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Contributing to a Coaching Team's Shared Mental Model of Player Game Understanding: An
Intervention within High-Level Youth Soccer

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Abstract

Judging soccer players' game understanding can pose ambiguities for coaches and coaching teams, partly due to the many situational factors which can affect how a player thinks on field. Consequently, interdisciplinary coaching teams must have a shared and coherent view on what game understanding looks like and why. Therefore, initial purposes of this case study were to establish coaches' views on levels of player understanding, and to check the coherence of these views between the coaching team. Importantly, a final purpose was to demonstrate the application of our process, to provide coaching teams with tools to measure and build Shared Mental Models (SMM's). One team of high-level youth soccer coaches evaluated their players' levels of understanding before and after a discussion-based workshop intervention. Findings indicated the importance of ongoing critical dialogue between coaches about game understanding. Conclusions highlighted the need for an interdisciplinary approach when building a SMM of game understanding, and in particular the skills and knowledge a psychology practitioner can bring to technical coaches facing these challenges.

Keywords: cognition; decision making; knowledge; problem solving

64 **Contributing to a Coaching Team's Shared Mental Model of Player Game**

65 **Understanding: An Intervention within High-Level Youth Soccer**

66 Coaching teams of any level strive to work collaboratively to ensure athletes receive
67 the best possible experience to help them to reach their potential. High level contemporary
68 sport settings, such as soccer, include a range of people with varied areas of expertise feeding
69 into the coaching process. In any highly categorised Premier League youth soccer academy
70 team, there is a head of coaching, age phase lead coach, age group head coach, assistant
71 coaches, support coaches, goalkeeper coach, performance analyst, sport scientist, licensed
72 psychologist, and scouts (Premier League, 2011). All of these practitioners are responsible for
73 developing players, and all will have an opinion on their progress. The make-up of a coaching
74 team has conceivable strengths and weaknesses for player development and performance,
75 depending on how the team works together.

76 A further challenge for coaching teams in soccer is the nature of the sport itself. Soccer
77 is an invasion sport, where the goal is to outwit your opponent. Outwitting your opponent
78 cannot necessarily be measured by scoring the most goals or stopping the opponent from
79 scoring. There are a lot of actions required from players which are underpinned by a complex
80 web of dynamic situational factors, which include social, psychological, emotional and
81 physical influences. Furthermore, in soccer, there are 22 players on the field and what a team
82 mate or opponent decides to do (or not do) will make an impact on the thought processes and
83 actions of others on the field. This can happen under strong or weak time constraints, depending
84 on the game situation. The complex nature of soccer is what makes the sport particularly
85 problematic to coach, largely due to the subjectivity involved when judging the progress and
86 performance of individual players and the team.

87 Therefore, in soccer, the challenge for a coaching team is to judge the performance and
88 progress of players on field, by paying attention to the thought process of players and not *just*
89 seeing the outcome of their decision making. One obvious struggle for coaches when
90 considering player thinking and not just action is that cognition is covert and can be difficult
91 to ascertain. For example, a player's decision to shoot rather than pass might be scrutinised if
92 they miss the target. However, if a coach established what information, feelings and knowledge
93 led them to that decision, then a pass could be considered as the better decision. Nonetheless,
94 in soccer, the term game understanding is commonly used in both practice and literature,
95 despite there being no consistent definition.

96 **Game Understanding**

97 Understanding of game play has previously been linked to the awareness and
98 appreciation of tactics and tactical understanding involves the narrowing down of choice in the
99 moment (Grehaighe, Richard, & Griffin, 2005). Any choice is linked to previous and
100 successive actions of a play configuration and, as an additional layer, guided by an overall
101 strategy. Deeper understanding of the game occurs when players are thinking strategically.
102 This is when players are able to monitor the progress of their decisions and regulate their future
103 thoughts and actions.

104 Elements which make up game understanding have previously been recognised from
105 coaches in high level youth soccer (cf. Price, Collins, Stoszkowski, & Pill, 2020). The major
106 constant between coaches in this study was how players demonstrate their knowledge in
107 relation to an opponent (see Table 1). The role of the opponent has the potential to cause
108 inconsistencies between coaches' views on how players respond to game problems because
109 there can be multiple tactics and strategies at play. Furthermore, underpinning how tactics and
110 strategies are deployed, is a range of situational factors which influence how player think and
111 act. Some examples include, a coach's instruction, the score line, weather conditions, and levels
112 self-efficacy.

113 Evidently, game understanding is a complex concept and is not *just* simply players
114 executing effective actions on the field. We argue however, that judging game understanding
115 most effectively requires the coach to be aware of players' thought processes in addition to
116 their on-field actions. Notably, there is an important role for licensed sport psychologists and
117 mental performance coaches (which we will refer to hereafter as psychology practitioners)
118 working as part of the support team. Building and monitoring the application of Shared Mental
119 Models (SMM's) and role clarity across the coaching staff is an important facet of psychology
120 work with teams. Furthermore, contribution to players' metacognition represents another
121 positive to be targeted. As such, developing psychology practitioners' awareness of the issues
122 surrounding SMM's is a useful tool.

123 **Teams of Coaches: Shared Mental Models (SMM's)**

124 Coaching expertise has been described as a goal-led decision-making process which
125 requires coaches to continually revisit their goals and make actioned decisions about the player,
126 their sport specific needs and the learning environment. As we have preciously explained, in
127 many high-level soccer settings (and other team sports), there is a team of coaches and
128 practitioners who work with players on a regular basis, which presents a wider range of options
129 for coach decision making. Unless the goals, plans, debriefs and roles of coaches within a
130 coaching team are communicated there will be inconsistent feedback and coaching practice.

131 For those athletes who do not possess high levels of feedback literacy, incoherent messages
132 from coaches can be detrimental for their progression (Taylor, Collins, & Cruickshank, 2021).

133 The importance of explicitly developing SMM's within coaching teams should not be
134 underplayed. In naturalistic environments, such as coaching, coaches must make decisions
135 where information is uncertain and shifting, where goals are competing, under time constraints
136 and sometimes where decisions are high stake. This is evidenced from Gershgoren, Filho,
137 Tenenbaum, & Schinke (2013) where a coaching team's SMM's were observed over a season,
138 and SMM's were reinforced through verbal and non-verbal communication. Naturalistic
139 Decision Making (NDM) investigates the decision making of skilled performers in highly
140 pressurised environments (Klein, Orasanu, Calderwood, & Zsombok, 1993) in real world
141 contexts. To manage the dynamism of a real-world environment such as coaching, coaching
142 teams require a SMM of performance to help coordinate their actions. Without having shared
143 knowledge of how to coach in context, coaches will make decisions based from differing
144 expectations and assumptions of individual players and team performance. Notably, the
145 development of SSM's is not the only essential cognitive process involved in teamwork; Klein
146 (2000) explains how application of strategies, heuristics and metacognition, situational
147 awareness, and control of attention also contribute. This point is acknowledged by Richards
148 and Collins (2020) in their critical commentary of how teams of players and teams of coaches
149 in sport use cognitive and social processes to operate in context, however they stress that these
150 five factors are best measured and developed away from the field.

151 Certainly, at least in our experience as coaches and coach educators, the existence of
152 SMM's is often an almost tacit assumption. Coaches speak of being on the same wavelength
153 and most development pathways will generate materials which list the goals, approaches and
154 evaluations to be applied.

155 **Intervention**

156 The first purpose of our study was to check for coherence in the views of coaches from
157 the same coaching team, on their players' levels of game understanding using a validated game
158 understanding criterion (see Table 2) adapted from Price et al. (2020). The second purpose was
159 to test the impact of a workshop approach where coaches discussed and debated their views of
160 player understanding as a means to build the coherence of coach views. Of course, this
161 quantitative study involves a small sample of coaches from one coaching team. However, the
162 third, and most important purpose of this case study was to demonstrate the application of our
163 process, to provide coaching teams with tools to measure and build SMM's across coaching
164 teams. With this third purpose in mind, we have provided significant detail for the description

165 of our intervention.

166 **Relevant Context**

167 In order to check and, if appropriate, build coherence in a coaching team's views on
168 their players' levels of understanding, we adopted a case study design using quantitative data.
169 Specifically, correlations across coaches' judgements on levels of players' understanding were
170 calculated on two occasions to test coherence of coaches' SMMs of game understanding.

171 Participants in the current study were coaches of an Under 13 team from one high-level
172 boy's professional youth soccer academy in England, who coach the 11-aside game format
173 within a developmental context. The coaching team coach three training sessions and one
174 competition game together per week, and are employed by the club on a full-time basis. At the
175 time of data collection, they had been working together as a coaching team for two seasons.

176 **Participants**

177 The first author approached and invited one soccer academy to take part based upon the
178 head of coaching's buy in to the research project aims, and the commitment from the coaching
179 team. All participants provided informed consent to take part in the study which was approved
180 by the research ethics committee at University of Central Lancashire. For participants under
181 the age of 18 years old, informed consent was also obtained from parents and/or guardians.

182 Coaches were all UEFA (Union of European Football Associations) qualified and
183 included the youth development phase lead coach (i.e., the senior coach responsible for the
184 development of players in the 12-16 years age band), the Under 13 head coach, the Under 13
185 assistant coach, and the Under 13 support coach. We deliberately selected technical coaches to
186 take part in this study (rather than performance analysts, sports scientists and psychology
187 practitioners) because this was an initial intervention study where in-depth soccer specific
188 knowledge was key to establishing and building a SMM for game understanding.

189 **Game Understanding Criterion**

190 Due to the mixed range of empirical research concerning the elements that signify game
191 understanding of soccer players, we used a set of game understanding criteria established as a
192 result of qualitative interviews with a range of high-level youth soccer coaches of players aged
193 between 9-23 years old (Price et al. 2020) (Table 2).

194 Prior to this study commencing, the validity of this game understanding criteria was
195 checked by an expert panel of ten soccer coaches considered to have high levels of expertise
196 in both coaching and coach education domains. The criterion was used informally with this
197 panel, where each expert was asked to score a fabricated player transcript, before coming
198 together and reviewing the suitability and practicality of the criterion. Key points from this

199 review were shared with the coaches in this study before any scoring took place, which
200 included; emphasis on scoring players in relation to the *expected level for the age group*
201 concerned (rather than in relation to the level of current team mates), to fully utilise the four-
202 point Likert scale where appropriate, and not to over analyse the player’s transcript by reading
203 it more than twice.

204 After checking the game understanding criterion with coaching experts, the first author
205 used the same fabricated player transcript to establish reliability of how coaches in this study
206 would interpret the criterion. This check involved each of the four coaches independently
207 interpreting the criterion in relation to the transcript, with the first author present. Due to this
208 being a fabricated transcript, and the purpose being to improve reliability in *how* the criterion
209 was used, we did not ask the coaches to provide scores. Instead, the coach was prompted by
210 the first author with open ended questions to establish which parts of the transcript shaped and
211 triggered the coaches’ thoughts on game understanding. Example questions included;

- 212 • “Which parts of the transcript show how the player manages the game?”
- 213 • “Can you recall which parts of the transcript suggest understanding of how to
214 reflect on performance”
- 215 • “Where does the player refer to his strengths, and to what extent does this show
216 understanding?”

217 **Description of the Intervention**

218 Prior to any data collection the Under 13 players took part in Applied Cognitive Task
219 Analysis (ACTA) interviews, a recognized tool to make players’ goals, judgements and
220 thoughts overt (Militello & Hutton, 1998). Use of the ACTA enabled a suitable appreciation
221 of how cognition is guided by situational factors which occur in context. The process of ATCA
222 interviews was a mechanism to support the operationalisation of game understanding, and
223 information on the process of ACTA interviews is detailed in Price, Collins, & Stoszkowski
224 (2021, p. 4-5). Due to the aims and purposes of the present study, we will not be referring
225 directly to the players or their interview responses.

226 The first occasion where all coaches measured player understanding using the criteria
227 was following the interviews, where coaches were provided with players’ anonymous
228 interview transcripts. The head coach and assistant coach (which we will refer to as “team
229 coaches” from this point forward) worked together with their scoring, because they worked
230 most consistently with this group of players. The team’s support coach and youth development
231 phase lead coach (phase lead) also scored players, but independently of one another and

232 independently of the team coaches. All coaches were encouraged to read all transcripts twice,
233 before scoring players on any of the criteria, and all scoring was complete within two days. In
234 the case of the team coaches who were working together to score, decisions were jointly made
235 for each of the criteria following a discussion where direct quotations from transcripts were
236 used to rationalise judgements.

237 Less than seven days after scoring was complete, and to address our second purpose, a
238 discussive workshop (Figure 1) between the first author and all four coaches took place
239 remotely using a video-based communications platform (Zoom: <https://zoom.us>). It was
240 important the workshop occurred soon after scoring to reduce any time related factors which
241 could affect how coaches perceive game understanding.

242 The first author, who is a soccer coach educator and coach developer, facilitated a
243 discussion between coaches for each of the criteria. An intended outcome of this discussion
244 was to establish a set of indicators for player understanding, specific to how the coaching team
245 viewed game understanding (see Table 3). To aid this process, coaches were given the
246 opportunity to justify views on high and low scoring, listen to and challenge colleagues’
247 interpretations of high and low scoring, become more aware of thoughts concerning game
248 understanding, and to reflect on their own judgements of game understanding.

249 The main role of the first author in this process was to ensure discussion was robust and
250 critical. This was achieved by asking challenging questions to encourage coaches to provide
251 examples from transcripts, or examples from their coaching experience with the Under 13 age
252 group team, to unpick their view on each of the criteria. Furthermore, the workshop was audio
253 recorded for the purpose of the second author acting as a critical friend to check for nature and
254 depth of criticality. This was because the first author was aware of how her professional
255 positionalities have the potential to cohere with, or diverge from, the research questions (e.g.,
256 personal perspectives of game understanding, previous experience of soccer coaching, identity
257 as a coach educator, coach developer and researcher). Importantly, no opinions were offered
258 to the coaches. Rather, the workshop was built around a guided critical discussion, with the
259 first author acting to stimulate conversations by probing for, then asking for justifications of
260 the views expressed. In summary, the workshop was designed as a potential mechanism for
261 coaches to develop their SMM of game understanding according to the criteria and related
262 situational factors.

263 The second and final opportunity for coaches to score players’ levels of understanding
264 occurred after the workshop, where coaches were given seven days to re-score the players’
265 original interviews against the criteria. A consistently short time frame was important for

266 managing time related factors which may affect coach perceptions of game understanding, and
267 in total all testing and the intervention workshop occurred within 21 days. As before, the head
268 coach and assistant coach (team coaches) worked together with their scoring, whilst the team's
269 support coach and youth development phase lead coach (phase lead) scored independently of
270 one another and independently of the head coach and assistant coach.

271 Reflecting the purposes of the study (evaluating and, if appropriate, developing
272 participant SMM's on game understanding), scores across the coaches on each occasion were
273 compared by use of Pearson Correlation Coefficients on the raw scores for each criterion
274 provided by the head coach and assistant coach with those from the support coach and the
275 phase lead coach. Whilst applying a parametric test to ordinal data may draw criticism, Norman
276 (2010) argues that using parametric statistics offers a more powerful and sensitive way to detect
277 levels of agreement between groups and that their use is perfectly acceptable for Likert scale
278 data. To evaluate the strength of the relationship, we applied the criteria proposed by Rumsey
279 (2011) in which +/- 0.3 was considered weak, +/- 0.5 moderate and +/- 0.7 strong.

280 This study aimed to check and, if appropriate, build coherence between a team of
281 coaches' views on levels of player understanding. Results of the Pearson Correlation
282 Coefficients across the scoring episodes are presented in Table 4. As shown, first occasion
283 comparisons yielded 4 out of 8 weak correlations between score of the team coaches and
284 support coach, and none between the team coaches and phase lead. Notably, some correlations
285 were even negative. Taken together, these data suggest low levels of agreement within this
286 coaching team. Data therefore indicates we suggest, very mixed messages to players, which
287 makes their learning process even more difficult to navigate.

288 Following the workshop, levels of coherence were improved. Between the team
289 coaches and support coach, four correlations were strong, two medium and two weak. For the
290 team coaches-phase lead comparisons, six were now strong and two medium. However, we
291 acknowledge the discussive workshop was highly unlikely to be the only reason for improved
292 correlations. In fact, due to this being a case study with no design controls, it is almost
293 impossible not to accept that during the three week research process, coaches involved would
294 have been talking together more explicitly and more frequently about the role of game
295 understanding. Subsequently, such discussions can build the coaching team's SMM and
296 develop their metacognition, equipping them to be more effective in their thinking.
297 Nonetheless, the use of one workshop across the coaching team had improved coherence,
298 representing better SMM's for game understanding. The workshop intervention was time

299 efficient and our data evidences it was also effective. Therefore, we suggest the whole coaching
300 team should be involved for future similar interventions.

301 **Discussion**

302 The initial purposes of our study were to check a coaching team's views on their
303 players' levels of understanding, and then to build coherence with these views to improve their
304 SMM of game understanding. Our third purpose was to demonstrate the application of our
305 process. Unsurprisingly, and in support of previous literature (Price et al. 2020), our
306 quantitative findings suggest coaches from the same soccer club, who work with the same
307 group of players, can share inconsistent views of game understanding. These include; what
308 game understanding is, how game understanding can be demonstrated by players, and how to
309 coach game understanding. If these inconsistencies are left unattended by the coaching team,
310 and in other words, coaches do not explicitly discuss and work through their differing views,
311 then the players are not best positioned to fulfil their potential (cf. Taylor et al. 2021 on the
312 role of coherent feedback for athlete development and performance).

313 **Psychology practitioners can bring their questioning and listening skills**

314 When seeking to develop a SMM of game understanding, we advise that technical
315 coaches can benefit greatly from integrating the expertise from their whole coaching team, but
316 especially psychology practitioners. This is because game situations can be highly pressurised.
317 All game decisions are influenced by layers of information, knowledge and feelings, and
318 therefore coaches must learn to seek this out (and understand it) before making rash
319 judgements. In typical coach education pathways for soccer in England, there is little attention
320 paid to the pedagogical skills required by coaches to develop learning in real world contexts
321 (Watts, Cushion, & Cale, 2021). Despite a "4 Corner Approach" (technical/tactical, physical,
322 psychological, social) to player development being advocated by The English Football
323 Association (FA) on all coaching qualifications, the large proportion of time and attention is
324 paid to the technical and tactical domain, particularly at Level 4/FA UEFA A (The FA
325 Bootroom, 2021). As per our study, the use of carefully considered questioning can be a highly
326 useful tool for coaches when seeking to make player thinking overt (cf. Price et al. 2021, p. 4).
327 Seeing as skills like these are not comprehensively or explicitly taught in coach education,
328 psychology practitioners can support coaches with their use of questioning. Furthermore,
329 technical coaches would benefit from learning how psychology practitioners listen to player
330 responses and ask follow up questions which provoke deeper thinking.

331 **Psychology practitioners can bring their situational awareness skills**

332 The workshop was used as a mechanism to promote critical dialogue between coaches

333 to develop a set of indicators for player understanding, aligned to each element of game
334 understanding from the criterion. Previous research in team sport has signified the impact of
335 “slow deliberate reflective learning” techniques for building a SMM of team performance
336 (Richards, Collins, & Mascarenhas, 2017) by means of exposing mental representations of
337 team tactics and strategies. When it comes to skills and tactics, we recognise this is the expertise
338 of technical coaches, and we are unsurprised that the game understanding workshop
339 intervention improved correlations between coaches. However, and importantly for the whole
340 coaching team, technical coaches have the potential to share their understanding of the sport
341 with psychology practitioners. Therefore, soccer related conversations off field should not be
342 confined to technical coaching staff; instead, it is vital that coaches with differing expertise are
343 involved. Technical coaches can benefit from this integrated approach towards developing a
344 SMM too. This is because team cognition occurs in naturalistic contexts where human
345 endeavour cannot be separated from the X’s and O’s, or otherwise the subject of learning
346 (Klein, 2000). Psychology practitioners can consistently remind coaches of the situational
347 factors which can affect player cognition, and therefore help coaches to see how players play
348 the game from a more contextualised perspective.

349 **Psychology practitioners can bring their understanding of cognitive development**

350 Of course, coaches’ individual mental model of game understanding will be constantly
351 evolving, even in the duration of this study, with consequent changes in how this is aligned to
352 colleagues. Consequently, it is important for coaching teams to maintain frequent dialogue on
353 game understanding, even when it is not the specific focus for player development. Added to
354 coaches’ evolving mental models of soccer, players’ mental models will evolve too. This is in
355 part influenced by players’ physical, emotional, cognitive, mental, technical and tactical skill
356 sets. These skills, particularly during adolescence, are emerging and maturing. Hence,
357 indicators for game understanding will look different for different players at different times.
358 These moving factors will, or at least should, affect how players solve problems and the
359 decisions they make in game. As a result, there is a need for coaching teams to be mindful of
360 factors which might influence how both declarative and procedural knowledge is demonstrated,
361 depending on the rate and context to which players are developing.

362 Given that moving developmental factors impact how players think, we advise that
363 having the whole coaching team involved in the development of a SMM for game
364 understanding will encourage a more interdisciplinary approach. Indeed, it is probably not
365 helpful for player development to separate player cognition from physical and technical
366 capabilities. This is because the decision a player makes is likely to be influenced by what they

367 perceive themselves to be capable (or not capable) of doing. The technical and physical makeup
368 of players is usually obvious for technical coaches to spot; a tall and gangly player who lacks
369 speed but can play a long pass, a short and strong player who is agile and can turn their marker,
370 or an under-matured and light weight player who can dribble out of pressure. Technical
371 coaches will notice how these characteristics and capabilities evolve in time, and throughout
372 adolescence. Comparatively, however, the cognitive capabilities of players are not so simple
373 to spot and monitor. The brain is complex, and sport coaches know very little about how it
374 works, nor are they educated to do so. In fact, a survey from Bailey, Madigan, Cope, & Nicholls
375 (2018) shows how coaches and coach education lacks critical evidence informed practice,
376 whilst Stoszowski, MacNamara, Collins, & Hodgkinson (2020) explain how social media has
377 magnified the “bullshit” present in coaching practice due to a lack of critical and analytical
378 thinking and scepticism of information sources. How a player perceives themselves and others,
379 how their emotions influence decisions, and how socially mature (or immature) they may be,
380 are just some factors which might affect decision making on field and the actions a coach will
381 see. Whilst most psychology practitioners will not proclaim to know everything about the brain
382 and how it works, it is likely they will have a more in-depth scientific understanding of this
383 compared to many technical coaches. Having psychology practitioners as a part (and not apart)
384 from ongoing critical dialogue (formal and informal) about game understanding is important
385 for technical staff and players. This is because technical coaches are heavily involved in critical
386 coaching decisions, such as team selections, retaining or releasing players, judging progress of
387 individual targets and planning sessions.

388 **Reflections and Conclusion**

389 Findings from our study suggest there is benefit for adopting a coinciding procedure
390 towards how coaches measure player understanding, and how they build a shared
391 understanding of game understanding. This coinciding approach was demonstrated by firstly,
392 a game understanding criterion and secondly, the ACTA protocol with players by means to
393 make their thinking overt, and thirdly, a game understanding workshop for coaches. Ideally,
394 this process will include the whole coaching team, which includes psychology practitioners,
395 sport scientists, scouts, performance analysts, and technical staff.

396 Author reflections on the intervention process consist of two major themes; firstly, the
397 size of the coaching team. We must acknowledge the limitations from using a small sample
398 team of coaches, albeit that this represented an intact group of high-level youth soccer coaches
399 who had been working together in this context for two years. As we stated earlier, however,
400 we suggest that these data are seen as a case study which may exemplify a common problem.

401 It is worth noting that our participants were surprised at the results; both in the original low
402 levels of coherence and then by how effectively these could be addressed through a short
403 intervention. Our suggestion would be that, even if all the careful measurements and use of
404 technical tools such as the ACTA are ignored, there would be potentially significant benefits
405 in using discussion-based workshops to develop greater coherence in SMMs across
406 interdisciplinary coaching teams. Therefore, despite the size of the coaching team and their
407 available resource, we suggest it is both advantageous and viable to schedule time across the
408 season for the coaching team to take part in short discussion-based workshops, either face to
409 face or virtually.

410 A second reflective theme was the integral role of the workshop facilitator, who is
411 required to possess a number of skills to ensure the workshop has maximal impact. Whilst we
412 have provided guidance on how the workshop might work in Figure 1, it may be of value for
413 the facilitator to have some opportunities to practice their facilitation skills. Notably,
414 opportunities to develop and refine facilitating skills may become more important, should the
415 workshop involve a larger coaching team. As frequent discussion-based workshops are
416 recommended across the season, it is hopeful the facilitator(s) will enhance their skills with
417 experience. It might be useful for the workshops to be recorded so the facilitator can engage
418 more effectively with self-reflection and peer feedback. In settings where there is no obvious
419 person to facilitate the workshops, one idea is to offer this role to an external person who is
420 objective and not involved in the coaching team. There may be numerous developmental and
421 professional benefits for this person (for example, a trusted postgraduate student). In addition,
422 there could also be benefits for the coaching team due to an absence of existing social, political
423 and historical factors at play which may affect how individuals engage with the facilitator.

424 Going forward, future research should repeat this case study and intervention with
425 larger numbers, and using the whole coaching team. Also, it would be important to test for
426 changes in coaching content and style as a result of the greater SMM's. Finally, testing the
427 impact on players as a result of greater coherence. For the moment, we hope the ideas in this
428 paper offer food for thought to coaching teams.

429 **Acknowledgements**

430 The authors would like to thank the professional youth soccer club who agreed to take
431 part in this study.

432 **Declaration of Interest**

433 The authors declare no competing financial interests or personal relationships that
434 could have appeared to influence the work reported in this paper.

435 **Data Availability**

436 Data is openly available in a public repository with a DOI:

437 <https://doi.org/10.7488/ds/2928>

438 **References**

- 439 Bailey, R. P., Madigan, D. J., Cope, E., & Nicholls, A. R. (2018). The prevalence of
440 pseudoscientific ideas and neuromyths among sports coaches. *Frontiers in*
441 *Psychology, 9* (641). doi: 10.3389/fpsyg.2018.00641
- 442 Gershgoren, L., Filho, E., Tenenbaum, G., & Schinke, R.J. (2013). Coaching Shared Mental
443 Models in Soccer: A longitudinal case study. *Journal of Clinical Sports Psychology,*
444 *7*, 293-312.
- 445 Grehaigne, J. F., Richard, J. F., & Griffin, L. (2005). *Teaching and Learning Team Sports*
446 *and Games*. 1st ed. New York: Routledge: Falmer.
- 447 Klein, G., Orasanu, J., Calderwood R., & Zsombok, C.E. (Eds.). (1993). *Decision making in*
448 *action: Models and methods*. Norwood, NJ: Ablex.
- 449 Klein, G. (2000). "Cognitive task analysis of teams," in *Cognitive Task Analysis*, ed
450 J. M. Schraagen, S. F. Chipman, and V. L. Shalin (Mahwah, NJ: Lawrence Erlbaum
451 Associates), 417–429.
- 452 Militello, L.G., & Hutton, R.J.B. (1998). Applied cognitive task analysis (ACTA): a
453 practitioner's toolkit for understanding cognitive task demands. *Ergonomics, 41*(11),
454 1618-1641.
- 455 Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics.
456 *Advances in Health Sciences Education, 15*(5), 625-632.
- 457 Premier League. (2011). *Elite player performance plan (EPPP)*. Retrieved from
458 <https://www.premierleague.com/youth/EPPP>
- 459 Price, A., Collins, D., Stoszowski, J., & Pill, S. (2020). Strategic Understandings: An
460 Investigation of Professional Academy Youth Soccer Coaches' Interpretation,
461 Knowledge, and Application of Game Strategies. *International Sport Coaching*
462 *Journal, 7*(2), 151-162. doi: 10.1123/iscj.2019-0022
- 463 Price, A., Collins, D., & Stoszowski, J. (2021). How do high-level youth soccer players
464 approach and solve game problems? The role of strategic understanding. *Physical*
465 *Education and Sport Pedagogy*. doi: 10.1080/17408989.2021.1967307

- 466 Richards, P., & Collins, D. (2020). Commentary: Team Cognition in Sport: How Current
467 Insights into How Teamwork is Achieved in Naturalistic Settings Can lead to
468 Simulation Studies. *Frontiers in Psychology, 11*(81). doi: 10.3389/fpsyg.2020.00081
- 469 Richards, P., Collins, D., and Mascarenhas, D. R. D. (2017). Developing team decision
470 making: a holistic framework integrating both on-field and off-field pedagogical
471 coaching processes. *Sports Coaching Review, 6*, 57–75. doi:
472 10.1080/21640629.2016.1200819
- 473 Rumsey, D.J. (2011). *Statistics for dummies*. Hoboken, NJ: Wiley.
- 474 Stoszowski, J., MacNamara, A., Collins, D., & Hodgkinson, A. (2020). “Opinion and Fact,
475 Perspective and Truth”: Seeking Truthfulness and Integrity in Coaching and Coach
476 Education. *International Sport Coaching Journal*. doi:10.1123/iscj.2020-0023
- 477 Taylor, J., Collins, D., & Cruickshank, A. (2021). Too Many Cooks, Not Enough Gourmets:
478 Examining Provision and Use of Feedback for the Developing Athlete. *Sport*
479 *Psychologist*. doi: 10.1123/ 2021-0037
- 480 The Football Association (FA) Bootroom. *UEFA A in Coaching Football*. Retrieved from:
481 <https://thebootroom.thefa.com/learning/qualifications/uefa-a-in-coaching-football>
- 482 Watts, D.W., Cushion, C.J., & Cale, L. (2021). Exploring professional coach educators’
483 journeys and perceptions and understandings of learning. *Sport, Education and*
484 *Society*. doi: 10.1080/13573322.2021.1887115
- 485
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496 Table 1. *Coaching Team's Game Understanding Criterion (adapted from Price et al. 2020)*

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Player Game Understanding Element	Indicators for Player Understanding, Decided by Coaching Team
playing in a style that represents identity of club	-appreciation of role and responsibilities as an individual -awareness of how unit and team link to me -knowing why we play like this, and not in a different way -pushing the boundaries (stretching our style)
using game plans	-team & individual -pre-determined (post game or half time) -context dependent (in game) -knowing the options
game management	-dealing with team & individual capabilities -state of the game (e.g. score, time remaining, weather, disciplinaries, injuries, fatigue, subs) -feeling and/or managing momentum
dealing with change	-adapting to plans & management of game - improvising within an individual moment - improvising within a team or group situation
reflecting on and in performance	-on: analyse what was good, what could be better and why, after the event -in: generating a new action based upon analysis under short time constraints.
having a why behind game actions	-feasible justification for decision -well intended justification for decision -appreciation of the “what next” & associated risk
playing to strengths	-using team & individual strengths to advantage -awareness of how strengths change -appreciation of how to build upon strengths -awareness of my/our weaknesses
recognizing opportunities to practice individual targets	-when & why to practice targets (appreciation of game difficulty) - acknowledgement of the implications for practicing

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Figure 1. *Workshop Information*

Objective: to build a coaching team's Shared Mental Model (SMM) of game understanding

Context:

- an online or face to face workshop with a coaching team
- in preparation, players take part in a recorded 1-2-1 conversation with a coach where they are asked specific questions relating to the game, which is guided by ACTA protocol (Militello & Hutton, 1998)
- in preparation, coaches refer to the recorded conversation to score players' levels of game understanding, using the game understanding criterion (Table 2)
- during the workshop, there is a facilitator who ensures that all coaches have an equal opportunity to share their views, in addition to asking questions which promote verbalisation of thoughts, critical thinking and reflection
- duration of workshop is not suggested, however, consider that it requires a high degree of thinking and concentration from all involved

Intended Outcomes:

1. To establish indicators, relevant to the coaching context, for each of the nine elements from the game understanding criterion
2. Share justification of scoring and listen to all members of the coaching team's justifications
3. Challenge the views of others appropriately using a critical thinking approach whenever possible
4. Develop more effective metacognition by being more aware about thoughts regarding game understanding
5. Reflect-in action about game understanding, as the discussion evolves

Reflections on the Role of the Facilitator:

- Aim to be impartial and curious about others (without judgement)
- In relevant moments, check in with individuals by asking how the coaching team is feeling about the discussion so far
- Provide ample time for people to think (which may involve periods of silence), and be prepared pause conversations if there is a need to move on
- Look out for more subtle forms of communication, and be perceptive to people's feelings
- Do not be a prisoner to time frames, and offer some semi-structured plans so people have an idea of what might be coming next
- Be aware of, and promote, how different people interact in different ways, and aim to value everyone's unique experiences, knowledge and skills
- Refer to personal experiences to shape thinking if required, and be comfortable if you or a coach doesn't yet have a clear view
- Discussion could go in multiple directions, so remember that depth and breadth of thinking are both useful at the appropriate times
- Try to draw peoples' attention to a range of perspectives, and show empathy towards alternative view points
- Reassure coaches that discussion is professional and that judgements or comments on players will remain confidential