



Original research

Acquisition of expertise in cricket fast bowling: Perceptions of expert players and coaches

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ABSTRACT

Objectives: Experiential knowledge of elite athletes and coaches was investigated to reveal insights on expertise acquisition in cricket fast bowling.

Design: Twenty-one past or present elite cricket fast bowlers and coaches of national or international level were interviewed using an in-depth, open-ended, semi-structured approach.

Methods: Participants were asked about specific factors which they believed were markers of fast bowling expertise potential. Of specific interest was the relative importance of each potential component of fast bowling expertise and how components interacted or developed over time.

Results: The importance of intrinsic motivation early in development was highlighted, along with physical, psychological and technical attributes. Results supported a multiplicative and interactive complex systems model of talent development in fast bowling, in which component weightings were varied due to individual differences in potential experts. Dropout rates in potential experts were attributed to misconceived current talent identification programmes and coaching practices, early maturation and physical attributes, injuries and lack of key psychological attributes and skills.

Conclusions: Data are consistent with a dynamical systems model of expertise acquisition in fast bowling, with numerous trajectories available for talent development. Further work is needed to relate experiential and theoretical knowledge on expertise in other sports.

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1. Introduction

In sport science an important challenge is to identify components contributing to the acquisition and maintenance of expertise.^{1,2} For example, qualitative analysis has revealed several psychological (e.g., mental focus, goal-setting and self-evaluation), socio-cultural (e.g., community and family support, cultural influence), physical (e.g., strength, height) and environmental (e.g., access to facilities and climate) constraints on successful Olympian development.^{1–3} However, the influence of these factors is likely to be sport specific due to different task constraints and the changing nature of the performer-environment relationship through practice, coaching and competing.^{4,5}

Recently, Dunwoody⁶ criticised the over-emphasis on the individual in cognitive psychology explanations of behaviour. He eschewed a humano-centric approach, suggesting that

traditionally psychologists have neglected the role of the environment and over-emphasised the role of organismic structure and processes in isolation, a tendency he termed 'organismic asymmetry'. Although there is a need to move away from an asymmetric-organismic focus on expertise acquisition captured by genocentric explanations,⁷ the tendency to over-emphasise the role of environmental constraints on expertise acquisition also needs to be avoided.⁸ For example, Ericsson and colleagues⁹ advocated that expertise is acquired only when performers specialise at an early age and engage in deliberate practice. Ericsson and colleagues⁹ highlighted the importance of structured practice involving goal-directed skill learning requiring effort and concentration. It was estimated that experts need to typically spend about 10 years or 10,000 h in deliberate practice to attain exceptional performance. Time spent in sport-specific training has been shown to discriminate between experts and non-experts in some sports, although the relationship between practice and performance is nonlinear.¹⁰ The uni-dimensional nature of the deliberate practice approach has been criticised as 'environmentalist'¹¹ and researchers studying deliberate practice in sport have encountered

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some incongruities with the theory's main tenets. For example, early specialisation has been deemed inessential for acquisition of expertise in sport in adulthood.^{12,13} Further, Weissensteiner and colleagues,¹⁴ studying cricket batting in Australia, found that talent development may be facilitated by early unstructured play termed 'backyard cricket'¹⁵ and other rich practice experiences, a wide range of sport experience during development, and early exposure to playing with senior players.^{14,16} The benefits of playing a range of sports has much anecdotal support in sporting cultures such as Australian cricket. A potential reason for the later emergence of these future experts was as a result of their greater involvement in secondary sports.¹⁷ Güllich and Emrich¹⁸ reported a higher proportion of world-class athletes trained and competed in other sports beyond their current individual main sport and they invested significantly more training time in other sports during development in the juvenile years.

Therefore, it seems apparent that expertise attainment in a particular performance domain depends on many constraints including, but not limited to, genetics, social and physical environment, opportunity, encouragement and the effect of these variables on physical and psychological traits.¹¹ Mono-disciplinary approaches to the acquisition of expertise have failed to capture the complementary nature of the relationship between these individual, task and environmental constraints.² For these reasons, in sport there has been growing awareness of the need for an interdisciplinary and interactionist theoretical framework to examine expertise attainment.⁸

Recently, a number of multidimensional models of talent development have begun emerging in the literature. For example, Simonton's¹⁹ multidimensional, epigenetic and emergent model has operationalised the process of talent development, comprising all physical, physiological, cognitive and dispositional traits that further the acquisition of expertise in a specific domain. The potential in each component is individually assessed on a ratio scale or weighting, highlighting that the relative contribution of each component to the talent development process can vary from one individual to the next. Although some common factors appear to underpin the development of expertise, multi-disciplinary models of talent development have highlighted talent as a nonlinear process, predicting that a range of developmental trajectories over different timescales can lead to achievement of sporting expertise.

One problem with some current multidisciplinary approaches to modelling expertise and its components, is that the models tend to be operational and propositional in nature.⁸ For example, Simonton's¹⁹ model of talent as a multiplicative, dynamic process and the Differentiated Model of Giftedness and Talent,²⁰ have yet to provide a detailed, explanatory theoretical rationale underpinning a dynamic and multidimensional basis for expertise and talent development.⁸ Recently, it has been argued that key concepts from dynamical systems theory and complexity science can provide a compelling theoretical explanation for the complex nature of talent and its development.⁸

One strategy that could be used to catalogue all the key components of talent in a sporting domain could be to analyse the experiential knowledge of true experts in sports (athletes and coaches). Sampling opinions and perceptions of experts by tapping into their vast experiential knowledge on the dynamics of development in elite performance environments,¹⁶ may enable identification of key constraints on talent and potential, and the factors related to athletes' differing levels of achievement. Open-ended interviews with expert athletes and/or expert coaches have been previously used to examine competencies of elite performers to derive factors associated with success,²¹ allowing exploration of concepts as they emerge, and inductive hypothesizing of theory relating to the development and constraints on expertise.

In this paper components of fast bowling expertise in cricket are identified through analysing the experiential knowledge of expert players and coaches. This is a rich sample group who have experience as player, coach, supporter and practitioner for fast bowling expertise. Historically, fast bowling has been crucial to team success in international cricket. The role of the fast bowler is to be the spearhead of a team's attempt to bowl out the opposition. Fast bowling is physically and mentally demanding and requires a high level of skill. Fast bowlers will often be required to bowl around 24 overs (144 balls) during a day's play. Attempts to defeat batters' typically, involve using a combination of speed, swing (making the ball swerve in the air), cut (making the ball deviate in direction after pitching) or by creating more bounce off the pitch than expected by the batter. Factors contributing to the acquisition of expertise in cricket fast bowling have not been identified in empirical research or from experiential knowledge of elite performers/coaches. Therefore, the following research aims are the focus of this study: (i) identifying components considered critical for fast bowling talent development by elite performers and coaches; (ii) understanding relative weightings of talent components in fast bowling proposed in experiential knowledge of elite performers and coaches; (iii) identifying interactions and development of fast bowling talent components as specified by elite performers and coaches.

2. Methods

The cohort was composed of two groups: athletes and coaches. The athletes consisted of 11 past or present Australian international, male, elite fast bowlers who had taken in total more than 2200 international test wickets in over 570 international test matches. They were classified as fast or fast-medium bowlers by members of the Cricket Australia Technical Fast Bowling Group: (a) having taken at least 100 test wickets each at international level; and (b) having bowled in at least 25 test matches at international level. The coaches' group consisted of 10 past or present Australian and State level head coaches and fast bowling coaches.

Participants were contacted through a letter of invitation in cooperation with Cricket Australia, were informed of the purpose of the study, and given details of their expected involvement and interview content. All semi-structured qualitative interviews were conducted by the primary researcher and recorded on an mp3 storage device, lasting between 40–70 min each. Pilot work reviewed and refined interview content, semantics and order of questions for the interview guide.

At the onset of interviewing, participants were reminded of the purpose of the inquiry and signed a consent form. The study protocol was approved by the human research ethics committees of the Australian Institute of Sport and the Queensland University of Technology. The interview guide (a list of questions that formed the framework to guide the interviews) was based on the findings from previous expertise and talent development research in sport.^{22,23} After rapport building conversations and broad questions to familiarise them with the inquiry theme, participants were asked about specific factors which they believed were markers of fast bowling expertise potential. Of specific interest was the participants' perception of the relative importance of each potential component of fast bowling expertise. Self reported data were collected in an open-ended way without prescribing categories for describing expertise components. Probe questions were used to encourage participants to expand on responses and provide depth to articulated perceptions. For example, one fast bowler (9), in answer to the question "in terms of your early involvement in cricket, can you describe what factors you think were most important for you developing and becoming an Australian pace bowler?" somewhat surprisingly reported that a key factor in his improvement was

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