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‘The Influence of the ‘Play the ball’ in Semi-Professional Rugby League’

Dissertation submitted under the discipline of Performance Analysis

by

Callum Wilkinson

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Abstract

The aim of this study was to explore the effect the speed of the 'play of the ball' had on match play using the measurable performance indicator of 'metres gained'. This was achieved by using a specifically created computerised analysis system that was able to observe team performance combined with a manual question list to help validate the study used in junction with a video questionnaire to analyse perception on 'play of the ball' speed. The match analysis and video question list was conducted using (n=15) South Wales Scorpions games from the 'Championship 1' using Nacsport computer software. The question list was created online using MYTPE. The intra-observer reliability showed the mean reliability level was very high with 0.02 accuracy. The research established the winning team has a mean advantage of (0.09s) per play of the ball and a mean (127m) per game advantage. The 10 largest gains across both sides in metres, came from a mean (4.6s) play of the ball time compared to the standard mean (5.5s). A correlation was shown between more metres gained the faster the play of the ball is. As the attacking set progressed the play the ball times decreased and metres gained increased. The video question list to understand players perception of the speed of the play the ball showed that (5s) was seen as acceptable play of the ball speed supporting the average play of the ball time seen in the match analysis of (5.5s). The question list showed large agreement that the current theory of coaching practices are the same or similar across the performance continuum and supported the research. Further research should focus on field position and type of carry to explore the effect of the speed of the play of the ball further.
CHAPTER I

INTRODUCTION
1.1 Introduction

The 1890’s saw the birth of rugby league in the north of England due to class differences in the game of rugby football (Collins, 1998). The sport is played with thirteen players aside and has a limit of six tackles before the ball is turned over. The sport has developed an attacking focus in which the rule changes of 1992 have increased the offside line from 5m to 10m giving the attacking team greater time on the ball in which to score from (Gabbet, 2005). Since the introduction of the 10m rule, tactics employed by teams have changed, however there is little empirical research in which to support this claim (Eaves et al., 2008).

There is sufficient research into how physiological factors affect performance within the sport of rugby league (Meir et al., 2001b). Despite this, little has been conducted into the area of team performance and the tactics used when focusing on the contact area, specifically how the ‘play of the ball’ (POB), can be used to a team’s advantage (Eaves et al., 2008). A ‘play of the ball’ is defined as the act of bringing the ball back into play after a tackle by the ball carrier ‘heeling’ the ball backwards (RFL, 2013). The RFL (2013) have defined a tackle as when the player in possession is tackled by an opposing player or players. The tackle is then completed when the player in possession’s momentum is stopped or the ball carrying arm comes in contact with the ground. Thus there has been a focus on the contact area and tackle process in order slow the opponents ruck speed down and control the opponents momentum across all levels of rugby league. For this reason coaches spend a great deal of time on slowing the oppositions POB, as it is suggested that if it is effectively slowed the defending team will have a greater amount of time to reorganise for the next attacking play.

Considering then the potential importance that the POB holds in rugby league, it is clear that further research into its tactical relevance will be of great value to team performance. Empirical research into this area will provide comprehensive feedback into the importance of the POB within a match situation. From which coaches across the whole spectrum of ability will benefit from conclusive data into how the POB translates from training into a competitive setting. As a result the influence of the POB over the outcome of a match will be measured and coaches throughout the
sport will be able to assess whether the time put into coaching this theory is justified. This research aims to reveal whether a faster play of the ball will result in more metres gained during a match. The use of metres gained as the measured variable will provide a relevant performance indicator from which conclusions can be drawn upon.

Previous research whereby a notational analysis was conducted of both rugby union and league sides in the northern hemisphere, such as Eaves’ (2006) study of ‘the convergence of the twain’, has suggested that since the 10 metre rule has been implemented within rugby league more successful teams such as Wigan, Leeds and St Helens have had a faster average POB than teams lower down in the same league. Eaves and Evers (2007) showed that this could suggest a link between controlling POB and the winning of games. However no ‘definitive statement’ regarding POB can be taken from the study as it was suggested that analysing performance in terms of winning and losing can be problematic (Eaves and Evers, 2007). Within this specified field Eaves and Evers (2007) concluded a need to further examine the POB to clearly define and analyse the importance of this performance indicator.

To explore this aspect of the game this study uses both quantitative and qualitative methods to explore the research question. In determining whether there is a link between the speed of the POB and metres made, 15 games of rugby league have been analysed. This was done by looking at the time the whole tackle process took to complete and then noting how many metres were gained as a result of the play. Because of the relatively small amount of empirical research into this area a question list has been created to provide a basis and validate the research being conducted. The data determines at what point a POB may become acceptable from a coaches point of view; this required a video based question list in which a number of POB clips were shown (with different time values) and the participants commented on whether the play was fast or slow. Implementing a triangulation of research methods will provide effective and relevant research into the relatively unexplored area of the POB which can be used by coaches and players alike to inform and validate current coaching practices.
2.1 Rugby league

Rugby League is a full contact invasion sport that originated in England (Collins, 1998). Rugby League was created due to a split within two factions, one in the north (The Northern Rugby Football Union) and ‘The Rugby Football Union (RFU)’ in the south. The split occurred when the RFU decided that they were to ‘enforce’ the amateur values of the sport, which did not allow the ‘broken time payments’. The broken time payments gave compensation to the players who missed time off work. This was a crucial part of the sport for the northern players, as most were coal miners or factory workers.

The rules of Rugby league allow the attacking team 6 tackles in which to score before the ball is handed to the opposition. Points can be scored by tries, drop goals and penalty, each worth four, one and two respectively. A team defends by stopping a team gaining territory up the field by tackling the ball carrier. A Rugby League side contains thirteen players on field and four players on the bench. The Thirteen is split between six forward and seven backs (Bamford, 1989).

The players on the team range in shape, size and have to have a speciality of skill for that position. The forwards are generally good ball carriers who have a very high level of fitness and adept in the contact area whereas the backs have good evasive skills linked with good handling skills and game awareness. Rugby league is a very attritional game by nature in which field position is worked in order to gain effective scoring opportunities. Because of the attritional nature of the sport a very high level of fitness is needed to be able to compete, therefore rugby league is favoured by athletic and dynamic players (Bamford, 1989).

Rugby League is run by the Rugby League International Federation (RLIF) who delegates responsibility to National Governing Bodies (NGB) in the respective countries. The RLIF has responsibility for the overall running of the sport decided on laws and the ‘direction of the sport’. The Domestic running of the Leagues are left up to the NGB’s, the Rugby Football League is the NGB that is responsible for the English national team and the running of the ‘Super league’. The Super league is the elite level competition in which fully professional players compete against each other in order to win the Grand Final.
In 1992, the game of Rugby League changed to give the attacking team a large advantage as the original defensive onside mark after a tackle was doubled from 5 metres to the current 10 metres (Eaves et al. 2008). The reason that this rule change was such a decisive change in the sport is that players have to retreat double the amount of distance covered after every tackle, to put them back onside before they are allowed to take part in the next passage of play.

2.2 Performance Analysis

This study used performance analysis as a prime method in which to investigate the research question. Performance Analysis is defined as gathering different forms of data to help players reach and surpass their goals of performance. Performance analysis is widely accepted to help athletes to understand the barriers from them achieving successful performance on the results that are found (Hughes and Franks, 2008).

Performance analysis is classed as a form of extrinsic feedback. This is because data is relayed to the athletes from an outside source. This extrinsic feedback allows athletes to compare and contrast their own performance against players of a higher level and decide what can be improved in their own game to reach optimum performance. The use of performance analysis is widely believed to speed up the learning process, especially in complex and challenging tasks (Hughes and Franks, 2008).

Performance analysis can be divided up between real-time analysis and lapse-time analysis. Real-time analysis methods may take the form of hand-notation or computerised analysis at a location, which can be supplemented with lapse-time analysis. Examples of commercial analysis programmes are Sportscode, Dartfish along with others such as Nacsport and Focus.

It is widely accepted that notational analysis can be used across all sports to improve performance (Hughes and Franks, 2008). Performance analysis is carried out in many fashions, “The most common form consists of video based time-motion analysis via notational methods” (Spencer et al., 2004). Hughes and Franks (2008) stated that notational analysis documents significant events of a performance in a
reliable way that can be used to provide an action plan for the participant or team that is being analysed.

Through developments in technology and an increased need for analysis in sport, computerised analysis programmes have become the preferred tool of most analysts for the efficiency and accuracy (Hughes and Franks, 2004). Computer software is widely believed to be the most user-friendly due to the ability to be able to skip between 'instances' that have been noted and coded. Pérez-Turpin et al. (2009) used Sportscode to digitise the video and then create a movement pattern matrix that was automatically created from the coded instances. This then allowed them to find the ‘gross movement performance in a real beach volleyball environment’. Pérez-Turpin et al. (2009) also noted about the ease of which the data was collated and available to draw results and conclusions from.

2.3 Performance Analysis in Rugby League

King et al. (2009) suggested there is limited information on performance analysis within the sport of rugby league. This is partly attributed to studies such as Meir et al. (1993), on the demands on rugby league players, which were conducted prior to the 10 metre rule change; therefore limiting the comparisons with the current day format. More recent studies, such as Meir et al. (2001b), examined the impact of the introduction of the 10 metre rule change, and assessed how it had affected match-play. However, the study is focused around physiological factors of rugby league, such as work to rest ratios and overall distance covered, with no relation to the contact area of which the 10 metre rule has most effect on.

Furthermore Sykes et al. (2009) used time-motion analysis to research the demands on Rugby league players and whilst comparing and contrasting different positions to find the work to rest ratios. Unlike Meir et al. (2001b), Sykes et al. (2009) utilised Eaves et al. (2008) use of the contact area as a performance indicator in relation to physiological demands on the players.

Sykes et al. (2009) defined the ‘contact area’ from where the defender first makes contact with the ball carrier to when the ball is played. Sykes et al. (2009) used footage from three games of elite level rugby league that was then analysed by the
software ProZone 3 (ProZone®, Leeds, England). In contrast to similar studies such as Gabbett et al. (2012) and Sykes et al. (2009) who used semi-automatic match analysis recognition system, however a sample size of 3 is relatively small.

Austin et al. (2010) used time-motion analysis to record repeated sprint efforts within rugby league to determine whether different positions within the sport had different values in their repeat sprint efforts. The recordings were taken by three cameras set out in different positions around the pitch as to give the analysts a complete view. The analysts applied a hand notation system of video footage, which arguably could have been conducted more efficiently with a computerised system.

The main concern with current research, such as Sykes et al. (2009) and Meir et al. (2001b) into the impact of the 10 metre rule on the contact area, is focused around strength and conditioning rather than how important it has become tactically in game situations to give a team the advantage.

2.4 ‘Play of the Ball’ Performance Analysis

Eaves and Hughes (2003) investigated the patterns of play in rugby union, similarly focusing on the difference between two eras. This is likened to rugby league to an extent, as rugby union has changed since turning professional; the ball is recycled faster giving defences less time to react to attacking play. Smith (2002) suggested that a quick ‘play the ball’ that can disrupt the defence. It was also discussed that the quick ‘play the ball’ is not simply about making 10 metres and gaining territory, it is about gaining momentum for the attacking side and making the defences retreat the 10 metres faster, in turn fatiguing the defence causing them to make mistakes (Smith, 2002).

Eaves and Evers (2007) analysed the ‘the play of the ball’ time and the occurrence of perturbations in rugby league. This study was based upon the research conducted by Hughes et al. (2001) in football (soccer) in which it was shown that in identifying the key parts of skill elements of that team that make changes in the ‘stability’ of the play that give that team the advantage. From this it was possible to engineer specific
performance indicators that can be used to extract the sections of a winning teams traits or skill sets (referred to as perturbations).

Eaves and Evers (2007) highlighted the tackle area and the speed of which play can be conducted at is not solely important within rugby league but is a generic trend across most invasion sports. As the principles of play are alike in most invasion games, just the information or language differs from sport to sport (Hughes and Bartlett, 2002). Hughes and Bartlett (2002) outlined and defined a ‘performance indicator’ as a singular or set of multiple variables that aim to define some or all aspects of performance. Eaves and Evers (2007) discussed that the speed in which the ball is played within the sport of rugby league is seen as a performance indicator that should be controlled in order to win.

Eaves and Evers (2007) research expresses a clear need in which the ‘play of the ball’ needs to be investigated further to clearly exemplify the significance of this feature of Rugby league. Furthermore, due to the small sample size (n=6), there is an argument that no definitive data can be drawn from the study until research is completed using a larger sample size.

Smith (2002) and Sharp (2002) also maintain that to be able to defend effectively in both codes of rugby that the ‘ruck speed’ needs to be controlled (slowed) in order to allow the defence to organise appropriately and stop the momentum of the attacking team.

Eaves et al. (2008) investigated the effect on rule changes within rugby league; this research explored the effect of the 10m offside rule on the type of tackle used by defence. It was discovered that the ‘mob’ tackle was employed to slow the attackers play of the ball time down. Furthermore It was discussed that further research was required to examine the play of the ball as a key match and tactical variable that future researches should examine further to allow coaches to see the full extent of the tactical variations from which the rule changes have brought.
2.5 Coaching impact

Coaches when providing performance analysis have previously stated that the ‘play of the ball’ speed can be determined by ‘winning’ or ‘losing’ the contact within tackle. A win was defined as the ball carrier landing on their front during a tackle, as less time is taken to get up and play the ball than if the player was on his back. A defensive win in the tackle was if the attacking player was worked onto his back or ‘turtled’. However, in modern day Rugby league these performance indicators are invalid, a player can still find a strong body position, but still take longer to play the ball than someone who was ‘turtled’ or put on their back.

Eaves and Evers (2007) showed that the ‘play of the ball speed’ or ‘ruck speed’ has become the focus of many coaches due to the distance in which players must retreat from where the tackle is completed. Slowing the play of the ball down or ‘controlling the ruck speed’ is seen as a very important part of Rugby league defence (Kear, 1996). The coaching impact of how to control the play of the ball is evident across all levels of the sport and a lot of time goes into coaching players how to slow the attacking team in this area (Kear, 1996).

Players across all levels of Rugby league have expressed that they spend a lot of time being taught how to slow people down in the tackle. If a coach were to not spend any time in slowing the opposition down, this would grant the opposing side with ‘quick ball’ in which an attack can be launched against a disorganised defence (Rugby World, 2007).

The coaching implications between both rugby league and rugby union are the same as rugby union teams will spend time training and working to both slow the ball down in the ruck but also to get fast ball by driving through the ruck to ‘blast’ players out the way so the scrum half can get their hands on the ball faster to release the backs, this is known as ‘recycling ball’. Studies within Rugby Union have been conducted in terms of recycled ball; how fast the ball is played in Rugby League is essentially the same as recycling ball in Rugby Union just rugby league the onside line is 10m further away, hence why it is so important to slow the play of the ball down. Studies such as Schwarz (2004) & Hapeta (2007) explored how to produce ‘lightning fast ball’ with the Irish national coach (Eddie O’Sullivan) where creating a strong body
position can help get ball recycled at a greater speed. This is transferable into rugby league as if an attacking player finds his front (strong body position) the ‘play of the ball is more likely to be faster as it will take less movements to get to their feet in order to play the ball (Eaves et al., 2008).

Coaches need to be able to see empirical evidence that the controlling the ‘play of the ball’ correlates to success on the pitch whether this is a try being scored, repeat set and whether a faster play of the ball will allow the attacking team to have more attacking options and threats against a disorganised defence allowing more meters to be gained as a result of a quick play (Eaves et al., 2008). This will help coaches make effective informed decisions as they need to understand the most important elements that impact the game (Csataljay et al., 2009).

Coaches can draw conclusive evidence from this study to determine just how important the play of the ball is to their game plans both from attack but also in defence. This research will look to answer key questions within the sport that are so heavily relied on as a vital part of any Rugby League team. By generating empirical data on the speed of a play of the ball, coaches can properly assess the importance of which tackle it is most important to get a fast play of the ball? If there is a fast play of the ball does this give more metres? Does the winning team have an average faster play of the ball? By using performance analysis as a methodology to attempt to answer these questions, this study aimed to broaden the understanding of the importance of the speed of the play of the ball.
CHAPTER III

METHODOLOGY
Data Collection

3.1 Subjects
The analysis for this research was conducted using 15 pre-recorded South Wales Scorpions matches from the cooperative championship 1 league from the 2009/2010 season. All matches were obtained through Cardiff Met University who were commissioned to provide performance analysis for the Club during that season. Players were notified when they were being recorded as they regularly given their stats from each game through the South Wales Scorpions. Cardiff Met secured ethical clearance to access the video and statistics for research purposes.

3.2 Equipment
Fifteen Scorpions video files were transferred from the Cardiff Met server to an external hard drive and analysed using the Nacsport software on a Windows laptop.

3.3 Operational definitions
Table 1. Operational definitions established within the study.

<table>
<thead>
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<th>Term</th>
<th>Definition</th>
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<tr>
<td>Tackle / Contact initiated</td>
<td>The tackle is started when the first defending player initiated contact on the ball carrier</td>
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<tr>
<td>Tackle/ Held</td>
<td>The tackle held is when the players momentum is stopped.</td>
</tr>
<tr>
<td>Play of the ball</td>
<td>The act of bringing the ball back into play after a tackle by the ball carrier ‘heeling’ the ball backwards</td>
</tr>
<tr>
<td>Meters Gained</td>
<td>The total metres made from the gain line.</td>
</tr>
<tr>
<td>Gain line</td>
<td>Imaginary line from where the tackle was previously complete.</td>
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3.4 Performance Indicators

The find whether the speed at which the ball was played had any effect on metres gained, relevant performance indicators were needed to clearly assess performance.

The action variables chosen for this study were as follows:

1. When contact was initiated
2. When the player was held
3. When the ball was played
4. How many meters were gained as a result

The performance indicators chosen were used to provide data for this research for what this research is trying to achieve. The time difference between indicators 1, 2, and 3 gave the time the whole tackle process took to complete, with indicator 4 showing how many meters were made as a result of the speed of the previous play of the ball. This will provide data to show comprehensive data to which will show the relationship between the play of the ball and metres made.

3.5 Template Design

The system was designed using the Nacsport coding tool that allows for buttons to be created in which instances can be recorded. A specific template was created to show the successive progression of the action variables in a user-friendly manner. The first stage was to set out the 6 tackles available to each team in an attacking set, each of these were used as descriptors in which the tackle variables would be collected (Figure 1).
Figure 1. The tackles available to each team on each attacking set.

Three descriptors were added to this structure for when each tackle started, was completed and when the tackle finished. These button gave a time stamp for each value in which were then be exported and interpreted in Microsoft Excel in order to determine the time difference between each point.

Figure 2. The descriptor buttons that provide the time stamps for the tackle speed

The next step was to create a variety of distance gained descriptors that allowed for not only positive meters gained but also if a team lost ground on a tackle. The NA button was included for errors, and if the play ended with a kick (that made the meters gained after a tackle non-applicable). The metres gained buttons were staged are up to 50 metres+, initially with smaller intervals.
Figure 3. The complete coding template used during the coding process.

For the template to work properly the exclusive links were introduced after a trial run for functionality. Exclusive links allow only one category button to be active at any one time, this reduced the capacity for human error by not allowing a previous button to be left on. These exclusive links were needed as there can be only one team in possession as any one time and it can only be either tackle 1 to 6 during that possession. Therefore exclusive links were set up between each of the descriptor icons (T1,T2,T3,T4,T5,T6 for each side), this allowed for the user to be able to click on the next one rather than unclicking the previous one before advancing.
3.6 System Procedure

The system that was created to be as efficient and accurate as possible for the analysis process. This was done to provide the most relevant data that was then used to draw effective conclusions. To code each tackle, tackle descriptor buttons were set out in each side of the template, the button that is relevant to the tackle will then be pushed.

After the number of the tackle button had been pressed, the observer coded when the tackle has started, this was determined when the first defending player has made contact with the attacking player. The observer then coded when the momentum of the attacking player had stopped or when the attacking player is wrestled to the floor, (due to the referees not being micro-phoned, it was unclear when the referee called the tackle was completed, however the laws of the game dictate the tackle is complete when the ball players ball carrying arm touches the floor or when the players momentum is stopped (RFL, 2013).
Once this was complete the observer coded when the ball was played. This was determined when the attacking players foot made contact with the ball or was directly above it, if contact was not made. The observer then recorded how many metres were made, using the 10 metre lines that are marked out on every Rugby League pitch as a guideline. This helped to make it more accurate and provided a better estimate of distance in which the next attacking player has completed.

The observer will only note the metres made when the ball carrier has made contact with the defence and pause the clip on the exact frame. Then click on the next tackle descriptor and start the process again for the next tackle.

Once the tackle set has been completed or an error (e.g. Penalty) has occurred the observer will note ‘NA’ as no metres have been made seen in (Figure 5).

![Figure 5. Work flow diagram of the data collection](image)

### 3.7 Validity

Eves and Evers (2007) study called for the need for more research into the speed of the play of the ball on match situations. Due to the little amount of research into the area, a questionnaire was created to explore the views of coaches alike to determine the importance of this factor when playing rugby league and to compare the results of the study. The questions were aimed towards players with professional or semi-professional experience and coaches who were coaching performance or elite level
athletes as to be specific to the study. The responses from the questionnaire helped filter the areas that needed to be explore, decide the critical aspects of performance and to create the operational definitions.

3.8 Pilot study

A pilot study was conducted to effectively test the coding template and whether the performance indicators chosen were effective in providing the data needed to complete this study. The study allowed for any problems will user accessibility to be detected and improved to make the process more efficient. For the pilot study the South Wales Scorpions away match versus Hunslet was chosen due to the clarity of footage provided. The game provided many tries and was seen as an effective way to test the system

3.10 Data Processing and Analysis

Once the data was collected, the data was exported into ‘Microsoft Excel’ from Nacsport using the ‘export to Excel 1 function’; this listed the results from the timeline into a format that could be used to formulate results.

<table>
<thead>
<tr>
<th>T1 Scorp</th>
<th>Start 00:05:37:1</th>
<th>00:05:37:1</th>
<th>00:05:55:00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Complete 00:05:47:07</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Played 00:05:51:19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>00:05:55:16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2 Scorp</td>
<td>Start 00:05:55:00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete 00:05:57:16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Played 00:06:00:16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>00:06:03:16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3 Scorp</td>
<td>Start 00:06:11:22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete 00:06:30:02</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Played 00:06:33:16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>00:06:11:22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4 Scorp</td>
<td>Start 00:06:11:22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete 00:06:32:22</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Played 00:06:40:18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td>00:06:22:01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6. An example of the data export structure from Nacsport.

From this data, formulae were created to extract and organise the time differences needed for further exploration. With formulae to export the actual time value was created to give more manageble time values in which to note the time differences for each of the three phases of the tackle (Figure 7).
With the actual time (s) in a clear format, the time values between each of the points being analysed (Start, Complete and Played) could be easily interpreted.

From this data provided (Figure 3) the time differences between the three points could be observed for the next stage of analysis. The S-C phase used the time between the start and complete rows, the C-P phase used the time difference between the Complete to Played rows and the S-P phase used the time difference between the Start to played phase to give the overall time the whole tackle too to complete (Figure 8)

This data was exported into IBM SPSS programme to conduct inferential statistical tests. The data was processed in a number of different ways: The winning and losing team's performance was compared exploring both POB times and metres made.

To explore the results a number of different tests were used within SPSS to uncover the practical implications of the results. A number of descriptive statistics exploration tests to find out the means and standard deviation and standard error values. Independent samples t-test was used to find the significant difference between each of the POB phases times. A ‘one-way ANOVA’ test with a post hoc Scheffe test was used to establish the significant difference between tackle number POB times. A Means test was conducted to establish the mean POB times across the different tackle numbers to see any trend that was forming.
3.10 Questionnaire

The questionnaire was designed on ‘Team Performance Exchange’ (MyTPE) website, which allowed a suitable format in which the questionnaire to be created and for the data to be analysed.

The question list was created for ease of use and to gain the most from the participants, the mix of multiple choices, yes/no and open answer questions gave the full range of queries into the area of slowing the play of the ball down. Question logic was applied to make the questionnaire as relevant to the participant as possible. The full question sheet can be seen in Figure 9.

Figure 9: The complete question list for ‘Rugby League 1’
3.11 Data collection for Questionnaire

An email was sent to recruit potential participants. If they replied positively, an account was created for them on MyTPE using their email address to allow them to answer the question list. Once completed the participants answers were aggregated into a table automatically by MyTPE and exported as a csv file. The open answer questions were interpreted manually.

3.12 Video Based Questionnaire

To gain a greater understanding of what was perceived to be a complete play of the ball, a video-based questionnaire was created. This involved 20 play of the balls varying in speed from three seconds up to 9 seconds, in a random order. Nacsport was used again to create the presentation of twenty videos. The video questionnaire was conducted using matches from the South Wales Scorpions verses the London Skolars 2010 (away). This game was chosen for the clarity of footage.

After the game was coded for the main study using ‘Nacsport’, the times of each tackle were presented on the timeline. With the tackle times presented a selection of 20 clips were chosen on time values to be added to the presentation.

Figure 10: Clarity of footage of London Skolars v South Wales Scorpions
The participants were asked to select whether the play they saw was fast, slow or acceptable, this was to determine at what point a play of the ball slow is or fast by correlating the results on IBM SPSS gave the values of what was classed as slow or fast, but also gave the value of at what point an acceptable play of the ball was completed. This feedback was processed and compared to the other data collected in the study.

### 3.13 Reliability study

To ensure the accuracy of the study as reliability test was conducted. The reliability test was conducted using an intra-operational method. To complete the analyst was required to code the Scorpions V Skolars game two times at a period of a week apart. When each of the games had been coded, the data was exported to Microsoft Excel using the ‘Export to Excel format 1’ tool available in Nacsport and the mean absolute time differences of the same event were calculated, (Table 2). The reliability study showed the study to be reliable as a mean of 0.02 was deemed accurate enough to complete the study using the current methods.

Table 2: Shows the mean time difference between the performances indicators used in the study.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Absolute mean time difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start – Complete</td>
<td>0.02</td>
</tr>
<tr>
<td>Complete – Played</td>
<td>0.02</td>
</tr>
<tr>
<td>Start - Played</td>
<td>0.02</td>
</tr>
<tr>
<td>Difference in meters gained.</td>
<td>0.00</td>
</tr>
</tbody>
</table>

### 3.14 Video based Question list

For the third prong of the research a video based questionnaire was created to determine at what time is the play of the ball deemed as quick. The question list was distributed to Wales Students Rugby League (n=20), the participants were shown 20 play of the balls with times ranging from 3s up to 8s in a random order.
The clips were chosen from an already coded game between South Wales Scorpions and London Skolars. The clips were chosen from the Start to Played (S-P) phase of the game to ensure the whole tackle process was included in the clips.

The video questionnaire was created within Nacsport using the presentation tool, the instances was selected on the timeline and added to a presentation. Once all clips were selected they were labelled and converted to MP4 format (Figure 11).

![Rugby game image]

Figure 11. Clip 5 from the video question list.

After the participants had answered the clips the data was put into excel and graphs were created ready for interpretation.
CHAPTER IV

RESULTS
4.1 Results Overview

The results of 15 games of Championship 1 rugby league gave 3717 tackles in which to analyse. The results into this research found some very significant differences and also a large degree of similarity. Due to the triangulated research that has been conducted the results section has been split up under the three research processes to provide clearer feedback. Furthermore due to the large amount of data acquired through the Match analysis section the data has been located under specific headings indicating the performance indicator that has been selected.

4.2 Match Analysis Results

The analysis of the correlation of statistics to win and loss showed no significant difference. The mean time between the play of the balls in terms of win and loss showed that there was a difference (±0.1) in (Start – Complete, Complete – Played and Start – Played). However in terms of metres made per tackle the winning team showed a mean of (0.51m).

The analysis of difference between tackle numbers showed a significant difference (p<0.05) was observed over the whole tackle process (S-P time). The values of p<0.001 between tackle 1 and tackles 2-6 however no significant difference was observed between tackles 2 – 6 and the significant value was at a minimum above (0.55) Mean metres made between tackle numbers provided a difference of a maximum of (7.75) between tackle 5 and 6 and a minimum (0.73) between tackle 1 and 6.

The Analysis of a correlation between the play of the ball time and metres gained as a result showed the time the whole tackle process took had a clear negative correlation on metres made. The longer the ball carrier was engaged in the tackle the mean amount of metres made went down significantly. Anomalies did occur during this and large amount of metres were made after a slow play of the ball.

The analysis between Scorpion and opposition showed that the scorpions had a higher number of mean metres made but a slower mean play of the ball. With analysis of speed of play of the ball in terms of metres made showed that a faster play of the ball was seen in the 10 highest number of metres made by either team.
4.3 Metres Made

A descriptive statistics exploration test provided the mean values for metres made on each of the 6 tackles. It is clear that with a value of 12.8m the highest mean was observed on tackle 5. The lowest value of metres made was evident on tackle 6. However this is rendered irrelevant in terms of match play as tackle 6 was only in use on a small volume of occasions where people gained an interception and tackle 0 was in place of tackle one and the numbering system was shifted down one place. Tackle 1 showed a value of 5.7m which would indicate the next relevant field of data.

![Distance vs Metres Made](image)

**Figure 12**: Mean metres made in each tackle.

The next stage of analysis was to compare winning and losing teams mean metres made to see whether the winning side had a higher mean of metres per tackle than the losing side. A Descriptive statistics exploration to find the mean values for metres gained between the winning and losing side was conducted.
Figure 13: Mean metres made per tackle in terms of winning and losing teams.

The winning team showed a mean of (6.8m) per tackle as opposed to the losing side who showed a mean of (6.3m). The mean number of tackles per game was 248, over 248 tackles the gives the winning side a mean advantage of (127m) per game.

The next stage of research was to analyse whether the largest distances gained by were a result of a fast play of the ball. The S-P phase was chosen again for the reason it contains both the S-C C-P phases and was seen to have the largest effect on the data field (Figure 17).
Table 3: The time of the S-P phase and the meters made as a result.

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.12</td>
<td>70</td>
</tr>
<tr>
<td>4.96</td>
<td>60</td>
</tr>
<tr>
<td>5.36</td>
<td>70</td>
</tr>
<tr>
<td>4.82</td>
<td>80</td>
</tr>
<tr>
<td>4.64</td>
<td>60</td>
</tr>
<tr>
<td>3.43</td>
<td>100</td>
</tr>
<tr>
<td>4.08</td>
<td>80</td>
</tr>
<tr>
<td>4.52</td>
<td>60</td>
</tr>
<tr>
<td>3.61</td>
<td>90</td>
</tr>
<tr>
<td>3.96</td>
<td>80</td>
</tr>
</tbody>
</table>

The highest distances gained by either team across the 15 games show the mean S-P phase time was (4.6s), this is much below the mean of S-P phase time of (5.5s) reinforcing the theory that a faster play of the ball results in higher metres.

4.4 Play of the ball

The results of the play of the ball analysis showed difference

An independent samples t-test showed that there was no significant difference (p<0.05) between the winning and losing teams play of the ball times.

Table 4: Significant difference between POB phases.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Significant Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start – Complete (S-C)</td>
<td>0.161</td>
</tr>
<tr>
<td>Complete – Played (C-P)</td>
<td>0.910</td>
</tr>
<tr>
<td>Start – Played (S-P)</td>
<td>0.273</td>
</tr>
</tbody>
</table>
A graph was created using the mean values (seconds) for S-C, C-P and S-P to show a visual direct comparison of data (Figure 14). From the graph it can be seen there was no significant difference between the winning and losing teams (p<0.05).

Figure 14: Mean play of the ball times in terms of winning and losing

An analysis of the correlation between play of the ball times and how many metres were made as a result of the speed in which the ball was played was implemented. The tackle speed was analysed from all three periods within the tackle S-C, C-P and S-P and scatter graphs were produced with a linear line of best fit to show the correlation.
Figure 15: Correlation between the time of S-C and metres made

The Start to complete phase of tackle sees a shallow negative linear correlation in which shows that the faster this stage is completed the more metres are gained on the consecutive play. However the negative linear correlation has a shallow decline $R^2_{\text{Linear}} = 0.006$ showing that there is not a high level of effect.

Figure 16: Correlation between the time of the C-P and metres made
C-P phase of the tackle again shows a clear negative correlation stating that the shorter time this period takes the attacking team will gain a higher number of metres in the subsequent play. The line of best fit has a steeper decline in the graph $R^2$ Linear = 0.042 showing this phase of play is seen to have a larger effect on the performance indicators than S-C.

Figure 17: Correlation between the time of the S-P phase and metres made

The S-P phase of play is a combination of the previous S-C and C-P. S-P is seen to have steeper decline in the line of best fit $R^2$ Linear = 0.044, this is seen to be the most important information gained from this analysis of the play of the ball as it takes into account the whole tackle process from start to finish. The S-P phase has a clear negative correlation showing that the shorter the play of the ball the more metres are gained as a result in the successive play.

The next part of analysis used an ANNOVA test to determine the significant difference between each tackle in terms of play of the ball times, the phase S-P was chosen as it encapsulates both S-C and C-P.
Table 5: Significant difference between tackle number play of the ball times

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.001</td>
<td></td>
<td>.001</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>.001</td>
<td>1</td>
<td>.953</td>
<td>.56</td>
<td>.923</td>
</tr>
<tr>
<td>3</td>
<td>.001</td>
<td>1</td>
<td></td>
<td>.974</td>
<td>.637</td>
<td>.936</td>
</tr>
<tr>
<td>4</td>
<td>.000</td>
<td>.953</td>
<td>.974</td>
<td></td>
<td>.958</td>
<td>.978</td>
</tr>
<tr>
<td>5</td>
<td>.000</td>
<td>.560</td>
<td>.637</td>
<td>.958</td>
<td></td>
<td>.998</td>
</tr>
<tr>
<td>6</td>
<td>.450</td>
<td>.929</td>
<td>.936</td>
<td>.978</td>
<td>.998</td>
<td></td>
</tr>
</tbody>
</table>

A significant difference (p<0.05) was observed between the S-P phase time between tackles. The values of (p<0.05) between tackle 1 and tackles 2-6 however no significant difference was observed between tackles 2 – 6 and the significant difference was (p<0.05).

A Means test was conducted to establish the mean POB times across 15 games and explore what tackle the fastest and slowest play occurred on.

![Figure 18: Mean POB times across 15 games](image)
The fasted POB was observed on tackle 6 however this is seen as irrelevant as in (Figure 12) tackle 6 was only observed in a very small number of occasions where the numbering system of tackles was shifted down one place due to the attacking team gaining a turnover in possession in play (e.g. interception). Tackle 5 is seen as the fastest POB which would correlate into metres made (Figure 12) where the most metres made gained were observed. It should be noted that Figure 18 ‘Y-axis’ does not start at (0.0s) exaggerated the differences; this was to highlight the declining trend.

4.5 Scorpions V Opposition

The Scorpions won 8 of the 15 games coded over the 2010 season; an analysis was drawn into the mean number of metres made per game but also the mean play of the ball times. This was to compare whether there is a link between metres made to play of the ball time using different variables.

![Figure 19: Difference in metres made between Scorpions and Opposition](image)

A statistical analysis shows the Scorpions had a higher mean of (0.61m) per tackle than the opposition over a period of 15 games. This correlates with the results of the matches as they won more matches than they lost. Over a period 248 tackles this equates to a mean of (151m) per game.
Statistical analyses of the whole tackle process (S-P) incorporating the phases S-C C-P show that the opposition had a mean (0.09s) faster play of the ball per ball. This is not seen as a large advantage to hold over an opposition a large advantage would be 2-3 seconds as with 0.09 seconds a player cannot move more than a meter. A number of reasons the Scorpions made more metres off a similar play of the ball time are: A higher skill level of players, better running lines, increased organisation or a combination of all of these.
### 4.6 Questionnaire Results

Table 6: Common trends from Question list

<table>
<thead>
<tr>
<th>Question</th>
<th>Common trends in Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Do you understand the terminology of 'slowing the ball down'??</td>
<td>• 100% agreed that they understood.</td>
</tr>
<tr>
<td>2: Do you refer 'Slowing the ball down' as something else?</td>
<td>• 100% agreed they did not.</td>
</tr>
</tbody>
</table>
| 3: How would you define 'Slowing the Ball down'?                         | 1. Ensuring the opposition do not get a quick play of the ball and speed up the tempo of the attacking set,  
  2. Preventing the opposition from playing the ball quickly  
  3. Ensuring the attacking player does not get a strong body position.                                                                                                                                 |
| 4: Can the Speed of the play of the ball be measured? How could it be measured? | • 100% agreement the play of the ball should be measured by the amount of time it takes for the player to play the ball from when the tackle has started. |
| 5: How many players would you recommend need to be in a tackle to effectively slow down the play of the ball? | • 100% agreement that 3 defending players in each tackle.                                                                                                                                                          |
| 6: Does slowing the opposition play of the ball down give your team an advantage? | 1. It allows the defensive line to get set for the next tackle,  
  2. It stops the opposition raising the tempo  
  3. Gives the defensive side more chance to obtain a better first contact  
  4. Slow the next tackle down and identify mismatches |
| 7: On a scale of one to ten how would you rate the importance of slowing the opposition down in the contact area? | • Mean score was 8.5 showing that the participants regarded slowing the ball down very important.                                                                      |
| 8: Why? (in relation to question 7)                                       | • 100% agreement defensive organisation purposes were the reason POB was regarded so high on the scale.                                                                                                                  |
| 9: Would you expect to score more easily when your players get a quick play of the ball within a set? | • 100% agreed that an attacking side is more likely to score.                                                                                                                                                         |
| 10 - 11: How many hours a week coaching time do you have with your players and how many of them are spent coaching slowing the play of the ball down? | • 100% agreement that the ball needs to be slowed down to gain an advantage over the opposition  
  1. Getting a ‘roll on’ (where the attacking team gains momentum and gain more metres),  
  2. Increased change of a mismatch (where the defenders do not have enough players to defend effectively) and defending players unable to make it back onside,  
  3. On average 3 hours a week coaching time with the players and all participants spending at least 1 hour coaching the contact area. |
| 12: Please define an “Ideal tackle” from a defensive point of view:      | • 100% agreement three players should be involved,  
  1. One goes high to stop the momentum and wrap the ball up  
  2. Two hits the midriff to gain control of the attacking players movements  
  3. Third goes low to ‘chop’ out the legs stopping the attacking player’s momentum,  
  4. The consensus was that an ideal tackle should take 8-10s for the defending team to have the advantage. |
4.7 Video Based Questionnaire

The third prong of the research was to look at 20 clips of play of the balls; these clips were strategically chosen for the length of time it took to play the ball. Of the clips shown the results are shown in (Figure 21).

![Figure 21: Difference in opinion on play of the ball times](image)

The statistical results show that of the play of the balls shown to the participants, the majority were in agreement that of that any play under (4s) and under was deemed ‘quick’. All plays with the time of (6s) or over were all deemed as ‘slow’.

The results of the 3 play of the balls with a time of 5 seconds show that participants were in disagreement over whether the play was fast or not, this indicates that 5 seconds is the area of acceptability for a play to occur for an attacking team as it is unclear whether the play was quick or slow.
CHAPTER V

DISCUSSION
5.1 Discussion Overview

The initial results of this research highlight some significant discoveries that can be directly used in terms of coaching and the development of the sport rugby league. The research indicated that the team who achieve a fast play of the ball (POB) have a greater advantage. This research provides empirical evidence to support the commonly held view that POB affects game play and also identifies a clear correlation between POB time and metres made. The triangulation of research will now be discussed.

5.2 Question list

The user-centred approach of the question list helped to gain a perspective into how the POB is perceived to effect game play. Checking the participants understanding of this technical aspect of the sport helped to ensure the answers were valid, and could be used to explore the statistics used in the match play analysis (Table 6). To further explore the participants understanding of the POB they were asked to define ‘slowing the ball down’; comprehensive feedback was given regarding the issue. It was explained that the ball carrier must find a strong body position after being tackled which will allow them to get a fast POB (Table 6).

To justify measurement boundaries of the POB during the match analysis, the participants were asked how they would measure the POB. The consensus was that the tackle starts when the first defending player initiates contact with the ball carrier until the ball carrier ‘heels’ the ball back allowing the next play to continue (Table 6).

The question list results highlighted that achieving a fast POB should give the attacking team an advantage. The mean score of the response (8/10) provides clear indication of the importance of the POB is within the game. All of the participants expressed that the POB needs to be slowed to effectively control a game; the largest component for the re-organisation of defence is time. Organisation of defence is key in rugby league to stop defenders from exploiting an overlap or a mismatch. The more time a defence has to organise, the more chance a team has to gain an advantage over the opposition and score points. Furthermore, it was explained that a faster POB gives the defence less time to retreat the 10m required to be onside. This was a common theme across all participants’ answers and shows a clear need
for further information to be obtained regarding the POB and how it affects game play (Table 6). Moreover, Eaves and Evers (2007) explained an effective defence has two main components, ‘moving quickly into the tackle’ (in other terms a fast line speed in order to cut down the attacker’s space) and slowing the POB in order to reduce the opposition’s recovery time and defensive shape. This will cut down the attacker’s time and space, rushing their decision making and execution, and potentially reduce the gaining of ground or force more errors.

Additionally, with all participants in agreement over the POB speed at around 7-8s from a defensive point of view, all participants expressed that they were either coached or coaching the POB for at least one hour a week (out of an average of 2-3). Most commonly coached techniques were the wrestle/grapple technique. These are used in the ‘mob’ tackle referred to by Eaves et al. (2008), which aim to gain a positive body position over the attacker.

The ‘ideal tackle’ responses explained that the style of tackle being taught is the ‘mob’ where at least three players should enter each tackle to effectively slow the POB down. The first defender stops the momentum of the player and ‘locking the ball up’ stopping the offload. The second player hits under the ribs, gaining control of the player with the hips in to put the ball carrier off balance to gain control over the movements. The third player chops the legs out to stop the leg drive and allowing the other two players to wrestle the ball carrier on to their back. Once the player is on their back, the two players who have most control over the ball carrier get up slowly using the ball carrier to get up off the floor slowing them further. All of this effort to put the ball carrier on to their back is to gain a positive body position which in turn slows the POB down.

Participants expressed that they work at least one hour on the contact area and slowing the POB down, which supported Kear (1996) in that all players should incorporate the tackle process into their weekly training. Dalkeith (2006) explained that this mob tackle that is being taught is to take advantage of the ‘dominant tackle’ rule in which the defending players have more time clear the ruck to be onside. Eaves et al. (2008) suggested that, due to the dominant tackle rule being introduced in the UK in 2006, the most common tackle used within professional UK rugby league is the double tackle, as it is a compromise between stopping the offload and
slowing the POB. However, from the question list results (Table 6) it would be seen that professional UK rugby league has progressed on from 2008 as it is seen that in the practical world of coaching the three man tackle or mob tackle is now seen as the most productive way of tackling (Table 6).

**Match Analysis**

**5.3 Play of the ball (POB)**

The perceived correlation between metres made and the play of the ball were well evidenced in the answers given in the question list. However, due to the lack of empirical research into this area, this study provides empirical data to support the theory. The correlation between metres made and the POB was evident across all three phases of the tackle area. The S-C phase of the ball showed link with the trend line at a negative angle indicating that the faster this phase was completed the more metres were gained. However, this was a very small angle and indicated that this phase of the tackle is not what has the most effect on the POB (Figure 15). The C-P phase of the tackle lasted for longer on average (mean) than the S-C phase, this indicated that this phase would have more of an effect on the outcome of the tackle. The S-C phase showed a stronger negative correlation between the speed of the POB and metres made. The less time the POB took the more metres were gained as a result (Figure 16). The steepest angle of negative correlation was observed in the S-P phase, this can be explained as both S-C and C-P phases are combined in the S-P phase (Figure 17). However, the S-P phase is regarded as the most important statistic, as it is the whole tackle process that has the most effect as one does not come without the other. This correlation statistically supports the view that the tackle process has a very significant effect on the outcome of game (Figure 17).

The data showing a correlation between the POB and metres made along with the participants answers of the question list, supports Smith (2002) and Sharp’s (2002) coaching manuals that emphasise the importance that ‘ruck speed’ needs to be controlled in order to allow the defence to organise and stop the momentum of the attacking team. Further analysis into the POB (S-P phase) established the significant difference between POB times and tackle numbers (Table 4). The results revealed
that the only significant difference was shown between the first tackle and the rest of the tackles (2-6) within that set (p<0.05). Tackle 1 had the slowest POB time, this was observed as tackle 1 occurred most commonly after the opposition had kicked away possession and the winger or fullback had run the ball back. A possible reason for the slow play, is the winger and fullbacks are told to set up the field position for the next attacking set, usually finding the centre of the pitch. The centre (or 50) of the pitch is where the middle unit defends (both props, hooker and loose forward), usually the most adept at slowing the POB down using the ‘mob’ tackle (Eaves et al., 2008). The middle unit will usually have a large physical advantage over the winger or fullback which would only add to winning the collision process.

There was a trend recognised across the tackle number and the POB time. Namely, as the tackles number increases, the time of the POB decreases. This may be explained as the tackle number increases, the defence are increasingly more fatigued and find it harder to cover the 10m back to be onside, this will cause reduced line speed on the next tackle. Therefore the fastest POB’s were observed on tackle 5 (Figure 18). Another explanation is when a team is on tackle 5, it is coached to kick to pin the team back into the corner or put an attacking kick through for a team member to run onto the ball and score. Therefore, if a team runs on the 5th tackle, it would be because there is a mismatch or overlap and there is a clear opportunity to score a try. Therefore a mismatch is most likely to occur on the edges of the field at defenders X,Y,Z (usually winger, centre and halfback). Defence at X,Y,Z is usually a cover tackle where a strong body position cannot be won, as these tackles are usually one-on-one, and the primary aim is to stop the defenders rather than slow the ball down.

Furthermore, the study conducted by Eaves and Evers (2007) explained that more perturbations (noticeable progression past the gain line or setting up a second phase play with the use of an offload) are more likely to arise when the ball is passed or directed further away from the ‘initial ruck position’. As 32.7% of pass plays away from the ruck results in perturbations, whereas only 14.5% of ‘hit up’ plays resulting in perturbations.

With the established link between the POB and metres made, it was important to see what the effect the POB had between winning and losing teams. The mean POB
times were calculated for each of the 15 games and compared against each other (Table 3 & Figure 14). The results indicated that there was no significant differences between the winning and losing side (p>0.05) (Table 3). This can be explained as both winning and losing teams will gain both fast and slow play of the ball. It is what a team does with the fast play that counts, and how many metres are made as a result.

Whilst Smith (2002) stated that teams do not always seek a quick POB, semi-professional level and above now tend to work to a structure, and every player will know where they have to be before the ball carrier has even taken the ball into contact. Therefore, it is suggested that teams now will always look to play of a quick POB in order to exploit mismatches as the structure for the next attack is already in play. This study further contradicts Smith (2002) as it was stated that the POB was unlikely to provide conclusive evidence between the POB and successful performance. A clear correlation is seen between the reducing POB time and the greater metres made as the tackle number decreases, backed up with the greatest metres made across the study coming from quick POB.

**5.4 Metres made**

The results in the POB show that there was almost no difference in POB times between winning and losing teams therefore the advantage for the winning side was witnessed through the metres made (p>0.05). The winning side made extra 0.5m per tackle (mean values). Over one set this was not seen as a significant advantage however, over 248 tackles (mean number of tackles observed across 15 games) this amount to 124m per game. This is a seen as a large advantage to the winning side, as a team with a 124m advantage will have more opportunity to score, as they will be in better field position with more attacking sets closer to the opposition’s line.

The next part of the research was to see if there was a certain tackle that most metres were made (Figure 12). The results indicated that as the tackle number progressed the more metres were made, the most notable metres made were on tackle 5. The progression in metres made as the tackle number increases, could be explained as teams who gain momentum with quick POB’s make it harder for the defence to defend effectively. Coupled with the POB data (Figure 18), it is suggested that with the decreasing POB times more metres are being made as a result.
To explore this further, a table of the 10 highest distances gained was created to determine where the largest gains had come from (Table 3), with the mean of 4.6s of these plays, they were a full 0.9s faster than the mean POB time of 5.5s. Although 0.9s is not a huge difference, it does suggest a trend that the faster POB more metres are gained. The one play that gained 70m, that came from a time of 7.1s, was from an offload out of a tackle where a player was running on at pace, whereas the others mostly came from overlaps or runs from the hooker from a fast POB. A run from the hooker after a fast POB is often seen as the most effective way of gaining metres after a quick POB (Eaves and Evers, 2007).

Kear (1996) explained that players should adopt a positive attitude towards defence and adopt an ‘American football’ attitude towards tackling and try to progress down the pitch using an ‘attacking defence’, which is also drawn upon within Eaves and Evers (2007) study. This explained the need for line speed to achieve an attacking defence; to reduce the number of metres made by the opposition to deny field position was explored further by Bayliss (2002). Bayliss (2002) proposed that the need for defences to use a quick line speed is to ‘reduce the space, time and option of the attack’. By reducing these components, the defending side will move faster into the tackle reducing the velocity the attacking player could generate over the provided 10m and deny attacking players ‘easy metres’.

5.5 Scorpions V Opposition

The Scorpions won 8 of the 15 games coded, the Scorpions had a mean gain of 0.61m per tackle in comparison to the opposition of each match, over the period of 248 tackles (mean number of tackles over 15 games) showed a gain of 151m per game, this would indicate that the Scorpions had a faster mean POB (Figure 9). Whilst these results showed higher metres made, the Scorpions actually had a slower mean POB by (0.1s). Whilst the Scorpions had a slower POB, this cannot be seen as a large advantage due to players not being able to move a notable distance especially as the match progresses into the later stages of the game (Sykes et al., 2009).

Therefore, it could be suggested that the Scorpions showed a higher level of attacking prowess than opposition using skill level rather than exploiting the speed of the POB. This can be seen with much of the 2010 squad players had higher league
experience and subsequently a number of players going on to play a higher standard of rugby league. With this attacking prowess, a difference was observed within the POB time. A possibility is that most of the players mentioned came from rugby union playing their first season of rugby league against players from the north that grew up playing rugby league. Players who have played rugby league all their lives usually demonstrate better game awareness and knowledge of the game combined with better tackle technique when slowing the POB down as they are more used to the specific tackle technique used in rugby league. Additionally, Eaves (2006) explained that since the introduction of the 10m rule, the more successful teams had on average a slower POB than the opposition. However, the more successful sides showed a higher number of POB’s than the opposition showing that the more successful teams have a greater ability in slowing the opposition POB down.

5.6 Video Based Questionnaire

From the clips that were shown to the 20 rugby players, nearly all participants agreed that a POB >6s was slow, and anything <4 was deemed as quick (Figure 21). The POBs that took 5s split the consensus of opinion where there was disagreement whether they were ‘fast’ or ‘slow’ providing a ‘grey area’ of which a play ranging from 4-6seconds. This suggests that this is the area that is classed as acceptable.

The three POB that took 5s were carefully selected to show a player having a different body position in each clip, Clip number ‘10’ showed nineteen observers in agreement that the POB was slow when in fact the POB was of average time. This observation could have been made due to the fact the ball carrier was put into a negative body position. Clip ‘11’ had fifteen observers in agreement that the play was quick; in this POB the ball carrier had found a positive position on the floor which although the POB taking the same period of time was deemed faster.

Exploring this further shows perceived correlation to the question list results when a player finds a strong body position means they are going to get a fast POB however, this research has proved that this is not always warranted. Therefore, in terms of coaching and performance it would be non-applicable to classify a carry a win or a loss on the body position the ball carrier has found (which is most commonly used as feedback for the players). On the other hand, the fastest POB were observed in the
latter tackles where teams are more likely to spread the ball wide lessening the chance of a mob in the tackle and gaining a positive body position (Eaves et al., 2008).

Further research could focus on the field position of the tackle to determine when to most utilise the quick POB. This would be beneficial as different types of defensive strategies are used by defending sides in different part of the field, especially with marker systems that are in play. By annotating what type of carry was performed, such as those used by Eaves and Evers (2007) study, it would give further basis on which coaches could develop specific coaching programmes; which amplify Eaves et al. (2008) conclusive comments.

5.7 Critical Evaluation

Questionnaires were sent to 20 participants but only 4 were returned, therefore the sample size was small and further research should employ a larger sample size for greater validity. The participants did show a high level of agreement (table 6) to support general trends in coaching practice. However, with a larger sample size the level of detail and depth of analysis could have been a lot greater. The feedback given was very useful to cover gaps in research that are common knowledge and practise for coaches and players alike in professional rugby league. Layne and Thompson (1981) expressed that the return rate of questionnaires is only 27.75% therefore this should have been noted for and compensated by recruiting more participants to yield a higher sample size.

This study does not cover the body position of the ball carrier in the match analysis, by bringing this aspect of the game in would allow coaches to compare POB time with body position and see whether the ‘mob’ tackle so widely used is as important in match play.

Regarding the video-based question list, further analysis could have been conducted to explain what influenced the participant’s decisions regarding how they classified a fast of slow POB, this would help performance analysts understand further how to classify POB’s for team performance.
The significance of this research should not be underestimated when considering Championship rugby league. However, in relation to the Super League, where the margin for error is a lot smaller, similar research conducted on this level is likely to yield different results with a more prominent correlation between metres made and the POB in which would be more relevant to coaches and programmes they create to improve performance. However, the importance of slowing the POB down has been expressed and shows a clear advantage in which teams can exploit.
CHAPTER VI

CONCLUSION
Conclusion

6.1 Main findings

In summary the correlation observed between POB time and metres made is one that is very significant and should be noted across the whole rugby league performance continuum as it has a large influence on the outcome of the game. Furthermore the results showed that the 10 largest gains across the research came from a faster than average POB suggesting that it is more likely to rip off a large gain after a fast POB.

This correlation was viewed between both the winning and losing team not specifically one or the other as the results showed that the POB was not significantly faster between the winning or losing team. On the other hand there was an advantage in metres gained between the winning and losing teams which would suggest the winning side has managed to achieve more with the ball they have had during the match, not from achieving a faster POB.

The question list raised some very interesting current theories used within the coaching setting. This research will only back up current practices used at within the training environment, for example the ‘mob tackle’ highlighted in the question list which supported Eaves et al. (2008) as the most effective way of slowing the opposition POB down. Further practical implications of this research is that it will allow to develop performance analysis in the sport of rugby league as this research will allow analysts help to classify the contact area from wins or losses to a time frame. This will provide players with effective and relevant feedback in which in turn be able to improve from.

6.2 Future research

Whilst this research explored the basic effect of the POB on metres made, further research will be needed to be conducted to effectively explain the effect of the POB on higher level rugby league. With focus also into field position of the tackle as defensive strategies change and when inside 10m of the oppositions try line players have less distance to retreat. Another interesting avenue of research could be to determine what time in the match a quick POB affects match play the most exploring
Eaves and Evers (2007) study further as the nature of the game would suggest as teams get more tired it would be ever more important to achieve a faster POB.
REFERENCE LIST


http://www.therfl.co.uk/~rflmedia/docs/RFL%20Laws%20of%20the%20Game%202013.pdf (Accessed 13th December 2012)


CHAPTER VII
APPENDICIES
APPENDIX A
FULL ANSWERS OF QUESTIONLIST
(MULTIPLE CHOICE)

<table>
<thead>
<tr>
<th>Name</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
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<tr>
<td>Participant1</td>
<td>1</td>
<td>2</td>
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<td>8</td>
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<td>Participant2</td>
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<td>Participant3</td>
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<td>Participant4</td>
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<tr>
<td>Participant 1</td>
<td>Answers</td>
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<tr>
<td>3. How would you define 'Slowing the Ball down'?:</td>
<td>Ensuring that the opposite does not get a quick play of the ball which will allow them to get a roll on and speed up the tempo of the game. This can be done by wrestling the opponent onto their back.</td>
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<tr>
<td>4. Can the Speed of the play of the ball be measured? How could it be measured?:</td>
<td>Yes it can be measured by the amount of time it takes for the tackle to be completed and then for the player to get to his feet and play the ball.</td>
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<tr>
<td>Why?</td>
<td>It stops the opposition speeding up the tempo of play, this means that the defensive team can organize the defensive line better. Better organisation means that the line speed is likely to be better and the initial contact will be better due to increased organisation</td>
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<td>8. Why? Please Answer below:</td>
<td>Slowing the ball down means that the defensive team has more time to be organised and better organisation means less mismatches which often result in tries</td>
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<tr>
<td>Why?</td>
<td>Whilst one quick play of the ball may not result in a try, it will improve the chances of the next tackle also being a quick play. This creates a roll on and increases the speed of play which is harder to organize and defend against which is more likely to increase the changes of a try</td>
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<tr>
<td>12. Please Define an “Ideal tackle” from a defensive point of view:</td>
<td>First player initiates contact and locks in the ball whilst also gaining a lever (a point of manipulate on the opposition body), second man enters the tackle and locks the upper body of the opposition. From here the two defenders have total control of the attacking player, the tackle should then be completed by a third defending player &quot;chopping&quot; the legs of the attacking player. The 3rd man then works off once held is called and joins the defensive line, the other two defenders communicate to slowly work off and become markers.</td>
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<tr>
<td>1. How would you define 'Slowing the Ball down'?</td>
<td>Slowing down the speed the opposition can play the ball</td>
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<tr>
<td>4. Can the Speed of the play of the ball be measured? How could it be measured?:</td>
<td>Yes, by the time it takes from tackle being made to the ball being played</td>
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<td>Why?</td>
<td>Allows more time for the defence to organise</td>
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<td>8. Why? Please Answer below:</td>
<td>By allowing the defence to organise it makes it much harder to break through the defence</td>
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<td>Why?</td>
<td>Quick ball plays allow players to target the holes created by a disorganised defence</td>
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<tr>
<td>12. Please Define an “Ideal tackle” from a defensive point of view:</td>
<td>Player one hits high wraps the ball up an exposes the ribs. Player 2 hits the exposed ribs to gain control and player 3 chops the legs.</td>
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</tbody>
</table>
**APPENDIX D**

**FULL ANSWERS OF QUESTION LIST**

**(PARTICIPANT 3 TEXT ANSWERS)**

<table>
<thead>
<tr>
<th>Participant 3</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. How would you define 'Slowing the Ball down'?</td>
<td>An opponent preventing the opposition from playing the ball quickly</td>
</tr>
<tr>
<td>4. Can the Speed of the play of the ball be measured? How could it be measured?</td>
<td>Yes, by measuring the time taken for the player to get up, play the ball and the hooker to touch the ball.</td>
</tr>
<tr>
<td>Why?</td>
<td>It allows the defensive line to get set ready for the next tackle</td>
</tr>
<tr>
<td>8. Why? Please Answer below:</td>
<td>9. As the speed of the play of the ball can effectively win or lose teams a game. The faster the play of the ball the more the opposition tire which will cause gaps to open up in their defense and may cause them to give away penalties.</td>
</tr>
<tr>
<td>Why?</td>
<td>Because the defense may struggle to get back 10m only to have to turn and defend an oncoming attack causing some players to be fatigued and so they will leave dog legs in the line.</td>
</tr>
</tbody>
</table>

<p>| 12. Please Define an “Ideal tackle” from a defensive point of view: | 3 tacklers. 1st man hitting high and wrapping up the ball, 2nd man hitting the waist or trunk acting as the driving force in the tackle, 3rd man chopping or adding weight with the opponent taking between 8-10 seconds to find his feet and play the ball. |</p>
<table>
<thead>
<tr>
<th>Participant 4</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3. How would you define 'Slowing the Ball down'?</strong></td>
<td>Working the ball carrier in the tackle to keep them upright, and the subsequent contact on the floor until the referee shouts &quot;move&quot; before releasing them to create a slower play of the ball</td>
</tr>
<tr>
<td><strong>4. Can the Speed of the play of the ball be measured? How could it be measured?:</strong></td>
<td>There are two ways the speed could be measured depending on a coaches discretion. 1-Simply from the time the attacker hits the floor to the ball touching the attackers foot or 2-If the defenders are dominant in the collision and actively holding the attacker from the floor you could class this as slowing the ball and add this to the time measurement</td>
</tr>
<tr>
<td><strong>Why?</strong></td>
<td>It provides a greater amount of time for team mates to get back 10, re-set, then identify and nominate threats</td>
</tr>
<tr>
<td><strong>8. Why? Please Answer below:</strong></td>
<td>As conceding quick play the ball's to the opposition means less time to organise defensively. Therefore over the course of the game you will tire quicker as your working harder to get back</td>
</tr>
<tr>
<td><strong>Why?</strong></td>
<td>As the defence has less time to get back, increasing the chance of a penalty or at least less organisation</td>
</tr>
<tr>
<td><strong>12. Please Define an “Ideal tackle” from a defensive point of view:</strong></td>
<td>1st man wraps the ball, gaining control over it and exposing the carriers ribs. 2nd man has a clean shot as his ribs and takes away his core, meaning he is completely in their control. 3rd man allows the other 2 to keep the attacker upright and then at the last minute chops the attackers legs and adds their weight before retreating 10m</td>
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</table>