

Parameterising expertise in coaching: Past, present and future

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Abstract

Research into expertise is increasing across a number of domains pertinent to sport. Whilst this increase is particularly apparent in coaching, a key question is how to identify an expert coach? Accordingly, this paper draws upon existing studies into expert coaches to address this issue; in particular, the criteria used to select expert coaches for research purposes and the methods used in expert coach research. Based on these data, we contend that the elements of expertise are not fully reflected within currently accepted criteria which, in turn, results in expert coaching research not necessarily identifying the appropriate individuals to study. The paper concludes with recommendations for more rigorous criteria for selecting expert coaches and highlights the associated implications for the future training and development of expert coaches.

Keywords: *Expertise, sport coaching, meta-analysis, criteria*

Introduction

Driven, perhaps, by the need to formalise, evaluate and improve performance in coaching, the nature of expertise in this crucial domain is an increasing focus for researchers and practitioners alike. Unfortunately, however, depending on the theoretical lens applied to examine the coaching process, clear, concise and common guidelines seem elusive: although the situation seems to be made more complicated than necessary by the proliferation rather than the integration of such perspectives (Abraham & Collins, in press). Be that as it may, a consequence of this vagueness is that key contributory factors to coach development, such as training initiatives, stakeholder perceptions, evaluation/accreditation systems and coach expectation lack the coherence of approach essential for effective outcome (Pawson, Greenhailgh, Harvey, & Walshe, 2005).

Accordingly, there are a number of reasons for pursuing a working (and workable) consensus on expertise in coaching; these purposes underpin our present paper. Firstly, and essentially as a backdrop to later discussion, we offer a brief historical overview of past perspectives. We then report a meta-analysis of the literature, in an attempt to provide the most accurate picture of current thinking. Finally, and as a result of this analysis, we offer a position statement

together with justified directions for future investigation, debate and application.

The past – behaviour, process and knowledge

Douge and Hastie (1993) reviewed the coach effectiveness literature between 1988 and 1992 to provide an overview of the criteria used to define and evaluate expertise in sport coaching at that time. The approaches that were used to describe coaching expertise included:

- 1) leadership style and coach/athlete perceptual congruence;
- 2) self analysis and reflection;
- 3) effective application of systematic observation instruments;
- 4) informant survey and content analysis
- 5) situation specific analysis.

The key focus of research at this time was defining expertise through a set of established coaching behaviours. For example, important instructional strategies had been identified, such as, feedback, scold/praise ratio, questioning, instruction, managing the environment, and observing (Claxton, 1988; Franks, Johnson, & Sinclair, 1988).

While coach behaviour remained the key focus for many of the areas of this research, investigations focusing on leadership style and more context-related work (e.g. level, gender, sport, goals) started to highlight the domain specific nature of expert behaviour. For example, research suggested that effective coaching required the adoption of a leadership approach (and associated behaviours) that matched the athletic environment by taking into account player, situation and coaching variables. In similar fashion, context-specific work within behavioural observation was highlighting the fact that only under certain situations were certain behaviours associated with greater effectiveness (Gray, 1989; Kuklinski, 1990; Lacy & Goldston, 1990). In short, the apparent clarity offered by the original behavioural work was found to be illusory. Behavioural observation still had (and, we suggest, has) a great deal to offer but only with significantly greater consideration of the underpinnings, precursors and logic surrounding it (Abraham & Collins, 1998). As a further complication, the multilevel agendas which characterise work in the human environment (cf. Martindale & Collins, 2005) meant that behaviour was best associated with a far more sophisticated decision making process than the original work had suggested.

In response to the critique of behavioural approaches, other coaching research methodologies emerged. For example, Jones, Housner, and Kornspan (1995) focused on the differences in planning and knowledge between expert and novice coaches. Furthermore, Rutt Leas and Chi (1993) found that experts plan in a much more focused way and have deeper, more complex reasoning underlying the use of various coaching tools to achieve their aims (cf. our point on sophistication earlier). In other words, research had started to move away from what expert coaches did and how they should do it, towards an exploration of why they do it in that particular way. Finally, and again from the 'essential knowledge' perspective, the view of coach as 'scientific expert' is also apparent in parallel to, or perhaps even preceding these approaches, although notably and interestingly more apparent in some sports than others (Seely Brown & Duguid, 2001). The classic approach of James 'Doc' Counsilman in swimming is an example (e.g. Counsilman & Counsilman, 1991), with that of Forbes Carlile (e.g. Carlile, 1955) providing another. In the UK, the approach taken by Athletics National Coach Frank Dick was also based on the coach as scientist; consider, for example, the Senior Coach syllabus and support material generated by the British Amateur Athletic Board in 1986 (Johnson, 1986). Crucially, however, all these coaches saw the science as essential to their coaching function, *but also* as knowledge required by and to be applied by the coach him/herself, rather

than through the coach-led orchestration of scientists and other specialists. This position clearly contrasts with the 'athlete centred, coach led' philosophy which has more recently underpinned the application of science to sport, at least in the performance domain (Cassidy & Kidman, 2010).

In conclusion, while much of the research until 1993 was behaviourally orientated, the complexity of expertise in coaching and some of the cognitive demands of it were starting to be recognised. In the 16 years since Douge and Hastie's (1993) review, there has been a dramatic shift in the definition of expertise within coaching. Abraham, Collins, and Martindale (2006), summarise this new emphasis by saying that "examination of recent research in the area of coaching practice and development reveals a position that directly or indirectly infers that coaching is, fundamentally, a decision making process." (p.549). The increasing recognition of this cognitive basis to coaching expertise has been the research focus of many other applied disciplines for years. For example, Nash and Collins, (2006) provide a summary of the key themes that emerge consistently across disciplines such as chess, music, clinical diagnosis, and sport. They highlight that the nature of expertise includes the following:

- 1) Expertise is domain specific and developed over a prolonged period of time
- 2) Experts recognise patterns faster than novices
- 3) Expert knowledge is structured to allow easier recall
- 4) Experts sort problems into categories according to features of their solutions
- 5) Experts initially are slower to solve problems than non experts but are faster overall
- 6) Experts are more flexible and are more able to adapt to situations
- 7) Experts develop routines to allow processing capacity to be focused on ongoing environments
- 8) Experts take deeper meanings from cues than novices

The knowledge on which such decisions are to be based is an important but embedded consideration within this approach. In order to do this effectively, the coach must utilise many different types of knowledge to solve problems and ultimately make decisions (Gilbert & Jackson, 2004). Unfortunately, however, research into expertise in coaching, and more specifically the method of identification of the expert coach, appears to have fallen behind other domains mentioned above. Accordingly, in this paper we are attempting to answer the question posed by Abraham et al. (2006) as what constitutes an expert coach.

The present – setting conditions and surveying the literature

Reflecting these varied concerns, the broad purpose of this study was to examine research into expertise in sport coaching, building from Douge and Hastie's (1993) review of coaching effectiveness to ascertain whether the knowledge base had appreciably increased.

Analysing the current literature – methods

The research design was based on a similar study in coaching science research carried out by Gilbert and Trudel (2004; See Gilbert & Trudel, 2004 for more details). It aimed to answer the following research questions:

1. How many research studies have been published in coaching expertise?
2. How was expertise defined?
3. What aspects of expertise have been studied?
4. What methods have been used?
5. What sports and sporting contexts have been utilised?
6. Is research actually identifying the expert coach?

An exhaustive search using databases was conducted for research in coaching expertise using the Boolean terms coach* and expert*. These were searched for anywhere in the article. The number of hits returned from each database is shown in Table I.

This initial database search was followed by individual searches in these databases using these criteria:

1. Written in English language
2. Peer reviewed journals
3. Dates between 1993–2009
4. Related to sport coaching

Criteria 1, articles written in the English language, allowed researchers to read and analyse the articles

Table I. Number of hits yielded by different search engines.

Database	No of returns for Coach* & Expert*
ERIC	11
Expanded Academic ASAP (Gale)	21109
Medline	121
PsychInfo	67
ScienceDirect (Elsevier)	767
SportDiscus	134
Web of Knowledge	326
Total:	22535

fully. A search carried out in the database SportDiscus using the same broad initial search terms coach* and expert* produced 243 hits in French, German, Russian, Italian and Spanish but also did not allow a search to be conducted in Chinese. Peer reviewed journals were considered to be an indicator of quality as well as setting the research agenda in a specific area such as sport coaching (Harvey, 2002).

The dates for this study were chosen to follow on from Douge and Hastie's (1993) analysis of coaching effectiveness and expertise. Criteria 4, related to sport coaching, was included as many initial hits involved transport or were related to sport in a more general sense, rather than specifically relating to the coaching of sport. Using these criteria the list was narrowed down to 554 articles and these abstracts were accessed by the research team, similar to the Gilbert and Trudel (2004) study. From these inclusion criteria, 50 research papers that identified expert coaches were read in full, to gather the data necessary to answer the six research questions. Source and date published information are presented in Table II.

Based on these data, it appeared that the majority of the research papers relating to sport coaching and

Table II. Journal, date and no. of articles selected for study.

Journal Title	Number of articles	Date Range
Applied Research in Coaching & Athletics Annual	4	1995–2007
Avante	1	1995
British Educational Research Journal	1	2003
Coaching & Sports Science Journal	1	1997
International Journal of Sport Psychology	4	1998–2006
International Journal of Sport Science & Coaching	2	¹ 2006–2009
International Sport Journal	1	2003
Journal of Applied Sport Psychology	3	2001–2007
Journal of Sport Behavior	1	2008
Journal of Sport & Exercise Psychology	2	1995
Journal of Sports Sciences	5	2005–2009
Journal of Sports Science & Medicine	1	2005
Journal of Teaching in PE	1	2006
Perceptual & Motor Skills	1	2002
Psychology of Sport & Exercise	1	2009
Reflective Practice	1	2004
Research Quarterly for Exercise & Sport	4	1998–2007
SOSOL	1	2002
Sport, Education & Society	2	2002–2003
The Sport Psychologist	13	1995–2008
Total	50	1995–2009

¹The first edition of this journal was 2006.

expertise were written after the year 2000, rather than the earlier period from 1993–1999. During the period of 1993–1999 only 13 research articles were published whereas from 2000–2009, 37 were detected. This considerable increase could signify a shift in research interest around the turn of the century, as a result of growing interest in sport coaching as an academic subject.

The aspect of reliability was addressed by the researchers in terms of article inclusion, coder training and article coding similar to the Gilbert and Trudel (2004) study. As there were only 50 articles included within this study, all were checked by the two main researchers and only those that were agreed by both were included.

Results & discussion

Descriptive statistics are presented for the research questions 2–6 posed earlier and the results are discussed in the context of how the empirical research has contributed to the theoretical landscape of coaching expertise.

How was expertise defined?

A number of varying definitions emerged from these papers relating to the criteria utilised to identify coaching expertise, which suggests a lack of clarity among researchers. From the 50 papers included in the study, there were 27 differing explanations or criteria to identify the expert coaches used in the studies. These fell into four distinct categories:

1. Criteria consisting of a composite of coaching experience, level of coaching qualifications, development of participants and level of coaching.
2. Selection by others (e.g. peers, administrators, National Governing Bodies (NGBs)).
3. Position held (e.g. Olympic coaches).
4. No explanation given.

The first category was the most popular, with a number using or adapting the criteria used by Côté, Salmela, Trudel, Baria, and Russell, (1995) in their work examining expert gymnastics coaches in 1995. There were, however a number of differences noted; for example, it is commonly accepted (although more recently challenged) that expertise in any domain takes a minimum of ten years to develop (Ericsson, Krampe & Tesch-Römer, 1993). In these selected expertise studies within sport coaching, minimum years of accumulated coaching experience ranged from five to ten years.

The level of coaching qualification also differed: much of this could be attributed to cultural variations

between perceived levels of coaching but there was no consistency amongst the selection of coaching levels. There was also no accepted practice of utilising the highest level available in the particular sport or in the country. Given that, within the UK, there are a number of different coaching awards that represent the highest level of qualification/accreditation possible, it may be advisable that the highest level of coaching qualification available should be used in conjunction with other criteria.

The development of participants along with the level of coaching practice also seemed an arbitrary measure – some specified national performers or international performers while others named competitions, for example, Olympic athletes. The level of representation would also have a clearly confounding cultural dimension, as in some countries it is easier to become an Olympic athlete than others, similarly with some more popular sports having a larger participant pool. The level of coaching practice definitions were on comparable lines varying from coaches who were coaching at a representative level to those who were coaching performers towards World Championships or Olympics. Both of these criteria, the development of participants along with level of coaching practice, allow for the selection of coaches with very differing backgrounds. In a few studies, there was also mention of expert coaches being mentors and involved in coach education.

The second category, that of selection by another, tended to be represented in studies carried out in the earlier phase of the years under review. The background and rationale for the ‘other’ doing the selection was not explained but generally these were other coaches at a similar level, sport administrators (often in the USA), or a collective decision from sporting organisations. More recently, some studies had utilised an amalgamation of categories one and two consisting of a composite of coaching experience, level of coaching qualifications, development of participants and level of coaching along with a recommendation from other sources, such as sporting organisations. This adds more criteria for coaches to fulfil the designation or otherwise of expert status; however whether these additions actually enable genuine expertise to be identified is questionable.

The third category, that of position held, was used in some studies, for example National or Head University coaches. There were no other criteria used to distinguish these coaches other than their position, unlike some studies utilising category one definitions where the level of coaching practice was often a similar position to the third category. This suggests that category one is more robust in identifying expertise in coaching than category three. Category four clearly offered the least compelling

argument with no explanation or definition of coaching expertise. However, whether there is any consensus surrounding the definition of an expert coach arising in the years between 1993–2009 is open to debate.

What aspects of expertise have been studied?

There were many different aspects of expertise identified by the authors as the focus or purpose of their studies (See Figure 1). By far the most researched aspect of expertise (30%) was the developmental process followed by expert coaches on the route to expertise. These aspects of coach development included all types of coach learning, formal coach education courses, informal networking or other methods of development such as professional development. In other words, researchers want to discover how expertise is developed in sport coaches.

Although coaching behaviour has been determined to be the 'hallmark' of an expert coach, namely demonstrating how they actually put their knowledge and experience into practice, many problems exist when determining expertise status. For example, Gilbert and Trudel (2004) established that there were few coaches whose practice was worthy of simulation and, according to the elements of expertise identified earlier in this paper, observed behaviour is neither listed nor does it reflect the cognitive processes necessary for expertise. Looking at Figure 1, those studies which could be clearly related to themes of expertise (as referred to earlier) were those investigating decision making (x3), routine (x1), adaptation (x1), cognitive processes (x1), self determination (x1), knowledge (x2) and visual search (x2). Notably, this represents only 22% of all studies where expertise in coaching is defined. In other words, only approximately one in five of the

studies purportedly undertaken in this area actually relate to known elements of expertise; perhaps because these aspects are difficult to explore unlike some of the more popularly researched areas such as development, behaviour and skills. This would lead us to ask whether aspects of expertise necessary to sport coaching have been identified or investigated thoroughly.

What methods have been used?

There was a considerable range of methods used (see Figure 2) in these expert coach studies. The most popular (48%) was by interview, although studies did mention a number of different interview types, for example, in-depth open-ended interviews, semi-structured interviews and structured retrospective quantitative interviews.

The mixed method approach was the next most popular, although only representing 14% of the range of methods in these studies. Mixed methods often included observation, usually of the coach during training sessions, questionnaire and some form of interview. Mixed methods researchers have repeatedly described the benefits of mixing quantitative and qualitative designs as enhanced triangulation, a more robust development of theory, and the potential to more comprehensively understand the research situation (Borkan, 2004; Creswell, Fetters, & Ivankova, 2004; Glaser & Strauss, 1967). Although mixed method designs have been used in many domains, for example, nursing, (Sandelowski, 2000), its adoption in sports research is less obvious and more recent. The only other method utilised extensively was the survey method, with 10% of the total. Like earlier studies looking at coaches' behaviours, observation methods, most commonly utilising video analysis, were still a popular method

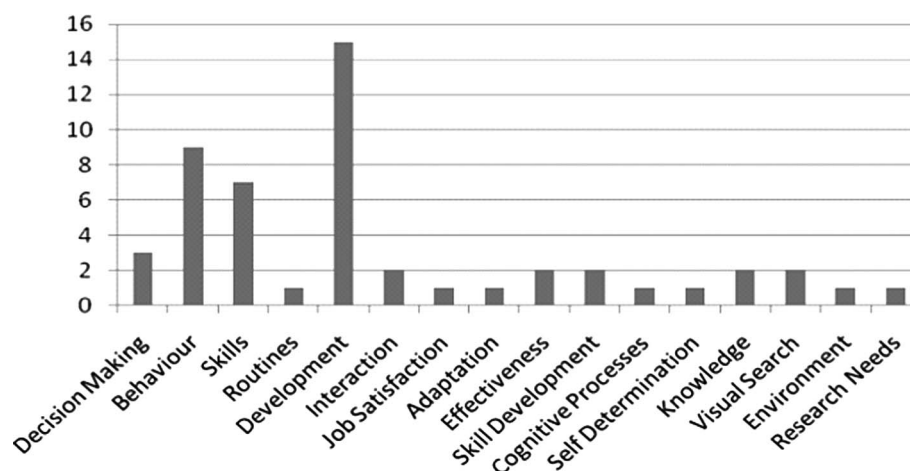


Figure 1. Focus of research studies.

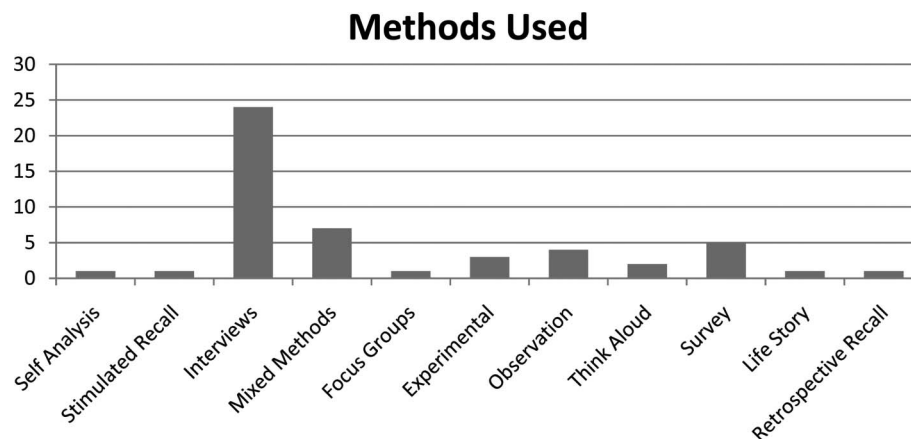


Figure 2. Methods used in research studies.

of identifying and studying expertise in sport coaches. As stated earlier, however, the collection of quantitative data on coaches' behaviours has limited significance if the situational context is not considered; for example objectives, season period and sport culture. In order to better understand coaches' interventions, it is imperative to study the rationale underlying coaches' decision-making in addition to analysis of the coaches' intervention based on systematic observation (Trudel, Haughian, & Gilbert, 1996; Jones et al., 1995). This means not just observing what coaches do, but *why* they do it (cf. Martindale & Collins, 2010). For these reasons, it is suggested that expertise research should attempt to investigate the cognitive functioning of sport coaches, possibly using mixed methods.

What sports and sporting contexts have been utilised?

There were a range of sports used in these studies as highlighted in Figure 3. The largest number of studies was carried out in 'mixed' studies, those that included a range of sports, whether just two or a larger number. The majority of studies were carried out in individual sports, judo, archery, gymnastics, swimming and rowing. There were also specific studies in soccer, basketball and volleyball as well as those which involved 'team sports'. It could be argued that expertise is easier to identify in athletes within individual sports but then that should not influence the expert coach in individual or team sports. It may be that the role of the coach is more complex and dynamic within team sports, especially in competitive environments, so in the early stages of expert research coaches of individual sports were selected.

Two thirds (67%) of the studies using expert coaches were carried out in North America, with 20 out of the 59 studies based in Canada, generally

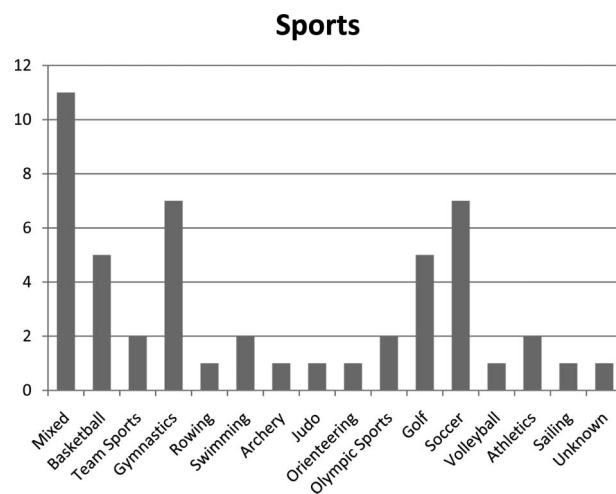


Figure 3. Range of sports in expert studies.

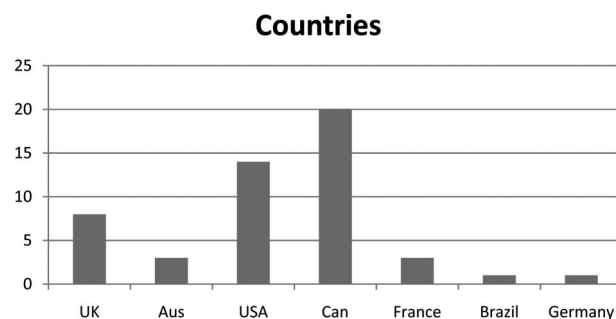


Figure 4. Countries of expert coach research.

using Canadian coaches (see Figure 4). This may be a result of the selection criteria for the studies; that of being written in the English language so the English speaking countries are well represented. It may also be that many of these countries are recognised for, not only sport coaching, but research into sport

coaching. It may well be the case that a substantial body of research exists in languages other than English but that is beyond the scope of this analysis.

Is research actually identifying the expert coach?

A number of problems have been identified in the study of expertise. These include difficulties distinguishing between expertise, experience and effectiveness, thereby identifying the relevant criteria to define expertise, as shown earlier. As expertise can often be presented as largely reliant on tacit, implicit or unconscious knowledge there can be varying names given to expert cognition in both differing and similar fields, for example, 'skilled intuition' or 'intuitive expertise' (Dodds, 1994; Kahneman & Klein, 2009; Kreber & Cranton, 2000; Sternberg, 2003). This can lead to ambiguity and confusion when attempting to categorise for use in sport coaching research.

As coaches develop, the pathway appears to become less well-defined, reflecting changes to the coaches' knowledge base and also their ability to make use of the appropriate information at the appropriate time; for example in decision making and problem-solving (Guest, Regehr, & Tiberius, 2001). Yet none of these skills are included in any definition of coaching expertise and few research articles. So are these studies merely examining the practices of elite (in this context high performance-associated and/or highly time serving rather than high performing) coaches as perhaps the hierarchical gaining of both coaching awards and experience appears to suggest? Current coach education courses tend to present coaches with sport-specific content, in a hierarchical process. Coaches are then evaluated on a number of pre-determined competences which are not allied with the characteristics of expertise (Department of Culture, Media & Sport [DCMS], 2007; Gilbert & Trudel, 1999; Griffey, 1994). If coaches are considered to be expert, then the methods by which they achieved this standing need to be scrutinised, evaluated and disseminated to coach education programmes for their information. This may also help establish a number of criteria of expertise, specifically relating to coaches and their practices.

This supports the perspective that experts seem to 'represent' problems at a deeper level than novices and, as such, can be discriminated from others by describing what they *know* that others do not and what they *can do* that others cannot (Phillips, Klein, & Sieck, 2004). Klein and Militello (2005) suggest several additional categories of knowledge related to expertise alongside this declarative and procedural knowledge: perceptual skills, mental models, sense of typicality and associations, and routines. In addition

to the different types of knowledge experts possess, Klein and Militello also describe what experts can do with this knowledge: for example, run mental simulations (to diagnose/explain/form expectancies), spot anomalies and detect problems, find leverage points (perform workarounds), manage uncertainty, plan and re-plan, assess complex situations, manage attention, and take their own strengths and limitations into account.

Interestingly, however, research also acknowledges that our understanding of how this cognitive knowledge is best developed and applied is rather lacking, especially with regard to the making of decisions against such knowledge (Yates & Tschirhart, 2006). Such limitations notwithstanding (or perhaps, not completely acknowledged?), the implications of this understanding of expertise led researchers to recognise that experts have large amounts of declarative and procedural knowledge related to a number of key areas, for example, sport-specific and pedagogy. In fact, Phillips et al. (2004) suggest that the primary distinction that separates experts from novices appears to be their domain-specific knowledge. Indeed, Abraham et al. (2006) provide a useful schematic representing the likely knowledge bases needed to enable coaches to make informed decisions in practice. However, experts also have the ability to make decisions and problem solve using this knowledge from a breadth first approach (Abraham & Collins, 1998), which means knowledge alone is not useful but rather, that coaches must gain experience in applying this knowledge within their varied coaching environments (Nash & Collins, 2006). While many coaches appear to work at a tacit level, it would appear that the "the currency of transfer is the base of declarative knowledge and the linking and interacting of information at the base level in order to make appropriate decisions" (Nash & Collins, 2006, p.473). This decision making process is somewhat complex in nature and occurs at a number of different levels, such as session, intervention and programme level (Martindale & Collins, 2005), where different time pressures and decision making strategies may exist. As suggested earlier, we still need to know more about this aspect and how it may be optimally developed and applied.

Due to the cognitive nature of coaching expertise, it would appear unlikely that an expert performer who has changed career into coaching will automatically be an 'expert' coach (Nash & Collins, 2006). While such a playing experience will potentially be very useful in providing relevant knowledge and experience, only with good reflective and critical skills will this knowledge be applied effectively as a coach. In fact, recent work has shown that many coaches consider themselves reflective without any understanding of critical reflective criteria; in short,

what are the criteria against which they reflect to evaluate and improve the quality of practice (Abraham & Collins, in press; Streat, Senecal, Howlett, & Burgess, 1997). As such, it is important to be wary of definitions of expert coaches based solely on playing experience or performance. Furthermore, Nash and Collins (2006) highlight that not all expert coaches make the best coach educators, because some of them work on a completely tacit level.

The future – discussion and future directions

As the previous sections have shown, the picture on expertise in coaching is far from clear. Even apparently concise findings may be questioned, often because the data are based on participants selected against questionable criteria. In short, have we been measuring what we should be? Accordingly, if our future efforts are to bear real fruit, we need to establish some effective criteria and base characteristics of expertise from which participant selection, study focus and eventual interventions may evolve.

So what do we know that may inform these next steps?

Expert coaches often function at a certain level of automaticity, developed through situated learning, another element of expertise brought about by reflection on and in the practice and use of procedures for certain elements to allow more working memory to be utilised for solving problems (Kidman, 2005; Nowotny, 2000; Zeitz, 1997). This ability could be attributed to the base of declarative knowledge and the linking and interacting of information at this base level in order to make appropriate decisions during planning, practice and competition (Nash & Collins, 2006). Notably, however, this *does not* mean that exploring coach knowledge bases (through applied cognitive task analysis (ACTA) for example, - Militello & Hutton, 1998) and examining decision making (Abraham & Collins, 2012) is obviated. Indeed, the way in which this tacit automaticity is developed and ongoingly refined may well be another key feature of expertise.

Table III. Proposed criteria for identifying and operationalising expertise in coaches.

Criteria	Essential/Possible	How exhibited in coach
Utilises a large declarative knowledge base to the application of problem solving and decision making, in line with the structure recommended by Abraham et al. (2006).	Essential	Knowledge could be evidenced by formal academic qualifications or by in-role examination. Application critical thinking skills (decision-making, problem-solving) generating effective and justifiable solutions is also crucial; evidenced through a combination of behavioural observation and viva style interview.
Utilises perceptual skills, mental models, sense of typicality and associations, and routines (Klein & Militello, 2005).	Essential	Use of ACTA techniques (e.g., a 'knowledge audit'; Militello & Hutton, 1998) to survey 'what they know' and 'what they can do' with that knowledge.
Demonstrates the ability to work independently, and capable of producing novel, innovative solutions.	Essential	Consideration of working practice in process and outcome; changes/innovations reported/ observed. Peer recommendation.
Demonstrates effective reflection skills and lifelong learning attitude to their development (e.g., framing, on-the-spot experimentation, and hypothesis testing, Schön, 1987).	Essential	Peer recommendation. Development record and involvement when in development settings. Demonstrates continual striving for development of professional expertise.
Takes their own strengths and limitations into account.		
Manages complex planning process.	Essential	Can run mental simulations, spot anomalies and detect problems, find leverage points, manage uncertainty, plan and re-plan, assess complex situations, manage attention and 'anticipate' needs (Klein & Militello, 2005).
Track record of developing athletes from one stage to another (e.g. from development athlete to world class standards).	Possible (although coaches will become increasingly specialised at certain stages of the performance pathway)	Coaching portfolios (could include statement of coaching philosophy, performer profiles, reflective evaluations, goals, programme & session plans).

In fact, the quest for knowledge may well be a criterion in itself. Expert coaches have been determined to display an ongoing quest for personal growth and knowledge acquisition (Bloom & Salmela, 2000). This could be operationalised as attending coaching seminars, continuing professional development (CPD) events and interacting with peers through 'communities of practice' (Schön, 1987). Few definitions of expertise in sport coaching have acknowledged this aspect, which could also be easier to identify than others. Unfortunately, however, this acquisitive trait may not be a universal characteristic, which would limit its use as a criterion for expertise. Recent work by Collins, Abraham and Collins (in review) has applied work on epistemological beliefs to high level coaches, suggesting the existence of such 'information-hungry' coaches but also some who seem inured to learning from others, termed respectively 'wolves and vampires'. This distinction, and indeed the contention that the open and enthusiastic pursuit of new knowledge is *not* an automatic characteristic of expertise, both await further investigation. However, the caveat should be noted and addressed by future investigation.

Nevertheless, 'off-line thinking' about their coaching would seem to be a sensible although not sole criterion to apply in distinguishing expertise. Historically coaches have been viewed as "merely technicians engaged in the transfer of knowledge" in a process that can be viewed as unproblematic as long as the coach follows an appropriate systematic 'model' (Macdonald & Tinning, 1995, p.98). More recently, within coaching research there appears to be recognition that coaching is a complex and dynamic process, indicating a change from Douge and Hastie's findings (1993). The constant change and complexity of the coaching role requires to be more thoughtfully presented to coaches if more are to aspire to expertise in coaching. Certainly, sharing of the whys as well as the whats appears to be a crucial feature of learning from others' expertise (Collins, Seely Brown, & Holum, 1991).

Research has demonstrated that a considerable number of coaches meet these 'expert' criteria. However it is also clear that there are different levels of functioning within that 'expertise level'. Current criteria appear to infer a certain inevitability about the development of expertise in coaching whereas the evidence suggests that expertise requires a long term approach and is only attained by a few. Accordingly, although this research has encountered coaching expertise and expert coaches, we strongly feel that the current accepted criteria for expertise in coaching need review. Coach education, as it currently exists in the UK, does not clearly delineate the expert from the experienced. Many coaches hold the highest NGB award and have accumulated over ten years

coaching experience. However, if their actual practice has not evolved during this time, can they be designated as experts? Also, the definition of an expert coach may change according to the country and culture of the coach, for example in North America there appears to be a cultural bias towards the importance of teaching within coaching research. This may be related to importance of their coach education programmes or indeed the cultural importance of sport.

In other words, the definition of expertise and subsequently the selection of expert coaches for research purposes would do well to take into account the cognitive expertise of the coach, and perhaps their ability to explain the processes and knowledge structure behind this expertise. As such, Table III suggests criteria recommended for the selection of expert coaches.

This clearly raises issues as to the criteria that have been used to identify the expert coach in the past but also suggests a way forward. The criteria proposed are less rigid than those used in previous research articles albeit possibly more difficult to identify. However, as the task of coaching has been identified as intricate and cognitively based, it implies that the identification and subsequent research into the activities of expert coaches should reflect this complexity. The proposed criteria bring additional implications for the training and development of coach expertise as to clearly delineate coaching expertise will assist the quest of those striving to develop it. We hope that these suggestions offer a basis for future discussion and investigations.

References

- Abraham, A., & Collins, D. (1998). Examining and extending research in coach development. *Quest*, 50, 59-79.
- Abraham, A., & Collins, D. (2012). Taking the next step: Ways forward for coaching science. *Quest*, 63, 366-384.
- Abraham, A., Collins, D., & Martindale, R. (2006). The coaching schematic: Validation through expert coach consensus. *Journal of Sports Sciences*, 24(6), 549-564.
- Bloom, G.A., & Salmela, J.H. (2000). Personal characteristics of expert team sport coaches. *Journal of Sport Pedagogy*, 6(2), 56-76.
- Borkan, J. (2004). Mixed methods studies: A foundation for primary care research. *Annals of Family Medicine*, 2(1), 4-6.
- Carlile, F. (1955). The athlete and adaptation to stress. *Journal of Physical Education*, February-March.
- Cassidy, T., & Kidman, L. (2010). Initiating a national coaching curriculum: A paradigmatic shift? *Physical Education & Sport Pedagogy*, 15(3), 307-322.
- Claxton, D.B. (1988). A systematic observation of successful and less successful high school tennis coaches. *Journal of Teaching in Physical Education*, 7, 302-310.
- Collins, A., Seely Brown, J., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator*, Winter, 1-18.

- Côté, J., Salmela, J., Trudel, P., Baria, A., & Russell, S. (1995). The coaching model: A grounded assessment of expert gymnastic coaches' knowledge. *Journal of Sport & Exercise Psychology*, 2, 1–17.
- Counsillman, B.E., & Counsillman, J.E. (1991). The residual effects of training. *Journal of Swimming Research*, 7, 5–12.
- Creswell, J.W., Fetter, M.D., & Ivankova, N.V. (2004). Designing a mixed methods study in primary care. *Annals of Family Medicine*, 2, 7–12.
- Department of Culture, Media & Sport. (2007). *Our promise for 2012*. London: Author.
- Dodds, P. (1994). Cognitive and behavioral components of expertise in teaching physical education. *Quest*, 46, 153–163.
- Douge, B., & Hastie, P. (1993). Coach effectiveness. *Sport Science Review*, 2(2), 14–29.
- Ericsson, K.A., Krampe, R.T. & Tesch-Römer, C. (1993). The role of deliberate practice in the development of expertise. *Psychology Review*, 100, 363–406.
- Franks, I.M., Johnson, R.B., & Sinclair, G.D. (1988). The development of a computerized coaching analysis system for recording behavior in sporting environments. *Journal of Teaching in Physical Education*, 8(1), 23–32.
- Gilbert, W. D., & Jackson, C.G.R. (2004). In search of an effective coaching style. *Olympic Coach*, 16(4), 16–17.
- Gilbert, W., & Trudel, P. (1999). An evaluation strategy for coach education programs. *Journal of Sport Behavior*, 22(2), 234–250.
- Gilbert, W., & Trudel, P. (2004). Analysis of coaching science research published from 1970–2001. *Research Quarterly for Exercise & Sport*, 75, 388–399.
- Glaser, B.G., & Strauss, A.L. (1967). *The discovery of grounded theory*. Chicago, IL: Aldine.
- Gray, S.W. (1989). Behavioral coaching in the development of open, collective skills of rugby. *Journal of Applied Research in Coaching and Athletics*, 4(2), 75–87.
- Griffey, D.C. (1994). Formative assessments in team sports in a tactical approach context. *Journal of Physical Education, Recreation, and Dance*, 69(1), 46–51.
- Guest, C.B., Regehr, G., & Tiberius, R.G. (2001). The life long challenge of expertise. *Medical Education*, 35, 78–81.
- Harvey, L. (2002). Evaluation for what? *Teaching in Higher Education*, 7(3), 245–264.
- Johnson, C.C. (1986). *Senior coach: Coaching theory manual* (2nd ed.). Leatherhead, England: British Amateur Athletic Board.
- Jones, D.F., Housner, L.D., & Kornspan, A.S. (1995). A comparative analysis of expert and novice basketball coaches' practice planning. *Applied Research in Coaching and Athletics Annual*, March, 201–227.
- Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: A failure to disagree. *American Psychologist*, 64(6), 515–526.
- Kidman, L. (2005). *Athlete-centred coaching*. Christchurch, New Zealand: Innovative Press.
- Klein, G., & Militello, L. (2005). The knowledge audit as a method for cognitive task analysis. In H. Montgomery, R. Lipshitz, & B. Brehmer (Eds.), *How professionals make decisions*. London: LEA.
- Kreber, C., & Cranton, P.A. (2000). Exploring the scholarship of teaching. *The Journal of Higher Education*, 71(4), 476–495.
- Kuklinski, B. (1990). Sport leadership - an overview. *New Zealand Journal of Health, Physical Education and Recreation*, 23(3), 15–18.
- Lacy, A.C., & Goldston, P.D. (1990). Behavior analysis of male and female coaches in high school girls' basketball. *Journal of Sport Behavior*, 13(1), 29–39.
- Martindale, A., & Collins, D. (2005). Professional judgment and decision making: The role of intention for impact. *The Sport Psychologist*, 19(3), 303–317.
- Martindale, A., & Collins, D. (2010). But *why* does what works work? A response to Fifer, Henschen, Gould, and Ravizza, 2008. *The Sport Psychologist*, 24, 113–116.
- McDonald, D., & Tinning, R. (1995). Physical education teacher education and the trend to proletarianisation: A case study. *Journal of Teaching in Physical Education*, 15, 98–118.
- Militello, L.G., & Hutton, R.J.B. (1998). Applied cognitive task analysis (ACTA): A practitioner's toolkit for understanding cognitive task demands. *Ergonomics*, 41(11), 1618–1641.
- Nash, C., & Collins, D. (2006). Tacit knowledge in expert coaching: Science or art? *Quest*, 58, 464–476.
- Nowotny, H. (2000). Transgressive competence - The narrative of expertise. *European Journal of Social Theory*, 3(1), 5–21.
- Pawson, R., Greenhailgh, T., Harvey, G., & Walshe, K. (2005). Realist review - A new method of systematic review designed for complex policy interventions. *Journal of Health Services Research & Policy*, 10(1), 21–34.
- Phillips, J.K., Klein, G., & Sieck, W.R. (2004). Expertise in judgment and decision making: A case for training intuitive decision skills. In D.K. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making*. New York: Wiley-Blackwell, 297–315.
- Pullo, F.M. (1992). A profile of NCAA Division I strength and conditioning coaches. *The Journal of Applied Sport Science Research*, 6(1), 55–62.
- Rutt Leas, R., & Chi, M.T.H. (1993). Analyzing diagnostic expertise of competitive swimming coaches. In J.L. Starks & F. Allard (Eds.), *Cognitive issues in motor expertise* (75–94). Amsterdam: Elsevier Science Publishers B.V.
- Sandelowski, M. (2000). Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-methods studies. *Research in Nursing and Health*, 23, 246–255.
- Schön, D. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.
- Seely Brown, J., & Duguid, P. (2001). Knowledge and organisation: A social-practice perspective. *Organization Science*, 12(2), 198–213.
- Sternberg, R.J. (2003). *Wisdom, intelligence, and creativity synthesized*. New York, NY: Cambridge University Press.
- Strean, W.B., Senecal, S., Howlett, G., & Burgess, J.M. (1997). Xs and Os and what the coach knows: Improving team strategy through critical thinking. *The Sport Psychologist*, 11, 243–256.
- Trudel, P., Haughian, L.P., & Gilbert, W.D. (1996). L'utilisation de la technique de rappel stimulé pour mieux comprendre le processus d'intervention de l'entraîneur en sport. [Using stimulated recall to understand the intervention processes of sports coaches] *Revue des Sciences de l'Éducation*, 22(3), 503–522.
- Yates, J.F., & Tschirhart, M.D. (2006). Decision-making expertise. In K.A. Ericsson, N. Charness, P.J. Feltovich, & R.R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance*. New York, NY: Cambridge University Press, 421–438.
- Zeitz, C.M. (1997). Some concrete advantages of abstraction: How experts' representations facilitate reasoning. In P.J. Feltovich, K.M. Ford, & R.R. Hoffman (Eds.), *Expertise in context: Human and machine* (43–65). Cambridge: AAAI Press/The MIT Press.

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