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Conceptualising decision-making and its development: a phenomenographic analysis

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Abstract

A novel phenomenographic approach was used to examine how former elite players who had all subsequently become elite coaches conceptualise three sets of phenomena related to decision-making in football: what it is; what constitutes a good decision-maker; and how is decision-making developed. Participants were interviewed and their responses to questions were recorded, transcribed and coded. An iterative analysis revealed conceptions of each of the three phenomena, ranging from simple and narrow to more sophisticated and holistic. In the narrower conceptions, coaches viewed decision-making as a collection of judgments leading to given outcomes that could be correct or incorrect. More holistic conceptions of decision-making reflected several sources of complexity arising from various contingencies within the game (e.g., speed of play, team dynamics). Participants' conceptions of good decision-makers reflected the broadening range of abilities required of players. In the most elaborate conceptions, the participants conceived of players as having to predict what happens next, based on their knowledge, as well as having to collaborate with teammates when on-the-ball and off-the-ball, within an ever changing environment. Participants highlighted their conceptions of how decision-making may be developed, emphasising the importance of: playing with others; effective communication; balancing structure and autonomy; knowledgeable inspiration from other players and coaches; and a focus on improvement rather than winning. In future, research is needed to better understand how a coach's conceptualisation of decision-making impacts on his/her ability to create effective environments to promote skill development in players.

Keywords: coaching; game intelligence; expertise; pedagogy; football

1 **Conceptualising decision-making and its development: a**
2 **phenomenographic analysis**

3 **Introduction**

4 The ability to make quick and accurate decisions is crucial to performance in
5 team games such as football (O'Connor and Larkin 2015; McGuckian et al. 2018). The
6 traditional approach to investigating decision-making in players is to use theoretical
7 ideas and experimental methods from cognitive psychology to analyse specific and
8 discrete epochs of decision-making (Williams and Ericsson 2005). Moreover,
9 alternative frameworks based on an ecological dynamics approach have been proposed
10 to understand how players perceive and make decisions in performance contexts
11 (Araújo et al. 2006; Travassos et al. 2012; Travassos et al. 2013). In this paper, we
12 present a complementary method to these more accepted approaches to enhance
13 understanding of decision-making in football. In addition to studying decision-making
14 directly (a 'first order' approach), we argue that it can be valuable to study how
15 decision-making, and its development, are understood by some of the key stakeholders.
16 Specifically, we report research carried out with 25 elite-level football coaches, each of
17 whom also had prior experience as a professional player. Our aim was to understand
18 how they conceptualize decision-making and its development in football. Although the
19 'second order' approach used in this paper has proved useful in educational research, it
20 has rarely been used in the sport sciences (Marton and Pang 2006). Knowing more
21 about how experts understand a phenomenon of interest provides helpful knowledge
22 that may be used to improve the design of educational and training programmes to help
23 evaluate and enhance performance. Our ultimate aim is to help coaches improve the
24 manner in which they design training programmes to facilitate better decision-making.

25 **Research on decision-making**

26 Decision-making can be defined as the process of selecting the most appropriate
27 response (e.g., moving to create space to receive the ball) or functional action (e.g.,
28 passing; dribbling; one or two touch control) from a range of possible options to achieve
29 a specific game-play outcome (Abernethy 1996; Hastie 2001). The ability to utilise
30 appropriate game-play information to guide skilled movement is a fundamental
31 component of performance (Abernethy and Russell 1987; Williams et al. 1999;
32 McGuckian et al. 2018). In team sports, such as football, decision-making is considered
33 to be a complex process influenced by a range of constraints including the player's
34 technical competency (e.g., ability to execute), the team's game plan (e.g., playing out
35 from the back), what the opposition are doing (e.g., opposition tactics), and the game
36 context (e.g., game score, location on the pitch) (Travassos et al. 2012; 2013).
37 Consequently, sport-specific decision-making can be defined as the process of
38 identifying and selecting the most appropriate response, from a range of possible
39 actions, which incorporates strategy, to achieve a specific goal (Abernethy 1996; Hastie
40 2001; Travassos et al. 2012; 2013; O'Connor and Larkin 2015).

41 In football, successful performance is underpinned by the ability of players to
42 consistently and efficiently make effective decisions during a match (e.g., when to pass
43 or shoot; where to run) (Gréhaigne et al. 2001; McGuckian, et al. 2018). Such decisions
44 are made under game pressures, and require players to use information related to space
45 and time in order to execute appropriate actions in response to the chaotic, unstable
46 game environment (Travassos, et al. 2012; McGuckian et al. 2018). Within this
47 pressured game environment, players must identify and select appropriate situational
48 cues and integrate this information with their knowledge of team strategy and technical
49 competence to make effective decisions about what to do with the ball (e.g., one-touch

50 pass, dribble or shoot) (Williams 2000; Cotterill 2014; Broadbent et al. 2015). While
51 ‘on the ball’ decisions have observable outcomes, it should be noted that during a game
52 individual players often spend less than two minutes in possession of the ball (Carling
53 2010); players make the majority of their decisions when not in possession of the ball
54 (i.e., ‘off-the-ball’). These latter instances can include, but are not limited to, decisions
55 such as: *In what direction should I move to receive the ball next? How will I evade the*
56 *opposition player marking me? If I get the ball, how many touches will I take? In what*
57 *direction should I move with the ball? How much space is there around me?* Such
58 decisions need to be made prior to making an effective in-game action and are equally
59 vital for performance in the sport (e.g., making an effective run in order to receive the
60 ball; tracking an attacking player). Ineffective decision-making can lead to loss of
61 possession, fewer goal scoring opportunities, more defensive errors and ultimately an
62 increased risk of losing the match.

63 **Research on how decision-making is developed**

64 Due to the importance of decision-making for game performance, researchers
65 have explored several methods to develop this ability in players. One such approach
66 has been the use of video-based methods. Starkes and Lindley (1994) proposed that the
67 perceptual-cognitive processes associated with fast and accurate decision-making in a
68 game situation could be replicated using a video task. The positive results reported by
69 Starkes and Lindley (1994) led many researchers to use video-based training methods
70 to accelerate sport-based decision-making performance (see Larkin et al. 2015). In
71 football, researchers have demonstrated the efficacy of video-based training
72 programmes to improve the decision-making accuracy of individuals (see Broadbent et
73 al. 2015). However, a limitation of video-based training methods is the perceived poor

74 ecological validity of the task, that is, the extent to which the task replicates the
75 game/match environment (McGuckian et al. 2018).

76 In an attempt to address this concern over ecological validity, researchers have
77 proposed an ecological dynamics approach to investigating and developing decision-
78 making in players. In sport, decisions are not made in isolation, with perception and
79 action inherently coupled (Gibson 1979), and therefore researchers propose
80 information related to decision-making in sports is linked to the dynamic environment
81 and continuous interaction of the player and the environment (Davids Araújo Vilar et
82 al. 2013; Travassos et al. 2012; McGuckian et al. 2018). As sport-based decision-
83 making is a complex process, with the continuous changing of environmental
84 constraints, researchers argue that it is counter intuitive to examine decision-making
85 independent of the behavioural expressions of the decisions in the performance
86 environment (Araújo et al. 2006; Travassos et al. 2013).

87 Investigations using the ecological dynamics approach have identified changes in
88 players' behaviours in relation to the performance environment, implying decision-
89 making in sport can be understood based on the dynamics of the special-temporal
90 interactions between the performer and the environment (Araújo et al. 2006; Headrick
91 et al. 2012; Travassos et al. 2013). So, to develop decision-making, key stakeholders
92 should consider the nature of the practice environment in order to ensure appropriate
93 environmental information is available for the player to make appropriate decisions
94 (Pinder et al. 2011; Headrick et al. 2012; McGuckian et al. 2018).

95 O'Connor and colleagues (2017) explored the different coaching strategies used
96 by youth football coaches to improve decision-making. Coaches indicated that practice
97 sessions focused on decision-making should include small-sided games based on real

98 game scenarios, the use of cues to prompt decision-making, the use of a question and
99 answer approach, and an emphasis on constraints-led approaches to instruction
100 (O'Connor et al. 2017). These findings align with research that advocates the use of
101 small-sided games to create environments that promote more holistic skill development,
102 with technical skills, tactical awareness, and decision-making all developed within the
103 same activity (Williams and Hodges 2005; Hill-Haas et al. 2011; Headrick et al. 2012;
104 Travassos et al. 2012; Davids, Araújo, Correia et al. 2013). Small-sided game
105 environments provide players with the opportunity to interpret cues, explore options,
106 make decisions and execute technical skills, providing an environment where players
107 are able to experiment with their decision-making and technical skills execution to
108 identify appropriate competitive in-game decisions and actions (Headrick et al. 2012;
109 O'Connor and Larkin 2015; O'Connor et al. 2017; McGuckian et al. 2017; 2018).
110 Furthermore, it is acknowledged that a less prescriptive approach to instruction and
111 greater focus on questioning may enhance decision-making learning through problem
112 solving and discovery by stimulating players to engage in higher order thinking
113 (Chambers and Vickers 2006; Harvey et al. 2010; Headrick et al. 2012; Partington and
114 Cushion 2013; O'Connor et al. 2017). As such, these pedagogical approaches afford
115 structure and facilitate learning through athlete-centred environments, whereby an
116 individual's interaction with the environment can foster decision-making development
117 (Kidman et al. 2005; Chambers and Vickers, 2006; Harvey et al., 2010; Partington and
118 Cushion 2013; Light et al. 2014; O'Connor et al. 2017).

119 *Phenomenographic research in sport*

120 Phenomenography is an approach to qualitative research that is distinguished by its
121 interest in how people experience selected phenomena. As opposed to trying to research

122 those phenomena directly or first hand, phenomenography takes a second-order
123 approach by evaluating people's understandings of the phenomena (Marton and Booth
124 1997). Phenomenography is related to phenomenology. Martínková and Parry (2011)
125 observe that the term 'phenomenology' is over-used and misused in research on sports.
126 The founder of phenomenography, Ference Marton (1981), acknowledges some
127 connections between phenomenology and phenomenography, but marks out the latter
128 as being concerned with finding out "the different ways in which people experience,
129 interpret, understand, apprehend, perceive or conceptualize various aspects of reality"
130 (p. 178). Although there are variations in how people experience phenomena, these
131 variations are far from infinite. In general, phenomenographic research typically
132 uncovers a small set of categories of experience and groups these categories into an
133 'outcome space'.

134 Phenomenography has an obvious appeal when the aim is to inform education
135 or training; knowledge of the main variations in how people understand something can
136 be very useful when it comes to designing training that meets their needs. In our case,
137 knowing more about how coaches and players experience and understand decision-
138 making in football may provide useful insights for a range of interventions aimed at
139 helping to improve decision-making in players.

140 There are some examples of research in sports that focus on mapping
141 participants' experiences of a phenomenon (or set of related phenomena), without using
142 the phenomenographic label and/or without taking on board the whole methodological
143 apparatus commonly used by phenomenographers (e.g. Kian et al. 2011). Some of these
144 studies may be described as being phenomenological, though in Martínková and Parry's
145 (2011) terms, they would merely be another species of qualitative research.

146 Lindgren et al. (2002) and Kristén et al. (2003) provide useful entry points to
147 research on sport using a phenomenographic approach. These papers report studies of
148 how young female athletes experienced a self-strengthening programme and how
149 parents of children with disabilities understood the effects on their children of
150 participation in sports. Such studies illustrate how phenomenographic research can
151 inform the evaluation, (re)design and enhancement of programmes (see also Lake
152 2001). Similarly, in a study of judges in figure skating, where mixed quantitative and
153 qualitative methods were employed, Kenworthy (2009) used phenomenography to
154 “map out and describe how expert skating judges experienced the skating performances
155 that they judged ... [and to examine their] varying conceptions and their mechanisms
156 for structuring their perceptions into meaningful decisions” (p. 41). Similarly, in a study
157 of Game Based Approaches to teaching, Jarrett et al. (2014) drew on phenomenography
158 to explore school teachers’ experiences. Their paper is particularly useful for those
159 wanting to understand the functioning of the interview in phenomenographic research.
160 Fagher et al. (2016) took a phenomenographic approach to examining the experiences
161 related to sports-related injuries in Paralympic athletes. They interviewed 18 athletes
162 from 10 sports and found nine distinct categories of experience. The study vividly
163 demonstrates both the complexity of these athletes’ experiences and the value of the
164 research insights in redesigning injury surveillance and prevention programmes.
165 Finally, Allen-Collinson (2011) used an *autophenomenographic* approach in
166 researching her own experience of distance running, injury and rehabilitation. This
167 latter approach presents a special instance of phenomenographic research in which the
168 researcher studies their own experience, understandings and apprehensions of
169 phenomena, rather than other people’s experiences of those phenomena. From our
170 utilitarian perspective, autophenomenography could be deployed as a method for

171 practitioner research by football coaches researching their own practice. In summary,
172 there are some convincing examples of phenomenographic research in the sports
173 science literature, but coverage is patchy and there is very little work on core areas like
174 decision-making and its development. We attempt to fill this gap in the literature. More
175 specifically, we explore coaches' understanding of three sets of phenomena related to
176 decision-making in football: what is it; what constitutes a good decision maker; and
177 how is decision-making developed.

178 **Method**

179 *Participants*

180 A purposeful sample of 25 participants (24 = male; 1 = female) who had a minimum of
181 20 years of experience in football (playing and coaching) volunteered to be interviewed
182 ($M_{\text{age}} = 48.5 \pm 9.3$). All participants had played professional football in Europe and
183 Australia for an average of 14.8 (± 4.5) years. Since retiring from playing, all
184 participants had become coaches and had been coaching elite youth and senior teams
185 for an average of 15.4 (± 9.8) years. The ethical approval for this study was granted by
186 the University of Sydney's Human Research Ethics Committee. Participants were
187 informed of the procedures employed before providing written consent prior to
188 participation.

189 *Semi-structured interviews*

190 Semi-structured interviews are one of the preferred methods in phenomenography
191 (Åkerlind 2005; Marton 1986). This approach allows participants scope to describe
192 how they understand key phenomena and to explain their conceptions through
193 conversation. A set of open-ended questions promoted consistent discussion to identify
194 the participant's conceptions of decision-making and its development in players (e.g.,
195 How would you define decision-making in football? How do you identify decision-

196 making expertise? What do you do to develop decision-making in players?). This
197 approach follows Marton's (1986) suggestion, in that interview questions should be as
198 open-ended as possible to allow the interviewee to select any aspect of the phenomenon.
199 Follow up questions were incorporated to further understand decision-making (e.g.,
200 What skills/attributes contribute to decision-making?), how to identify expert decision-
201 makers (e.g., How do you identify decision-making expertise in your players?) and how
202 best to develop this skill in players (e.g., How do you plan to develop decision-making
203 in players?). Follow up questions are important in phenomenography to encourage the
204 participant to reflect more deeply (Prosser 2000). Interviews were carried out by
205 research assistants with experience in using the protocol and took 30-65 minutes to
206 complete. The content was recorded and transcribed.

207 *Analysis of the interview material*

208 The interviews had three main foci: conceptions of decision making; conceptions of
209 good decision makers; and conceptions of how decision making can be developed.
210 Conceptions are the central unit of analysis in phenomenographic studies (Harris 2011).
211 Phenomenographic analysis does not seek to provide a quantified representation of
212 participant understandings. In contrast, the analyst aims to uncover distinct conceptions,
213 stopping when no new conceptions emerge from the interview data. A similar process
214 was used for each of the three focal areas (Trigwell 1997).

215 Individual interview transcripts were uploaded to NVivo (a qualitative data
216 analysis tool – see Bazeley and Jackson 2013). A new node or category was created for
217 each interview to make it easier to attribute specific comments to participants. The
218 analysis began with a close reading of the amalgamated interview responses. On
219 reading and re-reading the transcripts, utterances that described decision-making and

220 related ideas were coded into a new node in NVivo. A node can be conceptualised as a
221 category to which a certain concept can be assigned. This comprised the ‘pool of
222 meanings’ derived from the data (Åkerlind 2012). The meaning of an utterance often
223 lies in the utterance, but the context is needed to interpret the meaning. For this purpose,
224 NVivo provided the tools needed to look at individual utterances separately while being
225 able to jump to the particular interview and then to the entire pool of meaning when
226 connection to the whole was required. By using this iterative process, utterances were
227 grouped together based on their similarities and differences (Åkerlind 2012). Initially,
228 a large number of categories were created and then a process of abstraction was used
229 to merge similar conceptions, reducing them in number until the final set of categories
230 emerged. Descriptive metaphors were then assigned to each category, capturing the
231 category’s essence. This process was carried out independently by two members of the
232 research team.

233 Once the categories emerged, the analysis continued a step further. In this step,
234 the categories themselves were analysed to determine logically the internal
235 relationships between them. The categories were organised hierarchically into an
236 *outcome space*, ranging from categories that expressed a more sophisticated, complete
237 or holistic understanding to categories that focused on narrower and simpler ideas
238 (Åkerlind 2012). An important aspect of phenomenographic methodology to note is
239 that the outcome space does not organise conceptions as discrete, competing ideas. The
240 aim is to show how more elaborate conceptions embrace or include less complete
241 conceptions. Such an approach aligns with a practical aim of helping people develop
242 more sophisticated conceptions through growth from less sophisticated conceptions. In
243 general, participants who expressed more complex or complete conceptions made
244 reference to some or all of the simpler or less complete conceptions. The reverse is not

245 true; it was very rare for someone whose talk predominantly referred to a simpler
246 conception to speak about the more complex conceptions.

247 **Results**

248 *What is decision-making?*

249 As shown in Table 1, the analysis produced an outcome space with five distinct ways
250 that coaches conceptualised decision-making.

251 *< Insert Table 1 about here >*

252 A small number of respondents found it very difficult to explain what they understood
253 decision-making to mean. The five distinguishable conceptions that arose increase in
254 complexity when moving from left to right in Table 1.. The two simplest conceptions
255 focus on judgements about the outcomes of decision-making, whereas the three more
256 complex conceptions focus on what makes decision-making particularly difficult.

257 Following established practice in the reporting of phenomenographic research,
258 we offer some illustrative quotations that give a flavour for each of the five conceptions.

259 *1) There is always a right and wrong decision to be made in football*

260 “...you trust that your players will make the right decision to carry out the game
261 plan.”

262 “My view is that it’s the moment that a player, either with or without the ball, is
263 faced with more than one option and them choosing the right option. That is, in its
264 essence, is what I think that the decision making is”.

265 The underpinning idea is that the coach sets a game plan and the player has to
266 follow the game plan. The player has little choice, agency or flexibility. From this
267 viewpoint, decisions are right if they follow the game plan and if they result in a win.
268 Spontaneous decisions, particularly ones that do not result in a successful outcome, are

269 considered the wrong decision. A good decision is when a player follows the game plan
270 and executes the correct action at the right time.

271 *2) There are no right or wrong decisions in football*

272 “...the decision that the player makes is the correct decision for that moment”

273 “... I don’t think you can categorically say, black and white, whether a right
274 decision or whether a wrong decision.”

275 Since no two games are identical, a decision that is right in one game might not be right
276 in the next one. Players have different abilities, so the same decision, such as choosing
277 to pass the ball at a specific angle, might not be the right decision for every player
278 because not every player would be able to execute this skill. Furthermore, a player will
279 not always make the right decision and even high profile players will sometimes make
280 wrong decisions. However, they will make the right decisions more often than not.

281 The next category of conception represents a significant jump in complexity.

282 *3) Decision-making is difficult because in football decisions have to be made rapidly*
283 *and under pressure*

284 “...decision making is important to do it quick, at the right moment ... make that
285 decision quicker because you don’t have this time to control ...”

286 “I will say that football is a game of chess played at high pace, because like chess,
287 you’re trying to make a move that exposes the opposition but doesn’t expose
288 yourself, but you don’t get two minutes to make it. The men aren’t standing still,
289 and in a fraction of a second”

290 One thing that was mentioned in relation to this concept was that training players is
291 difficult due to the challenges of replicating the speed and pressure that exists in
292 competitive matches. Also, training players by showing them video footage of the game
293 is limited as this doesn’t authentically reflect the real game situation. Another aspect of
294 this conception, was that good physical ability does not mean a player can make quick
295 decisions, but a player who can handle pressure mentally can make decisions faster,
296 even when the player is not that fit physically.

297 *4) Decision-making is difficult because football is a team game*

298 “I think that a player as part of a team must have a strong understanding of the
299 team function, how the team proposes to work. I think they have to have an ability
300 to analyse or identify opportunities to partake in that style of play, but also
301 opportunities because of something that the other team haven't recognised or
302 there's spaces available or whatever.”

303 “I think decisions have to be in relation to the team style, the game circumstance,
304 the ability and quality of your teammates, so trying to play a final pass to someone
305 who can't run fast, it's sharing but is it going to work? ... I think that also in relation
306 to your position on the pitch, what decisions are good decisions. And I think the
307 last thing I had in my mind regarding decision making was the balance of
308 predictability and unpredictably; that your teammates have to have some ability to
309 predict what you might do so they can take up the right positions.”

310 A key part of this concept is that a player should know his team-mates well enough to
311 predict how they will handle a situation. The player's decision to execute an action
312 would be affected by how his team-mate decides to react to his action. In this
313 conceptualisation, communicating with team-mates is important. Also, a good team
314 player will let go of his/her ego in order for the team to win; a good player would pass
315 the ball to another player who is better positioned to score rather than trying to score
316 himself, to make him/herself look good.

317 *5) Decision-making in football is complex and influenced by multiple factors*

318 The most elaborate of the conceptions we discovered includes the difficulties of
319 decision-making at speed in multi-player situations, but goes further to take in
320 additional complexities.

321 “Obviously I think that football if it's categorised is an open skill game, it's an
322 interdependent team activity with constantly changing circumstances. Whether
323 that's the weather, the opponent, the result, the number of players on the field; all
324 those conditions are constantly changing.”

325 “Could be anything, could be a number of issues instead of what I normally do. It
326 could be the different opponents, so I was doing well but I had more space in those
327 previous two games and I'm not doing well now because there's a difference in

328 the way the opponents are playing or the coach has changed the way we play and
329 that's affected my form. I think there's more than one factor that will go into it."

330 An essential notion within this conception is the *openness* of the game of football.

331 *Characteristics of good decision-makers*

332 Table 2 illustrates the main findings for this focus area. We explain each of the five
333 distinctly different ways coaches conceived of good decision makers, moving from
334 simpler and narrower to more complex and inclusive conceptions (left to right in Table
335 2).

336 *< Insert Table 2 around here >*

337 *1) Perception: good decision-makers see the field and the things around them*

338 This category sees good decision-makers quite simply; good players need to be aware
339 of their surroundings in the game. They need to be switched on and scan the field
340 actively. They need to know where they are, the space around them, and be able to do
341 something quickly when they get the ball.

342 "For me, I believe the ones who are the best decision makers are the ones that can
343 actually see what's happening on the field, especially at a younger age, sometimes
344 they don't have the physical capabilities of executing the pass but they can see
345 what's happening in front of them. I think they are the ones that are going to go
346 to the next levels"

347 "You must be able to see what's around you before you see the ball, so you've got
348 to be aware of all that"

349 *2) Good decision-makers can make decisions off the ball*

350 This category of conceptualisation is expressing the view that players need to make
351 many decisions when they are not in direct possession of the ball. A good player will
352 know what to do when they are waiting to get the ball. A good player will position

353 him/herself in the best way and in the right space to receive the ball and then execute
354 an action.

355 “So much decision making is going on without the ball, we just don’t do it enough.
356 Particularly if you’re thinking about transitioning and a high intensity game, being
357 able to transition quickly and the anticipation element, so if I’m off the ball, I’m
358 always thinking about what’s going to happen next and where can I go, where can
359 I be, what information can I give”

360 “even if you’ve not got the ball, you’ve still got decisions to make in where you
361 go and where do you support, and where do you move to. When the opposition
362 have got the ball you got to make decisions of where you put yourself, you know,
363 positions without the ball”

364 *3) Collaboration: good decision-makers play as part of the team*

365 From this viewpoint, a good player is someone who can play as part of the team. They
366 listen to their peers and collaborate with them effectively.

367 “So, they learn to be curious, they learn to try different solutions and always with
368 that little chain that links them back to the responsibility of the team, that I can't
369 just do my own thing all the time, otherwise I might as well go and do figure
370 skating or something. I've got to express myself in terms of, what is going to help
371 our team overcome what's before us”

372 “Also listening to your peers but also then collaborating with peers as quickly as
373 you can in some situations depending on the game scenario.”

374 *4) Knowledgeability: good decision-makers understand the game*

375 This concept describes the view that in order to be a successful player you need to have
376 a complete understanding of the game. From this viewpoint, a good player knows how
377 to play at the right speed and in accordance with the space, the position of the ball and
378 other players. Good players know how to react to signs in the game. They know what
379 to do with and without the ball. They can “read” the game and they know their own

380 strength and ability. The more knowledge of the game a player has the better decisions
381 they can make.

382 “Know your own game. Know your teammates’ game if you can and get to know
383 the opposition’s game. You know, you should be able to get a sense of what that
384 is even if you’ve never seen it before, in 10 or 15 minutes. And that helps you
385 make decisions, you know the standard of people around you, what they’re good
386 at, what they’re capable of, what they expect from you, all of that.”

387 “The fact that they understood the game. So they could read the game. Simple. So
388 it can never happen in isolation... a decision has to be based on the scenario. So
389 it’s situation based. What great players have is they read the game.”

390 *5) Prediction and ‘playing ahead’: good decision-makers see things before they happen*

391 This conception is the most extensive in this list, involving abilities mentioned in
392 relation to categories 1-4. From this viewpoint, a good player is someone who can
393 predict the game and knows what is going to happen before it happens. These players
394 can perceive a situation and prepare to react to it before the situation arises. Their
395 prediction ability gives them more time to decide what to do about the situation that is
396 yet to come. This ability makes them more capable of dealing with the situation and
397 they are always *playing ahead* in the game in that they know what to do two to three
398 moves ahead.

399 “That’s the first thing is their quality, you just have players I don’t know how to
400 explain this, players that are thinkers. Players that before they receive the ball they
401 already know what they’re going to do next”

402 “...there are things going in your head while you’re playing, prior to you getting
403 the ball. I’m big on that too, I’m the sort of player that, not that I see things before
404 they happen but I always try and think where’s the next ball going because it does
405 make your decision a lot easier.”

406 The five categories describing good decision makers reflect a broadening range of

407 abilities required of a player. Players with the skills involved in the fifth category (right
408 hand end of Table 2) are deemed to already have the skills associated with the other
409 categories (i.e., subsuming the skills to the left in the table). In other words, a player
410 who can predict what will happen next is assumed to understand the game, will be
411 collaborating with their team, will know what to do all the time including when not in
412 possession of the ball and will be aware of what is happening around them in the field,
413 where the players are, where the goal is located, etc.

414 *How can decision making be developed?*

415 In this section, we summarise a large volume of responses to questions about how to
416 approach the development of decision-making in football.

417 Table 3 illustrates the results from our analysis of this material. Most
418 conceptions focussed directly on the challenges involved in supporting the
419 development of decision-making. In contrast, a few participants came at this indirectly
420 – talking about the training and resources needed by coaches. This finding is captured
421 in the leftmost column of Table 3. It is an important area of concern; if coaches are to
422 do a better job of developing players’ decision-making, then they need a good
423 understanding of decision-making (through better training for themselves) and they
424 need time, support and other resources. The latter concept is very different to the more
425 direct approaches captured in the rest of Table 3.

426 *< Insert Table 3 about here >*

427 The remaining approaches shown in Table 3 can be classified as more and less
428 sophisticated and complete.

429 At the simplest level (left hand side of Table 3), we find assertions that technical
430 skills should not be neglected because they (are believed to be) pre-requisites for the

431 development of decision-making. We also find a range of complementary perspectives
432 on the core belief that the development of decision-making takes a lot of time. Views
433 expressed included the following:

- 434 • Coaches should know and expect that proper development of decision-making
435 skills will take a long time;
- 436 • The development of decision-making skills should start early (when players are
437 young) - it is easier to develop good decision-making habits by ‘catching players
438 young’;
- 439 • The more time players spend playing, the better their decision-making will
440 become.

441 The next columns in Table 3 illustrate approaches or strategies for the development of
442 decision-making that grow in sophistication as we move to the right in the table. For
443 brevity, we distinguish these approaches primarily through their focus. Further
444 information on each approach, with some illustrative quotations, now follows.

445 *1) Focus on playing with others*

446 This concept represents the idea that players do not develop better decision-making
447 skills playing by themselves at home. Decision-making should be developed while
448 playing as a member of a group, in part because players learn from their peers.
449 Associated with this is a view that players should play more “street football” - playing
450 informally with family or friends in the park or in the backyard. When people play
451 street football they have to deal with players of different ages and there are no rules and
452 no coach, so they are making their own decisions and having opportunities to develop
453 better decision-making skills. Also, since the players are not practicing long enough
454 hours in the formal football club situation with coaches and other players, playing street

455 football gives them the extra hours they need, which then incorporates the ‘time to
456 develop’ category mentioned above.

457 “So one player, one ball, one back yard. What decision making processes could
458 that particular child go through?”

459 “I think I was self-taught quite a bit as well because I, as a young player, again
460 was playing in a team that was full of international class players so you would
461 watch sessions with them and slowly you would get involved in those sessions. So
462 visually what I was seeing every day, I would maybe focus on my position and see
463 what they were doing at the top end and then trying to use that and take that into
464 my game and then if I got the opportunity to go and join into that environment, be
465 very conscious of trying to think about all of those things and trying to implement
466 them in that session. So I learnt a lot by playing the players that were well ahead
467 of me and whether it be older or whether it be higher level, and I picked up so
468 much from that.”

469 2) *Focus on effective communication*

470 In this conceptualisation, the core idea is that coaches should communicate more
471 effectively with players in order to help them make better decisions. For example,
472 coaches should provide direct feedback and feedback provided on the field is better
473 than later. However, in this concept, coaches should be cautious about providing
474 feedback to players in front of their peers. It is better that coaches get to know their
475 players so they can provide them with better feedback. Coaches should use questioning
476 to make the players aware of their own decisions and should avoid overloading the
477 players with too many questions and feedback. They should definitely not give
478 feedback during the game by screaming at players from the sidelines.

479 “it’s not just about what you do, it’s about the timing of what you do, and that’s
480 equally important for coaches. It’s how do you give the players information, when
481 do you give them it, when do you step off them, and sometimes it’s trial and error.
482 You maybe make a mistake and then immediately you’ve got to correct yourself,

483 and it's the same for them. You don't mind them making mistakes, but you would
484 hate to see them make the same mistake again and again and again, and the same
485 applies to you as a coach."

486 "Well, maybe we ask too many questions, and whether we have too many coaches
487 asking questions to get the answer that they wanted, that the coach wanted, and if
488 that's the point why didn't you just tell them what you wanted and why are you
489 asking the question when you know the answer? I think the right kinds of questions
490 are obviously questions that make the players think and think."

491 *3) Focus on balancing structure and autonomy*

492 This perspective suggests that effective coaching, and the design of good learning
493 opportunities for players, often depends on finding the right balance between giving the
494 players autonomy and providing them with guidance, clear tasks and other kinds of
495 supportive structures. Players need some freedom, in order to be creative and learn how
496 to make decisions on their own. Coaches should not yell at the players from the sideline,
497 because they sometimes do not understand what the players are seeing and how and
498 why they are reacting to things in certain ways. Over-coaching is killing creativity,
499 some participants stated. On the other hand, in this conceptualisation, coaches should
500 provide opportunities to players within a properly designed structure to help them
501 develop better decision-making. There are many ways that coaches can structure
502 training as highlighted below:

- 503 • Have a purpose for each training session so you can base training on specific
504 principles;
- 505 • Vary the practice constraints to ensure the players don't get bored;
- 506 • Embed decision-making in the training throughout the player's development
507 and provide players with plenty of opportunities to make decisions;

- 508 • Take players out of their comfort zone by replicating realistic match situations
509 so that players have experience of dealing with match-like situations;
510 • Increase pressure on the players slowly and do not overload them with too many
511 decisions.

512 Some illustrative quotes relating to autonomy include:

513 “I believe it’s about not creating robots and I think that we have the models in
514 place with the skill acquisition phase here to allow players to express themselves,
515 as long as it still is about the players and not about coaches. ... It’s still about the
516 individuals and giving them the freedom to make the right decisions themselves.”

517 And on structure:

518 “... you have to replace it with proper training. Because you’ve got limited amount
519 of time. So in my view, most kids here are going to be doing between two and
520 three sessions, an hour, 75 minutes. I’m talking 10s, 11s, 12s. Two sessions for
521 under 8s, plus a game. Those two sessions are – there’s not a minute to waste.
522 They have to be helped as much as possible. That means the session has to be
523 perfectly designed, it has to be relevant, it has to be target oriented, it has to be a
524 principle, a technique and a tactical principle to open the mind.”

525 4) *Focus on knowledgeable inspiration (heroes)*

526 The focus of this concept is on positivity and inspiration and the role heroes play in
527 motivating young players to become better decision-makers. Players need someone to
528 look up to – they need their own football heroes – and they need to watch high quality
529 football for inspiration and for fresh insights. Coaches can work with this in a number
530 of ways that involves not just providing some inspiration themselves but also referring
531 to the skills and achievements of star players and encouraging young players to model
532 themselves on their heroes.

533 “I think having heroes helps, watching top players, people with fantastic vision,
534 the Zidane, Bergkamp, Pirès, top players that see, Riquelme, Xavi. The list goes
535 on of players that probably influence other people's lives by what they see, so kids
536 having heroes and watching those people and watching them express themselves
537 is the first thing”

538 “Because before you're good at anything, you have to love it, and for when we're
539 dealing with the young kids here, there are coaches – and I say to them, ‘It's not
540 teaching them the game, it's teaching them the love of the game’. Because if you
541 teach someone the love of something, they'll come back to you to become better,
542 you won't have to go to them. And if you're going to somebody else to become
543 better then you're motivated, and I think that's critical.”

544 *5) Focus on improvement rather than winning*

545 This concept is fundamentally concerned with the long-term or over-arching aims of
546 coaching and player development. Winning games may be good, enjoyable and
547 motivating, but it is not the main point.

548 “...if the drive is to simply win the game, and you know how to coach to do that,
549 that means realistically you're a coach in an anti-development way.”

550 “So no points, no tables, total development and better players because of it. Points,
551 tables, glory, grand finals, whatever, no footballers. Great experiences and
552 everyone gets a trophy, but no one actually learns how to play football.”

553 The categories in this section (and shown in Table 3) demonstrate how some of the
554 ideas for better development of decision-making are more holistic in comparison to
555 other, narrower, views. On the right hand side of Table 3, the ideas are more holistic -
556 concentrating on changing general perspectives, such as from a focus on winning to a
557 focus on improvement. The middle categories express a need to develop decision-
558 making through more holistic approaches that take into account the multiple and
559 complex factors involved in football. Moving further left, the categories describe less

560 holistic approaches, such as the length of time needed for developing better decisions,
561 how the coach should be structuring trainings sessions, and when should they start the
562 development of decision-making skills. The remaining conceptions (left of Table 3)
563 offer a much narrower view on how better decision making should be developed. The
564 focus is more on the development of technical skills and informal ways of developing
565 decision-making, such as through street football.

566 **Discussion**

567 In sport, and many other professional domains, decision-making is a complex
568 and dynamic process (Travassos et al. 2012; 2013). We examined how elite-level
569 football coaches understand decision-making, the characteristics of good decision-
570 makers, and how decision-making is developed. We use a relatively novel approach to
571 the sports sciences using phenomenography to inform coach education and influence
572 the effectiveness of the training environment.

573 Although all participants had extensive experience of playing and coaching the
574 game, their definitions and descriptions of decision-making varied considerably. In
575 relation to the question what is decision-making, the conceptions articulated by some
576 participants seemed fixed around certainties (decisions are right or wrong), whereas
577 others had a more complex perspective that acknowledges the interdependence of ideas
578 (Sandoval 2009). The more holistic conceptions of decision-making elicited from some
579 coaches acknowledge that there are many different elements involved due to the open
580 environment of the game, interaction with other players, the context-specific nature of
581 decisions and the uncertainty associated with decision outcomes. The diversity of
582 responses outlined by the participants mirrors the diversity of the research base on this
583 topic (Williams and Hodges, 2005; Travassos et al. 2012; Davids, Araújo Correia et al.
584 2013). Numerous researchers have attempted to understand the process of decision-

585 making in isolation via perceptual-cognitive assessments, such as video-based tasks
586 (Broadbent et al. 2015; Larkin et al. 2016; O'Connor et al. 2016), or using an ecological
587 perspective, which considers the multiple environmental factors associated with the
588 decision-making process (i.e., team mates; opposition, and the uncertainty within the
589 playing environment) (Williams and Hodges, 2005; Hill-Haas et al. 2011; Headrick et
590 al. 2012; Travassos et al. 2012; Davids, Araújo Correia et al. 2013).

591 The coaches' understanding of the characteristics of good decision-makers also
592 varied, reflecting a broadening of the player's skillset. For example, for some coaches,
593 good decision-makers were described as being able to predict what will happen next in
594 on- and off-the-ball moments, whereas for other coaches this was limited to a player
595 having a good awareness of their surroundings to assist them in making decisions on-
596 and off-the-ball. These levels of complexity reflect current decision-making
597 knowledge, where researchers have identified differences in decision-making ability
598 for expert and novice players in on-the-ball decision-making assessments (Ward et al.
599 2013; O'Connor et al. 2016). Furthermore, our findings support current decision-
600 making knowledge indicating skilled decision-makers complete more perceptual
601 exploratory behaviours (i.e., head movements; Jordet 2005a; 2005b). While research
602 relating to off-the-ball decision-making remains limited, researchers have demonstrated
603 that skilled decision-makers are better able to anticipate/predict the next passages of
604 play (Roca et al. 2012; Causer et al. 2017). These variations in complexity in
605 understanding decision-making have implications for how effective coaches will be in
606 developing in-game decision-making in players, and may provide a conceptualisation
607 of the process associated with the identification of talent in football.

608 The coaches interviewed in this study perceived the development of decision-
609 making to be the dual responsibility of the coach and player. It is imperative that youth

610 coaches create learning environments that provide players with the opportunity to be
611 creative and express themselves and experience different authentic decision-making
612 situations (O'Connor et al. 2017). Decision-making occurs within the game
613 environment and is relative to the dynamic and continuous interaction of the player and
614 the environment (Travassos et al. 2012; Davids, Araújo Correia et al. 2013;
615 McGuckian et al. 2018), using pedagogical approaches such as modified/constrained
616 games (i.e., small-sided games) ensures players are exposed to 'match-like' decision-
617 making opportunities (O'Connor et al. 2017). These contextualised learning activities
618 are related to the actual performance (Ford et al. 2010; Harvey et al. 2010), and may
619 promote decision-making development better than drill-based activities (Lee and
620 Simon 2009; O'Connor et al. 2017). In addition, most, but not all, coaches were aware
621 of the importance of planning, the use of feedback and a questioning approach, and the
622 pitfalls of over coaching. Yet, despite this understanding, researchers have shown that
623 football coaches may still be prone to over coaching with findings indicating
624 approximately 30% of a training session players are inactive listening to the coach
625 (O'Connor et al. 2018). Therefore, coaches may need to consider different coaching
626 strategies to ensure players have the opportunity to perceive game-play information,
627 decide on the best action and then execute an appropriate decision (O'Connor et al.
628 2018). All coaches recognised that the development of decision-making is a long-term
629 process. Finally, the views expressed by the coaches suggest that players need to invest
630 in their own development, have a love for the game and be inspired by their favourite
631 players.

632 It is evident that there is considerable confusion and controversy in the existing
633 research on decision-making. From the empirical research reported, it is clear that there
634 is little or no consensus among coaches about decision-making and how it is best

635 improved. The two may be connected, but it is also likely that understandings of
636 decision-making are strongly influenced by the personal experiences of playing,
637 coaching and being coached. In short, we still know very little about the genesis of
638 coaches' conceptions of decision-making. Further research is needed on this aspect of
639 player-coach development.

640 **Practical Implications**

641 It is recommended that coaches adopt an athlete centred approach to youth
642 coaching (Kidman et al. 2005), where coaches focus on long-term development, and
643 devise activities that provide players with opportunities to be creative and make
644 decisions without over coaching. In future, professional development opportunities for
645 coaches should aim to help them expand their conceptions of decision-making and the
646 ways in which better decision-making can be fostered.

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808 **Table 1:** Variations in conceptualisations of decision-making in football

Simpler and more fragmented conceptualisations				More sophisticated and cohesive conceptualisations
There is always a right and wrong decision to be made in football	There are no right or wrong decisions in football	Decision-making is difficult because in football decisions have to be made rapidly and under pressure	Decision-making is difficult because football is a team game	Decision-making in football is complex and influenced by multiple factors

809

Table 2: Variations in conceptualisations of the characteristics of good decision-makers in football

Simpler and more fragmented conceptualisations (fewer skills required)				More sophisticated and cohesive conceptualisations (more skills required)
Good decision-makers see the field and the things around them: they can perceive what's important	Good decision-makers can make decisions off the ball (without the ball)	Good decision-makers play as part of the team; they collaborate	Good decision-makers are knowledgeable: they understand the game	Good decision-makers are good at prediction: seeing things before they happen

Table 3: Variations in approaches to developing decision-making in football

Indirect strategies	Less sophisticated strategies and foci						More sophisticated strategies and foci
(Indirect) focus on providing coaches with right training and resources	Well-practiced technical skills are a pre-requisite or foundation for decision-making	Development of decision-making takes time	Focus on playing with others	Focus on effective communication	Focus on balancing structure and autonomy	Focus on knowledgeable inspiration	Focus on improvement rather than winning