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Bridging the gap between Science and Practice

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This winter the England Men's cricket team will head to Australia to defend 'The Ashes' with the two most successful English fast bowlers of all time within their ranks. Although the success of these two players may be a coincidence, their careers coincide with a partnership between Loughborough University (Dr Mark King, School of Sport, Exercise and Health Sciences) and the England and Wales Cricket Board (ECB; Kevin Shine ECB Lead Fast Bowling Coach) over the last 14 years. The aim of this partnership was simple: to establish an understanding of the relationships between fast bowling technique and improvements in performance and the likelihood of injury.

Initially a PhD by Craig Ranson focussed on lumbar spine injuries, the biggest time loss injury in the sport, and their relationship with fast bowling technique. The results of this research quite possibly saved England's leading test match wicket taker's career in its infancy. Initially, his technique displayed characteristics at back foot contact which were linked to lumbar spine injuries and this resulted in a preventative move to remodel his action. A loss of form and a spell of injuries followed. During this time the new research¹ suggested a move away from focussing on traditional back foot contact characteristics and a move towards focussing on the front foot contact phase of the delivery stride where spinal postures are most extreme and loading on the lower back is greatest. He reverted back to his old action and the rest is history.

The second major research project, a PhD by Peter Worthington, attempted to establish the link between technique characteristics, ground reaction forces and ball speed. This research aimed to identify technique characteristics common among the fastest bowlers, and whether

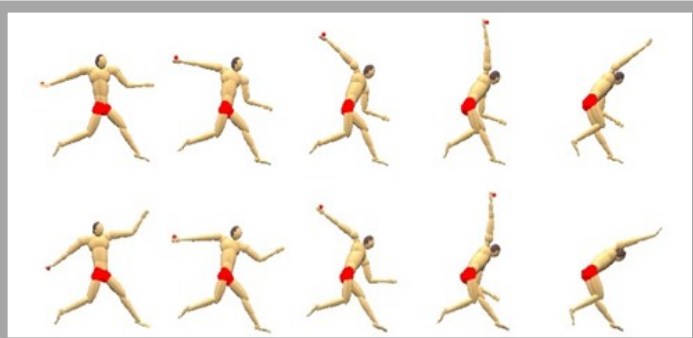


Annual biomechanics screening assessing performance and injury characteristics.

this technique was linked to higher ground reaction forces. The results suggested that the fastest bowlers have four common characteristics: a faster run-up, a straighter front leg, a larger amount of trunk flexion and delayed circumduction of the bowling arm². This leads to a technique in which the fastest bowlers maximise their horizontal braking impulse during front foot contact as opposed to their peak ground reaction forces and loading rates³. While this approach contradicted the common beliefs of cricket coaches at the time, it was comparable to the optimal technique used in javelin throwing to maximise throw distance. A direct consequence of these studies

has been the introduction of annual biomechanical screenings for fast bowlers coming through the international development pathway. This process allows the ECB to assess player technique for performance potential and injury risk.

Although the biomechanical screening provides the ECB with plentiful data on an individual bowler's technique, it does not provide a golden ticket to optimise their performance. It allows the coach to incorporate an evidence-based approach based on an elite group of fast



Comparison between current technique (top) and simulated optimal technique (bottom).

bowlers but the individual's optimal technique will have variations due to differences in anthropometry and physiology between bowlers. The third major research project undertaken by the partnership, in the form of a PhD with a continuing Post-Doc by Paul Felton, aimed to investigate the factors limiting individual fast bowling performance in attempt to provide bowler specific coaching recommendations. To do this a subject-

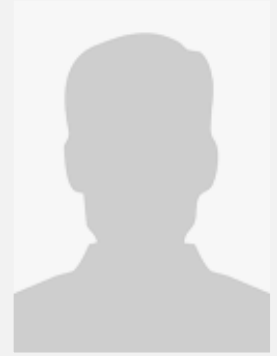
specific computer simulation model of the fast bowling action was developed, validated and then optimised for a pre-specified bowler⁴. The results indicated that a much larger performance increase was possible by improving technique (20%) rather than strength (1%). These recommendations were subsequently implemented within the individuals coaching plan and a significant increase in ball release speed has been observed (>10%). The goal is to use this model to supplement the coaching of all the players who enrol on the international pathway.

The success of this partnership has been based on the ability of the practice to question the discipline to understand fast bowling technique and its effect on performance and injury. At times however, the science has disproved the current thinking. This is more often than not, the biggest challenge in bridging the gap between science and practice. From experience it is important to remember that as scientists our job is to aid the practice and not replace coaches. Gain their trust, ask for their ideas, discuss what the scientific evidence suggests as simply as possible and remember both science and practice are not 100% fool proof. Finally once a plan has been put in place, let the coach do his job. The fact England head to Australia with their two most successful and most capped fast bowlers in their history, and with a programme specifically for fast bowling development, suggests that the ECB has been rewarded in their attempts to bridge the gap between science and practice.

References

1. Ranson et al., 2008. JSS 26, 267-276.
2. Worthington et al., 2013. JSS 31, 434-441.
3. King et al., 2016. JSS 34, 707-712.
4. Felton & King. 2017. ISBS 2017.

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