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

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Reimaging 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

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

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

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

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

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

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

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

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

Remote coaching research

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

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

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

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

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

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

Communicate to collaborate

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

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

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

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

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

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

Ecological dynamics and the coaching environment

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

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

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

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

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

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

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

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

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

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

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

Future Research Approaches

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

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

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

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

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

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

Ethnography and Barkerian Ecological Psychology

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

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

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

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

Conceptualising coaching environments as behaviour settings

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

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

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

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Table 1. The structural and dynamic properties that define 'behaviour settings', and initial insights highlighting the differences that may exists 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.
Vi 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).
vii. 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

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

Summary

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

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

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

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