A Case for Thinking About Thinking in Sports Coaching: Understanding Situated Cognition as a Means to Inform Coaching Practice

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Abstract

Research in sports coaching has most often been conducted using one of a number of disciplinary lenses (e.g., psychological, sociological, philosophical, or physiological). Although acknowledging that these approaches have provided a valuable, if partial, insight into aspects of coaching practice, limitations inevitably exist when adopting singular disciplinary perspectives. This research explored the situated (i.e., in, through, and within social contexts) coaching cognitions of an ice hockey coach, using an ethnographic approach and methodological bricolage to generate data over seven months. Using iterative adaptive research cycles, findings revealed that cognitions are 1) shaped by their proximity to goals at different social layers, 2) influenced by the social exchange (i.e., power and relationships) in which they occur, and 3) underpinned by biographical experiences. This study contributes significantly to how coaches can understand how their cognitive processes form, shape, influence, and are influenced by the coaching environment. In turn, the findings presented in this study offer opportunities, or prompts, for coaches to examine how their cognitions are formed, shaped, and shared to inform their practice interventions.

Keywords: psychology, ice hockey, coach, sports, coaching practice

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For decades, conceptual and empirical research has sought to provide insight into sports coaches' mental processes, knowledge, and decision-making (Collins & Collins, 2021; Harvey et al., 2015; Lyle & Muir, 2020; Nash & Collins, 2006). However, such psychological research has been argued to lack consideration of prevalent social forces and exchanges (Saury & Durand, 1998). In essence, the principal contention is an absence of attention to how cognition is situated in and influenced by layers of social context (Cushion, 2007; North, 2017; Potrac et al., 2000). This study attempts to redress the issue by exploring the merits of adopting a "situated cognition" perspective that considers how cognitions manifest *in*, *through*, and *within* a social context.

Cognition, for example, decision-making in coaching, has been explored from both psychological and sociological perspectives. However, each of these approaches has limitations. *In situ* (i.e., naturalistic) decision-making (Harvey et al., 2015) or Professional Judgement Decision-Making (Collins & Collins, 2021), using methods such as stimulated recall, after-action reviews, semi-structured interviews, surveys, and cognitive task analysis approaches have generated valuable insights into practicing coaches' cognitive processes and knowledge structures, but have been criticized for their inability to accommodate the complex and potentially ambiguous situational context in which coaching practice occurs (Jones et al., 2013). Significantly, methods such as the Think Aloud Protocol and Stimulated Recall, whilst helpful to some degree, are born out of positivist origins. This is problematic in terms of viewing cognition-based data as objective, reliable, and valid (Stodter & Whitehead, 2024). Moreover, Nichol and Hall (2024) highlight issues with Stimulated Recall as a

singular method as it focuses more on 'snapshots' of coaching practice and attends less to the temporal nature of sports coaching.

In contrast, sports coaching research undertaken through a sociological lens is typically characterized by ethnographic field-based approaches informed by underpinning sociological theories or frameworks (e.g., Avner et al., 2021; Crosby & Jones, 2020). Under the umbrella term of "ethnography," studies have used mixed methods, including participant observations (Corsby & Jones, 2020), document review (North, 2017), stimulated recall interviews (Harvey et al., 2015), and critical incident interviews (Ives et al., 2021). Within the sport coaching literature, researchers have sought to examine cognitive processes or knowledge in coaching contexts. For example, Saury and Durand's (1998) work examined the practical knowledge of sailing coaches in preparation for the 1998 Olympics and reported that coaches engage in organizational routines, cognitive anticipation, adaptability, and shared control of training sessions with athletes. In addition, in exploring soccer coaches' professional learning, Stodter and Cushion (2017) found that coaches' learning is shaped by factors such as biography, day-to-day social interactions, and formalized coach learning opportunities. These approaches have provided novel insights into the relational complexities that require coaches to employ navigational strategies as part of their day-to-day practice. However, focusing typically on person-to-person interaction and relations, less attention has been paid to the cognitive processes, mental inner workings, or embodiment (mind-body interaction) that underpin behavior.

Cognition-based Research in Sport Coaching

Not surprisingly, researching cognition is practically challenging and conceptually contentious. We consider cognition the "activities and processes concerned with the acquisition, storage, retrieval and processing of information" (Bayne et al., 2019, p. 2).

Coaches practice in complex environments, many of which are dynamic and almost overwhelmingly but not exclusively in the presence of multiple athletes or other stakeholders (Araújo & Davids, 2009). Attempting to conduct *in situ* cognitive research to accommodate this complexity preserves the ecological validity and authenticity of the setting. However, the often unstructured and imperfect nature of sports coaching (Lyle, 2020) presents data collection and ethical challenges. To complicate matters further, the term "context" in sports coaching is all-embracing and includes several equally complex components. At a macro level, coaches operate in cultural systems and organizational structures (Abraham & Collins, 1998; 2011; North, 2017). At a micro level, sports offer differing environmental constraints (Araújo & Davids, 2009), and research is made more challenging by the interdependence of cognitive processes and the situational particularity (e.g., nature of the coach-athlete relationship, domain, and sport-specific technical/tactical demands) of coaching practice (Lyle, 2020).

While acknowledging the growing body of sports coaching psychology research, *what* and *how* coaches think is under-researched (Lyle & Muir, 2020), and there is both scope and value in further qualitative research that *situates* coaching cognitions against a contextual backdrop (Araújo & Davids, 2009; Araújo et al., 2020). This sentiment is perhaps best expressed by Lave (1988), who advocated the need to move away from the "claustrophobic concept of cognition" (p. 1) to acknowledge that thinking and context are inevitably intertwined (Araújo & Davids, 2009). To engage with the situational context, an approach is needed that facilitates researcher embeddedness over a sustained period. An ethnographic approach offers just such an opportunity to address the issue of *cognition in context*.

Situated Cognition

Situated cognition, which has not been a feature of the sports coaching literature, has evolved to reconcile different disciplinary perspectives (e.g., sociological, psychological, cultural, and anthropological). Robbins and Aydede (2009) conceived of situated cognition as consisting of three distinctive pillars: 1) embodied, 2) embedded, and 3) extended. First, the embodiment element suggests that the body itself, body image, and body schema have the potential to shape the mind using the sensorimotor system (Gallagher, 2005). Schemas are structures of knowledge related to a particular topic (Collins & Collins, 2015). Embodiment helps to explain how mental representations acquire meaning in the human mind by interacting with the sensorimotor system. Meaningfulness is grounded by an individual's capacity to sense and act within the world. The embodiment perspective appears to be most useful in the case of sports performance, in which the language used in communication between coaches and athletes very often refers to concepts or mental representations that have a direct association with the athlete's and coach's physical experience of them.

Second, the mind is embedded within a particular social context and does not operate without other agents. Therefore, studying individuals' thinking without considering the interaction between the mind and the external world (perhaps better expressed as a social setting) only partially explains the relationship between cognition and context. This is particularly important for obtaining a better understanding of coaching cognitions, as the interaction reflects the propensity for change within the environment and how the (constantly) changing environment might influence what and how a coach thinks in a particular situation. Third, the concept of the extended mind is different from embodiment and embeddedness and is a significant leap away from traditional cognitive science (Robbins & Aydede, 2009). This concept suggests that the mind can exist or be extended to objects outside the body (e.g., cell phones or coaching clipboards). The extended mind concept

primarily suggests that objects in the world can complement and facilitate cognitive processes.

The layered complexity of situatedness is a challenging feature of potential research design and conduct. According to Engeström and Cole (1997), "'situatedness' is a challenging concept, and the aspects that are being focused on are seldom spelled out. Situatedness is not a black box. It is more like a Pandora's box that offers a rich variety of interpretations, possibilities, and dangers… another set of issues has to do with the multiplicity of contexts of practice and the boundaries between them*"* (p. 301). This reinforces the need for a complementary position on the broader ontological structures, layers of influence, and features such as goals, resources, actions, behaviors, etc., that are not necessarily captured/included by singular disciplinary perspectives. This approach can provide and act as a point of entry for researchers.

For clarity, within this research, "situated cognition" is understood to be "thinking" (i.e., activities and processes) that occur "in the coach's head" and are shared with the environment and spread across context (i.e., a wider assortment of stakeholders). This definition provides the necessary cognition-context duality. Therefore, this research study explored how coaches' cognitions form, extend, and permeate the social context. Consequently, this study maintained a dual cognition-context focus to explore how a coach's thinking was formed in, through, and within social contexts.

Theoretical Frameworks

This research used North's (2017) Embedded, Relational, and Emergent (ERE) model as the primary heuristic framework. The model describes the key components of sports coaching and their relational positioning as part of an ontological framework. The ERE model was developed as an alternative, integrative approach to existing disciplinary-aligned

positions in sports coaching research. It identifies goals (e.g., coaching intentions/milestones), actions/behaviors, resources (mental, physical, or social), and cognitive processes (reasoning, strategizing, and reflecting) as key features. Significantly, these components are portrayed as being in a layered social context (i.e., individual, interpersonal, institutional, and socio-cultural) and having a temporal aspect. The model places goals at its center, although it can also be reconfigured to place cognition at the center. It also facilitates an intentionally broad scope for research, allowing for the evaluation of contributory components (e.g., cognitive processes) and understanding how other features (e.g., social contexts, goals, actions, and resources) influence coaches' thinking.

North (2017) stressed the value of case studies and ethnography in creating the necessary social immersion to explore the details of the coaching context. Central to ethnographic research is the issue of understanding what exists in the environment and what is worthy of attention and inclusion (Edwards & Jones, 2018). Accordingly, researchers need to navigate and become immersed in the site of inquiry (perhaps better expressed as the social context and dynamics) in which coaching occurs. As a research approach (rather than a singular method), researchers have typically used ethnography to explore coaching as a complex social phenomenon. Ethnographic research designs are longitudinal and involve multiple research methods to capture research settings' social complexity and intimacy (Rees & Gatenby, 2014). This allows the researcher to become immersed in and make sense of the social context while also attempting to understand the coach's thinking over a sustained period. This, therefore, is the most appropriate means of exploring situated cognition.

Methodology

This research is underpinned by a critical realist philosophical approach. Critical realism accepts and acknowledges that how we, as individuals, make sense of the world is fallible and, therefore, subject to both theoretical and empirical challenges (Bhaskar, 2008). This research adopts ontological realism and epistemological relativism in keeping with critical realism.

Participants and Setting

A full-time professional ice hockey head coach (Chris) was purposively selected for this study. Ice Hockey was chosen as there were few preconceptions and assumptions about the sport by the research team. For this research, Chris was selected because he was a full-time, professional, qualified ice hockey coach and was responsible for coaching and managing all aspects of the team and roster over a season. The lead author had not played ice hockey but was familiar with the rules and regulations of the sport. He and Chris had similar experiences in physical education settings that acted as a helpful starting point for establishing rapport in the early stages of the study. The study took place over seven months (i.e., an entire season) and centered on Chris (aged 38 years) and two male players (George and Russ, aged 28-35 years) at The Storm Ice Hockey Club (pseudonyms have been used for all participants and the Ice Hockey Club). George and Russ were selected to participate due to their senior status in the team and years of playing experience. It was considered that these players were likely to have more interaction with and on Chris. Chris held the highest level of ice hockey coaching qualification (Level 2) that could be achieved in the United Kingdom, and the research setting was considered high-performance by the research team due to the stability of personnel, continuity of engagement, commitment to goal-orientated instrumental relationships, planned progressions and intensity of engagement (Mallett, 2010).

The Storm competes in the UK National Ice Hockey League, the second-highest tier of ice hockey in the UK. Coaching sessions took place on Tuesday and Thursday evenings and lasted for 90 minutes. The primary researcher interacted with the coach before, during, and after practices. In addition, further interactions occurred before and after games and in scheduled meetings in venues away from the ice rink to discuss Chris' perceptions of effective coaching, reasons for wanting to coach, and broader contextual influences as they emerged. These meetings provided useful contextual information about Chris, as he was unknown to the research team before the study occurred. These topics were purposely chosen to provide insight into Chris' coaching intentions (i.e., what and why he was trying to achieve in practices), features of coaching practice that he considered necessary, and his biographical information. The two players (George and Russ) were spoken with individually before and after coaching sessions. These conversations provided a sense of what was happening with and between players and the general mood and feeling within the team. In addition, other team members who were more peripheral to the study were also spoken to at the ice rink before sessions commenced to gain an appreciation of additional influences, such as fans and upcoming opponents.

Procedures

University ethics committee approval was obtained for the research design and procedures. Written informed consent was received from the three principal participants and one additional stakeholder, while peripheral stakeholders were asked for oral consent at the beginning of more informal conversations. Conversations and interviews with the three principal participants and one additional stakeholder were recorded and transcribed using a Dictaphone. Conversations with what were considered 'peripheral' stakeholders were recorded using field notes.

The lead researcher met with Chris and agreed on a plan for collecting data. The head coach shared contact details for two players he thought would be willing to participate in the research and, throughout the research, facilitated an introduction to other peripheral stakeholders in the research setting. These included fans, equipment managers, team managers, assistant coaches, the CEO of the organization, and video analysts.

Over 20 days (70-80 hours) were spent with stakeholders at the ice rink discussing ice hockey, coaching, and the broader psychological, sociological, and cultural characteristics and backdrop to their involvement. A methodological bricolage was used to generate data (Elder-Vass, 2007; 2010; Nichol et al., 2021). Specifically, semi-structured interviews, document reviews, non-participant observations, and drop-ins were used. A total of 20 coaching sessions and eight games were observed. The observation focused on Chris' interactions, decisions, and cognitive processes within the sessions and games. Of these, 12 coaching sessions and two games were video recorded while Chris wore a microphone to capture audio both on the ice and in the changing rooms. Semi-structured interviews were initially developed from North's (2017) work on Kayak Slalom. However, as the study progressed, the interview questions were devised in response to emergent events and points of interest to the researcher. More specifically, regarding reviewed documents, this pertained to individual practice sessions and 'blocks' of games that Chris used to separate the season and provide flexibility in planning. Document review was conducted using an in-to-out approach, first focusing on the individual sessions before attempting to understand where and how these fit in with the longer-term planning.

Chris agreed to share his coaching plans before each session, and these were reviewed with him after the session when time allowed. This provided valuable insight into the types of sessional goals that were set and how they were generated (e.g., specific preparation for an opponent or issues from a previous game). Time was also spent with players before and after

practice, either through formal semi-structured interviews or informal interactions. Opportunistic, free-flowing conversations with assistant coaches, multiple players, fans, and volunteers were recorded with field notes and reflected upon after the interactions.

Interviews, formal discussions, and Chris's verbal interactions during practices were recorded and transcribed. Several semi-structured interviews with Chris, George, and Russ allowed the researcher to support an exploration of social factors such as team dynamics, team goals, social recruitment strategies and obstacles, coaching/playing philosophy, and reasons for being in/on the team. The combination of data generation procedures was intentionally designed to capture the surrounding contextual environment and offer opportunities to adapt and refine theories throughout the research process.

North's (2017) ERE model was used as a framework to inform lines of inquiry throughout the research. More specifically, by reconfiguring 'cognitions' at the center of the ERE model, it informed what (i.e., resources, actions, and goals) and at which level (i.e., individual – socio-cultural) required the researcher's attention. The data analysis involved a series of iterative adaptive research cycles, which were an ongoing process throughout the study. To illustrate the workings of this approach, an adaptive research cycle is shared below:

> *Within the first interviews, goals were identified with individual stakeholders through semi-structured interviews. These were examined at the personal (coach), interpersonal (player), and institutional level (CEO) in the early stages of the study. Initially, goals were theorized as fixed, belonging to an individual, and of a personal nature. However, as the research journey progressed and the team experienced several losses early in the season, it became evident that the coach began sharing and setting monthly goals (illustrating fluidity and adapting to wins and losses) as a mechanism for encouraging players to maintain a sharper focus and work towards more immediate, or pressing, short term goals. In practice, this manifested with the coach separating the fixture list on the board in the changing rooms with 'blocks' created, each consisting of four games. The current 'block' (i.e., the next 1-4 games) was allocated an expected number of points from the games. The coach revealed that this approach was useful for him in sharing team goals but also gave him the flexibility to shape more immediate goals in response to the threshold of points required for the team to reach the playoffs at the end of the season.*

(Reflections from the lead researcher)

298 This theory refinement illustrates the need to examine the impact and shaping of goals
299 over time, as well as the importance of refining the sophistication of ideas and subsequently
300 "testing" these against emerging insights.
301
302 **Data Analysis and Presentation**
303 As the study progressed, cognitions and mental processes were recorded, explored,
304 and elaborated in an extended series of reflective journal notes through which underpinning
305 reasoning and causes emerged. North's (2017) ERE model was used as a framework to
306 inform lines of inquiry throughout the research. More specifically, reconfiguring cognitive
307 processes as the center of the ERE model informed which contributory features (i.e.,
308 resources, actions, and goals) and at which level (i.e., individual – socio-cultural) required the
309 researcher's attention. The data analysis involved a series of iterative adaptive research
310 cycles, which were ongoing throughout the study (Pawson & Tilley, 1997).
311 To do justice to the extent of the available data and to reflect both its relational and
312 temporal aspects, it was decided that vignettes were the most appropriate way to adequately
313 convey the rich contextual detail and its impact on the coach's cognitions. Many vignettes
314 were created as part of the analysis. These offer two distinctive advantages over alternative
315 formats. First, they allow emotion and feelings to be conveyed, essential contextual features
316 for gaining a deeper understanding and framing of situated cognitions. Second, vignettes can
317 remove the boundaries between participants and the researcher, which enables researcher
318 embeddedness to be shared with the reader (Potts et al., 2020). Indeed, and within coaching-
319 based research, Paquette et al. (2019) used composite vignettes to represent the experiences
320 of different coach education programs. They consider significant value in using composite
321 vignettes to represent data and provide interest and accessibility for the reader. When used in
322 this fashion, data that is presented within vignettes can resonate with a wider audience and

thus act as a powerful tool for coach learning. Within this study, the composite vignettes are of significant value as they provide a unique window and vivid insight into aspects of coaching practice. In turn, this provides a direct connection between the data (i.e., events) and analysis (i.e., interpretation) for both coaches and academics.

Within this study, approximately 70% - 90% of these non-fictional vignettes use direct participant quotations from actual events experienced by the coach and observed/recorded by the researcher. The remaining 10% - 30% comprise the researcher's narrative and interpretation. Throughout the research, a significant quantity of data was collected. Indeed, as in much qualitative research, what to present is a challenge, but it is also the responsibility of the research team to determine how best to present the data. Therefore, discussions among the research team took place to decide which stories (i.e., vignettes) best illustrated the coaches' situated cognition (i.e., embodied, embedded, and extended) within coaching practice. This was an ongoing and iterative process to arrive at the two presented in this study. This addition of the researcher's narrative layer of analysis within the vignettes conveys the subtle nature of the environment that the researcher experienced, which quotations, transcripts, and field notes alone cannot fully depict.

Results

For brevity, data are presented through two abridged non-fictional composite vignettes (Potts et al., 2021; Sparkes, 2002) that showcase the emergent themes of 1) goals at different societal levels, 2) social resources and networks, 3) social exchange within practice sessions, and 4) biography. The vignettes were selected to illustrate the influence of these themes in shaping situated cognition and were chosen to demonstrate the key features that influenced Chris's cognitions. To provide a layer of contextual detail and relative positioning

of the stories, they begin with a short "context box" that identifies the key aspects and outlines some of the emergent and relevant prior factors.

Vignette 1: Constructing the Roster

Context

This vignette elaborates on Chris's cognitions as he was coming to the end of constructing the roster for the coming season. The roster was approximately 90% complete, and although he had been working full-time for the club for just two months, he had begun recruiting players four months before the start of the season. To assist his decision-making processes, he had drawn upon his social network to understand better how certain players with certain characteristics might contribute to the team. At this point in the research, he had not shared his biography, yet some comments reveal how his upbringing and previous experiences shaped his current thinking.

Vignette 1

The story begins in the café at the ice rink, where Chris often spends time when working. The conversation soon turned to how his team was shaping up for the coming season. He reflected on his knowledge and beliefs and how they informed his approach to coaching. *"I'm a firm believer in work hard, play hard, and I'm also a firm believer in a team that is close off the ice will outperform a team that's not close off the ice every day of the week. You can get a team of super skilled, super talented players who don't particularly like each other, and yes, sometimes they'll win games on talent alone, but when things get tough, and you're in the trenches, and things aren't going your way, the team that's close off the ice will come like that* [Chris makes a fist] … *If I am battling against you in front of the net and whoever is defending and whoever is attacking, it's bloody-mindedness of the one who wants the puck to*

travel in a certain direction generally gets it…. You know, I've made a career out of playing like that. I didn't have much else; I just wouldn't lose those. Because that's controllable for me…There is no skill; it's just keep whacking and whacking until the puck moves in the direction you want it to move in."

From this passage, it is possible to see what Chris perceived as important characteristics and expectations of his players. In this sense, Chris had experienced playing ice hockey in a particular way (more reliant on grit and tenacity than skill). These embodied experiences remained with him well into this coaching career. His underpinning priority of hardworking players stemmed from his own experiences, and personal strength was a key component of his extended cognition when considering how he wanted his players and team to act. This suggests that embodied experiences can shape present-day dispositions, which can then be extended (shared) with others.

Chris elaborated on the process of constructing the roster. *"I can look at the stats like anyone else can and go, "Jesus, that guy scored a lot of goals last year," but then I phone someone* [a coach in the league] *and go, "Oh, what's Joe Bloggs like who played on your team last year?" And they'll be like* [makes noise], *"D**khead. Never want to hear from him ever again." And you go, "Right – strike him off my list!" And it's not that easy to do because there's only so many players of a certain standard."* This information exchange between coaches emphasizes how cognition is extended and shared by individuals in social networks. However, equally importantly, it illustrates the need for trust (i.e., that the information is reliable) and for similar evaluations between coaches of player qualities. The notion of trust is important as this research reveals that Chris was required to 'believe' information to facilitate cognitive processes.

Reflecting on the makeup of his team, Chris revealed, "*I've got a mixture; I've got three, maybe four teenagers on the team, and then another two or three 20 to 22-year-olds.*

And then I've got four guys in their 30s, and everyone else is in their middle-to-late 20s. And they have to all complement each other; that youthful excitement level, exuberance… that is great, and that can make an old guy that's sitting next to that young guy not feel tired when they're tired. At the same time, you need those old guys with the wiser heads sometimes to say to that young kid, "Calm yourself down. I've been here before; now's not the time to get carried away." And hopefully, I think I've got a pretty good mix. But the proof is in the pudding."

Chris's consideration of the team dynamics showed that his internal schema of player qualities influenced his recruitment. He verbalized that an individual who did not share the same goals, respect others' ideas, or detract from team performances were factors in his decision-making.

Vignette 2: A Coaching Session

Context

This vignette is constructed from a routine coaching session. This session focused on types of "zone entries" (a technical term that refers to a player skating with the puck into the attacking third while ensuring all their teammates are behind them). Chris meticulously planned his coaching sessions and always shared his plans with the players in the changing rooms (i.e., extended cognition) before they went on the ice. The aims of the session reflected the coach's deliberative thinking and planning about the need to improve the team's offense. The vignette also illustrates how humor emerged within established relationships. The team had experienced a succession of losses before the session, and several key players were unavailable for selection due to injuries.

Vignette 2

The session began with the players warming up, skating around the rink, handling the puck, and shooting. Early in the session, it became apparent that an ongoing game was emerging between Chris and one of the well-established players. Chris noticed his gloves being repeatedly knocked off the side of the rink when he was not looking. It was a humorous act, and Chris's mood quickly became more cheerful. Chris called a player over as the warm-up concluded; he yelled, *"Oi, d**khead, if you knock my gloves off there one more time, I'm going to feed you your f***ing dinner."*

"It wasn't me; I know who it is, though," responded the accused player. Chris was not concerned. *"I'll catch them,"* he retorted. Mischievously, the player hinted that *"One of them [was] overseas, and one of them [was] a Brit."* Sure of himself, Chris repeated, *"I'll catch them."*. The players smiled and skated off. Although brief, this interaction highlights how humor can influence mood and, therefore, thinking. Chris's gloves were part of an ongoing joke throughout the coaching session. His acceptance and facilitation of the humor are examples of distributed and shared cognition within the team. It is also feasible that the mood engendered would contribute to a subsequent positive mindset. There is the potential for different interpretations of this interaction. However, the embedded nature of the researcher in the site of inquiry meant that additional context could be added to explain this further. First, overseas players were primarily recruited for their superior skill set. Each team in the league was afforded three overseas players, who were, based on observations, the most skillful players. Second, overseas players were vital to much of the team's success, and therefore, 'home' players made extra effort in the locker room and away from the ice to ensure that overseas players felt welcome in the team.

Chris called the players in shortly after the warmup to explain the first drill. *"All right, boys, we're going here. I'm going to give you 5 minutes tops on your end, and then we're going to go full ice; we don't have enough killers to go into two ends… let's go."*

Throughout the session, Chris was observed to consult his plan (reminding himself of his prior extended cognitions). Groups of players completed each drill and were called to come and speak with him at various times for feedback. This is an example of Chris extending his cognitions to various groups within the team. He would then explain the purpose of the next phase of the session, and the players would move on to the next drill. This coaching recipe was repeated and apparent in every session that was observed.

After an hour into the session, Chris called the players in to provide feedback on the fast-paced drill. The verbal expression of his *in situ* reflection, as a response to emergent events, made it apparent that he was dissatisfied (or perhaps frustrated) that the players were struggling to grasp a concept in his planned drill, resulting in them making several errors. At this point, he made a decision that reflected his flexibility and willingness to take responsibility, *"You know what, guys, that last one… I don't like that much."* Chris reflected on his drill and said that while he *"Liked it on a piece of paper… [he doesn't] always like it when [he] see[s] it on the ice."*

This episode provides a fascinating insight into how cognitions are shaped and reformed as a response to emergent real-world situations. In this instance, Chris extended his cognition to the team through instruction and explanation. However, this could not be interpreted by and embodied within certain individuals. The dissonance between Chris's expectations and what he witnessed caused him to question whether this was a function of ineffective communication (his extended cognition) or poor planning. Chris went on to expand and contextualize the drill and encourage the players to think ahead: *"We want to make a play, so when we are doing it and comes to here, if the D is smart and he meets you there and it becomes a bit of a battle, just pump it to the back of the net. And that guy that is driving to the net and just go and get it, then you free yourself up, come into the middle.*

We've always got the high guy. Everyone got that?" He sent the players back onto the ice for the final drill.

As the session concluded, Chris called the players in to recap what happened and discuss how the session ended. However, one player disturbing his gloves for much of the session was caught. Chris reacted to the situation; he shouted, *"Get off my f***ing gloves! I know who is knocking them off now! I've never seen anyone look more guilty than Thomas. I told James I was going to feed him his dinner if he carried on. He didn't snitch, but he was close to it. I could have made him, though!"*. The players erupted with laughter. The humor quickly dissipated, and Chris focused on ensuring he delivered his final messages and key points for the session: *"We should see certainly on every offensive zone draw every time the center man should be calling the f***ing draw."* He drew the session to a close with a final motivational sign-off. *"Either way, boys, great f***ing week of practice. We are moving in the right direction. 5 pm Saturday, don't be late. Two f***ing points, let's go."* This might be interpreted as a ploy by Chris to share his embodied cognitions - the situational context that embraced training, effort, and the outcome of the next game.

Discussion

We intended to explore how coaches' thinking – cognitions – is situated and influenced by the context or features identified in the ERE model. Cognitions, or cognitive processes, were evident during practice sessions through actions such as taking decisions, providing instructions, reflecting, planning, providing feedback, prioritizing, and analyzing. To illustrate the key themes and the complexity of situated cognition, we present and discuss four key themes developed from this research.

How Goals at Various Levels Shape Cognition

Goals help to situate cognition by providing a purpose or direction of travel and are critical features of sports coaching (North, 2017). The evidence gathered showed the coach's goals to be dynamic (i.e., constantly formed and reformed), with consequent action as a response to the coach's perceived need to achieve these goals. These goals are primarily performance-based while being practically and socially constrained or enabled over time. Throughout the seven months, the framework of goals at all levels was aligned because of and in response to historical events. Chris's resultant cognitive processes and actions corresponded to and were given meaning by these goals (e.g., in his treatment of players and interaction with the broader stakeholder community).

These goals, however, are set to a greater or lesser extent by those within a layered structure of influence or power (Mills & Denison, 2018), and the primacy of the impact on the coach reflects the origin of the goals (e.g., from the CEO or fanbase). It is suggested that Chris was conscious of the "nested" effect of setting and addressing goals within this hierarchy, and these actions acted as a powerful backdrop for all his actions. This suggests that coaches need to "bring to the surface" the layered nature of goal formulation (whether social or performance-based, constraining or enabling, aligned or misaligned, and proximal or distal to the coach) and reflect on these in relation to actions taken or to be taken. Engagement in this "surfacing" process would allow coaches to consider the weight of importance and social origins of the goal and, in turn, consider if other goals are perhaps more important at a particular point in time.

How Social Resources and Networks Shape Cognition

One of the tasks undertaken by sports coaches in the high-performance domain is the recruitment of players (Parnell et al., 2021). The need to make judgments about expertise, character, and physical robustness highlights the value of information on which to make

evaluations. At an early stage in the study, Chris had been tasked with constructing a roster and signing players in the off-season (Vignette 1). His use of the contacts that he had accrued throughout his playing and coaching career meant that he could gather information and player references by asking questions of his ice hockey contacts to inform his judgments. Drawing on the concept of a Dynamic Social Network (Mallett et al., 2009), we can see that his cognitions were shaped and influenced by agents (i.e., coaches) in his social network. This acted as a mechanism to share information (or extend cognitions), and the extent of the information available enabled him to make judgments in a (more or less) rational fashion. This deliberative thinking would also be filtered through the level of trust Chris placed in the judgments of the other coaches,

In the first vignette, Chris is explicit about how important player character is to him and how he projects forward that certain characteristics will likely influence team performance, particularly in "tough times.". This also led to him believing that players needed to work hard and form strong social bonds to be successful.

One of the key emergent findings from the study is how interpersonal resources (e.g., relationships, connections, and trust) are vital for coaches to make informed decisions. This emphasizes both the macro (social network) and micro (team dynamics) context within which coaches operate. The resultant personal resources and values coalesce into a particular perspective that influences cognitions and acts as a contextual enabler. Once again, coaches may wish to reflect on and "surface" these "biases" to appreciate their own reasoning and strategizing – and perhaps those of others.

How Cognition is Changed by the Social Exchange in Practice Sessions

Coaching practice is a complex environment requiring the orchestration of multiple goals, the management of players and plans, and a dynamic mix of pedagogy-related

instruction, advice, and feedback (Lyle, 2020). This is sport-specific, and the combination of player numbers, interaction, and speed and patterns of play is a factor in constraining the micromanagement of the session and the capacity to make timely, informed decisions. There is a subtle blend of goal-based, structural, and relational activity that demands both deliberative and less deliberative thinking and decision-making.

Chris's behavior demonstrated several coping mechanisms – a strong reliance on the planning process, a willingness to observe and limit intervention, and using existing social comfort to "smooth" his emotional responses. Observation of Chris "in action" suggests that he employs these mechanisms to reduce his cognitive burden. His behavior during coaching sessions was typically calm and considerate during drills. However, outbursts containing colorful language were also evident when he perceived players' effort levels were below expectations. It is likely that the strength of his social bonds with players, evidenced through humor in sessions and observation of various interactions (e.g., team meetings and off-ice conversations), permitted both him and them to accept the more impassioned responses. Reflecting on Chris' routines suggests a level of routine expertise; that is, he was able to identify patterns, partly due to the structures he implemented. However, it is possible when considering the nature of adaptive expertise (e.g., nuanced planning, situational planning, reflection, metacognition, etc.) (Cushion & Stodter, 2023) that Chris' routines may act as constraining factors when, in fact, change and adaptation may well be required.

Dynamic and fast-paced team sports require coaches to think under time pressure and, for the most part, to focus on performance-related matters. Experienced coaches have learned to attend selectively to the most relevant features of the landscape (action). Nevertheless, social agents within the practice setting afford coaches an additional layer of "interference." This might be positive, trusting player aberrations based on previous experience, or negative, for example, player responses to poor performance or inter-player strife. To reduce his

cognitive burden, Chris rarely deviated from his planned practice structure of setting up the drill, observing the drill, and providing feedback to the group. The predetermined script (or behavioral habits) facilitated the establishment of a routine, which gave the coach a degree of freedom to focus on specific details (i.e., technical and tactical) and engage more personably with players when required. Therefore, the effectiveness of his cognitive processing was facilitated by the structure of the practice session, his coaching style, and the idiosyncratic nature of the coach (Lyle & Vergeer, 2013).

A key component of Vignette 2 was the emergence of humor (Edwards & Jones, 2018). Humor often surfaced within training sessions but rarely in competition settings. This is an excellent example of embedded cognition; the shared meaning attached to the outcome of the competition obviated the more humorful approach. Nevertheless, the coach's use of humor is of particular significance. The formation of strong social relationships with the players meant that Chris was comfortable engaging with players, perhaps as a purposeful release from the focus on sessional drills. Jones et al. (2002) suggested that humor is used to share aspects of personality and individuality. Extending this further, we recommend that the capacity to use humor also allows coaches to generate more interpersonal resources or social networks (Occhino et al., 2013), which, in turn, might make the sharing of cognitions (e.g., blunt feedback) easier for the coach to extend to the team and players.

How Biography Shapes Present-Day Cognition

The evidence indicates that prior experiences influence coaches' present-day reasoning, decision-making, and actions. Nelson and Fivush (2004) define autobiographical memory as "the outcome of a social-cultural cognitive system, wherein different components are being opened to experiences over time, wherein experiences vary over time and context, and wherein individual histories determine how social and cognitive sources are combined in

varying ways" (p. 487). This point emphasizes the significance of temporality and how previous experiences, accumulated over time, shape cognition and subsequent social interaction.

For Chris, his imposed rules on hierarchy and ensuring that respect was given to older players was non-negotiable, and his upbringing best explains the reason for the formulation and existence of these ideas. However, Barsalou (2009) extended the concept of how experiences shape actions by suggesting that situations can be viewed in terms of grain size (the spatial and temporal elements), meaningfulness (how arbitrary or interdependent objects are), and tangibility (if a situation is actual or imagined). This provides a valuable lens through which to examine sports coaching cognitions. The profile of personal resources that an individual accumulates over time acts as a filter that infuses cognitions. For example, Chris drew upon his resources as a player to inform his coaching style and management approach, revealing throughout the season key positive experiences that he had as a player. Nevertheless, supporting coaches in reflecting on the origin and primacy of certain influences on their "filtering framework" may be a valuable developmental exercise.

Limitations and Future Research

As with any study, some limitations exist but provide opportunities for further research. First, this was an ambitious research topic. We recognize that attempting to situate thinking in context requires selective observation and recording of the physical and social landscape. However, we cannot know and understand everything. Therefore, while a significant amount of time was spent in the field to understand the key participants and dynamics of the "action," events (i.e., stories) always continue to develop and emerge, and our account must always be partial.

Second, ethnography requires researcher-immersion in the research setting. However, participants are rarely willing to share their stories at the outset. For a researcher to become accepted and gain access to rich data (i.e., a familiarization and acceptance phase), establishing trust and credibility with the participants is essential. Nevertheless, we accept that some participants are always likely to be guarded and cautious about their behaviors, particularly with someone external to the organization.

Third, regarding data presentation, we found it a significant challenge to convey the richness of generated data. While vignettes offer a partial insight into events, they cannot truly illustrate the entirety and richness of the accumulated data.

Future research exploring coaches' cognitive organization and processes should account for the environment in which the coach operates. As we have demonstrated, coaches do not operate in a contextual or social vacuum. Therefore, a dual cognition-context focus is a more accurate depiction of coaching in the real world.

Conclusion

While existing research has used sociological or psychological frameworks and theories in isolation to examine coaching practices, this study attempted to demonstrate that coaches' thinking is an inherently complex concept that is best approached with a multi-disciplinary or pragmatic lens. Without a clear identification and a more complete (perhaps better expressed as appreciative) understanding of the coach *and* the context, any attempt to understand cognitions is severely limited. In this sense, we mainly refer to the substance of cognitions rather than modeling the cognitive organization underlying, for example, decision-making. We also reinforced the need for a clear ontological framework and philosophical position.

From a methodological perspective, the study has demonstrated how the elaboration and telling of "coaching stories" comprising events, issues, background, biography, and history have the potential to understand (and bring to the surface) cognitions over time. The use of vignettes allows stories to be shared, which, although inevitably providing a partial account of events over a period of time, offer a greater level of contextual detail than other presentational formats. While accepting that the vignettes (or short stories) shared in the paper are abridged versions, in contrast with other presentational formats, they facilitate more sharing of intricate contextual details and afford opportunities to demonstrate the linkage between events and cognitions.

This research has both theoretical and applied implications for the field. It has examined how cognitions can be captured from the coach, extend into the environment, and spread within social networks. For coaches, this is a significant message to convey. What coaches think and why they believe it is important as it underpins their behaviors. However, not only should coaches pay attention to their current context, but they should also reflect on and surface past experiences and developed values that act as a filter for current cognitions. For research in sports coaching, situated cognition offers a novel approach to understanding coaches' thinking and recognition that cognition is inherently linked to social contexts.

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