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

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Abstract

Decision making in elite sport has long been of interest, however only recently has the decision making process of coaches gained an increase in attention. Whilst a number of decision making models have been proposed, it still remains unclear as to how a number of these models may actually interact with one another as opposed to them being individual, discrete and isolated elements. This review is rooted within Cricket, given the idiosyncratic nature of the sport and the unique challenges faced by coaches within it. As a result, the review examines the existing literature around professional judgement and decision making (PJDM) and how this may be applied specifically to coaching in cricket. Secondly, we consider the integration of PJDM principles with coaches' epistemology and the epistemological chain. Finally, against this theoretical backdrop, we offer some implications for current practice and future research in this demonstrably important and complex area.

Keywords: Decision making, Epistemology, PJDM, Cricket

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’, Schön, 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

(Perry, 1968, p. 38)

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 (Giroto, 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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