can more easily outflank them, outrun them, out-chase them and out-support them. The faster players can also make changes in pace and in direction and are therefore more equipped for making individual breaks (Hedger, 2002).

In this section the emphasis will be on those aspects of speed, which have a direct influence on the attacking team’s ability to break the defence’s wall.

a. Body Control

This section of the study will be investigating and discussing aspects of movement associated with the lead up towards attacking play. The key factor involved is the physical aspect of running and changes in direction (Burkett, 1998). Incorporated in the discussion will also be aspects such as the relative body positioning and the physical attributes necessary in the execution of these running lines together with giving the ball carrier optimal available tools to launch and complete a successful attack. In order for this to be achieved, the following aspects need to be understood.

b. Speed versus Quickness

Speed is the measure of how fast an athlete can sprint short distances. A high maximum speed by itself doesn’t guarantee athletic success as coaches and athletes are aware that an athlete may be able to run fast however he may lack

the explosive power to accelerate rapidly, change direction rapidly, or get the entire body or a body part moving rapidly (Dintiman et al., 1998).

Quickness refers to the ability of an athlete to perform specific movements in the shortest possible time. It also involves the ability of the nervous system to process and produce rapid contractions and relaxations of the muscle fibres. Fast, explosive movements of the entire body, which occur in the starting and acceleration phases of sprinting, or in the adjusting of a body part to start a new movement or rapidly change direction demonstrates an athletes quickness (Dintiman et al., 1998).

The object of this section is to discuss specific aspects of quickness, which is applicable to the backlines ability to make a strike on the defence. Firstly the ball carrier's ability to accelerate when receiving the ball combined with his ability to change direction just before off-loading the possession needs to be discussed. This soundness of speed, body positioning and control will aid ball carriers in attacking situations to be in a physical position that is mechanically stable, and able to distribute or transfer the ball to a receiver who is also in this optimal state or condition (Evert, 2001a).

c. Speed Concepts Specific to Rugby

There are three broad aspects of speed:

- c1. running speed;
- c2. passing speed; and
- c3. thought Speed (Marks, 1998; Hedger, 2002).

c1. Running Speed

There has long been the notion that backs should receive the ball at top speed. This may be appropriate if the receiver is taking advantage of a gap, however if the aim is to create a gap it is difficult if the ball carrier is at full speed. The key is to have two speeds available with which to manipulate the defence. The following advantages exist:

- If a player has a deceptive turn of speed it can nullify the defender's ability to stop the attack, as the defender is unable to cope with the reserve acceleration the ball carrier has to beat him. If the ball carrier runs at full pace his only strength lies in the momentum he has from that run. By slackening off in speed, strength returns to the legs and then accelerating into a tackle is far more likely to break an arm grip than what would be possible if he was approaching with a constant speed. If the ball carrier can swerve while accelerating just before the tackle line, it makes him extremely difficult to stop (Jenkins et al., 1998).

A player's control of his running speed will aid his attacking ability in the following way:

- accurate passing and kicking is easier to achieve if you are running comfortably;
- when running at three-quarter pace, you have more of the balance and timing required to execute the appropriate line of run and deviation in course necessary for the nominated attack;
- if there is a difference in the pace of running between the ball carrier and supporters, there is always the option of blocking, or sending away the outside support on a burst. This is not possible if both backs are running at full speed; and
- by running fast towards the defence, tacklers are committed, however it also reduces the amount of space available. There are times when a slower approach is more likely to tempt one of the opposition tacklers to lose his alignment and leave a gap (Marks, 1998).

In summary, it is better for conservative running to the area where the break is attempted. Top speed is turned on in the following circumstances which all relate to the final strike at the defence:

- when you are attempting a break;
- when you have made a break;
- when you are supporting a break; and
- when you are about to make contact so that you can gain an extra metre at the contact area (Evert, 2001a).

c2. Passing Speed

Passing is the greatest asset a team can have. In respect of attacking play it is more effective to move the ball quickly through the hands than it is to move it quickly through the air by using cut out or skip passes as this does not “fix” any defenders and it makes it easier for the defenders to drift outwards while still covering the attack (Honan, 1992).

According to Magill (1993), a skill can be defined, as “an action or a task that has a goal and that requires voluntary body and / or limb movement to achieve the goal.” For this reason the execution of a well timed and sympathetic pass is vital in the success of any attacking backplay. A sympathetic pass can be described as a pass that is appropriate to the situation. This implies that if a fast transfer of the ball is required, then it should be executed. If however, a slower looped pass is required then it should be passed in that fashion so that advantage can be taken of the attacking situation.

When talking of passing speed, it is advantageous to be able to transfer the ball as quickly as possible, however in strategic phases the players are trying to deliver the ball into an unguarded hole just as one of their own strikers arrives out of “nowhere” to receive it. This requires a mix of speeds of running, handling and a balance, which is difficult to execute (Johnson, 1993; Marks, 1998; Smith, 2001).

c3. Thought Speed

Visual awareness is the ability to see everything in the visual field. (Greenwood, 1993) A flyhalf who sees all the defensive players as they are positioned and transfers the ball to a striker who receives the ball on the contact line and in the gap is a technique called open focus. This technique is similar to a camera that is able to take a clear picture, the player is then able to process all incoming information and automatically sorts out what he needs at any moment during the game. This technique can be developed by means of skill training with the incorporation of techniques that increase the area of

visual recognition, and, be able to manage other sensory input with improving ability (Greenwood, 1993; Levy & Ponissi, 1993).

Much of backline play is based on decision-making, particularly in the backs where there is a lot of traffic and a lot of options available that can be taken. Almost every time a player receives the ball there is a decision to be made in relation to the action he takes as well as to the subsequent support line he should follow (Marks, 1998).

In conclusion, the following guidelines can be given concerning decisions that players may face during play.

- If a gap opens up, accelerate and go for it.
- If it is to be a straight transfer of the ball, pull the ball across your body quickly towards its target (Honan, 1992).
- If you are to kick, balance and position yourself quickly.
- If there is to be a change in pace, make it dramatic.
- If you are going to take the ball up, set your body position correctly and build up momentum early (Evert, 2001a).

A team can live with decision-making mistakes provided that they are made positively and with urgency. Self-assurance, confidence and assertiveness are the primary requirements of backline option taking – wisdom can come later.

2.3.4.6 Manipulation of the Opposition through Numbers

To breach a defensive line requires both individual and collective skill. Individual breaks depend very much on running skills. Collective skills are directed towards putting a player away who is unmarked. In order to achieve this a team must either add to their own numbers or subtract from the oppositions numbers.

This can be achieved by means of two basic methods:

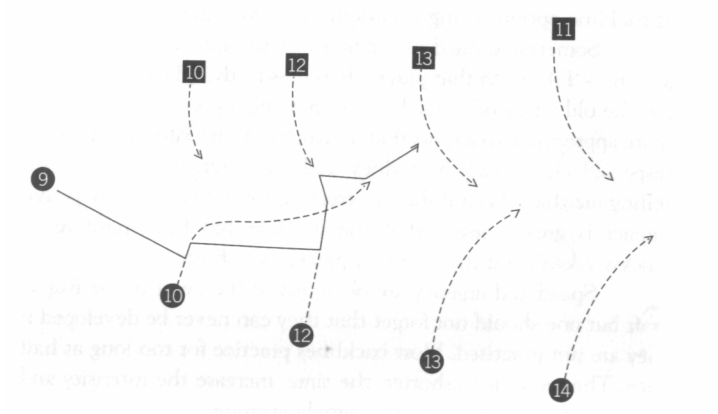
- addition. This comes from support play or bringing in extra runners onto committed defenders; and
- subtraction. This comes from involving or distracting the opposition, thereby taking them out of their defensive shape (Marks, 1998; Evert, 2001a).

a. Addition

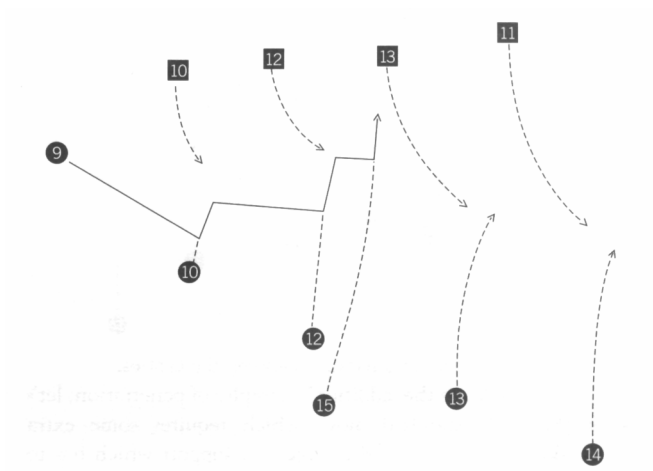
For the principle of addition to be successful the following aspects have to be optimally executed:

1. ball movement: The ball carriers need to be able to move the ball to the possible “space” and in some cases even create the hole with the path of the ball (Honan, 1999a);
2. “fixing” the opposition: If the backline can get the opposition to hold its approach lines and stick to their immediate defender, it can preserve the space between the players, the one on the inside of the ball carrier and the two on the outside being the most effective channels (Robbilliard, 1992; Marks, 1998);
3. first support entry: If the front line backs are committing their opponents, it becomes the responsibility of the support players to put themselves into unmarked spaces. The supporter’s presence or intended presence needs to be communicated to the ball carriers; and
4. final transfer: The passing of the ball to the entering support player is a vital part of the operation and the more accurately and deceptively it is done the more effective the outcome will be. The angle, speed and the timing of this pass are all crucial factors to the success of the attack (Marks, 1998).

(a)



(b)



Adapted from: Marks (1998).

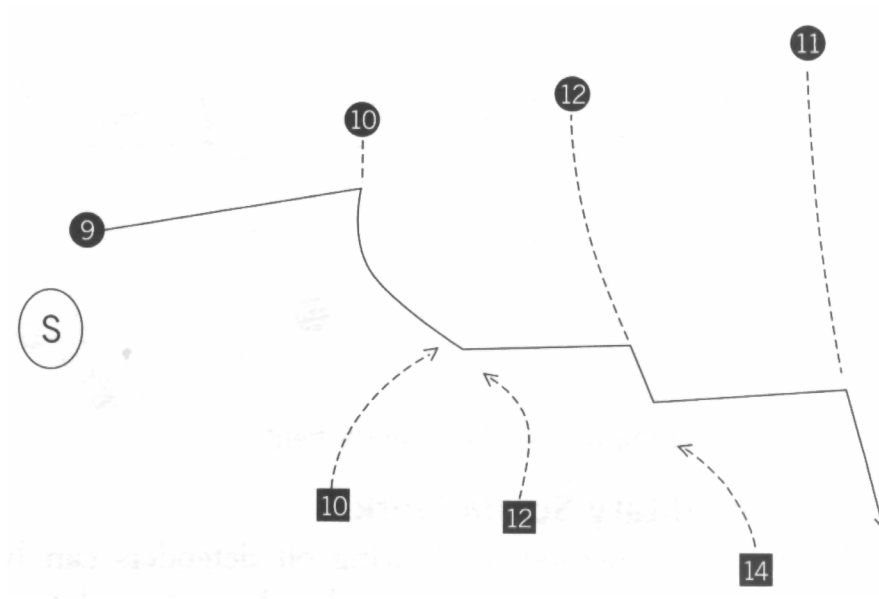
Figure 17: (a) Addition through a circle ball.
(b) Addition through an extra player entering the line

b. Subtraction

Subtraction is achieved by putting defenders into a position of disadvantage, i.e., they are either taken out of the game or left where they cannot take part in their defensive role any further (Johnson, 1993; Marks, 1998; Evert, 2001a).

To accomplish this the following needs to be achieved:

- the attacking backline must know how to position a key opponent to involve him or isolate him. This is usually achieved on the basis that an opponent will usually mark his opposite opponent directly, i.e., if the inside player wants to involve the outside defender, you need to drag that defender in by standing tight. If you want to keep the defender away from an inside striking area, it helps to stand wide and have the player come across to mark you;
- it is important to run at a defending player with the aim to commit him onto his inside or outside shoulder (Marks, 1998; Hickman, 1999);
- if you want to commit two tacklers, the ball carrier has to run at the defender one out. If the opposition are standing narrow you run at the outside shoulder to shut that defender off. If they are standing wide you run at the "one-out" player's inside shoulder thereby bringing the defender onto you (Evert, 2001a); and
- it is vital to be able to get tacklers to change their direction drastically, thereby momentarily stopping them in their tracks. When confronting your direct opposition, this becomes possible by slowing down and straightening or by stepping inside and then outside (Marks, 1998; Hickman, 1999).



Adapted from: Marks (1998).

Figure 18: Subtraction through committing two tacklers

2.3.4.7 Trailers

It is important to note that for an attack to be successful, the process must be completed through efficient and sufficient support play from the trailers. A trailer can be described as the players that are the 2nd line of support behind the ball carrier. These players are normally the blindside wing, fullback or 2nd phase forwards.

Effective support is based on an awareness that the player should be as committed to work off the ball as to any work that can be done with the ball (Marks, 1998). The emphasis for the trailer is that he is able to run to an unguarded spot and receive the ball before a defender can cover it.

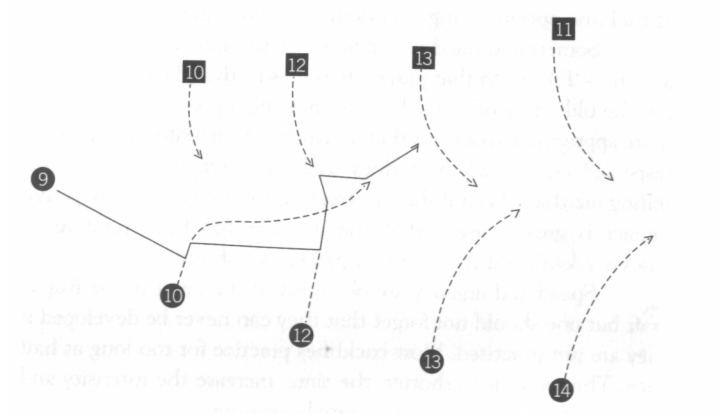
The term “ten man rugby” in backline attack means that there is a secondary use of players in attack, however to organise this properly the team really requires the support in a two wave situation involving starting and finishing trailers, the primary strikers going through the line and secondary supporters beating the cover defence.

This implies that all players should have the awareness of mind to search for any opportunity to run a trailing line. In attacking play there needs to be emphasis on two specific areas of support or trailer running lines:

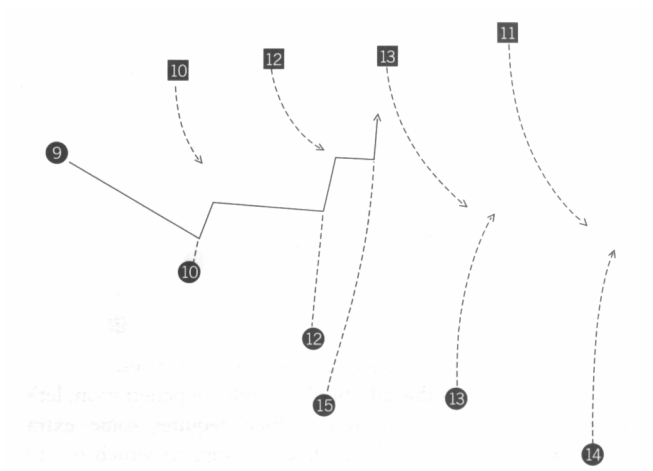
1. pre-possession; and
2. post-possession (Johnson, 1993; Robilliard, 1997; Shaw, 1998; Hickey, 1998; Marks, 1998; Evert, 2001a).

If this is optimally achieved it implies that there are two wave trailing situations involving starting and finishing trailers. Therefore the primary attackers attack through the line in search of a linebreak, and the secondary supporters work through to support the strike and to be in a position to be able to beat the cover defence.

(a)



(b)



Adapted from: Marks (1998).

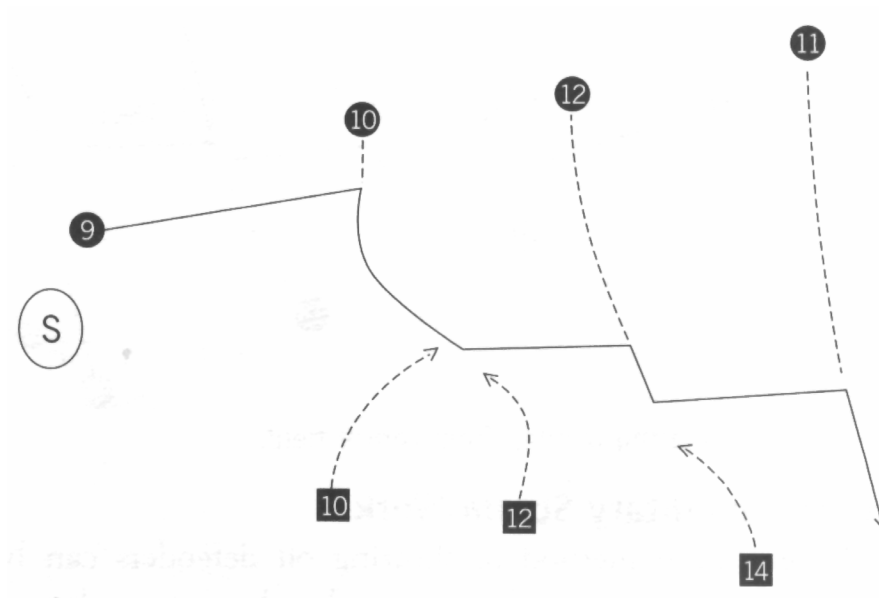
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This implies that all players should have the awareness of mind to search for any opportunity to run a trailing line. In attacking play there needs to be emphasis on two specific areas of support or trailer running lines:

3. pre-possession; and
4. post-possession (Johnson, 1993; Robilliard, 1997; Shaw, 1998; Hickey, 1998; Marks, 1998; Evert, 2001a).

If this is optimally achieved it implies that there are two wave trailing situations involving starting and finishing trailers. Therefore the primary attackers attack through the line in search of a linebreak, and the secondary supporters work through to support the strike and to be in a position to be able to beat the cover defence.

CHAPTER 3

METHODS, THE EXPERIMENTAL DESIGN OF THE INTERVENTION AND PROCEDURES

“Overloading the defenders with defensive options!”

3.1 METHOD

At this stage of the discussion the purpose of this section is to identify and explain the concepts that are to be incorporated into the experimental design of this study. The study will take the form of a quasi-time series experiment. Once an increase or decrease in total linebreaks has been established, an in-depth study of the reasons why the linebreaks were successful will be evaluated.

The concepts explained in this section will be used in the coaching of the Blue Bulls U21 team in order to gather the notational statistics required in order to determine whether these concepts as well as their application played a part in the increase or decrease in the number of linebreaks achieved in the matches that were played in the 2002 Bankfin U21 season. During the course of the season these aspects regarding the execution and implementation of the coaching concepts will be focussed on with the objective of attempting to increase the success rate of linebreaks during match situations.

By means of statistical information gathered during the 2001 Blue Bulls U21 rugby season a comparison is to be made in order to evaluate whether there was a change in success when compared to the results of the 2002 season.

The concepts identified as imperative to achieving successful linebreaks and to be concentrated on in the coaching sessions are as follows:

1. the initial starting position of the first receiver;
2. the alignment of the attacking unit from the facet;
3. the timing of the movement of the attack;
4. decoy runners;

5. the striker;
6. the strike area;
7. the angle of run after a successful strike has been executed; and
8. the strike moves (Evert, 2001a).

These concepts form the backbone of the experimental design. They can be seen as the structure of the attacking play that will be used in the coaching of the Blue Bulls U21 team during the 2002 season. The measurement of success will be determined by the success rates of the striking moves. These concepts form the core aspects of the attacking structure of the team and are instrumental as the basis from which each strike is to be launched. Evaluation of these concepts will be dependant on the player's ability to optimally execute these concepts and are dependant on the following:

1. the player's ability to understand the concepts; and
2. the player's ability to perform and execute these concepts in a match situation.

Following the evaluation of the relevant data a deduction is to be made as to:

1. which of the striking moves were the most successful and in which circumstances?;
2. can it be deduced that these concepts are of such value that if a team was to optimally make use of them, that a linebreak could be achieved at will?; and
3. is it possible to adapt these running lines in order to make them more effective?

A process will now follow discussing the above mentioned concepts giving a detailed description of the attacking principles that will be used in the organisation and execution of the strikes the Blue Bulls U21 team will use.

3.2. CHANGE IN THE INITIAL STARTING POSITION OF THE ATTACKING UNIT

The key to catching the opposition unaware so that advantage can be taken of their lack of attention on the field can be achieved by the whole attacking backline

positioning quickly, and then, as the ball is entered into play, the whole attacking backline positions as a unit in a new position, i.e., either

- a. two steps backwards – for a strike in a wider channel
 - b. two steps forwards – for a strike close to the facet
 - c. two steps to the left
 - d. two steps to the right.
- } for an expanded or compressed
} attack

This change in initial starting position creates the following situation for the defending team if they are not at full wit and aware of what is happening in front of them. The opposition's defensive line aligns themselves according to what they see in front of them. When the ball is entered into play, their attention focuses on the play that is taking place inside of them at that facet of play, i.e., the defenders attention is drawn to the result of the facet, this implies that if the ball is won by the attacking team, the defenders have to defend, however if the possession is won by the defending team through a turn-over at that facet, then the defenders will change to an attacking mode and react accordingly.

The net result is therefore that if the attacking team can take advantage of the opposition's split second lack of concentration, and in this time align differently from their initial position, the opposition's defensive "zones" will be slightly out of sync and the defenders will be faced with an attacking backline that looks "different" to what it did a split second earlier.

The following will be achieved:

1. By moving sideways before receiving the ball, it creates a situation where the defence's alignment is out of sync, due to them being too far inside their immediate defenders.
2. By being out of sync, there is extra space on the outside and it makes the preservation of this space easier if the attacking backline moves forward and "fixes" their immediate defenders.

3. Finally, the responsibility of the attacking team is limited to merely preserving and then making use of this space on the outside through optimal transference of the ball along the backline.
4. Defensively, it makes it increasingly difficult for the defenders, especially further out along the line. The reason for this is that because they are “caught” to close inside, when they press and move towards the attacking players, it is difficult for them to keep their shoulders square to the touchline in order to be in a good position to be able to execute the tackle.
5. Because the defenders suddenly feel “out of touch” of the attackers due to the extra space that is inside of them, it makes it difficult for the defenders to press, and then shift. He is forced to shift immediately as there is too much ground for him to make up and thus if he does press first, the attackers will move even more out of reach and there will be even more space on the outside. The defender thus becomes a chaser instead of being the one who attacks the opposition’s possession front on which is the optimal mindset of a defender.
6. This gives the attacking players the following advantages:
 - 6.1 The defender’s shift from the outset of the play, thus if the attacker runs forward “at” the defenders and attacks their defensive line, it is highly likely that the attacking unit will get over the advantage line.
 - 6.2 It forces the defenders to turn their shoulders towards the touchline thus making them defensively vulnerable behind their back from any attacking scissors “X”, or inside passes “Happy’s”.
 - 6.3 When defending they are not able to contest at the strike zone by making big hits or out muscling the attackers but are merely able to try and nullify it. The possibility of gaining a turnover or contesting at the resultant ruck is minimal thus the attackers are able to recycle quick possession which will put the defenders under further pressure at later phase play.

3.3. THE ALIGNMENT OF THE ATTACKING UNIT FROM THE FACET

With defence becoming more organised on set and phase play, it often occurs that a defending team will commit limited numbers to the ruck or maul and stack a straight line defence across the field, which often results in the defenders outnumbering the attackers (Townsend, 2000). This makes the transference of the ball very difficult.

As an attacking strategy against an opposition using such a defensive system, the alignment should be set so that the advantage line can be crossed and thus the attack can move up the field longitudinally, i.e., up the channel. This should be done until the lateral defence has been drawn in and has lost its defensive alignment. Once this has been done then the option can be taken to move the ball laterally to space where the attackers have numbers or continue up the channel if it is not well defended (Bird, 1998).

It is important to note that the channel to strike into may vary and should be directed to areas where the defence is weakest and this is not necessarily close to the ruck or maul.

According to where the strike is planned will influence the alignment of the attacking team. For explanation, the attacking channels in which the strike is likely to take place will be defined as follows, thus making further discussion easier:

- i. channel 1 - Between the flyhalf and the facet on the inside;
- ii. channel 2 - Between the inside centre and the flyhalf;
- iii. channel 3 - Between the outside centre and the inside centre; and
- iv. channel 4 - The area outside the outside centre.

The question of whether a backline should be aligned “flat or steep” and “shallow or deep” is dependant on the channel the strike is to be executed in. If the strike is to take place in channel 1 or 2, the backline can take the ball flat as the strike is to take place on the contact line and the ball does not need to be passed a long way before the strike will be made.

If an attacking unit attacks a “flat-line” defensive team, it can be assumed that the strike is going to take place in these two channels. When faced with this there are certain options available to the attacking team in order to “outsmart” the defenders. The concept of “overloading the defenders with attackers” is the key to a successful attack when confronted with a “flat-line” defensive line.

This is achieved by using the ball carrier and multiple runners to attack a defender one or two out from the ball’s current position. The ball carrier and runner needs to put the defender in two minds covering two or three runners. This is done by running at the gap to draw the defender out of position, overloading the situation with two additional runners holding their line or angling in towards another gap.

The key to this approach being successful is the need for the ball carrier to have two optional off-load options and having the ability to decide at or after the point of impact which option is to be taken.

The following can be seen as possible examples:

Option 1:

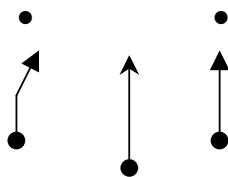


Figure 22: Attacker pulling the first defender out of alignment while the second defender marks his opposite attacker running at him

In this example the attacker is pulling the first defender out of alignment while the second defender is being fixed by his opposite attacker who is running straight at him.

The second defender is therefore being “attacked” because he has two players to cover, i.e., his own attacker, or the striker who is running in the centre. The ball

carrier has thus various offload options available to him depending on the reactions of the defender.

Option 2:

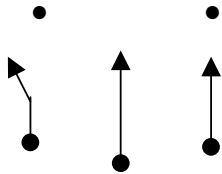


Figure 23: Attacker being pulled away from his defensive channel

In this example the attacker is pulling the defender away from his channel. The outside player holds his line to fix the second defender. The ball carrier squares up his defender then goes on the inside path using advantageous foot speed and tempo, executes a hit and spin off, or drive through into the defender before offloading to the striker or the second attacker depending on how the defenders react.

There are two further variations, which can be used in order to further “overload” the defenders:

1. the attacking unit can either execute a “block” or “one-out” striker to move the second defender out of their alignment; or
2. the third man out can run at the gap with the striker holding back and striking through a stream.

These two variations give the ball carrier two or three offload options, which make defending an arduous task.

The final option is that of attacking the third man out. This is slightly more complex when viewed in the line of the flat-line defence of the opposition. What is attempted to be achieved is the ball carrier fixing his defender then running hard at the inside shoulder of the next defender out. The two outside attackers hold their line but adjust their rate of attack to change their alignment, e.g., third receiver comes in faster than the second receiver.

Option 3:

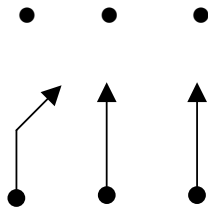


Figure 24: Outside attackers hold their line but adjust their rate of advance

The third defender is faced with the decision of which of the two attackers he is going to take which makes his defensive ability extremely difficult. The ball carrier has offload options to either the second or third attackers who are both approaching at different rates. Depending on whether the offload occurs before or after impact, or on how the defender reacts to what is taking place ahead of him, will determine which offload option will be taken (Muggleton, 2001).

This type of attack close to the facet brings forth the next concept to be explained which is a strike near to the facet. The key to attacks close in is to “overload” the defenders with attacking options. For this to be achieved the attack has to be “compressed”. A “compressed attack” implies that there is a concentration of attackers in a condensed area. What this achieves is that the attacking team knows where the strike is to take place and therefore throws all possible attackers into that strike area so to “force” the linebreak.

The second aspect of alignment is that of an “expanded attack”. This form of attack occurs when strikes take place further down the attacking line. The key to its success is the opening up of a space through which a strike can occur. This is achieved by keeping defenders busy on the inside of the strike zone, and on the outside of the strike zone.

The concepts of “one-out” strikers, “one-out” decoys and “one-out” trailers all work together to make this possible. The way that these “attackers” all interlink added to

the organised width to create the necessary illusion that will make the linebreak possible, all play a part in the success of an expanded attacking method.

If the strike is to take place further out in channel 3 or 4, a steeper alignment will be needed as the ball will need more time to reach its destination.

The advantage that can be created by an attacking backline aligning in a “crocodile teeth” manner holds even more advantages when the attack is executed. The reason for this is that it makes nomination of the attacking player to be defended difficult. Added to this, the fact that a backline that is viewed as marked with defenders allocated is all of a sudden different after the defender’s attention has been drawn away by the focus being on the preceding facet accompanied by the change in the initial starting position makes the defensive situation difficult to evaluate. We will attempt to incorporate the concepts of “compressed” and “expanded” attacking alignment to our attacking organisation and thereafter evaluate its influence.

3.4. THE TIMING OF THE MOVEMENT OF THE ATTACK

The success of any attacking play is dependant on variations in speed and movement through the different phases of the execution of the attacking strike. With the previous aspects in place, the key aspect is that the attacking backline should start moving as the scrumhalf touches the ball (Honan, 1999).

It is not necessary that this movement should be fast, the key is to move comfortably with the ability to be able to accelerate rapidly or decelerate as appropriate when required. This movement before the ball is passed makes the nomination and execution of the tackle by the defenders difficult (Robilliard, 1992) and begins the process of overloading the defenders with defensive options (Evert, 2001a).

It also gives the attacking players the necessary initial forward movement which will keep the defensive team on their toes as they cannot afford to just rush in on the attackers and will need to hold back to see what will transpire in the attack before

executing their defensive action. There is the also the added advantage that the attacking team will be able to get over the advantage line with greater ease as the initial movement is always forward (Honan, 1999a; Evert, 2001a; Hedger, 2002).

The second aspect of the timing of the movement in the attack is the change of pace during the execution of the attacking play. Each player within the unit has the responsibility to vary and adjust his speed of movement during the whole development of the attack as is appropriate in order to either catch the defenders unaware, or to surprise the defenders with unanticipated variations in pace and movement (Evert, 2001a).

These variations of movement take place in the following stages of the attack:

3.4.1 The initial starting position of the first receiver.

This involves the sideways movement which needs to be made subtly so as not to draw attention to this movement and thus to catch the defenders unaware (Evert, 2001a).

3.4.2 The alignment of the attacking unit from the facet.

The key to effectively catching the defenders unaware so that they do not know what to expect from the attacking unit can also be instituted in the alignment of the attacking players. This involves the concepts of “compressed” and “expanded” attacking structures. Again the movement needs to be subtle so as not to draw attention to the movement (Evert, 2001a).

3.4.3 The timing of the movement of the attack.

This concept involves the movement and changes in pace and timing prior to the strike being executed. The ball is in play and the execution of the strike is imminent. The reason for these changes in pace is the need to lure the defenders into a sense of comfort and belief that they have the attack covered. While the defenders may feel secure in their defensive abilities at that specific moment if the attackers are able to rapidly explode and totally overpower them by increasing the pace and intensity of the strike then it will result in an increase in the defender’s defensive options in such a way that they are not

able to cope with nullifying the attack (Evert, 2001a). The ball carrier who is to transfer the ball to the striker should move with ease and in such a way that he keeps his immediate defender on his inside shoulder if the strike is to take place on the outside. This ensures that the space on the outside is preserved. The first and primary responsibility of the first receiver is to ensure that he commits and “fixes” both his immediate defender, as well as the defenders moving across from the inside facet. The reason for this is that if any advantage is to be taken when striking in the outer channels, it will require space and one-on-one confrontations between attackers and defenders. This can only be achieved if the “sliding” or “drifting” defence is halted as close as possible to the facet that preceded.

The first means of achieving this is through the first receiver:

1. positioning himself quickly;
2. as the play is entered into he should realign himself two steps outwards; and
3. as the scrumhalf touches the ball, the first receiver starts moving forwards firstly on a very slight drift, and then as the ball touches his hands he increases his velocity rapidly and steps inside onto his immediate defender’s inside shoulder thus forcing him to straighten up his body positioning so that his shoulders are facing inwards. As soon as his immediate defender’s shoulders have been slightly turned, he slackens off on his acceleration and moves outwards with his body positioning being optimal to be able to give a precise pass to his fellow attackers who are outside of him.

By shifting his initial alignment outside his defender and running outwards then inwards he forces his immediate defender to change direction twice, first outwards, then inwards to cover his movement inwards. It also makes the inside defenders coming from the preceding facet have to make two alterations to their defensive running lines.

Firstly, they can immediately move across as the first receiver takes the ball on a drift, secondly, they are faced with the next decision as the first receiver immediately steps inside thus opening up the option of an attack in channel 1. They thus have to slow down to ensure that any possible play in that channel is checked before again being

able to move across the field to the outside once the first receiver passes the ball outwards. Although the players may not always react in this way, it seems to be a possible way of manipulating the immediate defender as well as the sliding inside defenders as long as possible so to be able to maintain the attacking space on the outside. What is also achieved is that if the opposition team are using the one-out defensive system, which implies that the openside flanker must take the first receiver, then, if the attacking first receiver can by means of his initial run at that specific point commit his immediate defender, i.e., the first receiver as well as the sliding defender from the inside, then the attacking team will have an extra attacker out wide who will be able to play havoc in the outfield when he is able to be unleashed (Evert, 2001a).

Secondly, a 15 vs 7 attack develops i.e., by running at the defender you force him to wait for the attack, as a defensive decision has to be made. This allows the attackers to get in ahead of their own forwards and the supporting running lines that the forwards run to the next phase of play is forward and not backwards as for the defending forwards (Macintosh, 1997; Macintosh, 2000). If the strike is to take place behind his back, i.e., with an “X”, then the ball carrier should lure his immediate defender to follow him across the field so that the attempted strike can take place in optimal conditions. This can be achieved by the attacker suddenly accelerating forward at the last moment towards his immediate defender’s inside shoulder so to lure the defender into believing that he may be going for that gap. If the defender follows the ball carrier the space will open up (Evert, 2001a).

3.5 DECOY RUNNERS

The role of the decoy runners is to create imaginary forces that manipulate the defenders into mechanically weak defensive positions. For this to be possible they should draw attention to themselves as impending “pressure” or “danger” players in order to be effective in committing opponents (Evert, 2001a).

There are two decoy ploys necessary if the play is to take place in the midfield channels. These decoy ploys take place inside and outside the strike zone. The decoy runner who needs to come in on the inside whose responsibility it is to “check” the

inside defenders from the preceding facet have to decoy “strike” with absolute conviction. His responsibility is to “fix” the inside defenders and to delay their movement across the field so to “buy” attacking time and space in the midfield where the strike is to take place (Evert, 2001a).

This also fulfils the function of nullifying the defensive system of “one-out” defence which is executed by using a forward at the facet to mark and defend against the flyhalf thus allowing the flyhalf to defend the inside centre and so on.

If this is not achieved then there will be no possible overlap on the outside thus the attack will be difficult due to the attackers equalling the defenders. If the “striking” decoy is convincing enough so to commit the inside defender thus forcing the flyhalf to have to defend against flyhalf then there will be extra attackers on the outside.

The second decoy ploy takes place on the outside of the strike zone and has the following two advantages. The first is that it keeps the hole through which the strike is to go through open by committing the outside defenders in their defensive zones as there always remains the possibility that these decoy runners can receive the ball on an “overs” line thus their immediate defenders cannot afford to tackle in. Secondly, it facilitates easier supporting running lines. Three situations can result from a strike with decoy ploys on the inside and the outside:

- (i) There can be a successful and clean strike. If this occurs, then the supporting running line will create two supporters who are in a position to receive “finishing off” return passes to score the try.

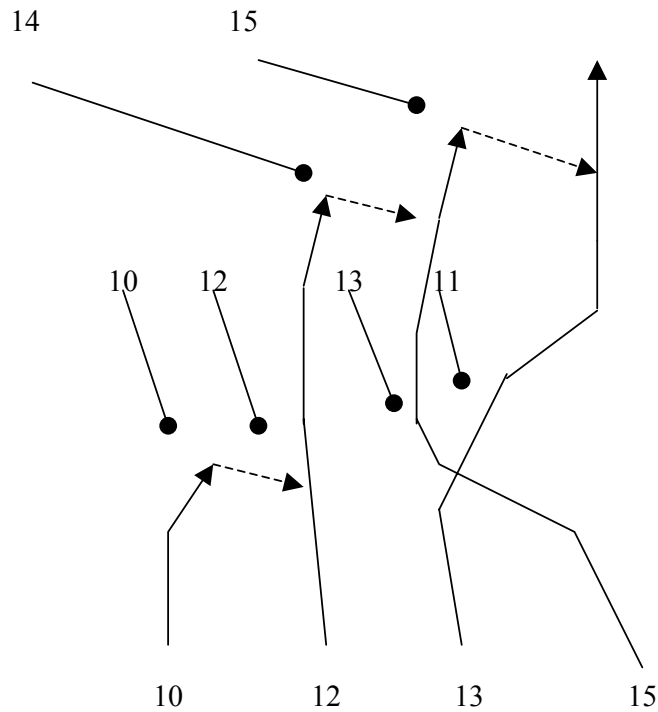


Figure 25: Indicating the use of an “O,I” decoy line and the support lines created through its use after a cleanbreak has been achieved

- (ii) If the strike takes place and the striker is momentarily stopped in the tackle, the supporting running lines of the decoy runners will result in there being a trailer who will be able to receive an offload and thus be able to continue the play that has been created.

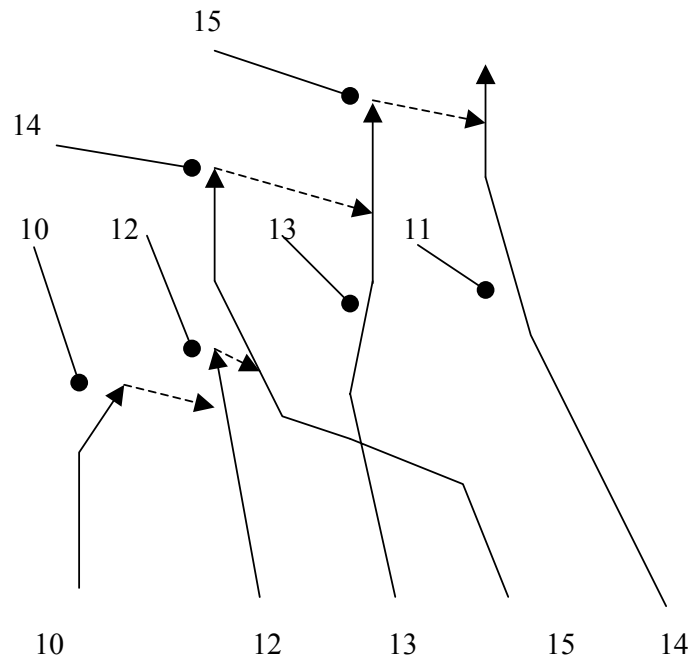


Figure 26: Indicating an “O,I” decoy line where the striker offloads to a trailer coming in, and the support lines created after the linebreak has been achieved.

- (iii) There will also be one extra support runner on the outside that will be able to link up with the player who received the offload and be in a position to receive the “finishing off” return pass to score the try. If the attack is smothered and the play is halted, the support runner will be in a position to be the first cleaner, thus recycling the possession and creating another opportunity to launch a further attack on the oppositions defence is created.

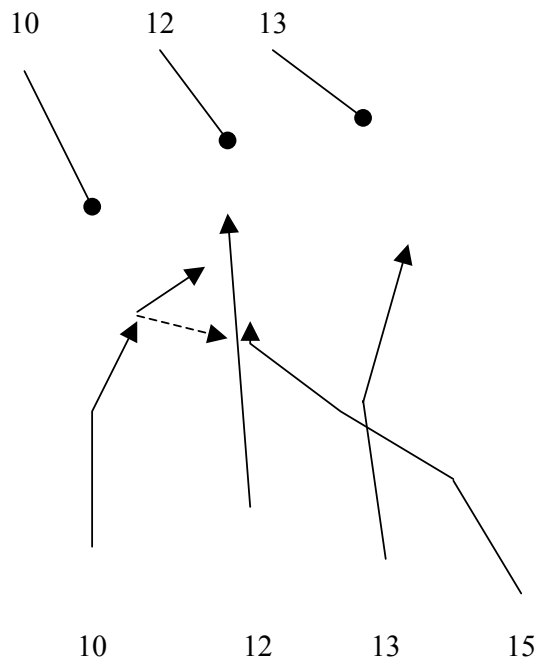


Figure 27: Indicating an “O,I” decoy line where the trailer becomes the primary cleaner with the previous ball carrier on the inside after an attempted linebreak has been unsuccessful.

With these examples in mind the fundamental role of force can be defined as the ability to change the state of motion of a body on which the force acts (Young, 1992).

If one was to look at Newton's first law of motion which states that: Every body continues in its own state of rest, or of uniform motion in a straight line, unless it is compelled to change that state by forces impressed on it, then it could be implied that if no net force acts on a body, the body either remains at rest or moves with constant velocity in a straight line (Cajori, 1934; Young, 1992).

In order to understand this link between Newton's first law and rugby, it is necessary to look at contact situations during play. In order for contact to take place, the striker and defender need to meet at the contact area. However, before this contact area develops, the players move towards each other with different velocities and from different angles.

The situation preceding contact involves many forces acting on the players before, during and after contact. The use of these varying velocities and running lines creates imaginary forces that are exerted on the defenders in order to manipulate them.

It is therefore the decoy runner's responsibility to create these forces, which can be achieved in the following way:

1. when these forces act on the defenders, it changes their state of motion. A player who is initially at rest will start to move. If the player is moving, a force in the opposite direction to the motion will cause the player to slow down or stop; and
2. if the decoy runner and ball carrier are able to exert a force on the defenders and manipulate them accordingly, their defensive line can be changed, thus creating conditions that could be conducive to a linebreak (Evert, 2001a).

The result is that if a defender has his line of defence, and a decoy runner together with the ball carrier's running line does not manipulate the defender, the defender will not be taken out of his defensive alignment and will be able to maintain his defensive line and will stop the attack.

With the understanding that the use of decoy runners is vital to a successful linebreak the finer details of decoy runners can be explained.

The first key aspect for decoy runners is the need to run angles that create an advantage (Honan, 1999). In order to create an advantage it implies that the attacking team is split up into attacking units.

These units are:

- the ball carrier;
- the decoy runners accompanied by the trailers;
- the striker; and
- the trailers who become the support runners (Marks, 1998; Evert, 2001a; Hedger, 2002)

With the importance of the first receiver keeping his immediate defender and the sliding defenders coming across from the inside “fixed” already having been established, the next part of the attacking unit are the decoy runners working in tandem with the ball carrier and the striker.

The decoy runner’s objective is to keep defenders busy and focussed on them so that advantage can be taken of the space that can be opened up. The ideal is to keep more defenders busy with fewer attackers thus opening up spaces in the channel opposite to where their attention is.

This contest of trying to keep more defenders busy with fewer attackers will result in the strikers having more trailers available behind them when they attack. The decoy runner should ensure that his movement is synchronised with the players on his inside.

If the strike is going to take place inside of them, then their aim should be to push and manipulate the defenders to keep their defensive width, i.e., they should stay wide.

This together with sufficient lateral space between the first receiver and the distributor will open up a space behind the distributors back in the second or third channel.

The term “one-out decoy” is as appropriate as what “one-out striker” is and implies that the first receiver out from the distributor i.e., the second receiver, runs the line that should take the defenders on the outside of the distributor outwards, while the person outside of him, i.e., the third receiver runs an “unders” line which crosses with the second receiver and becomes the automatic trailer.

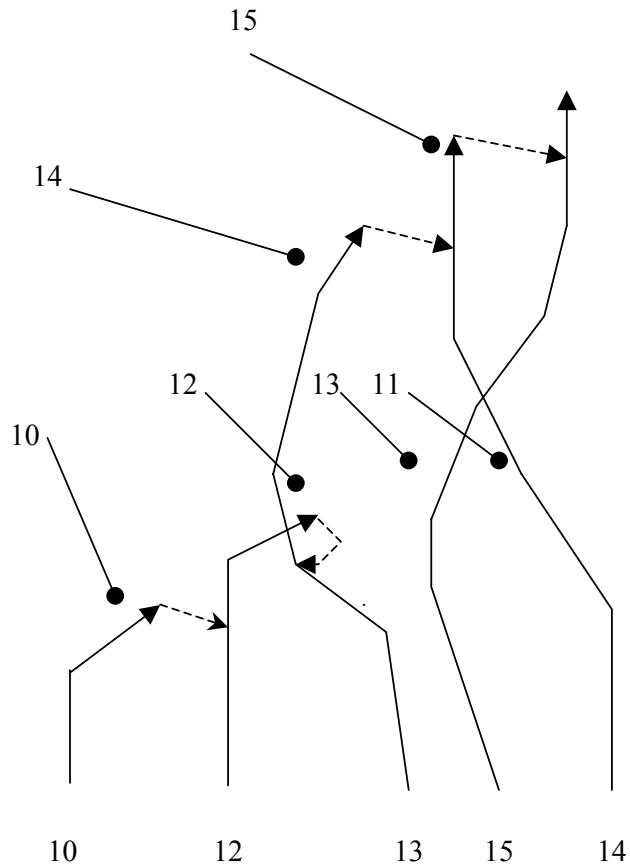


Figure 28: Indicating the concept of a “One-out” decoy line ending in a score

What this does is that it pools the defenders on the outside and then the strike takes place where they are not. If the strike is going to be wide in the fourth channel, then the aim of the decoy runners should be manipulate the defenders to “tackle in” so that the striker out wide comes into the strike “against the grain” and behind the defender’s back.

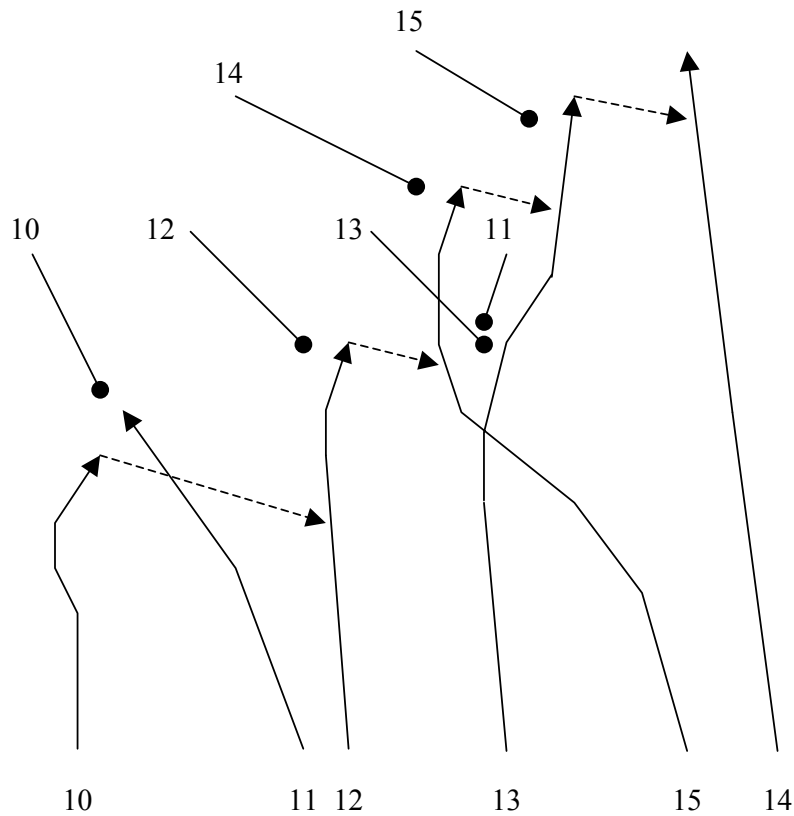


Figure 29: Indicating a decoy runner on the inside accompanied by a “One-out” decoy on the outside with the resultant trailing lines that are created

The success of the decoy runners is thus dependant on the following:

- the speed of movement of the defender and how this affects the speed of movement of the attackers;
- there has to be a marked acceleration on the part of the decoy runner in order to force the defender to speed up his movement. This must take place just as the striker is to come in on the strike. If this is achieved, the strike is more likely to be successful. If it is not achieved the defender may be able to realign himself and get himself into a position to make the tackle; and
- the centre of mass of the defender, which should be manipulated by the decoy runners to have a mechanical advantage for the striker. This can be achieved by the optimal use of the angle from which the decoy enters the strike zone. The defender must be taken past the point of no return for the striker to be able to play into an area that is defensively weak (Evert, 2001a).

3.6 THE STRIKE

This is the most important aspect of a successful linebreak. Before the intricacies and final detail is discussed, the effect of forces and momentum will be explained in order to understand why strikes should be possible under conducive conditions.

The first important aspect regarding the strike is that of the force exerted when it is executed. Force gives a quantitative description of the interaction between two bodies or between a body and its environment, therefore during contact situations there is a certain amount of force involved (Young, 1992).

The force of the striker takes place when he hits the tackle line in the attempt to break through the tackle. The key question is how a ball carrier and decoy runner can create a situation where the striker's force is sufficient in that the defensive wall is able to be broken.

As the striker moves he has acceleration and it is important to understand the relation of the acceleration to the force and thus an understanding of Newton's 2nd law of motion is needed. It can be stated that the magnitude of the striker's acceleration is proportional to that of the force, and the direction of the acceleration is the same as that of the force, regardless of the direction of the velocity (Cajori, 1934; Young, 1992).

Therefore, when a force involves direct contact between two bodies such as in a striking area, it is equivalent to a contact force. Force is a vector quantity, thus to describe it we need to know the direction in which it acts, as well as its magnitude (Hamill & Knutzen, 1995).

The direction of the force applies to:

- a) the angle at which the striker comes into the strike at the attempted linebreak;
and
- b) the angle with which the defenders enter the contact area i.e., in which direction the defender's shoulders are facing (Evert, 2001a).

The magnitude of the force is determined by:

- a) the acceleration of the striker before the ball is received;
- b) the acceleration of the striker after the ball is received;
- c) the velocity with which the striker enters the striking area together with the ability of the striker to change direction optimally if required;
- d) the effect of the decoy ploy to manipulate the defenders, such that their centre of mass is not optimal when attempting to make the tackle; and
- e) the mass of the striker (Evert, 2001a).

It is for this reason that running lines and changes in velocity are important in order to give the striker the momentum advantage at the contact area. The result of a collision between two bodies depends on their momentum, which can be described as the product of a body's mass and velocity (Young, 1992; Hamill & Knutzen, 1995). When two bodies collide and make contact, their resulting combined motion is in the direction of the body with the larger initial magnitude of momentum.

Momentum is determined by speed \times mass (Hamill & Knutzen, 1995). Unfortunately it is highly unlikely that a player's mass can be increased substantially in the course of a rugby season so to give him increased momentum in striking situations. What can however be achieved is that the player's speed or acceleration into a striking situation can be adapted to create a mechanical or momentum advantage for the striker.

This can be achieved by manipulating a defender so that they are mechanically weak and cannot re-align to be able to be in a position to make the tackle, i.e., the defender is manipulated into moving in the wrong direction and can't reverse his momentum.

If there is a marked increase in acceleration into a strike, if this has been achieved, then the strike is likely to be successful. Secondly, if a situation can be created where the defender is momentarily forced to stand still when the tackle is to be executed then the striker will have superior momentum as he is moving and attacking spaces, while the defender is stationary and trying to stop the attacking player. Thirdly, if the defenders are drawn away from the strike zone so that there is a hole through which the striker can move. This can only be achieved if the defenders are overloaded with defensive options

In conclusion, the key to a successful linebreak is the culmination of all the preceding factors and it is the responsibility of the striker to “finish off” all the hard work that has been done by his fellow attacking players. This “finishing off” is achieved by creating a situation where the striker comes out of a position which is difficult to evaluate and defend against by the defenders.

The concept that will make this possible is called a “one-out” striker. What this implies that the striker will not be the first person out to receive the ball from the distributor. This could mean that he could either coming into the line from:

1. outside the decoy runners; or
2. out of a stream, i.e., the player strikes suddenly coming in on a “blind spot” for the defenders.

All these factors are achieved by the optimal use of advantageous running lines. The strike can be executed using the following types of “running lines”:

1. an “angle” running line; (“X”, “L,O”, “O,I”, “Slap Chips”)
2. an “arc” running line; (“Happy”)
3. a “L” running line; and (“ACT”, “1,1”, “DSP”)
4. a “stream” running line (“Shark”) (Evert, 2001a)

Although these running lines could result in a linebreak, they often work better as a combination.

3.7 THE STRIKE AREA

If the tackle is made, then a collision area develops. At the collision area the following should be attempted to be achieved:

1. the angle of run and velocity of the ball carrier combined with the angle of run and velocity of the striker should be that the attacking players are at mechanical advantage and have a high kinetic energy while the defenders should be at a momentum disadvantage (Evert, 2001a).

This can be achieved by manipulating the defenders that they:

1. are forced into entering the collision area in a stationary body position; and
2. their body positioning / centre of mass is such that they are unable to re-check in order to get into position to make the tackle on a striker coming in on an attempted linebreak (Evert, 2001a).

In collision situations that result from a strike, the following situations can possibly arise. They are primarily determined by the angle at which the striker and defender meet in contact, which can be as follows:



Figure 30: A front on tackle situation

This type of collision arises due to the striker coming in on a strike from the same channel in which the defender is. It is very difficult to give an offload in this tackle situation and it will usually result in a ruck.

Often a tackle in this type of scenario comes in the form of a double hit tackle from the opposition. This holds the danger of the striker losing the ball in the tackle or the possibility that the attacking team's striker is tackled backwards which could result in serious negative implications for the supporting players of the striker.

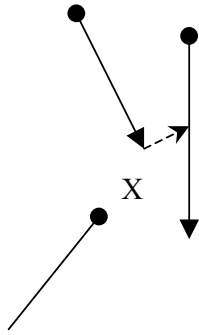


Figure 31: From the side tackle situation

There are two reasons why a side on contact situation is preferable:

1. the possibility of a linebreak is increased as the side on tackle can be stopped or be made more difficult due to:
 - 1.1 the striker being able to hand off the tackler due to the free arm being available; and
 - 1.2 the striker has the advantage that his hard body parts, i.e., elbows, hips and knees are the first body parts that make contact with the tackler making the tackler's "tackle strike area" smaller and less comfortable.
2. the striker is in a better position to be able to give an off-load to a trailer coming in from behind. This will only be possible if the striker can hand-off the tackler and safely keep the ball secure until the off-load option presents itself and then the pass can be given or be able to keep his arms free while he is being tackled thus making an offload possible.

3.8 THE ANGLE OF RUN AFTER A SUCCESSFUL STRIKE HAS BEEN EXECUTED

When a strike is made, there must be a sudden and immediate change in direction away from the inside defenders. This change of direction can be better explained by understanding that the striker always wants to play in behind the person who was originally entrusted to defend him. Because no cover lines are run intentionally, there will be a big space behind the beaten player where-after the successful striker is able

to link up with the decoy runner who was moving away from the strike zone but who is able to reappear to support the striker on the outside (Evert, 2001a).

It also results in the players coming across having to work harder to reach the successful striker. The common error players make is that they tend to run back towards the defenders thus making the defender's job easier.

By running away however, the players coming across will only be able to make a side on tackle, thus off-load options are easier to execute.

3.9 EXPLANATION OF THE RUNNING LINES TO BE USED DURING THE EXPERIMENT

3.9.1 Introduction

“You can never reach the limit, skills levels in rugby are poor all around. Over the next three years this is the area rugby must improve on – catching, passing, running lines, defensive skills. They are at a very basic level, but the sides who improve their skills will be the ones who do well in the next three years” (quote from Eddie Jones in an article by: van der Berg, 2000).

In terms of this experiment these running lines will be used as the basis of the team's attacking play. The difficult aspect regarding the coaching of these moves is the fact that their success is largely reliant on the player's ability to understand the concepts, be able to execute these concepts and to perform in pressure situations.

a. An “Overs” running line

- An “overs” running line is used in order to create an outside gap.
- It is achieved by stepping inside to force the immediate defender to “check” what the attacker is going to do next, and then to step and beat the defender on the outside using manipulating footwork.
- If each attacker executes this type of footwork, then it will create space on the outside, or the opposition will be beaten by speed by the ball carrier.
- If the attacker has superior speed, he will break the opposition’s defensive line.
- The attacker is also in a position to a hand-off if required.

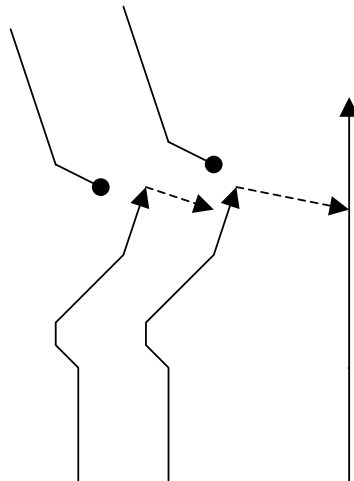


Figure 32: An “Overs” running line

b. An “Unders” running line

- This running line is used when you run at the defenders inside shoulder and attack inwards.
- It makes use of two attackers moving next to each other in one channel, which makes it difficult for defenders to defend against.
- It relies upon the defenders not being able to adjust in time to be able to get into a position to be able to defend.

- It should preferably be executed off quick recycled possession.

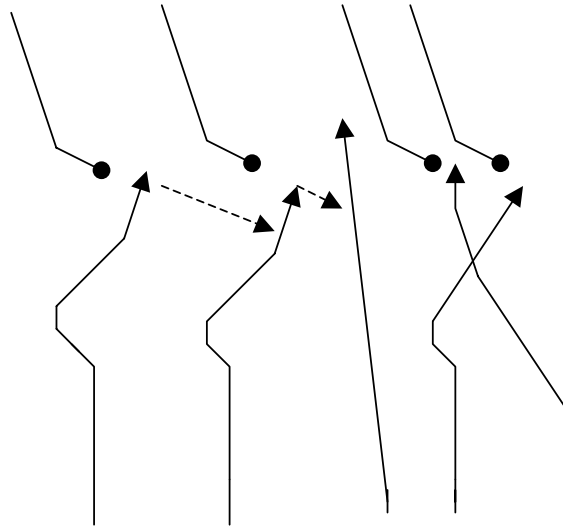


Figure 33: An “Unders” running line

c. A “Block” running line off the first receiver

- This is a passing line designed to spread the ball to an extra channel outwards, however without giving the defender the opportunity to drift too early due to the decoy player still being a threat to the opposition.
 - The opposition should be coerced into believing that the player being blocked will be receiving the ball on an “unders” line.
1. The first receiver should receive the ball with sufficient working space, step inside slightly to “fix” his immediate opposition as well as the defenders moving over from the previous facet and then get himself into a suitable position to be able to make a crisp clear pass to the player on his outside.
 2. The pass is made behind the back of the first player out from the first receiver who must “fix” his immediate defender, but should under no circumstances run into any opposition players.
 3. The second receiver receives the ball and is then able to distribute as appropriate to the attacking option taken.

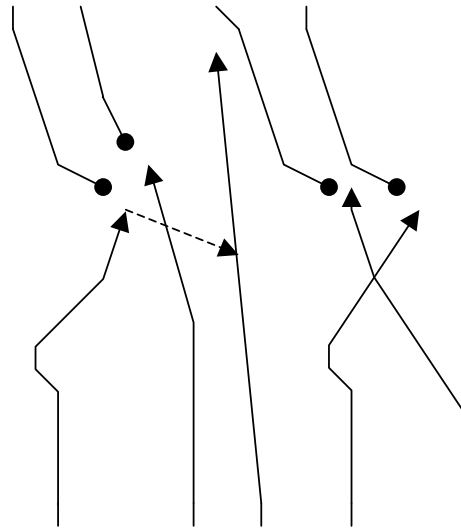


Figure 34: A “Block” running line off the first receiver

d. A “Block” running line off the second receiver

- This is a passing line designed to spread the ball an extra channel outwards, without giving the defender the opportunity to drift too early due to the missed player still being a threat to the opposition.
1. The first receiver should receive the ball with sufficient working space, step inside slightly to “fix” his immediate opposition as well as the defenders moving over from the previous facet and then get himself into a suitable position to be able to make a crisp clear pass to the outside player.
 2. He then passes the ball to the player outside of him who in turn steps inside to “fix” his immediate defender as well as those defenders who are moving across from the previous facet.
 3. The second receiver makes the pass behind the back of the player directly out from him, who in turn “fixes” his immediate defender, he must under no circumstances run into any opposition players.
 4. The third receiver receives the ball and is then able to distribute as appropriate to the attacking option taken.

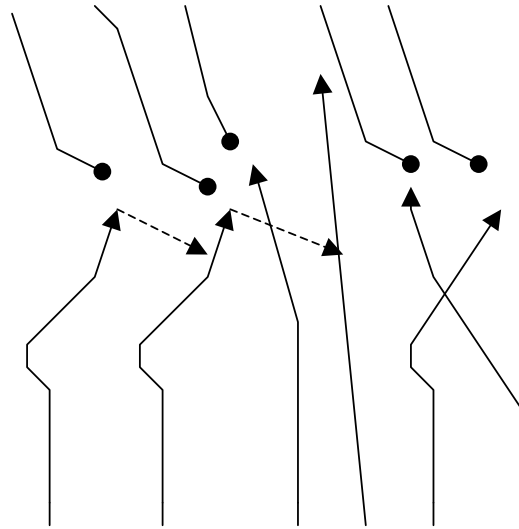


Figure 35: A “Block” running line off the second receiver

e. A “Face” running line off the first receiver

- The object of this passing line is to move the ball wide, this is not as effective as the block as it allows the defenders the opportunity to drift earlier as they can see that it is less likely that the decoy runner will receive the ball.
1. The first receiver should receive the ball with sufficient working space and must endeavour to “fix” his immediate opposition by stepping inside and then outwards just before the ball is distributed to the outside support players.
 2. The ball is then passed in front of the first player out from the first receiver to the third attacking player in the backline. He in turn distributes the ball as appropriate to the attacking option that is nominated.

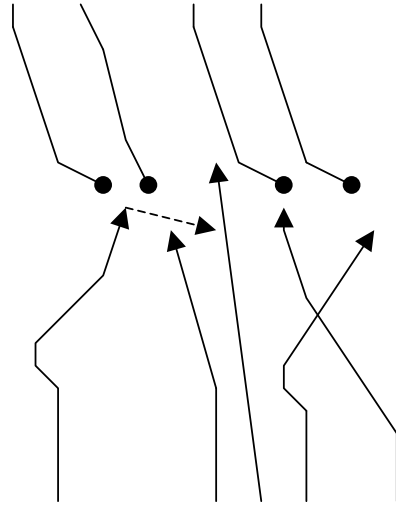


Figure 36: A “Face” running line off the first receiver

f. A “Face” running line off the second receiver

- The object of this passing line is to move the ball wide, this is not as effective as the block as it allows the defenders the opportunity to drift earlier as they can see that it is less likely that the decoy will receive the ball.
1. The first receiver should receive the ball with sufficient working space and must endeavour to “fix” his immediate opposition by stepping inside and then outwards just before the ball is to be distributed to the player on his outside.
 2. The first player out from the first receiver receives the ball and needs to ensure that he “fixes” the opposition before passing the ball in front of the next player in the backline. The third attacker in the backline receives the ball and is then able to play as appropriate to the attacking option nominated.

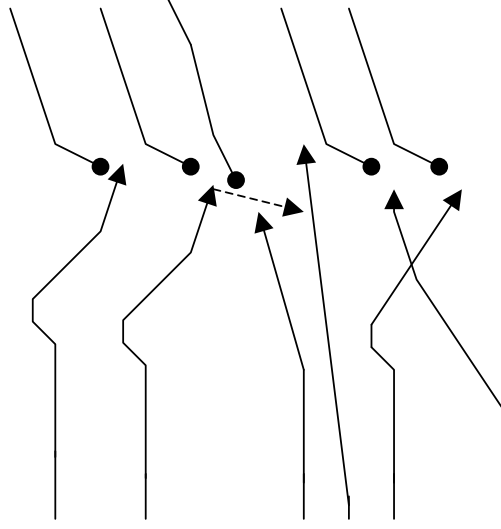


Figure 37: A “Face” running line off the second receiver

g. An “I,O” running line off the first receiver (inside - out)

- This is a running line used to manipulate defenders into weaker defending positions. This is achieved by taking the defenders out of their defensive channels by making use of crossover running lines.
 - It is important to note that this running line should be complimented by a striker coming in off it otherwise the backline will merely move sideways across the field.
 - There are many variations, which can be added to the move.
1. The pass from the scrumhalf needs to be reasonably flat and the first receiver should take the ball moving towards his directly opposite defender. He should step inside in order to “fix” his defender as well as the defenders coming across from the previous facet.
 2. As the first receiver gets ready to move the ball outwards, he should straighten up his line. The second player out from the first receiver should commit his immediate defender by running straight at him and then suddenly change direction and runs an “unders” line towards the first receiver. It is important

that the decoy runner under no circumstances runs into any of the defenders so to prevent them from being able to defend.

3. The first player out from the first receiver in turn should take the pass from the first receiver behind the back of the player who ran the “unders” line onto the first receiver.
4. The player out from the second receiver needs to run either on a supporting line or as a striker off the second receiver.

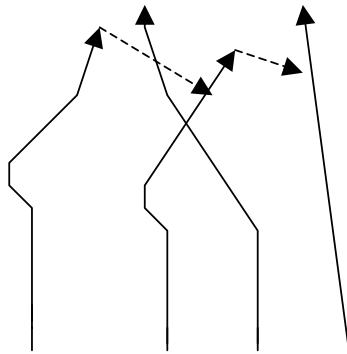


Figure 38: An “I,O” running line off the first receiver

h. An “I,O” running line off the second receiver (inside – out)

- This is a running line used to manipulate defenders into weaker defending positions. This is achieved by taking the defenders out of their defensive channels by making use of crossover running lines.
 - This running line needs to be executed slightly deeper as it involves an extra pass from the first receiver.
 - It is important to note that this running line must be complimented by a striker coming off it otherwise the backline will merely move sideways across the field.
1. The first receiver takes the ball moving forward, steps inside in order to “fix” his immediate defender and then steps outwards and passes to the player outside of him.

2. At this stage the second player out from the second receiver runs an “unders” decoy line towards the ball carrier at which time the ball carrier passes the ball behind the decoy “unders” runner’s back to the first player out from the ball carrier player who runs an “overs” line outwards.
3. The outside players need to run either on a supporting line or as a striker off the ball carrier who received the pass.

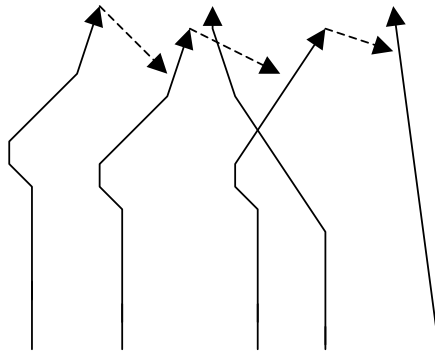


Figure 39: An “I,O” running line off the second receiver

- i. **An “O,I” running / trailing line off the first receiver (outside – in)**
 - An “O,I” is primarily used as a striking move however there is a possible variation where a strike can be made using it as an initial running line.
 - It makes use of a decoy runner to take the drifting defence outwards, and then strikes coming back with the one-out striker.
1. The pass from the scrumhalf needs to be reasonably flat and the first receiver should take the ball moving towards his directly opposite defender. He should step inside in order to “fix” his defender as well as the defenders coming across from the previous facet.
2. As the ball carrier gets ready to move the ball outwards, he should straighten up his line. The first player out from him “fixes” his immediate defender and then explosively steps off outwards on an “overs” line.

3. The one-out striker in turn attacks the advantage line by committing his direct opposition and then steps inside running an “unders” line on a strike.
4. The pass that the striker receives is taken behind the back of the outward moving decoy runner thus timing is important.
5. The first receiver runs as a trailer on the inside of the striker while the players on the outside run an “O,I” trailing line to either receive an offload or to clean as appropriate to the outcome of the attack.

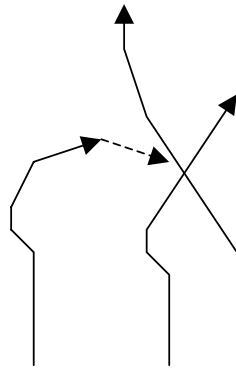


Figure 40: An “O,I” running / trailing line off the first receiver

- j. **An “O,I” Running / trailing line off the second receiver (outside – in)**
 - This running line needs to be executed deeper as it involves an extra pass from the first receiver before the strike takes place.
 - It makes use of a decoy runner to take the drifting defence outwards, and then a strike takes place coming back with the one-out striker.
 - It can be seen as an alternative striking move two channels out.
1. The first receiver takes the ball moving forward, steps inside in order to “fix” his immediate defender and then steps off and passes to the player outside of him.
2. The ball carrier takes the ball and aligns himself aiming at his direct opposition in order to “fix” him as well as the defenders moving over from the previous facet. As he prepares to distribute the ball outwards, the player outside of him

aggressively attacks his immediate defender and steps outwards on an “overs” line in order to take his defender away with him from the strike zone.

3. With that the one-out striker comes in on the strike on an “unders” strike.
4. The pass from the ball carrier is made behind the decoy runner who is moving outwards back and thus the striker plays into the open space created.
5. The ball carrier who made the pass becomes the inside trailer while the players on the outside being in a position to either receive an offload or to clean as appropriate to the outcome of the attack.

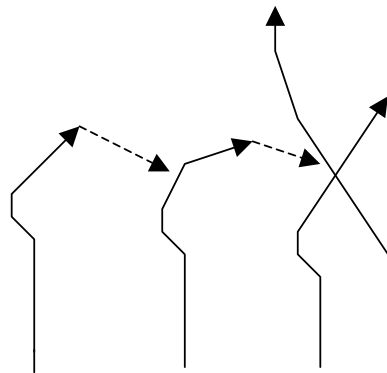


Figure 41: An “O,I” running / trailing line off the second receiver

k. A “1,1” running line off the first receiver

- This is mainly used as a set-up move however it can develop into a strike if it is executed off quick, second phase possession.
 - The first 1 in the name of the strike indicates that there is one pass before a striker is unleashed onto the opposition.
1. The first receiver needs to receive the ball fairly flat as there is only the pass remaining from him to the striker that still needs to be executed during the strike.
 2. He must run at the opposition as the strike has to be made with the attacking backline having as much forward momentum as possible.

3. There are two options available that can be used to execute the strike:
 - a. the basic option is that the striker, i.e., the first player out from the ball carrier comes in on an “unders” line and receives the ball on the contact line; and
 - b. the second option is making use of a one-out striker. This implies that the first player out runs a decoy outwards while the second player out runs an “O,I” striking line. The pass to the striker can be made behind the decoy player’s back or in front as appropriate.
4. The first receiver runs a trailing line on the striker from the inside while a player further out from the strike should run an “O, I” trailing line in on the striker so to be able to receive an offload or to clean as appropriate.

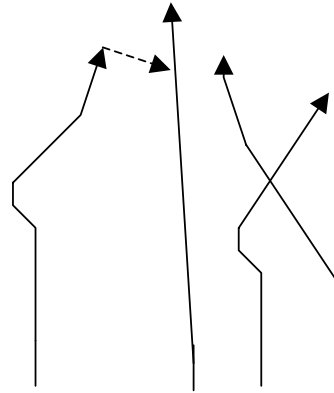


Figure 42: A “1,1” running line off the first receiver

I. A “1,1” running line off the second receiver

- This is mainly used as a set-up move however it can develop into a strike if it is executed off quick, second phase possession.
1. The first receiver needs to take the ball a little deeper as there is an extra pass needed before the strike takes place.
 2. The first receiver passes the ball to the next player out from him who in turn straightens up before passing to the player coming in on the striker.

3. There are two possible options to execute this strike:
 - a. the first option is basic and easier to execute. It involves a short pass to the next player out who takes the ball on an “unders” line on the contact line; and
 - b. the second involves an “O,I” striking line with the first player out from the ball carrier running a decoy outwards, followed by the one-out striker coming in on a strike on an “unders” line. The pass to the striker can be made behind the decoy’s back or in front as appropriate.
4. The ball carrier who passed to the striker runs a trailing line from the inside while a player on the outside must run an “O,I” trailing line to receive an offload or to clean as appropriate.

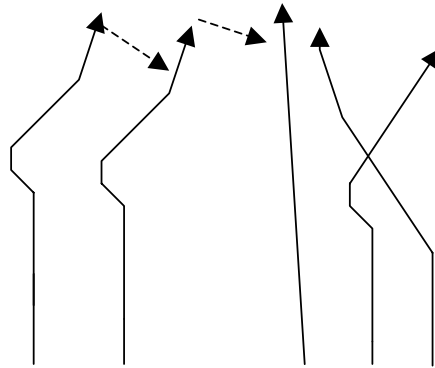


Figure 43: A “1,1” running line off the second receiver

m. A “Happy” – running line off the first receiver

- This is a basic, easy to execute strike move that can be used from any phase of play.
- This move takes place off the first receiver and in the first channel out from the facet, near to the forwards.
- The aim of the move is to send a striker through a space behind the ball carrier’s immediate defenders back as they (the defenders), are drifting outwards on their defensive line.
- The following are certain aspects that are important for the proper and successful execution of the strike.

1. The first receiver must take the ball moving forward and before making the inside pass, must move on an arced running line to draw the defence with him across the field.
2. Just before contact, the ball carrier must stop immediately in front of his immediate defender, transfer his weight so that he is facing the player coming in on the strike from the inside and pass the ball firmly and reasonably deep to the striker. The inside pass should not be made while still moving as it will lessen the biomechanical advantages that have been created.
3. The reason that the ball carrier should stop immediately is that it forces the defender to also stop in his tracks in order to see what is going to transpire. This creates a situation where the striker is running at a defender who is stationary thus giving the striker a momentum advantage.
4. The striker must strike at a line parallel to the ball carrier's running line, as this allows him to strike through the vacuum behind the back of the ball carrier's immediate defender. This angle of strike will also be advantageous, as the defender will find it difficult to realign himself quickly enough to be able to stop the striker coming through.
5. The outside players must run an "O,I" trailing line towards the strike as this will keep the drifting opposition defenders attention on the outside, as well as keeping the defending outside players attention "fixed" on the defenders in the outer channels.
6. The first and second receivers run a trailing line from the inside in order to be able to receive an offload or to clean as appropriate.

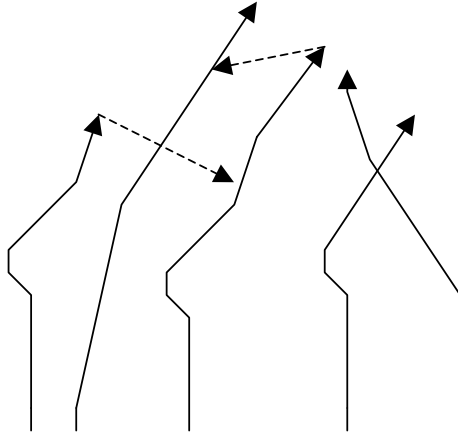


Figure 44: A “Happy” running line off the first receiver

n. A “Happy” running line off the second receiver

- This is a basic, easy to execute strike move that can be used from any phase of play.
 - The strike takes place off the second receiver, thus occurring in channel 2.
 - The aim of the move is to send a striker through a space behind the back of the ball carrier’s immediate defender as he (the defender) is drifting outwards on his defensive line.
 - There are certain aspects important for the proper and successful execution of the strike.
1. The first receiver must take the ball moving forward. Before the ball is passed to the second receiver on a “face” pass, he should aim to straighten his line slightly so to “fix” the opposition for a second and thus “buy” time before the drift defence moves across from the inside.
 2. Before making the inside pass, the ball carrier must move on an arced running line to draw the defence outwards with him.
 3. Just before contact, the ball carrier must stop immediately in front of his immediate defender, transfer his weight so that he is facing the player coming in on the strike from the inside, and passes the ball firmly and reasonably deep

to the striker. The inside pass must not be made while still moving as it will lessen the biomechanical advantages created.

4. The reason that the ball carrier should stop immediately is that it forces his defender to also stop in his tracks in order to see what is going to transpire. This creates a situation where the striker is running at a defender who is stationary thus giving the striker a momentum advantage.
5. The striker must strike at a line parallel to the ball carrier, as this allows him to strike through the vacuum behind the back of the ball carrier's immediate defender. This angle of strike will also be advantageous, as the defender will find it difficult to realign himself quickly enough to be able to stop the striker coming through.
6. The outside players must run an "O,I" trailing line towards the strike as this will keep the drifting opposition defenders attention on the outside, as well as keeping the defending outside player's attention "fixed" on the defenders in the outer channels.
7. The first and second receivers run a trailing line from the inside in order to be able to receive an offload or to clean as appropriate.

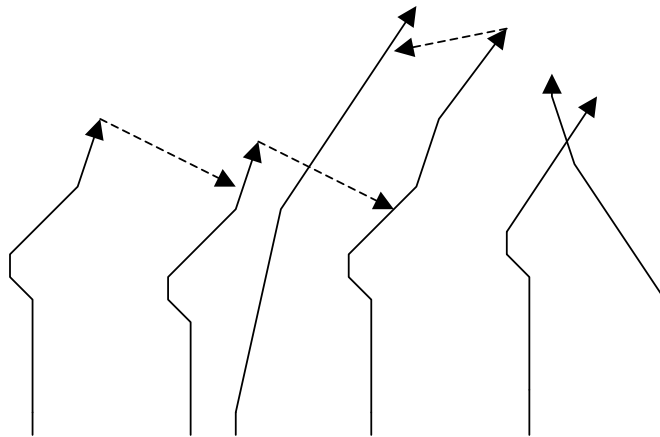


Figure 45: A "Happy" running line off the second receiver

o. An “X” running line off the first receiver

- The key to a successful “X” strike is that the striker should receive the ball in the space created just behind the back of the immediate defender of the first receiver.
 - It is important that the striker receives the ball on an angle that once the strike is made, he is moving away from the defenders that are coming across from the inside.
 - The strike must take place on the contact line otherwise the opportunities created by the preceding running line will come to nought as the defenders will have sufficient time to realign themselves and be in a position to make the tackle.
1. The ball must be passed reasonably flat to the first receiver who should receive the ball on a slightly outward angled run. Just before contact the first receiver should step off outwards with a big angle and then send the “one-out” striker into the space created by the first receiver’s running line. The strike takes place just behind the back of the first receiver’s immediate defender.
 2. The first player out from the first receiver needs to fulfil the function of keeping his immediate defender occupied by executing the “O,I” trailing line.

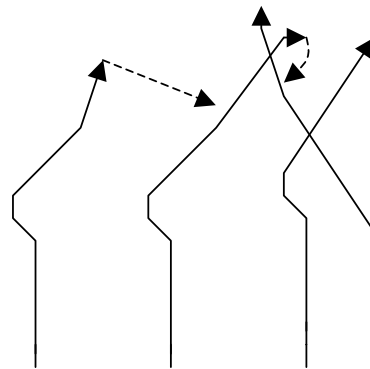


Figure 46: An “X” running line off the first receiver

p. An “X” running line off the second receiver

- This “X” takes place one channel out from the first receiver and therefore requires a greater working space. For this reason the initial alignment should be deeper due to the extra passes needed to be made.
1. The pass from the scrumhalf needs to be deeper so that the first receiver can execute a flat “face” pass to the second receiver.
 2. The second receiver takes the ball moving towards his immediate defender and the contact area ensuring that his angle of run is as straight as possible. Just before contact is made, he should very convincingly step off outwards so to “take” his immediate defender outwards with him.
 3. The two players on his outside should then execute an “O,I” trailing line with the player one-out from the second receiver coming in on the “one-out” strike while the decoy players move outwards.
 4. It is the first receiver’s responsibility to get in first to be of inside support to the striker so to clean or receive an inside offload as the situation develops.
 5. If a clean break occurs, the first receiver will still fulfil the role of inside support, and the outwards moving decoy runner will align himself as an outside supporter.

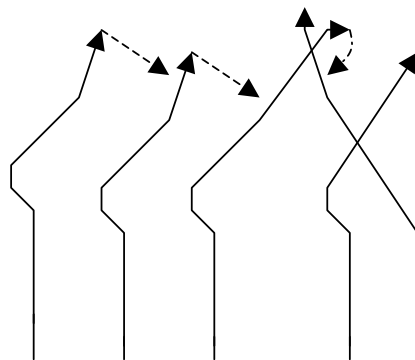


Figure 47: An “X” running line off the second receiver

q. A “Shark” running line off the first receiver

- This strike move makes use of stream running with a decoy player coming in on the first receiver’s inside and a striker appearing from behind the first receiver coming through the space on the outside.
 - It must take place on the contact line and it is important that the defenders believe that the decoy “Happy” runner on the inside is going to receive the ball.
1. The ball is passed to the first receiver who takes the ball reasonably flat moving towards his immediate defender. As he is on the contact line he must stop immediately making as though he is going to give an inside “Happy” pass to a decoy striking player in his inside channel but in the same movement gives a popped pass to the roaming striker who starts off on his inside but strikes through the channel just on his outside of the ball carrier.
 2. There is important work to be done on the outside, as it is the second and third receiver’s responsibility to open up the space just next to the flyhalf. This is done by an “O,I” trailing line being run to keep the attention of the immediately opposite defenders.
 3. This “O,I” trailing line will ensure that defenders are committed in their channels as well as the one out decoy runner being able to run a trailing line so to be able to clean or receive an offload as applicable to the situation.

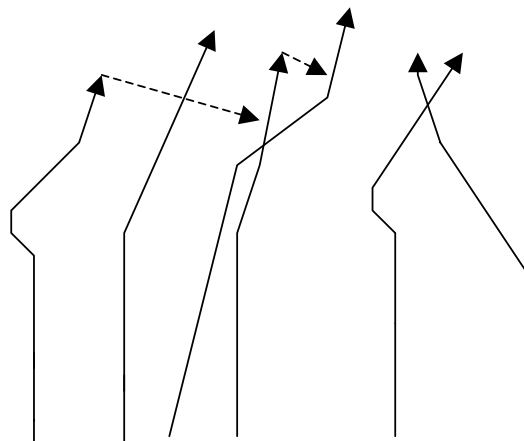


Figure 48: A “Shark” running line off the first receiver

r. A “Shark” running line off the second receiver

- This strike move makes use of stream running with a striker appearing from behind the second receiver coming in through the space on the outside.
 - Because of the extra pass involved it needs to be executed a slightly deeper however the strike must take place on the contact line and it is important that the defenders believe that the decoy “Happy” runner on the inside is going to receive the ball.
1. The ball is passed to the first receiver who takes the ball reasonably flat moving towards his immediate defender. The first receiver steps inside to “fix” his immediate defender and then gives a “face” pass outwards to the second receiver two channels out.
 2. The second receiver runs at his immediate defender and with that stops immediately makes as though he is going to give an inside “Happy” pass to a decoy striker on the inside but in the same movement gives a popped pass to the roaming striker who starts off on his inside but strikes through the channel just on the outside of the second receiver.
 3. There is important work to be done on the outside, as it is that player’s responsibility on the outside to open up the space just next to the second receiver. This is done by an “O,I” trailing line being run to keep the attention of the attacking player’s immediate defenders.
 4. This “O,I” trailing line will ensure that defenders are committed in their channels as well as the “one-out” decoy runner being able to run a trailing line to be able to clean or receive an offload as applicable to the situation.

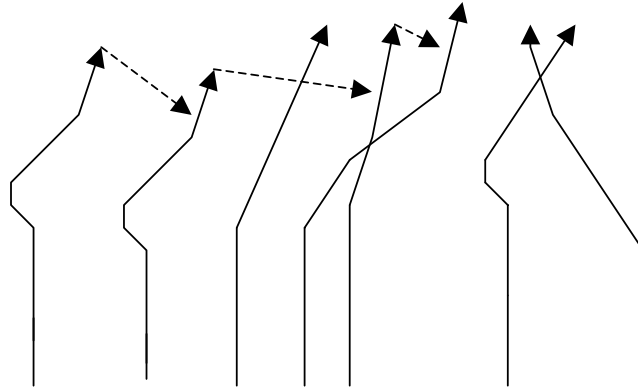


Figure 49: A “Shark” running line off the second receiver

s. An “ACT” running line with a strike close to the facet (RED)

- This is a slightly more complex running line that requires more space and good spatial judgement for its successful execution as there are more passes and off the ball running involved before the strike is made.
- It should mainly be done from a lineout or phase ball where there is sufficient space in which to do the pass-run-around.
- The colour indicates where the strike is going to take place:
i.e., “Red” indicates that the strike is going to take place nearer towards the forwards.
- Until players have the ability to judge and nominate where strikes are to take place in respect of where the spaces are, the strike will be nominated early. At a later stage and once the players are adept at decision-making, the player with space in front of him will call for the ball.
- The following aspects are important for the proper execution of the strike.
 1. The scrumhalf passes a reasonably deep pass to the first receiver who in turn takes the ball moving forward towards his immediate defender.
 2. The first receiver must move towards his opposition defender trying to get on the outside of him with the arc that he runs. At the last moment he must step aggressively inside on an angle so to manipulate the defender into adjusting his defensive line and turning his shoulders inwards.

3. The scrumhalf in turn then moves around on a reasonably deep loop so to be able to take a return pass from the first receiver.
4. The scrumhalf must continue moving across the field but must however make an effort to straighten up somewhat in order to commit and “fix” his respective defender who will be the player out from the first receiver’s initial defender.
5. The strikers approach the scrumhalf from a deep and angled run.
6. When a “red” is nominated the forward receives the ball on the strike behind the scrumhalf who is moving across the field. It is important that the striker’s line of movement should be outside the scrumhalf and that the striker runs an “X” line.
7. The success of the move is largely dependant on the work that is done simultaneously on the outside by the decoy runners.
8. They should execute an “O,I” trailing line. The second important aspect of this “O,I” trailing line is that it sets up a trailer who is thus able to receive the offload, be the first cleaner if a tackle situation arises or is a support runner if a clean break occurs.

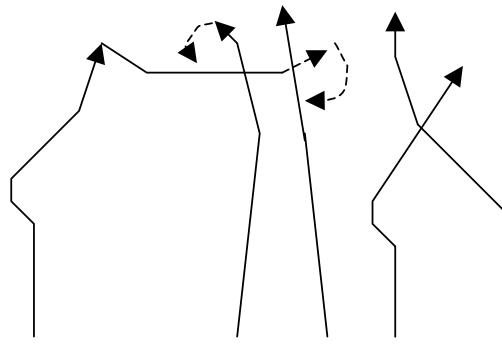


Figure 50: An “ACT” running line with a strike close to the facet (RED)

- t. **An “ACT” running line with a strike away from the facet (BLUE)**
 - This is a slightly more complex running line move that requires more space and good spatial judgement for its successful execution, as there are more passes and off the ball running involved before the strike is made.

Because the strike takes place further out than the “Red”, more working space is required in which to execute the move.

- It should mainly be done from a lineout or phase ball where there is sufficient space in which to do the pass-run-around.
 - The colour indicates where the strike is going to take place:
i.e., “Blue” indicates that the strike is going to take place further away from the forwards.
 - The following aspects are important for the proper execution of the move.
1. The scrumhalf passes a reasonably deep pass to the first receiver who in turn takes the ball moving forward towards his opposite defender.
 2. The first receiver must move towards his defender trying to catch him on his outside shoulder and at the last moment step inside on an angle so to manipulate the defender into turning his shoulders inwards.
 3. The scrumhalf in turn then moves around on a reasonably deep loop so to be able to take a return pass from the first receiver.
 4. The scrumhalf must continue moving across the field but must however make an effort to straighten up somewhat in order to commit and “fix” his respective defender who is out from the immediate defender of the first receiver.
 5. The strikers approach the scrumhalf from a deep and angled run.
 6. When a “blue” is nominated a forward runs a decoy striking run behind the scrumhalves back in order to “fix” the defenders that are moving across
 7. The striker comes in on an “O,I” strike with the decoy opening up the space through which the striker moves by running an arc outwards.
 8. The second important aspect of this “O,I” line is that it sets up a trailer who is thus able to receive the offload, be the first cleaner if a tackle situation arises or is a support runner if a clean break occurs.

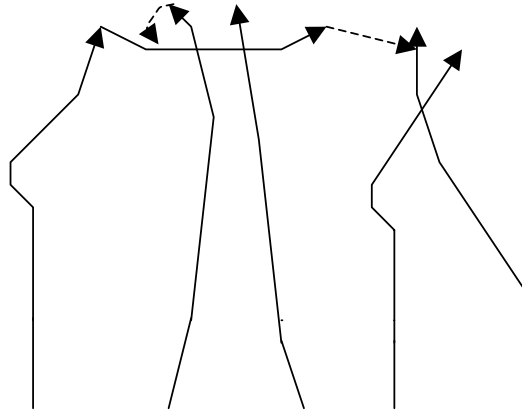


Figure 51: An “ACT” running line with a strike away from the facet (BLUE)

u. A “Slap Chips” running line off the first receiver

- This specific strike move is based on the pass-run-around moves (ACT).
 - It involves a strike off the first receiver with further decoy runners involved.
 - It is important that it is done on the contact line thus timing of the strike and decoys is important.
1. The scrumhalf makes the pass to the first receiver who receives the ball moving forward towards his direct defender. Just before contact he should aggressively step inwards so that his immediate opposition’s shoulders are turned inward.
 2. The scrumhalf runs around on the loop as a decoy continuing moving across the field but must however make an effort to straighten up somewhat in order to commit and “fix” his immediate defender. The decoy ploys on the outside will keep the space open where the strike is to take place.
 3. The roaming player then comes in on the strike in the space created by the looping scrumhalf.
 4. The success of the move depends on the work done on the outside by the players who execute an “O,I” decoy. Their job is to commit and “fix” the outside defenders so that if a linebreak occurs the defenders won’t be able to

correct and get back into a position to be able to defend. Secondly the “one-out” trailer is able to either receive an offload or clean if a ruck forms.

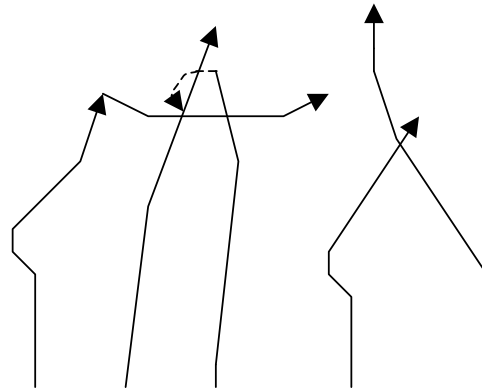


Figure 52: A “Slap Chips” running line off the first receiver

v. A “Slap Chips” running line off the second receiver

- This specific continuity move is based on the pass-run-around moves (ACT).
 - It involves a strike off the second receiver with further decoy runners involved.
 - It must take place a little deeper as there is an extra pass and for it to be successful it should be done on the contact line thus the timing of the strike and decoys is important.
1. The scrumhalf makes the pass to the first receiver who receives the ball moving forward and towards his directly opposite defender. Before making the “face” pass to the second receiver who is two channels out, he should ensure that he makes a step inside so to “fix” his directly opposite defender and those defenders moving across from the previous facet.
 2. The first receiver then makes a reasonably deep pass to the second receiver who should receive the ball moving forwards towards his immediate defender. As the second receiver is reaching the contact line he should step inside on an arc with the player who was faced looping around as a decoy

3. The “faced” player runs around on the loop as a decoy continuing moving across the field but must however make an effort to straighten up somewhat in order to commit and “fix” his immediate defender.
4. The roaming player then comes in on the strike in the space created by the looping “faced” player.
5. The success of the move depends on the work done on the outside by the players executing an “O,I” decoy. Their job is to keep the opened up space at the strike area and to commit and “fix” the outside defenders so that if a linebreak occurs the defenders won’t be able to correct and get back into a position to be able to defend. Secondly the “one-out” trailer is able to receive an offload or clean if a ruck forms.

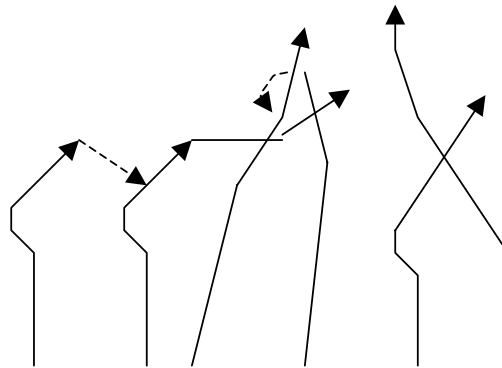


Figure 53: A “Slap Chips” running line off the second receiver

- w. **A “DSP” running line off the first receiver**
- This is a strike move where after quick, recycled possession is sought. It could possibly result in a successful linebreak if executed off quick second phase possession, however not likely against organised defence.
 - It is imperative that this move be executed on the contact line so that “go forward” momentum can be created.
1. The pass needs to be flat to the first receiver who should take it attacking the advantage line. Just before the move is executed, the first receiver should step

inside in order to “fix” the defenders moving across from the inside facet before readjusting in order to send the striker through the gap created.

2. The first receiver dummy-passes to the decoy runner who “strikes” behind his back, but in the same movement passes to the “one-out” striker who comes in on an “O,I” striking line with the player just out from the first receiver running outwards drawing the defenders away from the contact area. It is the ball carriers and outside player’s responsibility to run an “unders” trailing line so to be able to clean or receive an offload as the situation develops.

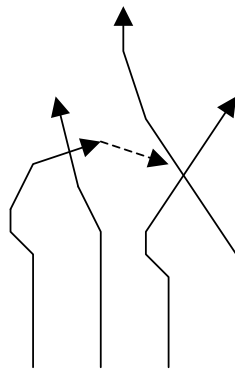


Figure 54: A “DSP” running line off the first receiver

- x. **A “DSP” running line off the second receiver**
 - The alignment of the attacking backline needs to be deeper as there is an extra pass that needs to be made before the strike takes place.
 - This is a strike move where after quick recycled possession is sought. It could possibly result in a successful linebreak if executed off quick, second phase possession, however not likely against organised defence.
 - It is imperative that this move be executed on the contact line so that “go forward” momentum can be created.
1. The pass needs to be flat to the first receiver who should take it attacking the advantage line. He should slightly straighten up his angle of run and then give a firm pass to the second receiver just out from him.

2. Just before the move is executed, the ball carrier should step inside in order to “fix” the defenders moving across from the inside before readjusting in order to send the striker through the gap created.
 3. The ball carrier dummy-passes to the decoy runner who “strikes” behind his back, but in the same movement passes to the “one-out” striker who comes in on an “O,I” striking line with the player just out from the first receiver running outwards drawing the defenders away from the contact area.
- It is the ball carriers and outside player’s responsibility to run an “unders” trailing line so to be able to clean or receive an offload as the situation develops.

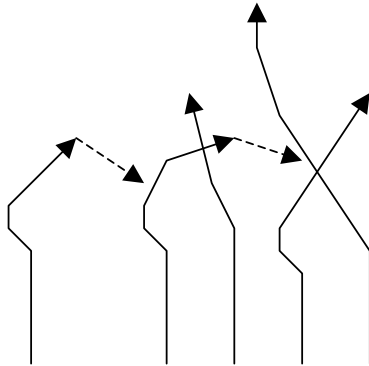


Figure 55: A “DSP” running line off the second receiver

CHAPTER 4

DATA DESCRIPTION AND ANALYSIS

4.1 INTRODUCTION

The evidence presented to us indicates that the implementation of interventions should have a positive effect on the number of line-breaks that a team achieves in a specific rugby match or season. However, it is important to give alternative support to the analysis through the use of statistical methods. The author will start off by giving some descriptive statistics on the data to form an initial expectation on the relationship between the specific variables. Thereafter, the author will specifically look at the 2002 season and investigate what specific running lines had the most significant impact on the total number of linebreaks achieved during the course of the season. This is followed by an analysis on which interventions are used in creating these specific running lines in order to assess the level of effectiveness of the interventions. Finally, the author will perform a hypothesis test to indicate whether or not the average linebreaks made during the 2002 season were significantly higher than the average linebreaks made during the 2001 season.

4.2 SOURCES OF DATA AND THE DATA SAMPLE

Analysing video types of matches played by the Blue Bulls U21 team during the 2001 and 2002 seasons obtained the data used in the analysis. A total of nine and ten games were played in the 2001 and 2002 seasons respectively. However, because of data problems only nine of the ten games in the 2002 season were considered in the analysis. For each game played in the 2001 and 2002 seasons the total number of linebreaks achieved in a match was calculated. In addition the total number of linebreaks achieved in the 2002 season was further subdivided into the specific categories of intervention in order to determine which intervention had the biggest impact on the total number of linebreaks achieved.

Our sample therefore consists of nine matches played in each of the 2001 and 2002 seasons, where the data of the 2002 season is further divided into relative subgroups.

4.3 DESCRIPTIVE STATISTICS

In order to form an initial expectation on the impact of the interventions we will view some descriptive statistics regarding the data. The author will start off by analysing the total linebreaks made during the 2001 and 2002 season when playing against various opposition teams. These values are given in Table 2.

Table 2: Comparisons of the total number of linebreaks made in the 2001 and 2002 seasons

2001		2002	
Opposition	Total linebreaks	Opposition	Total linebreaks
NW	11	BB A	19
Pumas	25	Border	36
Falcons	12	Falcons	30
Lions	9	Lions	12
WP	12	WP	14
Boland	9	Natal	21
Natal	7	FS	20
FS	6	WP	43
WP	6	Lions	29
Total	97	Total	225

From Table 2 it is clear that the total number of linebreaks achieved during the 2002 season is much higher than the total number achieved during the 2001 season. Without exception a comparison between similar teams played during both seasons indicates that the total number of linebreaks achieved during the 2002 season is much higher than when the team competed against the same opposition during the 2001 season. It seems as if the aggregate numbers indicate a significant increase in linebreaks from the 2001 to 2002 season.

Table 2 has clearly indicated that there is a significant improvement in the number of linebreaks made from the 2001 to 2002 seasons. The question arises therefore what has caused this rapid increase in the number of linebreaks being made? To answer this question, we proceed to take a closer look at what factors played the determining role in the linebreaks being made in the 2002 season.

In Table 3 the total number of line-breaks made is divided into a specific type of running line. The major components of total linebreaks are the “Overs” and “Unders” running lines with respectively 39% and 30% of total linebreaks being made up by these components. Together they make up more than 65% of total linebreaks, which indicates that they are a very important component of linebreaks being made in a match or season.

Table 3: Type of linebreak as a percentage of total linebreaks being made during the 2002 Bankfin U21 competition

Type of linebreak	Number of accuracy	As percentage of total
“Overs”	88	39%
“Unders”	67	30%
“1,1”	27	12%
“Happy”	14	6%
“X”	12	5%
“Shark”	5	2%
“ACT”	7	3%
“Slap chips”	3	1%
“DSP”	1	0.4%
“OI” Strike	1	0.4%

Although the “1,1”, “Happy” and “X” running lines have also made significant contributions towards the total linebreaks being made, they did not play such a dominating role as when compared with the previous two variables of “overs” and “unders” running lines. The remaining five variables had even less of a significant impact. This shows that the increased number of linebreaks experienced within the 2002 season was dominated by only a few variables.

Although it may seem as if these variables are the most effective, it may very well be that the other less significant variables were indeed the foundation or building blocks from which the more significant variables have developed. It could be the case that the development of the “less important” variables can lead to a huge beneficial increase in linebreaks experienced. Although the aim of this study is not to see whether this is the case, it may indeed be fruitful to engage in such further research activities.

A further analysis was done in order to determine which intervention had the most significant impact on the various running lines. Table 4 lists the specific running lines and their respective or underlining interventions. Column one shows the specific linebreak variable while column two presents the specific intervention that played the major role in the success of the variable in column one. The figure presented in parenthesis in column two indicates the percentage of times the specific intervention variable was partially responsible for the success of the linebreak.

It is clear from Table 4 that a variety of interventions were responsible for the success of the linebreaks. This is an indication that the development of the interventions would be beneficial for all running lines, which shows their significant importance in achieving linebreaks.

Table 4: Most significant interventions in determining specific linebreaks during the 2002 season

Running Line	Most significant intervention
“Overs”	Speed (83%) Decoy inside (42%)
“Unders”	Momentum advantage (67%) Power (60%) Expanded attack (42%)
“1,1”	Power (63%) Momentum advantage (63%) Change in initial starting position (33%)
“Happy”	Speed (79%) Change in speed of movement (71%) Decoy outside (57%)
“X”	Speed (84%) Expanded attack (67%)
“ACT”	Expanded attack (100%) Decoy outside (100%) Decoy inside (100%)
“Shark’	Expanded attack (100%) Decoy outside (100%) Decoy inside (100%)
“Slap chips’	N.A
“DSP”	N.A.
“O,I” Strike	N.A.

It is clear that the total number of linebreaks achieved during the 2002 season was mainly determined by specific running lines, which in turn were based on multiple interventions that were brought into the preparation or training sessions of the 2002 season. It can therefore be concluded that the major determinants of the increased linebreaks experienced in the 2002 season were indeed affected by the intervention, which was implemented into the specific running lines.

4.4 HYPOTHESIS TESTING

The descriptive data analysis has clearly indicated that interventions were the major cause of linebreaks experienced in the 2002 season. According to Table 2 it seems as if there is a significant difference between the number of linebreaks achieved in the 2002 season and the previous season due to the implementation of specific running lines and intervention. However, it is important to statistically prove that there is a significant difference between the line-breaks achieved in the two periods.

The author will therefore perform a hypothesis test to indicate that on average the linebreaks achieved in the 2002 season is statistically greater than that achieved in the 2001 season.

Hypothesis testing regarding averages can be divided into two main groups. Inference regarding the average of a single sample and inference on the averages of two or more samples. The second group of inference would be the one in which the most interest will be shown. Given the fact that two separate teams with different players have participated in the two seasons, the assumption will be made that the two samples are independent from each other, therefore the linebreaks achieved in the 2001 season will have no correlation with the linebreaks achieved in the 2002 season.

The hypothesis test regarding the averages of two independent samples is a simple T-test, however, there is an important distinction to be made between two samples for which the variance (σ_i^2) is equal and two samples for which the variances (σ_i^2) is not

equal. Therefore, an applied F-test will be done to determine whether the two samples have equal variances or not.

The null and alternative hypotheses to test for equal variances are presented in equation 4.1. Under the null hypothesis we assume that the variances of the two samples are equal, while the alternative states that the two samples have different variances. The test statistic is presented in equation 4.2. A value for the test statistic that is greater than the critical value will lead to a rejection of the null hypothesis.

$$\begin{aligned} H_0 : \sigma_1^2 &= \sigma_2^2 \\ H_A : \sigma_1^2 &\neq \sigma_2^2 \end{aligned} \quad (4.1)$$

$$F = \frac{S_1^2}{S_2^2} \sim F_{(n_1-1, n_2-1)} \quad (4.2)$$

where S_1^2 and S_2^2 represent the two sample variances.

The test statistic was calculated as in equation 4.3 and evaluated against the $F_{(8,8)} = 2.59$ critical value on a 5% level of significance.

$$F = \left(\frac{103.5}{6.5} \right) = 15.921 \quad (4.3)$$

The value of 15.921 is greater than the critical value of 2.59 and we can therefore not accept the null hypothesis, concluding that the two samples do not have equal variances. We can now proceed and test whether the 2002 average linebreaks are significantly higher than the average linebreaks achieved in the 2001 season.

The null and alternative hypotheses are given in equation 4.4. Under the null hypothesis the two sample averages are equal. Under the alternative the 2002 average is higher than the 2001 average.

$$\begin{aligned} H_0 : \mu_{2002} &= \mu_{2001} \\ H_A : \mu_{2002} &> \mu_{2001} \end{aligned} \quad (4.4)$$

The appropriate test statistic is given by equation 4.5. In contrast to normal T-tests, this specific test is a one-sided upper or right hand test due to the fact that we are testing whether the one average is greater and not equal to the other. Therefore, we would only reject the null hypothesis of equal sample averages if the test statistic were greater than the appropriate critical value.

$$T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \sim t_{\alpha, \nu} \quad (4.5)$$

$$\text{where: } \nu = \frac{(S_1^2/n_1 + S_2^2/n_2)^2}{\frac{(S_1^2/n_1)^2}{n_1 - 1} + \frac{(S_2^2/n_2)^2}{n_2 - 1}}$$

The calculated test statistic is given in equation 4.6 and was evaluated against the $t_{0.05,9} = 1.833$ critical value.

$$T = \frac{(25 - 9.33)}{\sqrt{\frac{10.17349^2}{9} + \frac{2.54951^2}{9}}} = 4.4827 \quad (4.6)$$

Once again we cannot accept the null hypothesis. Therefore we can conclude that the average of the total linebreaks made during the 2002 season is statistically greater than the average of the total linebreaks made during the 2001 season.

4.5 CONCLUSION

The objective of this chapter was to assess whether the implementation of the intervention had a significant positive effect on the total number of linebreaks made during the 2002 season. To reach a conclusion the first step was to compare the number of linebreaks made in various matches played in both the 2001 and 2002 seasons. From these figures it was immediately apparent that the number of linebreaks made in the 2002 season was significantly higher than the linebreaks made for matches played in the 2001 season. The following step was to look at the factors that had the most significant impact on the increased linebreaks made during the 2002 season and from these observations it was concluded that specific running lines based on the newly implemented interventions were the major contributor towards the increased linebreaks.

The final aspect of the evaluation was to end off by doing a hypothesis test to see whether the average linebreaks in the 2002 is statistically greater than the average linebreaks made in the 2001 season. The results of the hypothesis test did indeed show that statistically the 2002 number of linebreaks were higher than the 2001 number of linebreaks.

It can therefore be concluded that the implementation of the interventions through various running lines did indeed lead to a significant increase in the total number of linebreaks made.

CHAPTER 5

INTERPRETATION OF RESULTS AND DISCUSSION

5.1 INTRODUCTION

As has been statistically proven, the intervention interceded during the 2002 Bankfin U21 Season, played a major role in the increase in the number of linebreaks achieved.

The following recommendations and observations are applicable to the future successful implementation of these new areas of focus in the coaching of backline play.

After an in-depth evaluation of all the matches was made, the linebreaks of the Blue Bulls U21 team were evaluated in the light of the discussion in chapters 3.

There were two key aspects that were to be explored in more detail:

1. the types of running lines or strike moves that achieved a successful linebreak during the season?; and
2. how much influence did the level of imposed intervention play in the successful linebreaks that occurred during the season?

These will be discussed in greater detail in the following discussion.

Table 5: Total linebreaks as identified during the 2002 Bankfin U21 Currie Cup

	BB "A"	BOR	FAL	LIONS	Natal	WP	FS	BOL	WP	LIONS	TOTAL
"Overs"	7	17	12	6	13	3	5		14	11	88
"Unders"	5	3	6	5	5	5	7		16	15	67
"1,1"	4	9	5	1	1	3	1		3		27
"Happy"	1	3					4		4	2	14
"X"		1	1		2	1	3		3	1	12
"Shark"	1	1	1			1			1		5
"ACT"	1	2	2	1					1		7
"Slap chips"			1			1			1		3
"DSP"			1								1
"O,I" Strike			1								1
Total	19	36	30	13	21	14	20		43	29	225

The most noticeable aspect from these results is the fact that of the 225 linebreaks in the season, an overwhelming number were restricted to five types of running lines or strike moves, namely:

- “Overs” (88 linebreaks);
- “Unders” (67 linebreaks);
- “1,1” (27 linebreaks);
- “Happy” (14 linebreaks); and
- “X” (12 linebreaks).

These five types of running lines accounted for 92% of the successful linebreaks achieved during the season. The two most successful means of linebreaks were interestingly enough both running lines and were not specifically aimed as strike moves.

One of the key reasons for this was the way the Blue Bulls U21 team attempted to play pattern rugby in order to create “mismatches” when they attacked the opposition’s defensive line. A “mismatch” can be described as situations where the team in possessions attacking forwards were able to run at the opposition’s backs, or where the attacking backs were able to run at the opposition’s forwards. These “mismatches” resulted in the maximum effect of a speed or power advantage over the opposition as will be seen later.

There were two specific means of beating the opposition namely by speed, or alternatively by power. At this stage of the discussion the key focus will be on those running lines and strike moves that relied predominantly on speed as there major contribution to the successful linebreak.

5.2 LINEBREAKS ACHIEVED THROUGH THE USE OF RUNNING LINES AND SPEED

If one was to look at the following tables the following observations can be made:

Table 6: “Overs” running lines

Team played	Δ in initial starting position	Δ in speed of movement	Compressed attack	Expanded attack	Decoy inside	Decoy outside	Side on contact	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”	3	7	4	1	2	2	3	7		7
BOR	5	5	3	4	7	3	6	15	2	17
FAL	3	1	4	1	5	1	6	9	3	12
LIONS	3	1		1	3	3	3	3	3	6
NAT	4		4	2	6	2	5	11	2	13
WP	1		1		2		2	1	2	3
FS	1		2	1	2	1	3	4	1	5
BOL										
WP	1		5	5	6	4	3	12	2	14
LIONS	2	1			4		2	11		11
TOTAL	23	15	23	15	37	16	33	73	15	88

There were a total of 88 linebreaks achieved from the execution of an “Overs” running line. The factors that played the most influence on the successful execution were:

Speed	(73/88)	83%
Decoy inside	(37/88)	42%

The most obvious observation is that speed played the largest part in its successful execution. There are two possible reasons for this:

1. due to the “mismatched” situations, the attacking backs were too quick for the defenders and thus were able to beat them with speed on the outside; and

2. if there was a situation where the attacking backs attacked their backs, a further two assumptions can be made, namely that the attacking backs were quicker than the opposition's backs, or the second factor namely the use of a decoy ploy on the inside created enough attention for the defenders thereby delaying their shift outwards, thus the attacking backs had more time and space on the outside in order to beat the defence with speed.

The second running line to have speed as its major part of its successful execution is that of an "X" or follow scissors running line.

Table 7: "X" running lines

Team played	Δ in initial starting position	Compressed attack	Expanded attack	Decoy inside	Decoy outside	Side on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB "A"										
BOR			1		1			1		1
FAL			1	1				1		1
LIONS										
NAT	1	1	1		1	1	1	1	1	2
WP	1		1	1	1			1		1
FS	1		2	1	1	1	1	2	1	3
BOL										
WP	1		2		3			3		3
LIONS					1			1		1
TOTAL	4	1	8	3	8	2	2	10	2	12

During the execution of an “X” running line, of the 12 successful linebreaks that occurred, the following three factors played the most predominant role in the running lines success:

Speed	(10/12)	84%
Expanded attack	(8/12)	67%
Decoy outside	(8/12)	67%

As can be seen speed accounted for 84% of its successful execution. It is important to note that speed in this instance does not apply to how attacking backs move towards each other, but instead refers to the speed with which the “one-out” striker comes into the strike.

What was clearly evident was the way the next two factors played a part in the success of the move. By combining an expanded backline attack with the bringing in of a decoy on the outside, the defenders were wrong footed and tended to move outwards on the shift too quickly. This together with the speed of the “one-out” striker coming in meant that the defenders were in no position to make the tackle thus resulting in the linebreak.

The third strike move or running line to have speed as its major contributing factor in terms of success is the “happy” running line.

Table 8: “Happy” running lines

Team played	Δ in initial starting position	Δ in speed of movement	Expanded attack	Decoy inside	Decoy outside	Side on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”			1		1	1	1		1	1
BOR	1	3	1	1	2			3		3
FAL										
LIONS										
NAT										
WP										
FS	2	2	3	1	1	2	2	2	2	4
BOL										
WP	1	3	1		2	1	1	4		4
LIONS		2			2	2	2	2		2
TOTAL	4	10	6	2	8	6	6	11	3	14

During the execution of a “Happy” running line, of the 14 successful linebreaks that occurred, the following four factors played the most predominant role in the running lines success:

Speed	(11/14)	79%
Δ in speed of movement	(10/14)	71%
Decoy outside	(8/14)	57%
Expanded attack	(6/14)	43%

Again the definition of speed in this context is the speed with which the striker came through the space that was opened up by the decoy outside. The key to the successful execution was clearly evident due to a combination of factors.

The speed of movement refers to the player passing the ball stopping, before passing the ball to the striker coming through rapidly in order to create a situation where the defenders are forced to stop. This results in the striker having the advantage of running at a space while the defenders are shifting sideways and then are forced to stop immediately.

The decoy on the outside also played an important part in drawing the inside defenders across too early and thus advantage could be taken of the space created on the inside.

The expanded attack created a situation where the spacing between the defenders was slightly wider thus they “felt” that they needed to move across earlier onto the decoy on the outside thus making the strike more effective.

The fourth running line to rely on speed is the “shark” running line.

Table 9: “Shark” running lines

Team played	Δ in initial starting position	Δ in speed of movement	Expanded attack	Decoy inside	Decoy outside	Side on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”	1		1	1	1			1		1
BOR			1	1	1			1		1
FAL	1	1	1	1	1			1		1
LIONS										
NAT										
WP			1	1	1	1	1		1	1
FS										
BOL										
WP	1		1	1	1			1		1
LIONS										
TOTAL	3	1	5	5	5	1	1	4	1	5

During the execution of a “Shark” running line, of the 5 successful linebreaks that occurred, the following two factors played the most predominant role in the running lines success:

Expanded attack	(5/5)	100%
Decoy outside	(5/5)	100%
Decoy inside	(5/5)	100%
Speed	(4/5)	80%

The “shark” running line had to be executed in the specific way as set out in figure 48. The two most significant factors to its successful execution were the expanded attacking formation and the speed with which the striker moved from the inside of the ball carrier to the outside in order to receive the pass. The concept of the decoy on the outside was also integral in the success of the strike as it opened up the space just outside the ball carrier. The decoy on the inside created a type of “legal” block on the inside so to slow down the shift of the defence across, this also contributed to the success of the striker. The expanded attack created the situation where there was wider spacing of the defence, this allowed the striker even a greater chance of being able to move through the defences line.

As discussed earlier, there are two means of braking the opposition, firstly by speed, and alternatively by power. This second aspect of power linebreaks will now be discussed fully.

5.3 LINEBREAKS ACHIEVED THROUGH THE USE OF RUNNING LINES AND POWER

If one was to look at the following tables the following observations can be made.

The first running line relying on power for its successful execution is an “unders” running line.

Table 10: “Unders” running lines

Team played	Δ in initial starting position	Compressed attack	Expanded attack	Decoy inside	Decoy outside	Side on contact	Front on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”	1			1	2	3	2	5		5	5
BOR	2	1	2	3	1	1	1	2	1	2	3
FAL	1	1	2	3	2	2	2	4	2	4	6
LIONS	1		5	1		3		3	2	3	5
NAT	1		2	1	2	4	1	5		5	5
WP	2	2	1	1	2	4		4	1	4	5
FS	2	2	2	1	2		4	4	3	4	7
BOL											
WP	3	1	7	1	1	8	2	10	6	8	16
LIONS	6		4	1	3	7	1	8	10	5	15
TOTAL	19	7	28	13	15	32	13	45	25	40	67

During the execution of an “unders” running line, of the 67 successful linebreaks that occurred, the following three factors played the most predominant role in the running lines success:

Momentum advantage	(45/67)	67%
Power	(40/67)	60%
Expanded attack	(28/67)	42%

The execution of an “unders” running line resulted in 30% (see table 3) of the total linebreaks achieved during the season. This running line was especially successful after quick recycled possession where advantage could be taken of the “mismatches” that were created, mainly through forwards running at backs.

The “unders” line made predominant use of power for its successful execution. It was also positively influenced by an expanded attacking formation as this created greater spaces on the outside for the striker to move through.

It was also evident that a momentum advantage (67%) into the contact area was necessary for the successful execution, as can be seen from table 4.

The second running line relying on power for its successful execution is the “1,1” running line.

Table 11: “1,1” running lines

Team played	Δ in initial starting position	Compressed attack	Expanded attack	Decoy inside	Decoy outside	Side on contact	Front on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”	1		1		1	1	3	4		4	4
BOR	2		3		1	2	4	6	3	6	9
FAL	2	1	2	1			3	3	2	3	5
LIONS		1			1				1		1
NAT							1	1		1	1
WP	1		2	2	2		1	1	2	1	3
FS	1	1							1		1
BOL											
WP	2	1				1	1	2	1	2	3
LIONS											
TOTAL	9	4	8	3	5	4	13	17	10	17	27

During the execution of a “1,1” running line, of the 27 successful linebreaks that occurred, the following four factors played the most predominant role in the running lines success:

Power	(17/27)	63%
Momentum advantage	(17/27)	63%
Δ in initial starting position	(9/27)	33%
Expanded attack	(8/27)	30%

As with the “unders” running line, the 1,1 running line was primarily reliant on the speed of the presentation of the ball after phase play for its success. The reason for this was that if a 1,1 was run off slow recycled possession where the defenders organisation was in place, the striker would be “double hit” by the opposition defenders and didn’t manage to get over the contact line which was behind the advantage line.

Power and a momentum advantage into the contact were vital for this running line to be successful. This “brute” force was however aided by the following two factors namely a change in the initial starting position as well as an expanded attacking formation. The reason for this became apparent after observation of the successful strikes and can be explained as follows. By shifting the backline as a unit outwards, the opposition’s defensive line became slightly too “tight” in terms of their alignment on each of their specific defenders. This aided by the slightly more expanded attacking unit, tended to create a situation where the opposition’s field coverage was not quite sufficient in order to stop the attacking backline in terms of covering all the defenders.

This resulted in the defenders not being able to get into a position to stop the player coming in on the “1,1” strike. If the defender was able to get into this defensive position, he was however unable to make a dominating tackle thus the striker was able to break through the defensive line. This occurred most often, thus being seen by the high values of the contact involved in the running line.

After the evaluation of all the striking situations during the Blue Bulls Bankfin U21 season of 2002, the following scientific principles were identified as the reasons why the intervention according to the laid down principles during the coaching of the team resulted in a marked increase in the number of linebreaks.

When the Blue Bulls team endeavoured to break the defensive line of the opposition, there were certain scientific principles that played a role in whether the attempted linebreak was successful or not. It became evident through the course of the study that it was the application of these scientific laws of movement that was in the most cases the reason for a successful linebreak.

In order to attempt to explain the results a discussion concerning force, Newton's laws of movement as well as other pertinent concepts will be explored.

As has already been stated, the object of an attacking strike is to drive forward with the intention of beating the defender while attempting to cross the centre line of the contact area by applying maximum contact forces on the opposition defender (McClymont & Cron, 2002).

According to Newton's principles, objects move when acted upon by a force greater than the resistance to movement provided by the object. This force involves the interaction of two objects and produces a change in the state of motion of an object by pushing or pulling it (Beer & Johnston, 1990; Young, 1992; van Staden et al., 1992; Hamill & Knutzen, 1995).

This statement can be applied directly to contact situations arising from attempted linebreaks. As a result of this collision and in this context, a force can be defined as any interaction, a push or a pull, between two objects that can cause an object to accelerate either positively, i.e., break through the tackle, or negatively, i.e., be tackled backwards (Hamill & Knutzen, 1995).

5.4 CHARACTERISTICS OF A FORCE

Forces are vectors and as such have the characteristics of a vector – magnitude and direction. Magnitude represents the amount of force being applied. It is also necessary to state the direction of a force because the force could have a different effect, depending, for example, if the force is pushing in one direction instead of pulling in the other (Beer & Johnston, 1990; Young, 1992; van Staden et al., 1992; Hamill & Knutzen; 1995).

This would imply that the running lines that gave the striker a momentum advantage over the defender with sufficient space to play through while coming in on an advantageous angle were the most successful strikes that resulted in the linebreaks.

Vectors are usually represented by arrows, with the length of the arrow indicating the magnitude of the force and the arrowhead pointing in the direction in which the force is being applied (Beer & Johnston, 1990; Young, 1992), e.g.,

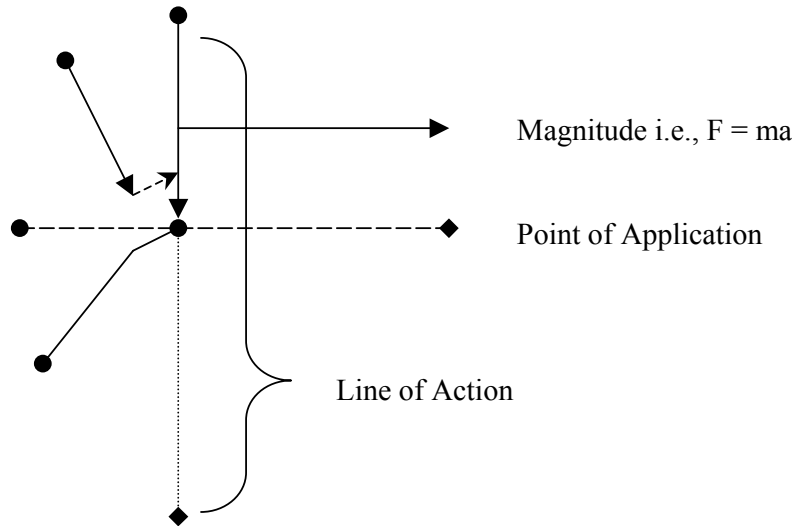


Figure 56: Vectors involved in a linebreak

Forces have two other equally important characteristics: the point of application and the line of action. The most important of these two characteristics is the point of application of a force which can be described as that specific point at which the force is applied to an object or in this case a person (Hamill & Knutzen, 1995).

This point of application in a rugby context takes place where the striker and defender meet at impact. This is probably the most important aspect of the attempted linebreak as the team that dominated this area was the team that had the greatest likelihood of either achieving or stopping the linebreak.

5.5 SPEED / FORCE APPLICATION

The magnitude of force that is applied by one player upon the other is proportional to the mass of the player, and the rate of change of velocity (acceleration) at impact.

When evaluating the strike moves it will be assumed that both the attacker and defender were of similar mass. The principle of conservation of momentum ensures

that the player that is moving faster at impact will apply a greater force and that he will tend to maintain his forward momentum rather than be tackled backwards (McClymont & Cron, 2002).

An aspect of speed / force application that is more appropriate to the rugby situation involves how the striker and defender meet at impact / contact. As mentioned earlier, the speed into the strike zone plays an important role in the conservation of momentum thus resulting in a greater force being applied onto the defender.

There were four possible contact angles that resulted in different outcomes. Although the amount of force and momentum taken into the contact had to be sufficient so to take the striker over the point of application, i.e., he had a momentum advantage, the end finishing result was dependant on the angle with which the striker made contact with the defender.

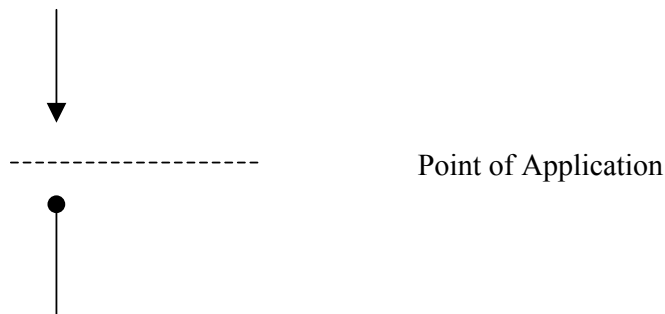


Figure 57: Head on head contact (Domination of the tackle with greater momentum)

In this situation the player with the greater momentum or force into the contact area will get over the point of application. There were practical problems for the striker that developed, namely that if the striker did dominate the tackle and continue moving forward, it was a difficult contact area to manage for his support players as the striker tended to fall over the defender thus excess bodies were bundled in a small area thus the ability of the supporting players to recycle the possession in that area was made difficult.

Another problem that was identified in this situation was that it more often than not occurred that there were two tacklers in this situation who were able to execute a “double hit” or “gang tackle” involving more than one tackler hitting the striker thus the striker did not get over the contact line or line of application. It also became evident that this type of strike occurred in the absence of decoy runners working with the striker.

The reason for this was that it tended to take place from quick, recycled possession with the ball carrier running onto the defenders who were too slow in being able to realign in their defensive positions quickly enough. It was unsuccessful from slow ball and if the ball wasn't turned over in contact the players were tackled backwards putting the attacking team under pressure.

After continued evaluation of matches it was determined that this type of strike was effective, however, it could only be successful from quick recycled ball with players coming out of a stream running at ill prepared defenders. In this situation the defenders were not mechanically strong due to lack of time in preparation for the tackle and not through manipulation from the attacking teams decoy runners and running lines.

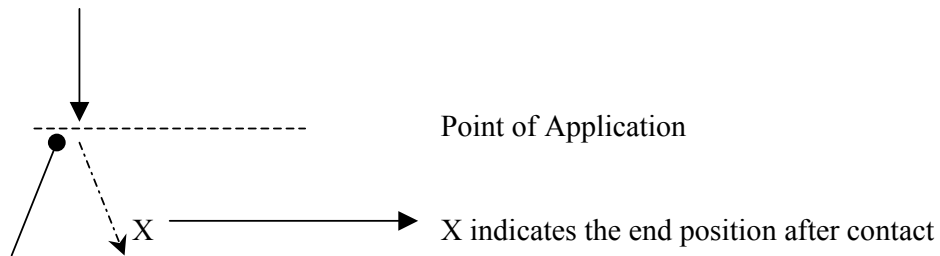


Figure 58: Head on contact (domination of the tackle)

The tackled player was able to dominate the tackle and there were two results that occurred during the matches played. On occasion players broke through the tackle resulting in a clean break. It also occurred that the striker was able to position himself in a way to be able to get an off-load away in the tackle. The reason that this type of contact was the most successful was that the striker was able to take maximum

momentum into the tackle. He also had the advantage that when he made contact with the defender it was made with his “hard” body parts that the defender had to contend with as he was running at the defender and not away from the defender. This meant that the striker was better equipped to “bump” off the tackle. As can be seen from the probable end position after the tackle, the line of action is still in favour of the striker thus the advantage would lie in the hands of the attacking team.

This form of strike tended to take place off organised play where the attacking team endeavoured to break through the defence with force. This form of strike normally took place with the use of decoy plays however they tended not to be as successful in manipulating the defenders as would have been liked.

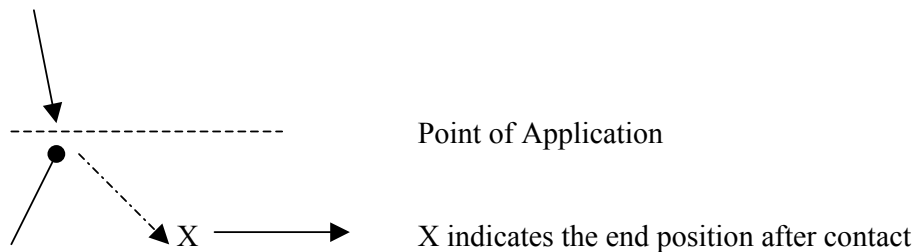


Figure 59: Side / Head on contact (domination of the tackle)

The tackled player was able to dominate the tackle however was not as effective as in the previous examples. In this situation, the striker was still able to dominate the contact and be able to impose his “hard” body parts onto the defender however their was more “soft” tackling area exposed and if the defender was able to track the striker well it could make the contact situation less pleasurable for the striker. In terms of the probable end position of the striker after the contact, it still held a favourable result with the attacking team maintaining their forward momentum.

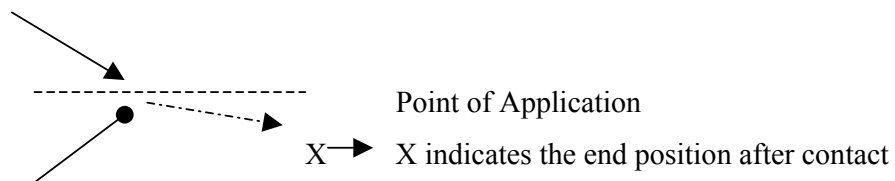


Figure 60: Side on contact (non - dominance of the tackle)

In this situation the tackler dominated the contact area. When this happened, the attacking supporters found it difficult to support the striker as the momentum was with the defender who was able to tackle the striker backwards. The striker was still to a degree able to maintain his go-forward momentum, however it was not enough to continue the go-forward dominance which is required to give the attacking team the necessary momentum so to be able to dominate the defence.

The whole situation resulted in poor outcomes for the attacking team, namely,

- The tackler was able to execute a dominating hit on the striker resulting in a positive psychological advantage for the defenders.
- The angle of how the striker and tackler met lead to the tackler's "softer" body parts being exposed thus resulting in a more debilitating tackle being executed.
- The tackle direction took the striker towards the next defender out which resulted in that defender being able to get to the breakdown point first thus the possibility of a turnover.
- The angle the cleaners come from makes it difficult for them to come in from an on-side position, as they have to approach the tackle area from the hind most feet.

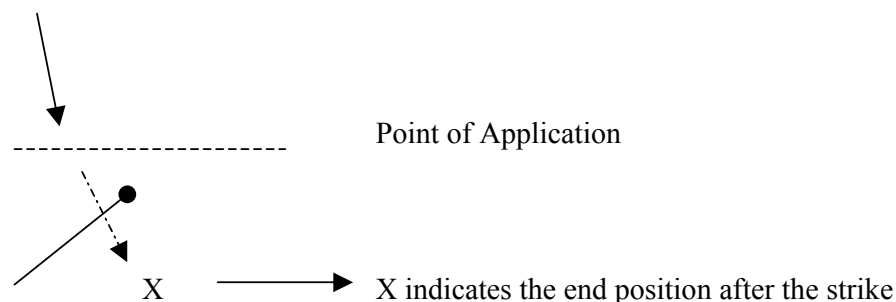


Figure 61: Clean break

A clean break was the result of three situations that took place, it either occurred due to the decoy ploys together with the attacking running lines manipulating the defenders to such an extent that they could no longer handle the defensive situation, or there was a wide strike with too many extra players on the outside and the ball was successfully shifted outwards and the clean break occurred on the outside.

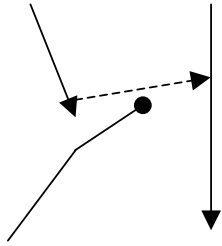


Figure 62: The use of an extra player on the outside

The third situation resulted from an outside gap being taken using an “overs” running line and the striker having a running speed advantage over the defender.

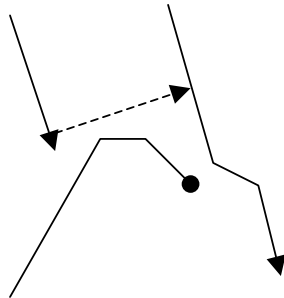


Figure 63: An outside gap taken with a line being broken by speed

As can be seen the mass and velocity with which the striker enters the impact / contact area is important, however, the angle with which the striker comes in on also influences the striker's ability to “use” his momentum and force. The running lines that the team executed that had an advantageous attacking running line tended to result in more positive outcomes when executed optimally incorporating all the aspects mentioned in the section regarding the experimental intervention.

5.6 THE DIRECTION OF THE FORCE

The direction in which each player applies forces is determined by the body posture of the player in relation to the point of application (Bartlett, 1999), and in relation to others (Quarrie & Wilson, 2000).

In a contact situation where the attacking ball carrier impacts on the defender the most important emphasis on body posture is applicable more so on the defending tackler than as is appropriate to the striker. The striker is focussed on hitting through a space near to the tackler with as much momentum as possible with the ultimate goal of breaking through his grasp.

For the tackler however, the importance of vertebral column alignment in the transfer of his tackling force is of importance. The phrase “spine in line” is commonly used to describe the optimum body position of a player approaching a tackle: the tackler’s shoulders and hips should be at the same height, and his head up to transmit forces through the shoulders at an angle as near to horizontal as possible. An essential component of body posture in the tackle must be the angles at the hip, knee and ankle joints, both prior to and during force application (ACC Rugby Smart, 2001).

This is a significant factor in force application technique (McClymont & Cron, 2002). The importance of these postural concepts is as applicable to the striker’s level of success as what his momentum is when impact is made. The reason for this is that as an attack needs to be organised according to the principles as laid out in the section regarding the intervention to be applied to the team, if the tackler is not able to position himself according to the above mentioned optimal defending body positioning, even a lack in striking momentum from the striker would be sufficient to break through the tackler’s arms and achieve the linebreak.

5.7 ENERGY

Energy is the capacity to do work. In biomechanics the main concern is with mechanical energy. Mechanical energy has two forms – kinetic energy and potential energy. Kinetic energy (KE) refers to the energy resulting from motion. An object or person possesses kinetic energy when it is in motion, which is when it has velocity. Linear kinetic energy is expressed algebraically as:

$$KE = \frac{1}{2} mv^2$$

where m is the mass of the player and v is the velocity with which he moves. What is important to notice from the equation is that the velocity is squared. What this implies is that any change in velocity will greatly increase the amount of energy the player has when approaching the impact area (Hamill & Knutzen, 1995).

The way in which this aspect of science influenced our attacking strikes can be seen in the way the striker was able to accelerate rapidly as he went for the gap. It was noticeable that if the striker approached the strike zone with a uniform velocity, the defenders were able to get into place and were better able to stop the strike. However, when the striker was able to accelerate into the strike it seemed as though the defender was lured into a feeling of being in control of the situation. With the sudden acceleration the striker caught the defender off guard and secondly the increased speed allowed the striker to enter the impact area with greater energy.

5.8 NEWTON'S FIRST LAW – THE LAW OF INERTIA

The fundamental role of force is to change the state of motion of a body on which the force acts (Beer & Johnston, 1990; Young, 1992; van Staden et al., 1992; Hamill & Knutzen, 1995).

Newton's first law of motion states:

“Every body continues in its own state of rest, or of uniform motion in a straight line, unless it is compelled to change that state by forces impressed on it” (Beer & Johnston, 1990; Young, 1992; van Staden et al., 1992; Hamill & Knutzen, 1995).

This implies that if no net force acts on a body, the body either remains at rest or moves with a constant velocity in a straight line. After observation of the games played during the season, it became evident that Newton's first law was applicable to how the opposition defenders were manipulated into weak defensive positions by “imaginary” forces created by the decoy runners on either side of the strike zone.

During the execution of the strike, the striker and defender met at the contact area. However before this contact area develops, the players move towards each other with different velocities and with different lines of approach.

This approach by both the attacker and defender results in the concept of inertia becoming evident that can be defined as the tendency of a body to remain at rest, or to keep moving once it has been set in motion. The situation preceding contact involves many forces acting on the players before, during and after contact. The use of running lines creates “imaginary” forces that are exerted on the defenders in order to manipulate them.

When these forces act on the defenders, it changes the state of motion of the defenders. A player who is initially at rest will start to move. If the player is moving, a force in the opposite direction to the motion will cause the player to slow down or stop. The result is that if a defender has line of defence, and a decoy runner together with the ball carrier’s running line does not manipulate the defender, the defender will not have to change his path of run and will be able to maintain his defensive line and thus be able to stop the attack.

If however the decoy runner and ball carrier are able to exert a force on the defenders and manipulate them accordingly, their defensive line can be changed, thus creating conditions that could be conducive to a line break. What became evident was that the importance of the decoy ploys to take the defenders out of their defensive shape was instrumental to the success of the strikes and without them our level of linebreaks would not have been as high as it was.

5.9 NEWTON’S SECOND LAW – THE LAW OF ACCELERATION

“The change of motion is proportional to the force impressed and is made in the direction of the straight line in which the force is impressed” (Beer & Johnston, 1990; Young, 1992; van Staden et al., 1992; Hamill & Knutzen, 1995).

Newton's second law generates an equation that relates to force, mass, and acceleration. This relationship is:

$$\text{Force} = \text{mass} \times \text{acceleration}$$

or

$$F = ma$$

In this equation, the force is the net force acting on the object in question, that is, the sum of all the forces involved when the defender attempts to halt the striker who is attempting the linebreak. In adding up the all the forces acting on the defender it is important to take the direction of the forces into account. If the net force produces acceleration, the accelerated object, i.e., the striker, will travel in a straight line comparable to the line of action of the net force (Hamill & Knutzen, 1995).

5.10 MOMENTUM

The factor that probably had the biggest influence on the success of strikes was the aspect of momentum of the strike on impact. What became evident during the season was the fact that when the striker and defender met, if the striker had sufficient momentum, if he wasn't able to break through the tackle, he was able to get over the contact line resulting in good go-forward possession from which attacking play could continue (Evert, 2001a).

Momentum is closely related to the force the striker takes into an impact situation between the striker and the defender. By re-arranging the equation described by Newton's second law, it becomes possible to determine what the momentum is of the striker when he enters the impact area.

Acceleration is described as $\frac{dv}{dt}$

By substituting this expression into the equation of the second law:

$$F = \frac{mdv}{dt}$$

The product of mass and velocity in the numerator of the right hand side of the above equation is known as the momentum of the striker. Momentum can thus be described as the quantity of motion that the striker takes into contact. Finally it should be noted that the force is equal to the time rate change of momentum. To change the momentum of the striker, an external force must influence the striker that he has to change. The momentum may increase or decrease, but in either case, an external force is required (Hamill & Knutzen, 1995).

The reason that momentum is vital to the success of a strike is that even if all the other aspects of the attacking play that is applied to the coaching of the team is correctly executed, if the striker doesn't have a superior force and momentum on impact the strike will not be successful. The defender will have sufficient force to be able to cancel out the strikers momentum, thus the strike will be ineffective.

This law affects the outcome of contact situations when the striker and defender meet. A further application of it can be seen in the following discussion: A key fault many inexperienced players made was to slow down once they received the ball as they were to make contact with the opposition defender. This had a marked influence on the player's momentum into the strike. If one was to give a hypothetical example of the force a striking player would exert in terms of his momentum, it could look as follows:

If a striker has a mass of 85 kg and is running at a speed of 4.5 m/s, his momentum would be:

$$\begin{aligned} p &= \text{mass} \times \text{velocity} \\ &= 85 \text{ kg} \times 4.5 \text{ m/s} \\ &= 382.5 \text{ kg-m/s} \end{aligned}$$

This value indicates the momentum the striker would have if he made impact with the defender without slacking off during the execution of the strike. As previously mentioned, one of the faults made by the players was that they tended to slow down as they were about to make contact with the opposition. If one was to adjust the equation appropriately, it becomes noticeable that the amount of momentum the player takes into contact becomes drastically reduced.

$$\begin{aligned} p &= \text{mass} \times \text{velocity} \\ &= 85 \text{ kg} \times 2.5 \text{ m/s} \\ &= 212.5 \text{ kg}\cdot\text{m/s} \end{aligned}$$

It becomes evident that the striker's momentum decreases from 382.5 kg·m/s to 212.5 kg·m/s a decrease of 170 kg·m/s. This shows a decrease of 170 kg·m/s in momentum into the strike.

It was obvious that the players who were more accustomed to striking were better able to impose the maximum amount of force and momentum into each strike. The following was identified as possible reasons why the more experienced players were able to maintain their momentum into a striking situation.

1. The more experienced players had been exposed to the scientifically based strength programs for a longer period of time and thus were both physically and mentally better equipped to apply maximum force and momentum into the strike. They tended to have more confidence in the physical ability of their bodies and tended to not hold back when going into contact.
2. Another of the reasons why players tended to slacken off in velocity before contact was their inability to identify where the attacking space was and thus be able to pick the area of impact and apply full attack there. They didn't possess the "feel" necessary for identifying where the space was to open up and thus had to adjust their line of strike by slowing down and then moving to where the space was. The key coaching point of the execution of the strike was to create the situation where the striker made contact with the defender's arms and not his shoulder, this made the possibility of a linebreak higher as

the defender was forced into a situation where he had to grasp and was not able to dominate the tackle situation.

Wakeman (2002) makes an interesting observation regarding attentional focus and reaction time. He feels that the ability to focus one's attention (i.e., to read) and react in explosive sports often appears to be at least as important as movement time for successful power performances.

Watching a striker get flattened by a defender on a misdirected strike illustrates this point. In many cases the striker gets crushed not because he was not explosive, but because he did not have a correct read (focus) and / or did not demonstrate good reaction time.

Athletes can have awesome explosive capabilities from the neck down but never get to use them effectively because of limiting factors (mental focus problems and reaction time deficiencies) from the neck up. Athletes may have a big, powerful gun (body) but if they cannot pull the trigger (read and react appropriately) under competitive conditions, the size of the gun and speed of the bullet (explosive movement speed) become irrelevant.

Few, if any, other factors influence the expression of sport explosiveness more than attentional focus and reaction time.

This aspect of attentional focus and reaction time was influential in every striking situation by the teams attacking units. Due to the dynamic nature of the game it never occurred that the defenders and strikers met at the same situation, at the same time or in the same place. This meant that the space through which the striker was to move varied as well as the distance between the spaces through which the striker was to move varied. This in a rugby context was the area where the players needed to apply their attentional focus and reaction time.

In order to discuss this application of attentional focus and reaction time it is necessary to recap on the concept of taking momentum into the strike. As was indicated earlier, if a striker decreases his velocity into contact, he dramatically decreases his amount of momentum he can take into the contact area.

The difficult aspect the players have in this regard is that they tended to battle with the way their ability to identify the space and then to go for the strike. At times it occurred that they did not get their striking angle correct and then had to adjust in order to “hit” the space. This is not something that can be coached however the player’s ability to adjust can be improved thus the amount of momentum taken into contact is not affected too dramatically.

When this problem was identified, the key factor that played a role in keeping the momentum was the type of movement style used when changing direction. Through evaluation it became evident that if the player changed direction in a way that maintained normal running technique then the change of direction did not affect the momentum of the player into contact.

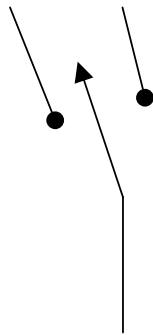


Figure 64: A change in running technique that does not dramatically reduce the amount of momentum into contact

The mistake the players tended to make which had a direct result on the amount of momentum taken into contact was that they tended to “shuffle” side ways and then tried to accelerate forward. This created the situation that where the player who just adjusted his line of strike to subtle sideways shoulder adjustment to change the line of movement managed to keep his momentum, the players who “shuffled” tended to “lose” a significant amount of momentum and then still had to accelerate from a “standing” start.

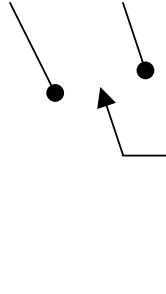


Figure 65: A change in running technique that does dramatically affect the amount of momentum into contact

Once this aspect was adjusted the player's momentum in contact was maintained at a reasonably high level for most of the situations evaluated.

5.11 NEWTON'S THIRD LAW – THE LAW OF ACTION–REACTION

“ To every action there is always opposed an equal reaction; or, the mutual action of two bodies upon each other are always equal and directed to contrary points ” (Beer & Johnston, 1990; Young, 1992; van Staden et al., 1992; Hamill & Knutzen, 1995).

Newton's third law illustrates that forces never act in isolation but always act in pairs. This implies that when two objects interact, i.e., when the force executed by a striker is counteracted by a force equal and opposite exerted by a defender, these forces are equal in magnitude but opposite in direction. The result is that these two forces cannot cancel each other out since they act on and may have a different effect on the objects, i.e., the player applying the greater force is not moved backwards. To explain how this affects two objects coming into contact with each other, an example involving a person landing from a jump will be used. A person landing from a jump exerts a force on the earth, and the earth exerts an equal and opposite force on the person. But because the earth is more massive than the individual, the effect on the individual is greater than the effect on the earth. This type of situation can be applied to one where the striker and defender meet at impact. The forces don't cancel each other out, however they do have a different effect on either the striker or defender depending on the result in contact (Evert, 2001a).

5.12 CONCLUSION

Many sports require the expression of great speed and power for success. There are many areas and strategies currently available to improve sport explosiveness. At the present time, there does not appear to be one best method or recipe to improve speed and power for all athletes in all sport situations. Each sport, position, and circumstance should be analysed to decide how speed and power could be modified to maximize performance.

Realistic training and performance goals should then be set based on the speed and power improvement possible. Coaches and athletes need to understand that motor abilities like speed of limb movement, explosiveness and flexibility, to a large degree, are genetically predetermined.

For example, Wilmore (1982) suggests that sprint speed may only be enhanced about 10% through training. Olympic history supports this hypothesis. In 1900 Jarvis, from the USA, set the Olympic 100-meter dash at 11 seconds. In 1980, Wells from Germany, set a new 100-meter dash mark of 10.25 seconds, an improvement of only 0.75 seconds over an eighty-year period (Komarek, 1998).

This actuality tells all that speed and explosiveness can be improved, but not to a large degree. It suggests to coaches that recruitment of gifted (explosive) athletes should be the first priority (if speed and explosiveness are an important part of the game). More importantly, it tells competitors that the purchase of magical training recipes and equipment are ill advised at best. The demonstration of sport specific explosiveness comes from a combination of genetics; intelligent coaches who know how to communicate their training knowledge and athletes who are motivated to use that knowledge (Wakeman, 2002).

For this reason a coach can influence the performance of his team, however, there will always be limitations and problems involved in the striving towards this higher level of performance. Coaches shouldn't put boundaries onto their creativity in coaching, it is these ideas that together with the coaches ability to mix the science and art of coaching on the rugby field that will result in the team coming close to achieving all that they can in planned attacking backplay.

5.13 RECOMENDATIONS

After all striking situations were evaluated during the season, the following key aspects were identified as cardinal to successful linebreaks

The following forces were involved and played an integral part in the success of linebreaks:

- speed of movement (velocity) of both the striker and defender.
The velocity of the striker at the impact is the most important factor affecting the force and momentum, if the striker has a momentum advantage it will ensure a more effective strike;
- the mass of each player.
As has been discussed, momentum and force are both influenced by the mass of the striker. This factor has less influence on the striker's momentum and it is also not possible to influence this variable, it does play a role in the success of a strike;
- the centre of mass of the defender.
This involves the manipulation of the defender's shoulders so that their centre of mass is such that they are not able to adjust their body positioning so that they are optimally able to ward off the attack;
- the striker should have a momentum advantage.
This will create the situation where the striker is able to break through the tackle or otherwise be in a position to get over the contact line and thus ensure good go-forward momentum for the team; and
- the striker should have a kinetic energy advantage.
This together with the momentum will give the striker an advantage when entering the contact area.

The following situations existed and influenced whether a strike was successful or not.

- The striker had sufficient momentum to break through the tackle, i.e., the defender was momentarily forced to stand still when the tackle was to be executed.
- The defenders were mechanically weak and could not re-align to be able to be in a position to make the tackle, i.e., the defender was manipulated into moving in the wrong direction and couldn't reverse their momentum.
- The defenders were drawn away from the strike zone so that there was a hole through which the striker could move, i.e., the defenders were overloaded with defensive options.
- The striker is momentarily stopped in contact however is able to offload to a trailer coming through in support.
- The defenders were kept in their defensive channels as long as possible before being "allowed" to shift outwards, i.e., there was a preservation of space on the outside and the covering defence were committed on the inside.
- 15 vs 7 attack, i.e., by running at the defender you force him to wait for the attack as a defensive decision has to be made. This allows the attackers to get in ahead of their own forwards allowing the supporters coming through to be able to run onto the situation and not backwards before being able to the approach the facet.

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APPENDICES

APPENDIX A

ABBREVIATIONS


Δ = Change in

DIAGRAM SHAPES

 = Ball carrier's path

 = Defender's path

 = Ball's path

 = Defender in his defensive shape

 = Scrum

APPENDIX B

Comparison of the number of linebreaks versus the final scores of the matches played during the 2001 and 2002 Bankfin U21 Currie Cup season:

2001			2002		
Opposition	Total Linebreaks	Score	Opposition	Total Linebreaks	Score
NW	11	33-20	BB "A"	19	19-24
PUMAS	25	45-10	BORDER	36	50-13
FALCONS	12	47-37	FALCONS	30	34-19
LIONS	9	38-23	LIONS	13	46-50
WP	12	27-15	WP	14	40-32
BOLAND	9	31-23	BOLAND		50-23
NATAL	7	21-22	NATAL	21	28-18
FS	6	33-50	FS	20	36-27
WP	6	37-47	WP	43	43-24
			LIONS	29	35-35
Total	97	312-247		225	381-265
Average per match	11	35-27		25	38-27

APPENDIX C

The level of significance regarding the imposed intervention on the successful linebreak:

	BB "A"	BRD	FAL	LIONS	NATAL	WP	FS	BOL	WP	LIONS	TOTAL
Total Linebreaks	19	36	30	13	21	14	20		43	29	225
Δ in initial starting position	6	10	11	4	6	6	7		9	8	67
Δ in speed of movement	7	9	2	1			2		4	3	28
Compressed attack	3	4	6	1	6	3	5		7		35
Expanded attack	8	14	11	7	5	6	6		18	4	79
Decoy inside	5	14	15	5	7	7	5		10	5	73
Decoy outside	7	8	8	4	5	8	5		13	6	64
Side on contact	10	12	12	8	11	5	6		15	11	90
Front on contact	5	5	6		2	1	4		3	1	27
Momentum advantage	11	8	10	4	7	6	6		15	10	77
Opposition beaten by power	11	11	13	7	9	8	8		13	5	85
Opposition beaten by speed	8	25	17	6	12	6	12		30	24	140

APPENDIX D

The following observations were made from the indicated values:

Total linebreaks in all matches played		225
Cleanbreaks	108	
Contact involved in the linebreak	117	
Δ in initial starting position	(67/225)	30%
Δ in speed of movement	(28/225)	12%
Compressed attack	(35/225)	16%
Expanded attack	(79/225)	35%
Decoy inside	(73/225)	32%
Decoy outside	(64/225)	28%
Side on contact	(90/225)	40%
Front on contact	(27/225)	12%
Momentum advantage	(77/225)	34%
Opposition beaten by power	(85/225)	38%
Opposition beaten by speed	(140/225)	62%

APPENDIX E

“Slap chips” running line:

Team played	Δ in initial starting position	Expanded attack	Decoy inside	Decoy outside	Side on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”									
BOR									
FAL	1	1	1	1			1		
LIONS									
NAT									
WP	1	1	1	1			1		
FS									
BOL									
WP		1	1	1	1	1		1	1
LIONS									
TOTAL	2	3	3	3	1	1	2	1	3

APPENDIX F

“DSP” running line:

Team played	Δ in initial starting position	Expanded attack	Decoy inside	Decoy outside	Side on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”									
BOR									
FAL	1	1	1	1			1		1
LIONS									
NAT									
WP									
FS									
BOL									
WP									
LIONS									
TOTAL	1	1	1	1	1		1		1

APPENDIX G

“O,I” running line:

Team played	Δ in initial starting position	Decoy inside	Decoy outside	Side on contact	Momentum advantage	Opposition beaten by speed	Opposition beaten by power	Total linebreaks
BB “A”								
BOR								
FAL	1	1	1	1	1		1	1
LIONS								
NAT								
WP								
FS								
BOL								
WP								
LIONS								
TOTAL	1	1	1	1	1		1	1