Article

What you think – What you do – What you get?: Exploring the link between Epistemology and PJDM in Cricket coaches

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10   Abstract

11   Decision making in elite sport has long been of interest, however only recently has the

12   decision making process of coaches gained an increase in attention. Whilst a number of

13   decision making models have been proposed, it still remains unclear as to how a number of

14   these models may actually interact with one another as opposed to them being individual,

15   discrete and isolated elements. This review is rooted within Cricket, given the idiosyncratic

16   nature of the sport and the unique challenges faced by coaches within it. As a result, the

17   review examines the existing literature around professional judgement and decision making

18   (PJDM) and how this may be applied specifically to coaching in cricket. Secondly, we

19   consider the integration of PJDM principles with coaches' epistemology and the

20   epistemological chain. Finally, against this theoretical backdrop, we offer some implications

21   for current practice and future research in this demonstrably important and complex area.

22

23   *Keywords*: Decision making, Epistemology, PJDM, Cricket

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26   The area of decision making (DM) has been studied in a wide range of contexts, although

27   clear guidelines on how the process may consistently be optimised have proved elusive. As

28   Kahneman and Klein (2009) identified; "the intuitive judgments of some professionals are

29   impressively skilled, while the judgments of other professionals are remarkably flawed" (p.

30   518). Accordingly, the underpinning reasons as to 'why' a particular decision has been taken

31   are of great interest. Investigation has spanned areas such as business (Baker, 1981; Geva,

32   2000; Kourdi, 2003), medicine and nursing (Lopez, 2009; McLemore, Kools & Levi, 2015;

33   Pattison, O'Gara & Wigmore, 2015) and sport (Abraham & Collins, 2011; Muir, Morgan,

34   Abraham & Morley, 2011; Richards, Collins & Mascarenhas, 2009), reflecting the statement

35   by Smith, Shanteau and Johnson (2004) that "sound judgment and decision making are the

36   crux of many professions" (p.4)

37   In seeking to improve DM, a number of perspectives have been proposed; for

38   example, naturalistic decision making (Chase & Simon, 1973; deGroot, 1946, 1978) and

39   Heuristics and Bias (Goldberg, 1970; Meehl, 1954), to try and explain how perceived experts

40   in various domains make decisions. Most recently, however, at least in coaching, the focus

41   has turned to two alternative but interlocked perspectives. Firstly the ideological and over-

42   arching philosophical positioning of practitioners known as 'epistemology'. This is

43   compared with the more micro- and meso-level DM process identified as professional

44   judgement and decision making (PJDM).

45   This review is concerned with the DM of sports coaches and, more specifically, those

46   working within cricket. As with many sports, DM (of both players and coaches) is of

47   significant interest, especially when the constraints of the sport are considered. Unlike

48   numerous other sports, cricket presents many unique challenges in relation to playing and

49   training for the game for those involved; for example.

50

51   ➢ With three different formats of the game existing, ranging from matches that last from

52   3 hours to five days outcomes, strategies and practice routines required by coaches

53   and players for the various formats are all significantly different.

54   ➢ Unlike most team sports, the coach has limited access to players when they are

55   performing in competition. In a five-day match, for example, it is the captain that is

56   responsible for making bowling changes, manoeuvring the field and developing

57   tactics. This merits comparison to the team sports of football and rugby, where it is

58   often the coach who instigates changes on the field of play. Other team sports enable

59   this coach centric approach to an even greater degree, with time outs and substitutions

60   enabling an ever greater potential dominance of on-field DM.

61   ➢ At the international level, the playing conditions in which matches take place can be

62   significantly different, based on the county in which games are taking place. For

63   example, fast and bouncy pitches in Australia verses slow and turning pitches in India

64   and Sri Lanka.

65   ➢ Cricket is a seasonal, outdoor sport played on vast grass areas with diameters reaching

66   up to 150m (WADSR, 2015). In contrast, training and practice sessions during the

67   off-season are forced to take place in indoor facilities which severely restrict the type

68   and fidelity of practices available to coaches and players.

69 Against these significant challenges, it is interesting here to note previous work on DM in

70 cricket by Cotterill (2004), which describes;

71   Cricket is a game where decision-making is of paramount importance. For each

72   discrete passage of play (ball that is bowled) the batter needs to make a decision about

73   the shot that is going to be played, the bowler needs to make a decision about the type

74   of ball that is going to be bowled, the wicket keeper needs to decide where to stand,

75   and the captain needs to make decisions regarding the positions of the fielders. As a

76   result, effective decision-making is a crucial component of performance, and one of

77   the key factors that distinguishes expert compared to novice players. (p. 89)

78

79 What is not mentioned within the above passage are the complexities faced by the cricket

80 coaches as to the most effective way to prepare both individuals and groups of players as

81 teams, ready for optimum performance. Given the challenges already identified and the

82 previous work of Epstein and Hudert (2002), expertise in DM is characterised by "the ability

83 to solve ambiguous problems, tolerate uncertainty, and make decisions with limited

84 information'' (p. 227) interest in the DM of coaches becomes clear. As a result, this purpose

85 of this paper is threefold. Firstly, to review the existing literature around PJDM and how this

86 may be applied specifically to coaching in cricket. Secondly, we consider the integration of

87 PJDM principles with coaches' epistemology. Finally, and against this theoretical backdrop,

88 we offer some implications for current practice and future research in this demonstrably

89 important and complex area.

90

91 **Professional Judgement and Decision Making (PJDM) in sport – What do we know?**

92 Research into PJDM has received substantial attention in the past half century in a range of

93 fields including medicine, law, economics, political science, cognitive science, psychology,

94 teaching, artificial intelligence, and the military forces (e.g., Evetts, 2001; Husted &

95 Husted,1995; Simon, 1986). Only recently, however, has attention turned to the field of sport

96 and, more specifically, a range of practitioners including sports psychologists and coaches

97 (Collins & Collins, 2015; Martindale & Collins, 2007). Existing research has often focused

98 on isolated and discrete areas of knowledge in an attempt to understand and explain the

99 underlying decision making process of practitioners. These areas of knowledge have been

100 heavily researched and include but are not limited to; sports psychology, exercise physiology

101   plus strength and conditioning, motor control, sports specific, pedagogic, social, political,

102   inter- and intra-personal (Abraham & Collins, 2011; Abraham, Collins & Martindale, 2006).

103   However, PJDM should not be considered as an application of a single area of knowledge at

104   a given point in time but rather, as the means through which decisions are reached on the

105   particular combination or blend of knowledge most suited to the immediate and longer term

106   context, together with decisions on how this might best be applied.

107   It is becoming increasingly recognized that professional practice, at least in fields

108   where humans are concerned, is characterized by complexity, uncertainty and

109   unpredictability to which practitioners are required to exercise their judgment and wisdom

110   (Coles, 2006). In a more applied sense, it has been suggested that professional practice is

111   largely a series of decisions in terms of assessing which issues require attention, setting goals,

112   finding or designing suitable courses of action, and evaluating and choosing among

113   alternative actions (Simon, 1986). This is supported by the work of Carr, (1995) who

114   identifies;

115   Professional action is not 'right' action in the sense that it has been proved to be

116   correct. It is 'right' action because it is reasoned action that can be defended

117   discursively in argument and justified as morally appropriate to the particular

118   circumstances in which it was taken. (p.71)

119
120   To briefly revisit the existing literature around DM, it has been proposed that there are two

121   main ways in which decisions are reached; either classical decision making (CDM) or

122   naturalistic decision making (NDM). CDM is where decisions are made as a result of careful

123   consideration and a 'weighing up' of options (Abraham & Collins, 2011; Edwards, 1954).

124   NDM, by contrast, is where decisions are made very quickly (often on the spot) as a result of

125   previous experience(s) (Klein, 1998). Both CDM and NDM are valuable tools for decision

126   makers in order to effectively "deal with uncertainty by weighing alternatives and taking

127   creative risks" (Conly, 1988 p.397) whilst at the same time being aware of the expectations

128   (context, norms, etc.), goals and others that they are working alongside (adapted from Conly,

129   1988).

130   A practical example of NDM comes from recent research done in the field of

131   adventure sports coaching with coaches having to make on-going, in-session decisions based

132   on ever changing and potentially dangerous environments and changes in the perceived

133   competence of often novice participants involved (Collins & Collins, 2015). In such

134   dynamic and complex environments, the distinction between novice and expert decision

135   makers becomes more apparent. Novice practitioners – at the early stages of development-

136   are often still involved in the reproduction of behaviours (e.g. those that they have seen used

137   before by perceived 'experts' or those they have been exposed to as one time performers) and

138   make decisions based on what they have seen, without being critical or questioning the

139   reasons as to why. Novice coaches also adopt those behaviours they have been encouraged to

140   use by the coach development qualifications they have taken part in (Collins, Burke,

141   Martindale & Cruickshank, 2015) and are also known to make decisions based on

142   assumptions and deeply held beliefs of which they may not always be aware (Strean, Senecal,

143   Howlett & Burgess,1997). Novice coaches' decisions are also often guided at the simplest

144   level by micro-policies and procedures (Schempp, McCullick & Mason, 2009), as opposed to

145   the individualised, long-term needs and wants of those involved.

146   In contrast, more expert decision makers are involved in a 'higher' level of thinking

147   which often involves the selection (and de-selection) of solutions from competing ideas

148   (Abraham et al., 2006). This is from both a top-down (i.e. constant application of long-term

149   planning and objectives or 'Nestedness' - Abraham & Collins, 2011) and bottom-up approach

150   (i.e. working in the moment in relation to the long term goals - Martindale & Collins, 2012).

151   To continue, expert decision makers are able to select the best option available whilst dealing

152 with uncertainly, taking risks and weighing up options which are specific to the demands of

153 the environment in which they are working (Conley, 1988). That said, it would appear that it

154 is not simply personalised choices that practitioners are making and that decisions are often

155 influenced by a range of factors, including tradition and culture. For example the work of

156 Lave and Wenger (1991) around communities of practice (CoP) outlined that individuals

157 have to 'absorb and be absorbed' in order to be welcomed into their CoP. Indeed, it could be

158 argued then that any profession is influenced by social, historical and ideological constraints.

159 ***PJDM – 'Intention for Impact'***

160 The ways in which coaches and participants build their relationships and how they work

161 (together) moving forwards are largely influenced by theoretical and philosophical stances of

162 the coach (Shertzer & Stone, 1968; Weiss, 1991). Accordingly, PJDM is incorporated into

163 each level (micro-, meso- and macro) of the coaching process. For example, programme

164 aims (macro) are designed and then rolled out through block coaching plans (meso) and

165 specific behaviours within sessions, utilised by the coach during interactions with players

166 (micro) (Thorburn & Collins, 2003). Whilst these interactions can be planned, coaches also

167 have to reflect these choices and decisions in reactive and ad-hoc, real world interactions with

168 players and colleagues (i.e. the 'action present', Schón, 1991 - adapted from Griffey &

169 Housner, 1991).

170   Intentions represent the rationale for selecting a specific behavior, response mode,

171 technique, or intervention to use with a client at a given moment. In a sport psychology

172 context, the "intention for impact" (literally, what are my intended outcomes?) is regarded as

173 the primary step in the design and application of an effective intervention (Hill & O'Grady,

174 1985). In previous work with therapists, researchers produced a 'Therapist Intentions List'

175 which included 9 clusters; i) set limits ii) assess iii) support iv) educate v) explore vi) re-

176 structure vii) change viii) relationship ix) miscellaneous (Hill & O'Grady, 1985; Hill et al.,

177   1988). Clearly, these intentions are formed around the 'nature of the goal' and the 'nature of

178   the relationship' required (Collins & Martindale, 2005). A practical example of this comes in

179   the form of work with an elite Judo player (Martindale & Collins, 2002). The study set out to

180   explore a sport psychologist's PJDM, with the nature of the psychologist's goal and

181   relationship with the athlete being performance orientated. Initially, and as an ongoing macro

182   (higher order) goal, the intention for impact was based around encouraging the athlete to

183   become increasingly self-sufficient and independent. However, the athlete in the study

184   suffered a serious knee injury and, due to the change in the nature of the goal (i.e.

185   rehabilitation as opposed to performance), different meso- and micro- intentions for impact

186   were adapted (e.g. accepting the harsh reality) but maintained in line with the macro-level

187   aim of developing self-sufficiency and independence.

188   *Evaluating the effectiveness of PJDM*

189   Reflection has been suggested to be beneficial by assisting practitioners in making sense of

190   their experiences, managing the self, and increasing personal and professional effectiveness

191   (Anderson, Knowles & Gilbourne, 2004). Practitioners might be familiar with why, when,

192   and how they should reflect but there is not a lot of information on "exactly *what* about their

193   practices they should be reflecting on and against *which criteria,* in order for them to find

194   evidence of their effectiveness" (Martindale & Collins, 2007, p. 462). Effectiveness

195   indicators within psychology are reported as being; i) quality of support ii) psychological

196   skill and well-being iii) athletes' responses to the support iv) performance (Anderson, Miles,

197   Mahoney & Robinson, 2002). In the context of this paper, research within coaching practice

198   has suggested that areas to evaluate against could be; player engagement, practice structure,

199   coach behaviours and session objectives (Muir, 2012) against over-arching programme aims

200   (e.g. constructive alignment - Biggs, 2003). More broadly speaking, a definition of coaching

201   effectiveness and expertise has been put forward as; "the consistent application of integrated

202   professional, interpersonal, and intrapersonal knowledge to improve athletes' competence,

203   confidence, connection and character in specific coaching contexts." (Cote & Gilbert, 2009

204   p.316). Accordingly, and reflecting the idiosyncratic nature of coaching, those evaluating

205   PJDM (whether it be the coach themselves or others) must focus on the individual and

206   contextual nature of professional decision making (Reagan, Case, Case & Freiberg,1993) as

207   opposed to more generic and standardised features.

208

209   **What lies behind coaches PJDM? – Epistemology**

210   It is important here to delve deeper beneath the surface and unpack 'how' and 'why' PJDM

211   takes place. Whether classical or naturalistic, decisions are often made as a result of an

212   individuals' philosophy – more specifically, their epistemological beliefs. A coaching

213   philosophy is a set of beliefs and principles that guide your behaviour. It helps you remain

214   true to your values while handling the hundreds of choices you must make as a coach (Burton

215   & Raedeke, 2008) and can also help coaches clarify motives and provide direction to their

216   coaching whilst addressing what uniquely valuable contribution they might make as a coach

217   (Kretchmar, 1994).

218   The underpinning of a philosophy is an individuals' epistemological stance.

219   Epistemology is the branch of philosophy concerned with the nature and scope of knowledge.

220   It is concerned with answering the questions of what is knowledge, how is it acquired, and

221   how we know what we know (Grecic & Collins, 2013). Epistemology is said to develop as a

222   result of home and educational life (Anderson, 1984) and is important because it is

223   fundamental to how we think, perceive, value and learn about knowledge (Perry, 1981).

224   Research has shown that epistemological beliefs can provide a basis for understanding how

225   individuals use their specialist knowledge areas within practice. A relevant example within

226   the present context is how this impacts teachers' professional practice (Arredondo &

227   Rucinski, 1996; Berthelsen, Brownlee & Boutton-Lewis, 2002). As a result, these

228   philosophical viewpoints (should) influence and direct the reflective practice that is crucial in

229   the PJDM process (Grecic & Collins, 2013).

230   *Epistemological Views*

231   Early work around epistemological beliefs by Perry (1968) plotted epistemological

232   development on a continuum with two extreme ends – naïve and sophisticated. A person

233   who holds a naïve epistemology generally believes that knowledge is simple, clear, and

234   specific and that knowledge is handed down from authority rather than developed from

235   reason. A naïve epistemology is also based on the premise that knowledge is certain and

236   unchanging. Finally, a naïve epistemological stance is based on the premise that concepts are

237   learned quickly or not at all, and that your ability to learn something is innate and fixed rather

238   than acquired and developed (Grecic & Collins, 2013). In comparison, a person who holds a

239   sophisticated epistemology believes that knowledge is complex, uncertain, and tentative; that

240   knowledge can be learned gradually through reasoning processes and can be self-constructed

241   by the learner (Howard, McGee, Schwartz, & Purcell, 2000). Table 1 outlines an individual's

242   beliefs about knowledge according to Perry's (1968) 'positions'. It is worth noting here the

243   deliberate use of the term 'positions'. Perry's (1968) work suggests that people can change

244   positions at will, moving back and forth from position to position, whilst also being able to

245   hold differing positions in differing contexts.

246   Perry's research (1968, 1970, 1981) and, more recently, the work of Entwistle and

247   Petersen (2004) was based upon students' conceptions of learning and knowledge within

248   higher education. As the research developed, four key stages were identified as to how

249   students viewed learning and knowledge; i) Dualism – knowledge is either right or wrong.

250   Black or White. ii) Multiplicity – there are a number of ways of looking at the same situation.

251   iii) Relativism – there are a number of possible conclusions to the same situation based on

252 using objective evidence. iv) Committed Relativism – a personal stance is formed on given

253 situations with an acceptance that all knowledge and ideas are ultimately relative. To

254 summarise, Perry's work suggests that as students enter the world of higher education, they

255 assume knowledge is simple and can be passed down. Consider this student response for

256 example; "when I went to my first lecture, what the man said was just like God's word, you

257 know. I believed everything he said because he was a professor, and he's a Harvard

258 professor, and this was, this was a respected position" (Perry, 1968, p. 18). As educational

259 life continues, however, it is assumed that students' epistemological views are challenged as

260 they are faced with more dynamic and complex material within their classes. For example;

261   There was one thing I expected – I expected that when I got to Harvard…I came up

262   here expecting Harvard would teach me one universal truth…took me quite a while to

263   figure out…that if I was going for a universal truth or something to believe in, it had

264   to come within me

265   (Perry, 1968, p. 38)

266

267 A development of this work in the form of the 'Reflective Judgement Model' was proposed

268 by Kitchener & King (1981) (See Table 2). Similarly to Perry's work, this model's main

269 focus is around intellectual development, with a special focus on how people deal with ill-

270 structured problems (Schommer, 1994, p. 296). Similarities clearly exist between the two

271 approaches, with both authors identifying that, towards the latter positions/stages, there are

272 multiple perspectives and a lack of objectivity. The main difference appears to be the

273 appreciation shown by Kitchener and King (1981) for the individual as part of the existence

274 of knowledge and incorporation of the individuals' time and space (i.e. their reality).Practical

275 examples of this work in sports coaching are available from the existing literature. Firstly, to

276 draw the attention to the naïve vs. sophisticated sports coach. Grecic and Collins (2013)

277   outlined the possible epistemological chain (EC) of both naïve and sophisticated golf coaches

278   in areas such as 'environment created', 'relationship built' and 'goal setting' (Table 3). This

279   work is supported by the research of Becker (2009) who explored athletes' experiences of

280   'great coaching'. Participants in this study commented on both the environment created,

281   suggesting their coaches were approachable; "You never felt like you were stepping over a

282   boundary if you were to walk into their office and ask them a question" (p.103). Becker

283   (2009) also identified that, for the most part, participants in the study were also able to build

284   'strong' and 'lasting' professional and personal relationships with their coaches, a theme that

285   also identified in the work of Diffenbach, Gould and Moffett (1999) who outlined that good

286   coach-athlete relationships are "characterized by mutual trust, confidence in each other's

287   ability, good communication (especially good listening skills) and a sense of collaboration or

288   working together" (p.2).

289   A practical summary of both Perry's (1968, 1970, 1981) and Kitchener and King's

290   (1981) work on individuals' beliefs about knowledge is found in the work of Abraham,

291   Collins & Martindale (2006). The following quote from a coach-participant in their study

292   succinctly demonstrates a coach who has progressed into the stage of (committed) relativism:

293   All the other -ologies and -isms and all the rest of it, well my personal view is that

294   you need to have as broad a background as you can and have a broad range of

295   knowledge. It's very rare that you push a button that says psychology or you push a

296   button that says physiology or technical. Everything that you do has an implication

297   psychologically or physiologically or whatever and you need to know how things

298   work, the ''what ifs'', so if you press that button what happens to that, what happens

299   to that? (p558-559)

300   ***Epistemology in Practice – The Epistemological Chain***

301 Whilst Epistemology is an individuals' stance on learning and knowledge, the

302 Epistemological Chain (EC) is effectively the link between an individuals' philosophy,

303 beliefs about learning and knowledge, and the resulting behaviour (Grecic & Collins,

304 2013).For example, the professional decisions made by coaches as a result of their

305 epistemological views. Put more formally, the EC has been described as;

306   the inter-related/connected decisions made that are derived from high-level personal

307   beliefs about knowledge and learning, and which become apparent through the

308   planning processes adopted, the learning environment created, the operational actions

309   taken and the review and assessment of performance.

310   (Grecic & Collins, 2013, p. 153)

311

312 In the world of education, numerous studies confirm a strong connection (chain) across

313 teachers' beliefs, their classroom behaviors, and the learning environment they create (Brown

314 & Rose, 1995; Hofer, 2002; Kagan, 1992; Nespor, 1987). There are also similar findings in

315 recent sport specific studies that have taken place within golf (Grecic & Collins, 2013) and

316 adventure sports coaching (Collins, Collins & Grecic, 2014) where coaches have used the EC

317 to aid their planning, decision making and critical reflection. What is starting to be

318 recognised as of increasing interest is how these beliefs affect instructional approaches and

319 curriculum implementation (i.e. PJDM) at macro, meso and micro levels (adapted from Hofer

320 & Pintrich, 1997; Prawat, 1992).

321 ***Integrating the EC with PJDM – How Coaches could/should operate***

322 The sports coaching process is idiosyncratic due to its wide range of contextual demands and

323 ever changing nature (Abraham & Collins, 2011a) (e.g. Olympic level team water sports,

324 children's tennis and adult social leagues). As a result, the vast majority of coaches will be

325 involved in making decisions and as a result, whether consciously or sub-consciously, be

326 drawing on both PJDM and the EC.

327   It is here that both the distinction and links between the two inter-connected

328 perspectives becomes clearer. PJDM is often used by coaches to impact at a micro-level. An

329 example of this would be where coaches observe that a practice is not going as planned and

330 make a decision to intervene and adapt the practice. In contrast, a coaches Epistemology and

331 the EC are used to guide coaches on a more meso- and macro-level. For example, a coach

332 identifying what is trying to be achieved within their environment. Consider the following

333 cricket specific example.

334   A representative age group side have played their first competitive fixture of the

335 summer and are all out for 84. The team has only managed to bat for an hour of its three hour

336 allocation. Prior to the team going out to field, the coach has a number of decisions to make;

337 ➢ (How) does the coach interact with the players during the mid-session break after this

338   disappointing performance?

339 ➢ If the coach does choose to do so, does he/she interact with the team as one group,

340   specific sub-groups of the batting order, bowling attack or on an individual basis?

341 ➢ Does the coach look ahead to the second half of the match, review the first half or do

342   both?

343 ➢ In doing any or all of the above, what type of specific coaching behaviours does the

344   coach engage in? (E.g. praise, open/closed questions, scold, silence etc.)

345 It is here where PJDM comes to the fore. In making these choices, the coach may internally

346 review the aims and desired outcomes of the fixture (micro-level), identify an 'intention for

347 impact' (Hill & O'Grady, 1985) and design a short-term intervention to suit. It's worth

348 noting here that the coach would have the same decisions to make had the team batted for an

349 hour and a half, two hours or the full three hour allocation. Fundamentally, the coach has to

350   assess the context in which they find themselves and develop an appropriate course of action

351   (Simon, 1986). At times, coaches PJDM may be disconnected from their epistemological

352   views due to the time-pressured and emotionally-laden nature of situations.

353   In making these decisions, it is here where the coach could/should be integrating their

354   epistemological stance to create an effective EC. For example, the coach is consciously or

355   sub-consciously drawing on their belief systems in order to identify their 'intention for

356   impact'). To further explore the above example, the coach may want to consider the meso-

357   and macro-level outcomes of the context in which they are working. For example;

358   ➢ What are the aims of the system in which the coach is working? (E.g. win/loss ratios,

359   psychological development, high level of enjoyment, player progression, increased

360   player retention etc.)

361   ➢ How long have individual players within the team been involved with the system?

362   (e.g. 6 months, 2 years, 4 years)

363   ➢ To what extent are individual players progressing towards the aims and objectives

364   they are working towards?

365   Being able to form answers to these questions would help to guide the coaches PJDM as a

366   result of incorporating their views of how players learn (epistemology). Table 4 considers the

367   possible short, medium and long-term outcomes of coaches in the above situation who hold

368   opposing naïve and sophisticated epistemological views.

369   It's also worth briefly switching the focus and considering an athletes' EC. If a coach

370   were to spend time understanding their athletes' EC and hence their preferred methods of

371   working and learning, possible future conflict in the relationship may well be avoided. For

372   example, consider the coach with naïve epistemology working with a player who holds a

373   sophisticated stance. The direct instruction and knowledge 'transmission' from coach to

374   player may well be unwelcome and poorly received. Consider too the reverse. A coach with

375   a sophisticated epistemology attempting to draw out the knowledge from a player – who

376   themselves hold a naïve stance and are wanting/needing the knowledge (and answer) to come

377   from the coach (adapted from Grecic & Collins, 2013).

378

379   **Applying the Integration – Implications for Research and Practice**

380   The review has outlined what is currently known about PJDM, Epistemology and the EC in

381   isolated and discrete exemplars, however there remains little in the way of 'applied evidence'

382   confirming or not, the existence of inter-connected decisions in relation to sports coaches

383   planning, practice and reflection processes.

384   The variability of coaching roles in relation to Epistemology and PJDM is also an area

385   which would be of significant interest and is currently underdeveloped. To consider recent

386   work around participation motivation in sport and physical activity – i.e. 'the thee worlds'

387   continuum (Bailey et al., 2010; Collins et al., 2012) and overlay the premise of Epistemology

388   and PJDM of sports coaches, there are a number of interesting questions that are raised. For

389   example, consider a cricket coach who works within both 'elite referenced excellence' (ERE)

390   and 'personal referenced excellence' (PRE) contexts. (Where ERE is "achievement is

391   measured against others with the ultimate goal of winning at the highest level possible"

392   (Collins & Bailey, 2015 p.137/8) and PRE is described as excellence in the form of

393   improving one's own performance, (i.e. task goal orientations (Nicholls, 1984)). To what

394   extent does their epistemological viewpoint remain the same for both contexts? To what

395   extent is it adapted? To what extent is it *allowed* or *expected* to change based on the social-

396   cultural pressures and expectations that are often faced by coaches in the world of sport?

397   (E.g. line managers, colleagues, parents of players etc.) Finally and perhaps most importantly,

398   what impact does this have on the practical decisions that are made within their coaching

399   practice?

400   On a more sport specific front, a small number of studies have taken place across

401   individual sports such as golf (e.g. Grecic & Collins, 2012; Grecic & Collins, 2013; Grecic,

402   MacNamara & Collins, 2013) with similar investigation taking place within adventure sports

403   coaching (Collins, Collins & Grecic, 2014). However, these sports differ in nature to cricket.

404   Both golf and adventure sports are performed all year round (in the UK), whereas cricket is a

405   seasonal sport and takes place throughout the late spring and summer months (April –

406   September). As a result of the seasonal nature, there are pre-season, competitive and off-

407   season stages to be considered in the annual planning of cricket coaches. To this end,

408   continuing research would help to further and more specifically contextualise cricket coaches

409   planning, practice and reflection processes at various stages of the year. Furthermore,

410   longitudinal research would help to unpack and explore the consistency and potential

411   variability of coaches' epistemology based on the phase of the annual plan (and beyond) they

412   are in, and the specific aims associated with it.

413   In practice, if further research were to compare the PJDM and EC of coaches within

414   both performance (i.e. outcome orientated) and development cricket coaching contexts, this

415   would continue to contribute towards a greater understanding around the creation of truly

416   individualised (and athlete centred) coaching approaches (e.g. Muir et al., 2011). As a

417   continuation of this theme, the potential education of cricket coaches could become more

418   informed. Coach education could help to develop expertise - i.e. an understanding that a

419   range of possible solutions often exist (Girot, 2000; van der Vleuten & Schwirth, 2005) with

420   coaches developing the ability to make decisions in answer to ambiguous problems with

421   limited information (Epstein & Hundert, 2002) as opposed to the current competency system

422   (i.e. the reproduction of behaviours) that is in use across the majority of coach education

423   programmes (Collins et al., 2015).

424   Whilst there currently appears to be very few answers to these types of questions,

425   research around this area would aid organisations and coaching contexts to better understand

426   the challenges that are faced by coaches, managers and administrators in attempting to create

427   a truly aligned, cohesive and context-specific coaching environment that best meets the needs

428   of those within it.

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