

## **Reimagining the Coach–Athlete–Environment Relationships in the Digital Communications Era**

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**Reimagining the coach-athlete-environment relationship in the digital communications**

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Reimagining the coach environment

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## Abstract

The evolution of 4G and 5G digital technologies is (re)shaping contemporary methods of coaching by removing the restriction for coaches to be physically present at practice and competition venues. This technological advance provides opportunities for sports organisations, especially those with limited resources, to implement innovative learning and performance solutions by delivering remote coaching. In this insight paper we reimagine what ‘the coaching environment’ could look like, by considering how context shapes coaching. Currently, there is limited understanding of the use and implementation of such approaches, highlighting a need for further research to be conducted to better understand how online environments may impact the coaching process. We propose how adopting an ecological dynamics approach may align with existing research within coaching science and contemporary theorising in skill acquisition and motor learning, advocating a learner-centered approach to coaching. We then introduce and discuss the work of Roger Barker with a focus on ‘behaviour settings’ and how this perspective may provide a lens for future research to explore different coaching environments. When complemented by ethnographic methodologies, this approach may provide a novel way to understand how coach-athlete interactions are framed *in-situ*.

**Key Words:** Remote coaching, coach-athlete interactions, ecological psychology, behaviour settings, ethnography

## Introduction

51

52       When you hear the phrase, ‘the coaching environment’, what images pop into your head?  
53 Do you imagine the physical space for coaching, such as a court, running track, gymnasium,  
54 sports hall, or playing field? Or do you think more about the socio-cultural environment in  
55 which the coach is working? Typically, a common feature, irrespective of what you visualise,  
56 is that you see the coach physically ‘coaching’ and *leading* in that environment. Indeed, a  
57 good coach is often said to have ‘presence’ and previously it could be argued that there has  
58 been an over-emphasis on the importance of *persona* as being an essential pre-requisite for  
59 high quality coaching (Renshaw et al., 2009). However, the emergence of 4G and 5G digital  
60 technologies is changing the way in which coaches, athletes, and sport practitioners (e.g.,  
61 skill acquisition specialists, strength and conditioning coaches, psychologists) engage with  
62 online and digital technologies as shown by Bennett (2020a, 2020b) and Szedlack (2022) and  
63 highlighted in the recent special issue ‘exploring coaching delivery and coach education in  
64 online/digital environments’ (Szedlack et al., 2023). Of particular interest in relation to this  
65 insight paper is research looking at the use of online and digital technologies for the delivery  
66 of remote coaching (e.g., Fyall et al., 2023; Taylor et al., 2023).

67       These technologies are changing the requirement for coaches and sport practitioners to  
68 always be physically present in practice and competition venues and have great potential for  
69 sports organisations with limited resources (i.e., funding, access to facilities, less coaching  
70 expertise) to provide access to quality coaching for athletes in different geographical  
71 locations (Taylor et al., 2023). Additionally, coaching remotely invites coaches and  
72 practitioners to consider the effectiveness of their current pedagogy and perhaps counter-  
73 intuitively, could lead to a more athlete-centered approach being adopted (Bennett., 2020b;  
74 Glen et al., 2020; Szedlack et al., 2022).

75           In this paper, we note how the evolution of digital technologies is aligning with  
76 contemporary theories of skill acquisition, talent development (Chow et al., 2022), and  
77 educational theories (see Hase & Kenyon, 2013). These influences are changing the ways in  
78 which coaching is perceived and how it can be delivered, and it may be timely (perhaps  
79 overdue) to reimagine what is meant by the ‘coaching environment’, especially in the context  
80 of the opportunities provided by online and digital technologies to deliver remote coaching.  
81 This re-imagining process could help to understand how context shapes the ‘coaching  
82 process’ (see Lyle & Cushion, 2016), and how we should approach this digital evolution from  
83 both scientific and practical perspectives. For example, when coaching does not require  
84 coaches, sport practitioners, and athletes to be in the same country, let alone the same room,  
85 how does this impact the coaching process, and how might this be a benefit over coaching in  
86 person? That is, how could remote coaching change the way that practice sessions are  
87 planned, what coaches do, what coaches say, and how and when coaches interact with  
88 athletes and sports practitioners in sessions?

89           There is some suggestion that “what coaching looks like” is not likely to change,  
90 irrespective of the age or skill level of performers (Ford et al., 2010). So, will the socio-  
91 cultural expectations of what coaching is expected to look like (see Renshaw et al., 2022b)  
92 mean that coaches simply strive to coach in the same way, regardless of the context, even  
93 when the coaches are not physically present in the same location as their athletes? Or will the  
94 fact that the coach is not *surrounded* and physically immersed in the same physical coaching  
95 environment mean that they are perturbed away from the deep attractor of their current  
96 coaching tendencies to take the opportunity to coach differently?

97           The aim of this insight paper is to stimulate debate and considerations of what the  
98 coaching environment is, and what coaching could look like in the digital age going forward.  
99 Reimagining ‘the coaching environment’ in the context of remote coaching and the online

100 environment could help applied scientists better understand how different environments  
101 shape coaches' learning designs, based on how they adapt their communication and  
102 interactions. We will discuss the need for novel ways to study the context-dependent  
103 constraints of different coaching environments (including in-person, remote coaching, or  
104 blended experiences). Specifically, we will consider how the online environment may shape  
105 coach-athlete interactions and how the specific context may *invite* coaches to design and run  
106 practice sessions. Further, we will discuss key ideas and implications of an ecological  
107 dynamics approach to learning that could be leveraged to build our understanding of the  
108 coaching environment and guide the design of future applied research.

109         To situate this paper in current practice, we highlight the ongoing work by  
110 Paralympics Australia (PA) to establish and implement remote coaching. PA have worked  
111 with communication technology providers in Australia since 2015 to provide enhanced  
112 opportunities for coach-athlete-practitioner interactions impacted by a 'tyranny of distance'  
113 across countries like Australia (Sygall, 2020). The use of online technologies for remote  
114 coaching at PA was in response to the ongoing challenges experienced during applied support  
115 for Australian high-performance programs (Taylor et al., 2021). These challenges included  
116 limited opportunities for in-person coaching due to the significant travel demands associated  
117 with athletes and expert coaches being based in separate locations. Indeed, time wasted in  
118 travelling excessive distances, instead of spent practicing, is a major inefficiency. This  
119 problem is exacerbated by the limited financial resources available to Paralympic athletes and  
120 coaches, and by limited access to suitable equipment and training venues/competitions both  
121 nationally and internationally (McMaster et al., 2012; Pinder & Renshaw, 2019; Sygall, 2020,  
122 Taylor et al., 2023; Wareham et al., 2018; Wareham et al., 2019). However, there is a need  
123 for a deeper examination of remote coaching from the perspective of the lived experiences of  
124 existing users to provide insights to inform future practice as shown by the recent work of

125 Szedlack et al., (2022). Identifying opportunities and challenges of remote coaching in Para  
126 sport could stimulate deeper thinking of the coaching and learning process in a wide range of  
127 coaching environments. Further, Para sport may provide a rich and challenging context for  
128 researchers, leading to bigger shifts in thinking and robust approaches in research design  
129 (Askew et al., 2023).

### 130 **Remote coaching research**

131 As highlighted above, the emergence of remote coaching through necessity, either  
132 through challenges experienced by sport organisations (Bennett., 2020a; Taylor et al., 2023),  
133 or because of unforeseen events like the Covid-19 pandemic (Glen et al., 2020; Szedlack et  
134 al., 2022), raises some important questions. Specifically, if we are re-imagining coaching  
135 environments to include those that do not require the coach to be physically present in the  
136 same location as the athlete, we need to consider the impact that opportunities for athlete self-  
137 regulation may have on learning design, and specifically how remote coaching and the online  
138 environment may impact coach-athlete interactions.

139 To date, research has primarily focused on coach, practitioner, and athlete experiences  
140 in using remote coaching, providing insights into the challenges and opportunities  
141 experienced (Bennett, 2020a, 2020b; Fyall et al., 2023; Glen et al., 2020; Szedlak et al., 2022;  
142 Taylor et al., 2023). These insights indicate that coaches find it difficult to replicate the  
143 pedagogical methods they prefer to use when coaching in-person (Bennett, 2020a, b; Glen et  
144 al., 2020; Taylor et al., 2023). A primary barrier to being able to use traditional pedagogies,  
145 when coaching remotely, was the coaches' inability to move freely around the training  
146 environment (with video technology in a fixed location) (Bennett, 2020b; Taylor et al., 2023).  
147 Further constraints highlighted by coaches related to how and when coaches were able to  
148 communicate with athletes and their ability to provide demonstrations when compared to  
149 coaching in-person (Bennett, 2020b; Glen et al., 2020; Taylor et al., 2023). The domination

150 of augmented visual information from video technology in remote coaching led to coaches  
151 reporting an inability to perceive and attune to a rich variety of environmental information  
152 that they would normally experience first-hand when coaching in-person (Bennett, 2020b;  
153 Taylor et al., 2023). This has a knock-on effect on the overall structure of a training session  
154 and places greater emphasis on session planning, highlighting the need for coaches to be  
155 more conscious of the structure, timing, content, and delivery of augmented verbal  
156 information provided to athletes during training (Bennett, 2020b). Additional challenges also  
157 arose due to issues with technology and from poor or limited Wi-Fi connections, which  
158 impacted the quality of video and audio during sessions (Bennett, 2020a, b; Glen et al., 2020;  
159 Taylor et al., 2023).

160           However, rather than seeing remote coaching opportunities from a deficit perspective,  
161 where it limits coaches' ability to coach 'properly', a more positive interpretation is that it  
162 could provide significant opportunities for creativity and innovation by 'inviting' coaches to  
163 move away from attempts to replicate their typical in-person coaching approach. The positive  
164 impact and opportunities created when using remote coaching technology include more  
165 opportunities for coaches to increase the number of connections in lieu of being able to  
166 conduct coaching in-person with athletes, and build interpersonal relationships (Glen et al.,  
167 2020., Szedlack et al., 2022; Taylor et al., 2023). Szedlack et al. (2022) found that the online  
168 environment allowed practitioners to show a more personal side of themselves (e.g., athletes  
169 meeting their family and children) compared to in-person which helped strengthen their  
170 connection and relationship with athletes. The online environment also provided  
171 opportunities for practitioners and coaches to check in on athletes (during the Covid-19  
172 global pandemic) and created opportunities for non-sport related discussions to occur  
173 (Szedlack et al., 2022). Placing the person, not the athlete, at the center of the coaching  
174 process has significant advantages for the coach-athlete relationship (Rollnick et al., 2019).



175 These findings were further supported by Taylor et al. (2023) who observed coaches during  
176 remote coaching session engaging in ‘off topic’ conversations with athletes which provided  
177 coaches with opportunities to “*really* get to know” the athletes and helped to build  
178 interpersonal relationships (p.320).

179         Use of online and digital platforms for remote interactions between coaches and  
180 athletes may solicit and energise a more ‘learner-centered’ approach by coaches. In addition,  
181 the use of remote coaching provides an opportunity for exploring new training information  
182 from the online environment and affords (i.e., invites) coaches the opportunity to be creative  
183 in how they communicate and adapt to the challenges discussed previously (Glen et al., 2020;  
184 Taylor et al., 2023). As shown by Taylor et al. (2023), the use of remote coaching created an  
185 opportunity for coaches to explore new training information within the online environment  
186 that was previously limited when coaching in-person. For example, the positioning of camera  
187 equipment allowed coaches to view different angles of their athletes performing, compared to  
188 the viewing angles they would typically use as coaches need to observe training from a  
189 distance to ensure safety of those in attendance. This change in perspective provided coaches  
190 with a clearer, stable, and unobstructed view of the athletes in a safe environment when  
191 compared to in-person. Therefore, if viewed positively, rather than through a deficit lens,  
192 remote coaching can provide opportunities to reimagine or create shifts in the coaching  
193 process that could enhance athlete learning by promoting learner-centered approaches (e.g.,  
194 increased co-design and ownership for the athlete; Fyall et al., 2023; Glen et al., 2020;  
195 Szedlack et al., 2022; Taylor et al., 2023).

#### 196 **Communicate to collaborate**

197         Communication has long been identified as the key ingredient of effective coaching  
198 (Jones et al., 1997). Given that it is reported that 80% of interactions between coaches and  
199 athletes are concerned with improving skilled performance (Tinning, 2006), knowing what to

200 say to support the learning process is crucial (Fischman & Oxendine, 1993), highlighting the  
201 need to base communication strategies on a sound theoretical understanding of the learner  
202 and the learning process (Otte et al., 2020; Renshaw et al., 2019). Implicit in supporting  
203 athlete learning is the need to design coaching environments that lead to high quality  
204 interactions between the athlete and the coach (Poczwardowski et al., 2002). In this context, it  
205 is important to understand how online coaching impacts communication between athletes and  
206 coaches since what coaches say and do to help athletes develop and prepare for performance  
207 does not exist in a vacuum.

208         Recent work has begun to consider coaching from a socio-relational perspective by  
209 recognising that coaches are one of the most important social agents in sport performance and  
210 practice environments (Horn, 2008). Importantly, the coaching process is something that is  
211 not merely delivered in a de-contextualised way, but rather, it is a dynamic social activity that  
212 vigorously engages all involved (Cushion, 2004; Jones, 2000; Jones et al., 2002), cognitively,  
213 socially and emotionally (Chow et al., 2022), across different environments. From an  
214 ecological dynamics perspective, coaching behaviours are, therefore, continually shaped by  
215 the specific intentions of an athlete and coach interacting within the environment (Chow et  
216 al., 2015). Specifically, verbal information is used to facilitate and prompt an athlete's search  
217 for functional performance solutions in practice, rather than to prescribe a technique for  
218 compliance (e.g., Araújo & Davids, 2011; Renshaw et al., 2019). For us, this approach further  
219 emphasises the importance of understanding how to effectively use online and digital  
220 technologies for communications to enhance a collaborative search process involving both  
221 coach and athlete within the online environment. Aligning with suggestions that “pedagogical  
222 design is the major factor impacting learning in an online environment” from previous  
223 research focused on the use of technology in coach education and development (Cushion &  
224 Townsend., 2018. pg. 15).

225           Therefore, given the challenge of geographical distances, a key challenge is to  
226 promote collaboration and connectedness between coaches, practitioners, and athletes. This  
227 can be achieved through a process of co-design or co-creation of learning environments (e.g.,  
228 Correia et al., 2019; Orth et al., 2019; Woods et al., 2020). However, we need to understand  
229 how remote coaching impacts the ability of athletes and coaches to effectively communicate  
230 with each other to that end. This is further supported by insights provided by the review of  
231 technology-enhanced learning in coach development by Cushion and Townsend (2018) who  
232 highlighted a “...need to consider the wider pedagogical scaffold in which technology fulfils  
233 an integral function; that is, the interaction between the learner, the learning environment and  
234 the intended learning outcomes and the potential role of technology in facilitating these” (pg.  
235 12).

236           When coaches collaborate with athletes, they co-create learning opportunities (Orth et  
237 al, 2019). Implicit in this approach is that coaches look to support athlete learning through  
238 two-way communication rather than a direct transfer of information via one-way  
239 communication. However, we do need to improve understanding of how two-way  
240 interactions are impacted when coaches and athletes are practicing remotely, in comparison  
241 to in-person. Speculatively, but based on significant experiences of the authors working  
242 directly with coaches using technology in this way, we wonder if being physically absent  
243 from the training context may invite coaches to break away from relying on traditional  
244 coaching behaviours, such as moving from demonstrating and prescribing towards co-  
245 designing different affordance landscapes in practice that focus on including information for  
246 (self) regulating actions to support athletes in developing knowledge of the performance  
247 environment. This is aligned with contemporary pedagogical ideas (see Bennett & Szedlack.,  
248 2023) that adopt an ecological dynamics approach to coaching self-regulation promoting the  
249 idea that the learner should be an active perceiver of information (Gibson, 1986).

250 Learning to perform at the highest level often requires exploration and being ‘brave’  
251 enough to explore something that is unfamiliar. How coaches create collaborative learning  
252 environments, built on trust and empathy, should be a critical and central question for  
253 coaching research. A key concern is the psychological impact of what coaches say and ask  
254 performers to do in practice. Borrowing from the area of teaching, Patience (2008)  
255 emphasises that feelings and emotions are inseparable from learning outcomes, and of  
256 relevance to this insight paper, applied research is starting to understand how the constraint of  
257 the coaching context differs between in-person and online environments (e.g., Taylor et al.,  
258 2023). For example, considering whether there are observable differences in how coaches  
259 interact with athletes in different coaching contexts may provide insights that inform research  
260 and help to better understand coaching environments. However, current research of coaching  
261 behaviours has some key limitations in terms of exploring the quality of interactions in these  
262 environments which we discuss in the next section in the context of an ecological dynamics  
263 approach to skill learning.

264

### 265 **Ecological dynamics and the coaching environment**

266 Whilst there has been significant growth within coaching research in general,  
267 understanding the coaching process across a wide range of contexts remains under-researched  
268 (Lyle & Cushion, 2017). For example, knowledge of the “contextual differences across  
269 coaching domains” and “the particularity of these contextual differences on interpersonal  
270 interactions” is very limited (Lyle & Cushion, 2017, p. 14). Traditionally, research methods  
271 fail to capture the nuances of what coaches say and do, which fails to enhance our  
272 understanding of the ‘coaching process’ beyond simple frequency analyses (e.g., systematic  
273 observation) that document direct coaching behaviours (e.g., feedback, instruction) and that  
274 miss important contextual or environmental information (e.g., Glen et al., 2020).

275 Ecological dynamics has been previously introduced and aligned with contemporary  
276 theories of skill acquisition and motor learning (e.g., non-linear pedagogy; see Hammond &  
277 Bateman, 2009). Whilst, more recently it has been proposed as a theoretical framework to  
278 support the integration of technology to support athlete learning and to study coaching and  
279 sport performance (McCosker et al., 2021). Therefore, in response to Bennett et al. (2023)  
280 and Szedlack et al. (2023) who advocated for contemporary pedagogy “to be built on  
281 frameworks and theories that have been developed and designed for learning in the digital  
282 age” (p. 314), we propose ecological dynamics as one such theoretical framework that has the  
283 potential to guide coaching practice and future research design to help inform our  
284 understanding of the coaching process not only in online coaching environments, but also  
285 across different coaching environments. The application of ecological dynamics through a  
286 nonlinear pedagogy shares similarities and aligns with principles of heutagogy (Hase &  
287 Kenyon., 2013) and other learner-centered approaches, ‘championing self-determined  
288 learning’ and placing the coach as a “facilitator” of autonomous learning (Chow et al., 2022).

289 Ecological dynamics is founded on the key idea of direct epistemological contact  
290 between performers (e.g., athletes) and their environments (Button et al., 2019). Gibson  
291 (1986), the founder of ecological psychology, referred to the significance of the surroundings  
292 of individuals that ‘perceive and behave’ in that environment, arguing that ‘no animal could  
293 exist without an environment surrounding it’ (p. 8). Surroundings can be defined in terms of  
294 information perceived and the affordances available to use, that is, in terms of what they  
295 offer, solicit, or invite from individuals (Gibson, 1979). Learning is, therefore, predicated on  
296 individuals’ active perception of information and utilisation of affordances from the  
297 environment in which they are situated (Gibson, 1966). Importantly, for the present  
298 discussion, Gibson (1979) identified other organisms (e.g., individuals in human society) as  
299 one of the most important affordances available in the environment. As such, we should

300 consider ‘behaving’ others (e.g., teammates, practitioners, parents, and coaches) to be an  
301 integral part of an athlete’s learning environment.

302         Adopting an ecological dynamics approach considers the role of the coach as  
303 engaging in activities that support or facilitate an improved fit (i.e., more functional  
304 adaptation) between performers (e.g., athletes) and their learning and performance  
305 environments (Chow et al., 2022). This key idea aligns with some accepted definitions of the  
306 coaching process. For example, Kahan (1999) defines coaching and the coaching process as  
307 "a complex web of interdependent organisms dynamically adapting to one another and their  
308 surroundings" (p. 42). Further, Lyle and Cushion (2017) consider the coaching process to  
309 include “the specific engagement between an athlete/team and a coach” and the agreement  
310 and operationalisation of this engagement as an “extended period of social activity” (p. 42).  
311 From this perspective, coaching and the coaching process clearly have “human, social and  
312 emotional” dimensions (Lyle & Cushion, 2016, p. 47) in line with the view that coaches need  
313 to move away from being the expert who passes down their knowledge to one of being a  
314 facilitator of the learning process (Bennett et al., 2023).

315         Even though they strongly impact the dynamic ‘stream of interactions’ that take place  
316 between coach and athlete (Turnnidge et al., 2014), socio-cultural aspects of the environment  
317 that frame the pedagogical process are often underplayed (Cushion et al., 2006), with the role  
318 of the context in which these transactional processes occur being largely neglected. This is  
319 somewhat surprising as, although the social-cultural-historical constraints framing the  
320 ‘coaching environment’ can extensively change over years and decades (Rothwell et al., 2019),  
321 the actual ‘physical’ coaching environment has remained relatively unchanged (locales for  
322 learning like gyms, halls, fields, and pools have tended to remain the same). Now that the  
323 coaching process can be undertaken without the need for the coach to be physically present in  
324 the same venue, an important question is “do the in-person socio-cultural aspects of the

325 coaches' environment have a similar influence on coach-athlete interactions and learning  
326 design when coaching remotely?" Therefore, moving forward, reimagining the coaching  
327 environment to include all environmental contexts (including online environments) in which  
328 transactions between coaches and athletes *that facilitate, or guide learning processes* becomes  
329 an essential consideration when guiding learning design and future research.

330         These ideas place the athlete at the center of the learning process and imply that the  
331 coaching environment is clearly more than just the physical space that the coach occupies and  
332 in which the coaching process takes place. The environment can not only be seen, but it can  
333 also be heard and felt. Effective coaches can attune and adapt to environmental and task  
334 constraints by using a range of senses (visual, acoustic, haptic) to pick-up contextual  
335 information available to them to understand how the session is progressing (Uehara, 2016).  
336 Hence, perceptive coaches can see how performers are adapting to constraints of practice  
337 tasks, can hear interactions between athletes and feel the energy and emotions in the  
338 performance locale (room or on the field). For example, good coaches radiate their passion  
339 (Philpott, 1996) and can sense when motivation is waning. However, recent research has  
340 shown that coaching remotely can impact a coaches' perception of the athlete's training  
341 environment and their ability to perceive and access environmental information (Taylor et al.,  
342 2023). Specifically, coaches reported challenges as they were unable to 'personally  
343 experience' the same conditions (i.e., weather) as the athlete and how this may impact their  
344 interpretations of performance (Taylor et al., 2023).

345         These ideas are captured in Gibson's (1986) conception of '*knowledge of*' the  
346 environment where coaches use environmental information available to them in the training  
347 environment to directly regulate and adapt the continuous transactions with and between their  
348 athletes (Woods et al., 2022). Consequently, effective coaches are tightly coupled to context:  
349 the informational constraints and landscape of affordances available in a practice

350 environment which may facilitate athlete learning. They can exploit or (re)calibrate these  
351 affordances from the practice environment through implementing interventions (e.g.,  
352 providing augmented information and feedback when needed through instructing, prompting,  
353 or questioning) to facilitate learning and exploratory activities for athletes during practice.  
354 These moments will be triggered differently for each coach, based on their intentions and  
355 how this influences their perception of the environment (Renshaw et al., 2022b). For  
356 example, a coach who underpins their practice with principles from nonlinear pedagogy  
357 (NLP) is likely to undertake activities that encourage athlete exploration, skill adaptation, and  
358 self-organisation, guided through the manipulation of task constraints (Button et al., 2019;  
359 Renshaw et al., 2022a).

360         The verbal interactions between coaches and athletes underpinned by NLP approach  
361 are more likely to focus on supporting exploration through questions, using analogies or  
362 prompts to work towards the goal of promoting skill adaptability and refinement, and  
363 working with athletes to co-design practice tasks that result in the emergence of intentions,  
364 emotions, and perception-action couplings that are closely aligned with the performance  
365 environment (Chow et al., 2022). In relation to our focus in this paper, how coaches may  
366 exploit online and digital communication technologies when coaching remotely to  
367 collaboratively communicate with athletes and to co-design learning is an important  
368 consideration to help guide future research design and inform future coach development  
369 guidelines (Cushion & Townsend., 2018).

### 370 **Future Research Approaches**

371         Research has identified that there is a difference when coaching remotely and within  
372 an online environment (Bennett, 2020a, b; Glen et al., 2020; Fyall et al., 2023; Taylor et al.,  
373 2023). These findings now point to the need for researchers to explore different boundary  
374 constraints within the online coaching environment. This research could continue to develop



375 our understanding of how remote coaching shapes coaches' behaviours within an online  
376 environment, and how it may impact coach-athlete interactions (i.e., communication) and  
377 learning design to support athletes' learning. Further, there is a need to deepen our  
378 understanding of the longitudinal impact of remote technology on interpersonal relationships  
379 and the potential implications for athlete self-regulation in practice, and coach development  
380 and learning. For example, the use of Bluetooth headphones to streamline communication  
381 when coaching remotely has immense potential to enhance coaching by facilitating two-way  
382 communication with athletes, but also by providing coaches with useful insights and  
383 information (gained from athlete self-talk) from the athletes' training environment (Taylor et  
384 al., 2023).

385         From an ecological dynamics perspective, online and digital technology has the  
386 potential to impact how coaches help athletes gain knowledge of the environment to support  
387 their performance interactions, rather than to deliver knowledge about the environment (Otte  
388 et al., 2020). However, if used incorrectly (e.g., prescribing solutions for the athlete) this  
389 technology may be perceived as 'intrusive' as it may impact the natural learning process of  
390 the athlete and essential coach-athlete interactions. Ecological dynamics principles can help  
391 to understand how to effectively use technology to facilitate athletes' engagement with their  
392 practice environment and limiting their ability to use performance related feedback. There is  
393 a need for further ideas on how theoretically driven implementation of new technologies may  
394 support athlete learning and development processes with remote coaching.

395         One of the challenges in this area is that historical approaches to studying coaching  
396 behaviours have previously had limited value by simply documenting counts of direct  
397 coaching behaviours via systematic observation methods that do not include contextual or  
398 environmental information (e.g., Cope et al., 2022). In our view, socio-cultural  
399 considerations, and the environments in which they occur, should have a much more

400 prominent role in research. More recent research investigating remote coaching has typically  
401 adopted qualitative methods (i.e., semi-structured interviews), capturing the anecdotal  
402 experiences of coaches, athletes, and practitioners within the online environment and  
403 providing initial insights into the different environments, equipment needs, and online  
404 platforms utilised during remote training sessions (Fyall et al., 2023; Glen et al., 2020;  
405 Szedlack et al., 2022). Whilst this information provides a valuable contribution to our  
406 understanding of the opportunities and challenges associated with the use of online and  
407 digital technologies for remote coaching, this ‘remains an underdeveloped area of research’  
408 (pg. 9) and the time is ripe for exploring innovative ways of conducting research and practice  
409 (Szedlack et al., 2023).

410 As such, there have been calls for research approaches that better capture the dynamic  
411 interactions between coaches and athletes *in situ*, from a theoretical standpoint (Bengoechea  
412 & Johnson, 2001; Kahan, 1999, McCosker et al., 2021). In ecological psychology, the  
413 Barkerian approach (also known as Ecobehavioural Science) developed by Roger Barker  
414 (1968) has potential to provide a theoretical framework that could significantly shape and  
415 impact research methodologies to capture key information from different coaching  
416 environments (Araújo, 2009; Heft, 2001). Below we highlight how this approach could be  
417 aligned with current coaching literature and further explain the contemporary theories within  
418 skill acquisition highlighted earlier. We suggest how this approach may begin to address  
419 some of the current gaps in the literature on remote coaching and provide a method and  
420 approaches beyond those traditionally adopted (Bennett & Szedlack., 2023).

421

### 422 ***Ethnography and Barkerian Ecological Psychology***

423 The first step in considering a Barkerian (1968) approach to explore the coaching  
424 environment, coaching process, and coach-athlete interactions, is to develop a carefully

425 designed program of work to increase understanding of what coaches do, why they do it, and  
426 what drives and limits their actions in different environments (Denzin & Lincoln, 2011;  
427 Sparkes & Smith, 2014). This challenge could benefit from deep immersion (of researchers)  
428 founded on an ethnographic approach, integrated with a Barkerian (1968) perspective. Whilst  
429 ethnography may not be considered a novel research methodology in sport research (for a  
430 brief history, see Dunn & Hughson, 2015), we propose that exploration of coach-athlete  
431 interactions may benefit from adopting an ethnographic research methodology by situating or  
432 embedding the researcher within different coaching environments (e.g., in-person, remote  
433 coaching or blended approaches) for extended periods (Jones & Gratton, 2004). By  
434 embedding themselves within the environments of the population sample to be investigated,  
435 the researcher can take on the role of ‘insider’ and record or capture not only what happens,  
436 but experience the environment for themselves first hand to gain insights and understanding  
437 of coaches’ interactions with athletes from their perspective (Jones & Gratton, 2004; O’Reilly  
438 & Bone, 2008). This unique perspective provides the basis for a novel, research-oriented slant  
439 on adopting a learner-centered approach including online environments, which is typically  
440 advocated in pedagogical frameworks like constraints-led coaching and NLP (Chow et al.,  
441 2022). Adopting such an approach would not only be a novel insight into coach-athlete  
442 interactions, but it would also provide more flexibility in data collection and analysis.  
443 Ethnographic research methods, such as participant observations supported by researcher  
444 field notes and participant interviews, may enhance the capability to understand coach-athlete  
445 interactions, not only by observing coaching behaviours, but also exploring the consequences  
446 of those behaviours (Cushion, 2010). This methodology allows the researcher to capture the  
447 subtle nuances of coach-athlete interactions as they emerge *in situ*.

448           Barker (1968) was primarily concerned with contexts of the ecological environment,  
449 especially the ‘social and physical components of the real-life, everyday setting within which

450 people engage in goal-oriented, purposive behaviour... that exists independent of the  
451 psychological processes of any individual' (Schoggen, 1989, p. 1). Barker (1968) observed  
452 that, by being embedded within the environment of interest, this enabled the collection of  
453 naturalistic data of individuals, enabling a better understanding of what happens in different  
454 contexts, which is ideal for examining impacts of coaching methodologies in the online  
455 environment. Of significance for this insight paper, Barker (1968) highlighted that some  
456 attributes of behaviour vary less across individuals within a given setting, compared to the  
457 extent to which those same behaviours vary across different settings for any one individual  
458 (Schoggen, 1989). These findings led Barker (1968) to develop the concept of 'behaviour  
459 settings', establishing that it is possible to forecast an individual's behaviours by having  
460 knowledge of [standing] patterns of behaviour in certain settings, rather than of an individual  
461 themselves (Schoggen, 1989). For example, the 'micro-structure' (Davids et al., 2017) of  
462 training and the patterns of behaviour of athletes and coaches for table tennis, rowing, and  
463 football would be reasonably similar when observed across the world. Therefore, it could be  
464 assumed that coaches are more likely to resonate with the patterns of behaviour observed in  
465 different settings for the same sport in which they coach, regardless of the geographical  
466 location, compared to the behaviours observed in different sports. From an ecological  
467 dynamics perspective, it is the combined actions and responses of individuals (e.g., coaches  
468 and athletes), integrated with the physical and socio-cultural characteristics of their  
469 environment (e.g., equipment, support technologies, sport rules, governing organisations,  
470 athlete classification and eligibility), that create a range of unique behaviour settings for  
471 observation and analysis (Heft, 2001).

#### 472 ***Conceptualising coaching environments as behaviour settings***

473         Considering different coaching environments (i.e., in-person or online) through the  
474 lens of behaviour settings could provide researchers with 'concepts and methods for studying

475 environments of human behaviour at the molar - that is the goal-oriented or purposive level'  
476 (Schoggen, 1989, p. 1). This approach provides defining properties that may allow  
477 researchers to draw greater attention to, and capture, key environmental information of  
478 different coaching environments to support observations of coach-athlete interactions. As it is  
479 the adoption of these defining proprieties “that makes it possible to compare different  
480 environments” (Schoggen, 1989, pp. 72-73) as behaviour settings provide “... a stable,  
481 constant unit for the comparative study of different environments at a given time and for the  
482 same environment at different times” (Schoggen, 1989, pp. 72-73).

483         The term, ‘behaviour setting’ refers to different environmental features (e.g., physical  
484 objects, geographical features, historical characteristics, socio-cultural influences) that shape  
485 the behaviour and actions of individuals (e.g., coach and athlete) within a particular  
486 environment (Heft, 2001). These aspects of the environment, and therefore what defines a  
487 ‘behaviour setting’, can be broken down into structural and dynamic properties (Heft, 2001,  
488 pp. 253-256; see also Schoggen,1989) (Table 1). This perspective could allow researchers to  
489 look at the different properties of the online environment to establish whether they differ  
490 when the coach is in-person. For example, using insights provided by Australian Paralympic  
491 coaches, Taylor et al. (2023) reported initial differences between remote coaching from the  
492 online environment in comparison to coaching in-person.

493   \*\*INSERT TABLE 1 HERE\*\*

Table 1. The structural and dynamic properties that define ‘behaviour settings’, and initial insights highlighting the differences that may exist between remote coaching and in-person.

Behaviour Setting Properties	Remote Coaching	Coaching In-person
i. Contains ‘standing patterns’ of behaviour.	Coach limited to sitting (or standing) in front of device for the duration of the training session. Limitations on coaches’ ability to provide demonstrations.	Coach able to move freely within the training environment. Able to provide demonstrations. The coach can act as a training partner to support and assist skills if required.
ii. Occur naturally in the environment since they are not pre-planned and prescribed by researchers or scientists.	Sessions established and included as part of the coach and athletes’ regular training program regardless of study being conducted. Access to online training sessions more heavily restricted.	Sessions established and included as part of the coach and athletes’ regular training program regardless of study being conducted.
iii. Emerge at a specific geographical location.	Coach located at home or office.	Coach located at training environment (e.g., pool, gym, track, field) with athlete.
iv. Contains discriminable boundaries.	Limitations on what coach can see and hear within the athletes’ training environment.	Coach has access to full training environment with access to visual, acoustic, haptic information.
v. Have clear start and end points.	Start of session limited to when coach/athlete ‘join’ the online session. The athlete (or facilitator) is responsible for the set up and management of equipment required to join online sessions.	Session may start when coach/athlete enter the training environment and can include the time required to set up equipment prior to beginning the physical aspects of training.
vi. Are ‘quasi-stable’ and maintain or constrain the ‘degrees of freedom’ of individuals and their behaviours within the setting.	Online environment constrains certain actions and behaviours of participating coaches and athletes. For example, online platforms have additional controls around camera and microphone access and management. Additional permissions and information/equipment required to gain access to online sessions.	Rules of sport constrain what athletes and coaches can and cannot do within the training and performance environment.
Vii Exist independently of participants and can be identified by an independent observer.	Potential limitations exist in the ability for ‘independent’ observation of online sessions as permission and access (i.e., session details and link) are required to be sent for individuals to enter the online environment.	Sessions may be open to spectators for public observation or have practitioners attend more frequently and visit informally (i.e., not pre-arranged).
viii. Have a degree of interdependence between the interactions of participants.	Athletes and coaches’ ability to interact in real-time using online platforms can be dependent on the use of supporting technology (i.e., Bluetooth headphones). Coaches can provide instruction, ask questions, and provide feedback to athletes at any time. If supporting technologies are unavailable, coaches may have to wait for athletes to approach devices to communicate.	Coaches have almost unlimited freedom to move within the environment and to approach athlete/s and stop training at any time to provide feedback and/or adjust an aspect of the drill/skill performance within the environment.

Heft, 2001, pp. 253-256; see also Schoggen, 1989; Taylor et al., 2023

495 By considering coaching environments as behaviour settings and seeking to  
496 understand how they regulate and constrain opportunities for coach-athlete interactions  
497 within different settings, researchers could provide new insights into the rationale behind  
498 coaches' actions (i.e., what they say and do) and the potential impact this may have on athlete  
499 learning. Furthermore, the concept of behaviour settings can provide opportunities to further  
500 understand and explore key environmental differences of the online environment for coaches  
501 when using remote technologies and help coach developers/applied researchers refine their  
502 use of such tools to support coach and athlete development.

### 503 **Summary**

504 In this insight paper, our aim was to re-imagine the coach environment to stimulate  
505 debate and challenge thinking of what coaching is and what coaching can look like in the  
506 digital communications age. We highlighted how the emergence of new 4G and 5G  
507 technologies is challenging the traditional perception of the coaching environment as one that  
508 *mandates* the physical presence of a coach. Initial research has focused primarily on coaches'  
509 anecdotal experiences from coaching remotely, with findings reporting that coaches  
510 experienced differences in the online environment compared to when they were coaching in  
511 person (Bennett, 2020b; Taylor et al., 2023). Primarily, coaches indicated that the online  
512 environment limited their freedom of movement, what they were able to see, hear, and feel,  
513 and how they communicated (both verbally and in their ability to provide demonstrations)  
514 with athletes (Bennett 2020b; Taylor et al., 2023). However, the limitations experienced by  
515 coaches generated opportunities for creativity and led to a shift towards a more athlete-  
516 centered coaching approach, highlighting the importance of co-creation/collaboration  
517 between coach and athlete (Fyall et al., 2023; Glen et al., 2020; Szedlack et al., 2022; Taylor  
518 et al., 2023).

519 Interestingly, research has already highlighted the possibility that use, and  
520 implementation of remote coaching could act as a catalyst to facilitate changes in behaviour,  
521 sparking new ways of working, and innovate coach-athlete interactions due to the specific  
522 constraints of the digital coaching context (Fyall et al., 2023; Bennett., 2020b; Szedlack et al.,  
523 2022; Taylor et al., 2023). These innovations may support athletes in engaging in more  
524 exploratory behaviours in co-designed practice contexts, promoting skill adaptation  
525 facilitated by the remotely situated coach (Araújo & Davids, 2011). We propose that the time  
526 is right to for researchers to reimagine approaches to studying coaching by bringing greater  
527 attention to the coaching environment, including online and digital environments. We  
528 introduced the notion that adopting an ethnographic approach, complemented with theoretical  
529 concepts from Barkerian ecological psychology (1968), could provide researchers with a  
530 means to identify and distinguish between different coaching contexts to better guide the  
531 study of coach-athlete interactions in-situ. For example, researcher could explore the  
532 influence of changing contexts on coach-athlete interactions within the same cohort across  
533 different (i.e., remote coaching, in-person of blended) environments.

534 Hopefully, these insights have sparked some new ideas and opened the potential for  
535 creative research programs in the coaching space. Our focus is to understand and enhance  
536 coach-athlete-practitioner interactions in Para sport contexts, and that the purposeful  
537 exploration of the constraints of these environments can have significant impact for all  
538 coaching contexts (Askew et al., 2022).

539

540

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