Kicking

How Rugby Can Benefit from Improved Kicking Technique: A breakdown of AFL kicking technique and its portability to rugby

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Question: Why can a 165cm tall AFL player kick a football sixty metres, while a 185cm tall rugby kicker struggles to kick the ball forty five metres?

Answer: Foot Speed

Introduction

Kicking is rapidly gaining kudos as an essential skill in the modern game of rugby; however rugby players on the whole have poor kicking technique. This paper will demonstrate the attributes that constitute the successful kicking styles of Australian Rules Football (AFL) players. It will also detail biomechanical measures of both rugby and AFL players, to support the case for rugby players to learn more about AFL kicking.

In the 2005 Tri Nations, the average number of kicks per team per game was as follows (irb.com, 2005):

South Africa	**34**
New Zealand	**31**
Australia	**24**

South Africa kicked 40% more than Australia and given Australia's higher rate of possession, South Africa's relative kicking percentage was over 70% that of Australia (irb.com, 2005). New Zealand also kicked significantly more than the Wallabies – approximately 25% more.

Australia is not keeping pace with the increase in quality and extent of rivals' kicking games. Whilst this is a coaching and "style of play" decision for the Wallabies management, changes in defensive patterns over recent years are forcing teams to rethink their game and kicking plans. Brumbies coach, Laurie Fisher feels that the "Wallabies and Brumbies need to change their mindset on the use of kicking plays given the increased line speed and ferocious tackle contest".

This opposition pressure will further test the kicking ability of the Wallaby and provincial kickers, as well as those infrequent kickers. It will be more important for more players to participate in the structured kicking plans. Fisher again comments that "New Zealand kicks from 9 to 15 (especially 12) whereas Australia almost exclusively kicks from 10, 12 and 15."

As well as needing to improve kicking for field position from general play (as outlined above), Australian players need to learn more skills in line kicking. International kickers like Percy Montgomery and Daniel Carter regularly punish sides by gaining large territory from penalties; Australia needs to do the same.

Eddie Jones said after the 2003 Rugby World Cup that "Australian rugby needs to develop its own Jonny Wilkinsons as it heeds lessons from England's Rugby World Cup triumph…England exposed flaws in the Wallabies' playing style, including their lack of emphasis on kicking …" (rugbyheaven.com 2003)

By learning from AFL, rugby players can gain distance, accuracy and consistency in their kicking. This will require good technique and practice.

Background to Successful Kicking Technique

Kicking must be considered an all of body movement, not just a leg swing. Kicking is a throw-like motion – proximal to distal sequence or acceleration. That is; maximum angular velocities are reached in sequence. In kicking, it starts from the proximal segment (the hip) and proceeds sequentially thru the thigh to the distal segment (the lower leg or shank). Segments of the body rotate in different ways to maximise foot speed. Energy is transferred from trunk to pelvis, thigh and leg. Correct sequencing results in maximum velocity of the foot at impact. (Rath 2004) It is the speed of the foot at contact that is the key factor in successful kicking.

This is called the Kinetic Link Principle.

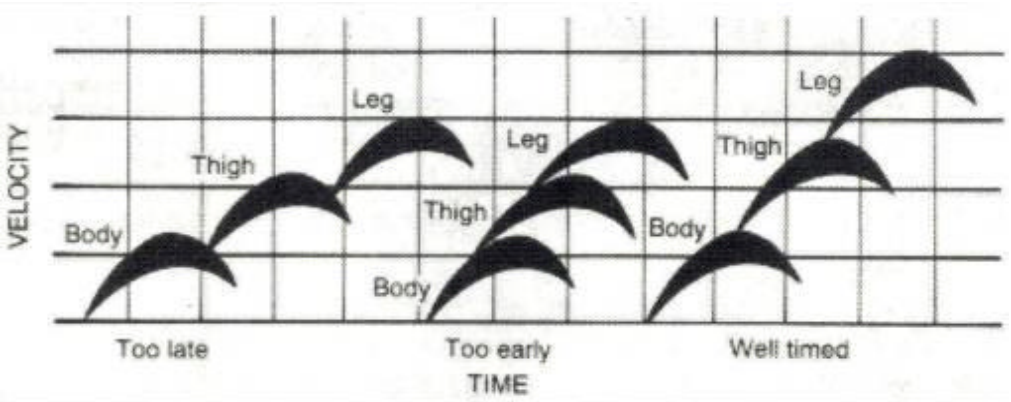

Figure 1: Kinetic Link Principle (Rath 2004)

Early or late action of the body, thigh or leg will reduce the velocity at impact.

Optimal progression is outlined below and forms the basis of this paper.

- Approach
- Grip and Release of the Ball
- Generating Foot Speed
  - Hip Extension
  - Knee Flexion
  - Stretch across truck/hips/quad
- Role of the Support Leg
- Impact
  - Momentum thru Impact
- Follow Through

Approach

In set shots for goal in AFL and kicking for line in rugby the approach is used to gain a rhythm but is also important in setting the forward momentum required through the

impact. Vertical “bounce” allows a lengthening of the backswing prior to kicking and enables bracing of the support leg (Rath 2004).

The actual path or angle of the approach is also important. Both a straight run and a curved run can work, but it important not to continue the arc to impact if using a curved run. Straighten out so that the kicker is heading directly toward the target. The greater the curved run up, the greater the angle the body has to compensate to draw the ball back to the target (Wheadon 2004). For a right footer, this will often cause the ball to track from right to left. This can cause kicking errors.

The approach when kicking in general play will change slightly due to pressure from opponents, but if the kicker has commenced his approach prior to receiving the ball and continues toward the target, he should be able to complete the remaining sequences of the kick successfully. Also, if the technique outlined in this paper is followed, the player will stand a far greater chance of affecting a useful kick. This is true of all types of kicks required in both games, be they snaps at goal in AFL or box kicks form the half back in rugby. Whilst they ill not be able to perform all the actions outlined here, the foot speed at contact is still possible.

Grip and Release of Ball

The drop punt kick is the kick referred to throughout this paper. This is the common kick in AFL and has become the favoured kick for many players in rugby. The majority of the discussion in this paper equally applies to a torpedo kick; however the grip is for a drop punt.

The grip taught at all levels of AFL is one with both hands approximately near the top of the laces of the ball with the fingers spread and the ball tilted back slightly. It is important to feel comfortable over the ball so minor differences appear, but this grip allows better control over the release than holding the ball upright and on the side as many rugby players do. The tilt opens up the contact point on the ball. As the ball spins backwards in the air after contact, it is crucial to tilt the ball backwards slightly to achieve maximum distance.

For the player to have maximum control over the ball onto his foot, the kicker uses both hands to swing the ball up to chest level and almost full arm extension. The ball inertia generated by this upward movement allows the kicker to better control the ball with his right hand (right foot kicker) after he takes his left hand off the ball. The right hand guides the ball down to hip level (see the player on the left in Figure 2).

By moving the ball up and away from the body, the kicker creates a bigger range of motion as the ball is dropped further in front. This allows an increased range of leg movement. This extension cannot be gained if the ball is pushed directly to the kicking zone from the waist, something common in players uncomfortable with kicking or with poor technique (see the right side player in Figure 2).

Although the kicker has a greta deal of control over the ball, he does not guide it right onto his foot; his aim is to release the ball to coincide with his kicking foot leaving the ground. It is obviously critical that the player controls the path and orientation of the ball between hand and foot. (Rath 2004)

Generating Foot Speed

As mentioned earlier, kicking involves the whole body in generating foot speed. As the kicker takes his left hand off the ball he moves his arm up and back, opening up his left side. A long last stride onto the support leg allows back extension, pelvic rotation and hip extension. This helps to put quads, hips and trunk on stretch. This position assists the stretch-reflex response of the key muscle groups, like the stretch of an elastic band. This is analogous to winding up a spring and letting it go.

Figure 2: Ball drop and maximum thigh extension position (Baker 2005)

The greater the hip extension, the longer the time over which force can be developed (Baker 2005), the more muscle groups working together, hence the greater the force.

The player on the left in Figure 2 demonstrates greater thigh extension and will have more time to generate force. He has also dropped the ball further in front, allowing him to more time to generate more foot speed at impact.

As the kicking foot begins to move forward, the trunk begins to flex and the pelvis squares up. At this point, the knee angle tightens and the thigh flexes forward. The tightness of the knee angle is inversely proportional to the speed of the thigh, shank and foot. With the thigh, shank and foot closer to the axis of rotation – the hip joint – the moment of inertia is lower of these combined segments is lower thereby creating a higher angular velocity and consequently foot speed, This situation is the same as when an ice-skater brings their arms close to their body allowing them to spin faster. This minimum knee angle also allows the late release of the lower leg and foot, similar to a golf club whipping through at impact. The player on the left in Figure 3 below will generate more speed by virtue of his tighter knee angle.

Figure 3: Minimum Knee Angle

The thigh moving forward has initiated the angular velocity of the leg/foot. As the forward momentum of the thigh slows, the knee rapidly extends in a whipping action. The tighter the knee angle, the higher the velocity of the shank moving to impact.

It is at this stage that the left arm comes down and through and provides the balance by countering the kicker's leg motion.

Role of the Support Leg

The support leg has a vital role to play in successful kicking. After all it is the position of the support leg that influences the length of the final stride and this stride allows the spring to be wound up to the required level. Ideally the support leg will be pointing directly at the target and will play a crucial role in bracing the body for the kick and allowing the body momentum to be transferred into the kicking leg. It is important that the support leg can flex to absorb the weight and momentum of the kicker and then rebound off again to allow full extension after impact.

Remember, the kicker will have generated significant forward momentum by this stage and this needs to be transferred into the follow through. The strength provided by the support leg also allows the kicking leg to clear underneath the kicking hip. If the support leg collapses, the kicking leg cannot swing through the optimal arc. This collapse will also reduce the forward momentum of the player and ultimately reduce the force imparted on the ball.

Impact

As per the Kinetic Lick Principle (Figure 1), correct sequencing results in maximum velocity of the foot at impact. At this stage the sequential momentum is transferred to the knee extension and there is little other critical movement of the body. The knee will continue to extend to impact, using the force generated by the other body segments to generate foot speed. The knee is not fully extended at contact; it is at an approximate angle of 130degrees. Apart from techniques the final foot speed is dependent on flexibility, sequencing and strength. There is a strength and training issue here that often goes unnoticed, particularly in rugby circles.

As for the body shape at impact, the head should be over the support foot and the foot – ball contact should be made under or just in front of the kicking knee. At this point

the foot has generated maximum velocity and will continue to drive through after initial contact.

Effective mass is another factor affecting impact. Stiffening of the joints and ensuring contact is made on a rigid foot creates an efficient energy transfer. Maintaining or increasing the forward momentum of the player through impact also contributes to the speed of the ball off the foot. To use a cricket analogy, Brett Lee would not bowl as fast if he walked to the crease.

Follow Through

It is important that the kicker continues his momentum through the kick. As the knee is not fully extended at contact, the kicker must continue with the generated velocity after impact. The support leg now rebounds and provides the kicker with full extension of the leg.

How Can this Benefit Rugby Players.

As discussed in the introduction, kicking is becoming an increasingly important skill, and statistics and results show that the multi phase style of play has not been successful in 2005. In this year's Tri Nations, all tries were scored in three phases or less. The successful teams in southern hemisphere rugby in 2005 built their success around a philosophy of kicking. This is tantamount to saying that the best teams have the best kicking games. The kicking games may be different to each other, but the facts are indisputable.

The main part of this paper has discussed how to improve the skill of kicking by using the technique of AFL players. By working towards this technique in a closed environment, rugby players will become better kickers with better habits. It is these habits that will come into play in an open environment – a game. By ingraining the sequencing discussed here, players will be able to generate more force when kicking the ball, be it for a set kick for line, a hurried clearance out of the 22 or a contestable high ball.

More importantly, it will allow more players to become confident in kicking and give coaches more kicking options in a game. As previously mentioned, the All Blacks have several kicking options, whereas the Wallabies are restricted to a few. Morgan Turunui kicked 3 times in over six tests whereas his Kiwi equivalent Aaron Mauger kicked the ball fifty times. The kicking philosophy is winning rugby at the moment.

The winners of the 2005 Super 12 are testimony to this. The Crusaders have a history of kicking well, and have had the skilled players in Mehrtens and Carter to execute their plans. This year, they shortened their game and kicked to a contest far more. This type of game requires a higher skill level that just kicking the ball as hard as you can. Without proper technique, it is far more difficult to land the ball in a five metre area. They were able to regather 27% of their kicks by effective contestable kicking. Further, their rate of miskicks was less than half the average for Super 12 in 2005. (Tooheys Super 12 Statistics)

The runners up in the Super 12, NSW Waratahs, kicked the ball far more than any other S12 team. Their kicking game varied from the Crusaders in that they were happy to kick the ball long and out and rely on their lineout to get possession. In their 13 games, they kicked the ball out more than twice as much as the Crusaders. They also had the highest number of miskicks, so improved technique would have helped them given their game plan.

In the Tri Nations, both New Zealand and South Africa kicked far more than Australia and with better effect. New Zealand for example, was able to contest nearly half their kicks, whereas the Wallabies' rate was under 25%.

Contestable kicks have become a way to turn pressure onto the opposition and have become extremely influential in the game. A good kicking technique will provide the height and accuracy to allow players to contest. Rather than run multi phases, sides are now resorting to kicking to get past brick wall defences. The better the kick, the more effective the chase and the more pressure exerted on the opposition – the more likelihood of regaining possession.

At a more base level, and something that is prevalent in club rugby is the ability to find touch from a penalty near the opposition try line. Many tries are scored from a rolling maul from a lineout within 10 metres of the line, but far fewer are scored from 20 metres out. The ability of a kicker to kick the ball out near the goal line validates the need to improve rugby kickers' technique and accuracy on its own.

How to Coach Improvement

It is important to explain and show the kicker where they are aiming to get to. It is also important to take an integrated approach and ensure that the kickers are flexible enough and have the strength to allow sound kicking techniques. Hip, Quad and hamstring flexibility are important in gaining maximum velocity.

Where possible, capture video of the kicker as a baseline and then work on correcting he earliest mistake first. If this error is not fixed, subsequent improvement will be hindered. The technique outlined here is "textbook' and there needs to be room for individual flair, but not at the expense of generating the velocity needed to kick successfully.

Variability is crucial and every kick will be different, break the skill down. Use a soccer ball and get the player to kick with an tighter knee angle, just to get the feeling of what is required to generate the requiste foot speed. Use didferent balls, different targets and kick types to keep the learning interesting.

As with most skill learning, work in both closed and open environments to allow to players to test what they have practiced.

Conclusion

The game of rugby seems to have gone full circle in some respects in the last ten to fifteen years. Ten man rugby changed into the running game and now defence has taken over. With the vast majority of international tries being scored off early phase

ball, coaches must look for ways other than “ball in hand“ to reach opposition try lines.

Kicking the football is the style that is now in vogue. The teams that are winning tournaments are those with the best kicking games. Kicking technique is under the spotlight more than ever and more players are required to contribute to a team’s kicking game.

How much time coaches devote to a skill that is so influential to the game will vary, but it seems obvious that teams with several quality kicking options and a game plan to suit will reap the rewards, just as the current World Cup, Tri Nations and Super 12 champions have.

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