

IDENTIFYING THE KEY TECHNICAL ASPECTS OF RUGBY PLACE KICKING: A QUALITATIVE CASE STUDY OF AN ELITE COACH

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Place kicking plays an important role in the outcome of rugby union matches. However, the understanding of rugby place kicking technique is currently limited and this study aimed to start 'bridging the gap' between contemporary coaching expertise and the biomechanical understanding of rugby place kicking. An Interpretive Phenomenological Analysis of a semi-structured interview with an elite kicking coach was used to identify the key technical features of rugby place kicking and thus provide direction for future biomechanical research. Ball placement, the approach, body position at support leg contact, support leg mechanics, the path of the foot during the kicking phase and its orientation at ball contact, energy dissipation during the follow through, and overriding coordination issues were all identified as key areas in need of future research.

KEY WORDS: biomechanics, coaching, football, Interpretive Phenomenological Analysis, kick.

INTRODUCTION: Successful place kicking is becoming an increasingly important part of modern rugby union. In the 2013 Six Nations Championship, an average of two and a half tries (12.5 points) were scored per match, the lowest number since the Championship's inception in 2000. In contrast, the contribution of penalty goals to the total points scored has steadily increased since 2000; in 2013 there were on average 6.3 successful penalty kicks (18.9 points) per match. Furthermore, in each of the last four years, the results of two (2011) or three (2010, 2012, 2013) of the 15 matches would have differed if the losing teams' kickers had improved their kicking success percentages to a combined average of 80%. Despite the importance of place kicking, the technical aspects of rugby place kicking remain largely unexplored; only two three-dimensional studies exist (Baktash et al., 2009; Bezodis et al., 2007) and these have focussed on very specific aspects of the action. In order to help direct the necessary research in this area, this study aimed to develop an evidence-based understanding of the key technical features of rugby place kicking through a qualitative in-depth assessment of an elite kicking coach's technical expertise. These technical features were then critiqued in relation to existing rugby kicking and soccer literature where relevant.

METHOD: Following institutional ethical approval, an International Performance Coach with Responsibility for Kicking was purposefully selected. A case-study approach was adopted due to strict selection criteria which included sport-specific involvement, coaching expertise, and long-term experience of coaching kicking. The coach has been involved in rugby union as both a player and coach for over 30 years and qualified as a Rugby Football Union (RFU) Level 5 coach (specialising in goal kicking) nine years ago. He has been actively coaching professional rugby union for 16 years: seven years as an Assistant or Head Coach at professional clubs, and 12 years with various coaching roles within an International Union's set-up (nine years full-time with a kicking-specific role).

An Interpretive Phenomenological Analysis (IPA; Smith, 1996) was adopted to address the aim of this study. Such an approach facilitated a detailed investigation of the coach's understanding of the key technical aspects of rugby place kicking by exploring the processes through which he made sense of his own experiences (Brocki & Wearden, 2006). The interview followed a semi-structured approach and comprised open-ended questions to allow the coach considerable scope to express his thoughts and expand on the views he offered. Although there was a certain element of structure to the interview, the order of the questions was dependent on the response of the coach, thus allowing him the freedom to talk and ascribe meanings while bearing in mind the broader aims of the project (Smith, 2008).

Prior to data collection, a pilot interview was conducted with a Level 3 qualified rugby union coach. This allowed for revision of the interview guide and ensured that the terminology was appropriate and the schedule provided enough opportunities to gather the required richness of data. The final interview guide was structured around three key areas: general introductory and contextual information, attributes associated with successful kicking performance, and sources of coaching knowledge. A variety of probe and elaboration questions were employed to ensure complete understanding of the coach's comments and enable in-depth answers to be obtained. Before providing written informed consent, the coach was provided with an explanation of the study purpose, informed that all information would remain confidential, and that he could stop the interview at any time. The interview was conducted on a face-to-face basis by the first author in the coach's typical environment and lasted 57 minutes.

The interview was transcribed verbatim and read thoroughly several times to immerse the authors in the data and gain a sense of whole before data reduction. Preliminary comments, associations and summaries were noted to ensure the authors' understanding of the coach's account. Using the preliminary notes, the emergent themes were then documented, reflecting the richness of the coach's experiences. Analysis involved an iterative process of moving between the complete transcript, paragraphs, and sentences in order to construct the emergent themes in detail. The final themes were collated and combined with quotations from the transcript to ensure that the connections worked for the actual words of the participant. The two authors had extensive discussions throughout the data analysis. Triangulation consensus was then reached with a third independent researcher who was not involved in the data collection or initial analysis but was employed to check the clarity of the subsequent interpretation and the themes extracted. In event of disagreement, the original transcripts were re-read and further discussed until a consensus was reached (Smith, 2008). Finally, member checking was performed with the coach to ensure the identified themes accurately captured his experiences and to offer him the opportunity to add any additional points (Brocki & Wearden, 2006). Following this process, the coach confirmed to the authors that a precise portrayal of his experiences had been represented.

RESULTS AND DISCUSSION: Analysis of the interview transcript revealed two emergent themes relevant to the aim of this study. The first related to the coach's professional philosophy and will be briefly discussed to provide context. The second related to the attributes associated with successful place kicking performance.

Professional philosophy. Independence was a key aspect of the coach's philosophy which was influenced by "*experiences of playing, experiences of my...day job*". Whilst the coach acknowledged that "*the be all and end all in this profession is results*", he assesses the impact of his coaching on both kicking success percentages – "*anything above 80% is good*" – but also on "*the longevity of the player*": "*he could kick eight out of eight one week and then not play for the next ten weeks. That defeats the object.*" The coach acknowledged that "*science has a massive part to play*" in place kicking and although "*the kicker is an artist first and foremost...science can supplement the art*". The coach highlighted the role of interdisciplinary science in developing intervention programmes: "*The example of that was [Player X]. Two years ago I had worked with him for three years but we wanted to increase his distance. That was a collaboration between conditioner, Head of Performance, physio and kicking coach all working together to collaborate on a programme that would achieve [greater distance]. It needs proper experts to say we need to develop...this muscle in conjunction with this, we need flexibility here. You can't do that by just going out on the field kicking; you need to have a sustained programme off the field to do that.*"

Attributes associated with successful place kicking performance. Whilst the coach mentioned that "*goal kicking is a very, very individual technique...I don't think one model fits all*" – a notion which was attributed to "*the individual anatomy of players [being] different, and their timing [being] different because of their power and strength ratios*" – he highlighted three broad sets of attributes which all successful kickers required: technical, mental and physical. As the coach's expertise relates to the development of technical attributes, and given the relevance of this for addressing the stated aim of this study, the general set of

required technical attributes were thus explored in detail. The key technical attributes that the coach highlighted could be divided into one of three phases of the kick: the approach, the kicking action (from support leg contact (SLC) to ball contact (BC)), and the follow through. The first attribute related to the approach was ball placement. This was largely individual as the coach allows his kickers to choose their own preference – *“there’s an advance for people leaning the ball slightly to open a sweet spot...some like [to kick] on the point...others [prefer to position the ball] upright”*. No peer-reviewed research exists investigating the efficacy of different approaches to rugby ball placement on a tee, but given the non-spherical nature of a rugby ball and the known importance of the foot-ball interaction in soccer (Lees et al., 2010), it is an area worthy of consideration. The second key attribute in the approach related to *“being balanced on the way in...the kicking foot barely touches the ground...so it’s nice and light, not digging in to the ground. You’re almost keeping it free to swing through”*. Whilst Baktash et al. (2009) experimentally affected the approach of three rugby place kickers by manipulating the location of the support foot contact relative to the ball by 30 cm in anterior, posterior and medial directions, these manipulations were quite extreme and there exists no further research focussing on the approach in rugby place kicking. A curved approach of two to four steps has been suggested to be important for soccer kicking performance (Lees et al., 2010) but the reasons for this remain disputed. Given the variety of approach techniques evident in rugby place kicking, the approach warrants further consideration.

The kicking action was explained with a series of specific attributes that were deemed fundamental for all successful kickers. The kicking action commences with SLC where the importance of a stiff *“pillar”* was identified: *“locking out your [support] leg in order for your [kicking leg] to strike through”* alongside a *“support foot...parallel to target”*. This is also yet to be explored in rugby place kicking, but given its potential importance in soccer instep kicking – Potthast et al. (2010) identified a positive relationship between deceleration during the kicking phase and ball velocity – the role of the support leg as a *“stiff pillar”* in rugby place kicking performance is worthy of investigation. The coach identified a stretch in the body at SLC as paramount. Referred to as the *“triangle”*, the coach aims to have the non-kicking foot, the non-kicking side shoulder and the kicking foot as far apart as possible: *“the more stretched this is, the more power that should hopefully be generated...it’s like an elastic band, stretch it. The non-kicking side shoulder taut and pulled up right across the body from the kicking leg. If that collapses the kicking leg collapses”*. The stretch of the non-kicking side shoulder may relate to the previously identified role of the non-kicking arm in the generation of angular momentum (Bezodis et al., 2007). The stretch between the two feet in this *“triangle”* may reflect the importance of pelvic retraction on the kicking leg side at support leg contact which allows for a greater subsequent range of pelvic protraction (Lees et al., 2010), whilst the stretch between the kicking foot and non-kicking side shoulder, and the elastic band analogy, are similar to the ‘tension arc’ proposed by Shan & Westerhoff (2005). The kinematics of a kicker at SLC is an important area for investigation in rugby place kicking and given that the approach leads into SLC, the aforementioned role of the approach could be appraised in relation to achieving certain configurations at SLC.

As the kicking action proceeds, it was made clear that the hip, followed by the knee, and finally the ankle should *“snap”* towards the target: *“when we’re talking about ‘snapping’ the ball, we’re talking about how the hip leads the knee; the knee then ‘snaps’ the shank that ‘snaps’ the foot through the ball underneath it.”* The role of such proximal-to-distal sequencing has been well documented in throwing and kicking skills. The path of the endpoint of the kicking leg system (i.e. the foot) during the downswing was also identified as important. This should be *“inside to go through rather than going outside to in. You don’t want the leg to go out and then come across the ball”*. The coach aims for all of his kickers to have the foot moving through in a *“straight line going through...towards the target...from six to twelve inches behind the ball [until]...six to twelve inches after impact”*. Whilst there has been no specific foot trajectory investigation in rugby place kicking, Alcock et al. (2012) described a 3D ‘swing plane’ fitted to the kicking leg in different soccer kicking tasks, and such an approach could be used to aid the understanding of the foot path in rugby place kicking. It was suggested that BC should occur with the foot *“toe down, laces up; promote the*

hard part of the foot striking through the ball”, a logical premise based on impact mechanics, and one that could be investigated in conjunction with ball positioning. The coach suggested that in expert kickers “*the ankle releases on impact with the ball...almost like a wrist release in golf*”. No evidence exists to support this but soccer research has previously suggested that a more plantar flexed foot at BC is associated with lower ball velocities (Lees et al., 2010). Overriding all of the above technical attributes was the repeated belief that kickers could not be successful “*if they haven’t got any...coordination*”. For example, players were identified who have “*a hugely quick limb speed but can’t coordinate [it] into a kicking pattern*”. One of the main areas in which coordination was highlighted as important was “*the ‘snap’ of the hip, knee and foot [accelerating] towards the target*”. However, it was clear that coordination and timing were deemed fundamental throughout the approach phase and the kicking action. This was highlighted as one of the key reasons why kickers are unsuccessful at times: “*people...get quick in the transition from their drive step (last ground contact with the kicking leg) into their placement step (support leg contact) and they don’t give themselves time to get back to their full natural ‘triangle’. They get really quick...on it so there’s a timing issue and that’s the first thing that really tends to go.*” Coordination is an increasingly popular area in sports biomechanics and whilst there has been some recent interest in kinematic coordination in soccer (see Lees et al., 2010), there is clearly scope to explore the potential roles of coordination in rugby place kicking. For the follow through, the coach suggested that “*there needs to be a...release mechanism...at the end...to dissipate the energy build up...[due to] the braking forces they’re putting on themselves*”. He highlighted individual variation in follow through technique in that it may be “*a hop or a skip, it may be a run, a step on your kicking foot afterwards, it may be whatever it is but there needs to be a release*”. The follow through has not been directly investigated in rugby place kicking, although Bezodis et al. (2007) did present whole body and segmental angular momentum data during this phase. If injury prevention and player longevity are to be a focus of place kicking research, it is possible that the follow through will be a necessary consideration based on the importance attributed to it by the coach.

CONCLUSION: The coach identified and discussed technical attributes that were suggested to be important for rugby place kicking performance and these were critiqued in relation to relevant existing literature. Key areas worthy of consideration in future biomechanical research were identified as ball placement, the approach, body position at support leg contact, support leg mechanics, the path of the foot during the kicking phase and its orientation at ball contact, energy dissipation during the follow through, and overriding coordination issues within and between these key areas.

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