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**An exploration of situated cognition in sport coaching using three
contrasting methodological approaches**

By

Simon Quick

August 2022

Thesis submitted in partial fulfilment of the requirements of Leeds Beckett University for
the degree of Doctor of Philosophy

Abstract

Sport coaching has been described as a dynamic, complex and at times, messy, activity that occurs in specific social contexts (Abraham & Collins, 1998; Bowes & Jones, 2006; Cushion, 2007; Jones & Wallace, 2005; Lyle, 2018). Existing research that explores coaching cognitions is, to date, limited in capturing, acknowledging and making sense of the rich socio-cultural backdrop in which coaches mentally operate and practice. The aim of this research is to explore situated coaching cognitions, notably the *how* (style) and *what* (content) of coaches' thinking, whilst explicitly capturing the environmental constraints and affordances of the layered contextual environment in which coaching is situated.

As part of a complex research design, three contrasting methodological approaches have been used. These gradually progress towards an embedded and highly-contextualised research setting. The research adopts the situated cognition paradigm and consists of three self-contained but connected studies that describe, conceptually refine, and situate cognitions within a rich coaching context. In study 1, a modified Applied Cognitive Task Analysis, along with stimulated recall, was used to reveal coaching tasks and a framework of higher psychological functions (types of thinking in which specific cognitions can be grouped). In study 2, coaching cognitions in a micro-management setting were examined using Think Aloud Protocol. It found that coaches engage strategies to overcome difficulties caused by their environment. However, the findings suggest that as coaching becomes more time-dependent, the influence and strength of wider contextual factors diminishes and therefore, coaches are unable to contextualise and reason whilst practising in complex environmental conditions. Study 3 engaged with the findings from the previous studies and drew upon the ERE model (North, 2017) to inform an ethnographic approach, which identified and examined situated cognitions in a researcher-embedded setting. As part of this study, the socio-cultural layers and stakeholder goals were explicitly captured in order to offer a refined and more sophisticated perspective of situated cognitions.

The findings reveal that cognition is highly dependent upon, and influenced by, practical constraints and the social context in which it manifests. Themes such as goals, stakeholders and history help academics and coaches to understand better the challenging and intricately-balanced setting in which coaches mentally operate and practice. Consequently, this body of work recommends that future *in situ* research should explicitly consider the broader context, domain, and coaching purpose as 'cornerstones' upon which to explore cognitions.

Declaration

I confirm that the thesis is my own work and that all published or other sources of material consulted have been acknowledged in notes to the text or the references.

I confirm that the thesis has not been submitted for a comparable academic award.

Name: Simon Quick

Signed:

A solid black rectangular box used to redact the signature.

Date: September 1st 2022

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Chapter 1

Introduction

1.1 Research context

The value and contribution of sport coaching is attested to by UK Sport, “Coaching, alongside other key performance support services such as Sports Medicine and Sports Science, Performance Lifestyle and Research and Innovation, plays a crucial role in ensuring the ongoing success of British Athletes” (UK Sport, 2021). Within the many different facets of sport coaching, an analysis of coaching literature during the period 2005-2015 found that sport psychology was the most researched theme (Griffo et al., 2019). Given that sport psychology embraces a wide range of factors relevant to performance, such as coaching behaviours, learning, decision-making and competition preparation, the breadth and significance of this type of research should not be underestimated.

The review of literature in Chapter 2 will demonstrate that existing research exploring the *in situ* cognitions of coaches has elected to focus on decision-making (Abraham & Collins, 2011; Harvey, Lyle & Muir, 2015; Lyle, 2010a; Lyle & Cushion, 2017). However, decision-making approaches are problematic in their ability to account for the complexity of the coaching process and the socio-cultural context in which coaching occurs (Cushion, 2007). Nevertheless, a number of researchers have attempted to shed light on how coaches navigate and cope when practising. The use of Think Aloud Protocol (Whitehead, 2015; Whitehead & Richards, 2020), Applied Cognitive Task Analysis (Collins & Collins, 2020; Militello & Hutton, 1998), stimulated recall (Debanne & Fontayne, 2009; Lyle, 2003), and interviews (Côté, Salmela & Russel, 1995a; Saury & Durand, 1998) have offered some insight into how coaches think, and what they think about, during practice. Much of the above research has been heavily criticised for its lack of consideration of the wider coaching landscape, such as stakeholders, social context, cultural context and goals (North, 2017). Consequently, there is an opportunity to undertake research which does account for these wider contextual conditions.

The field of study of cognition in coaching presents one fundamental, yet persistent issue; unless the researcher is able to employ neuro-scientific technology, it is impossible to get ‘inside the head’ of a coach. Whilst the actions and behaviours of coaches are readily observable, accessible, and arguably reproduceable, the same cannot be said for the innerworkings of the coach’s mind. Although the researching and teaching of desirable

coaching behaviours is useful and important, an understanding of how coaches operate mentally is still underdeveloped (Lyle & Vergeer, 2013). Therefore, the cognitive processes that do, or do not, lead to action are one of the most fundamental parts of the sport coaching psychology domain (Abraham & Collins, 1998, 2011; Lyle, 2002; Lyle & Cushion, 2017).

The researching of cognition in sport coaching is both a practically challenging and arguably conceptually contentious endeavour, which is reflected in the various strands of literature or 'schools' of research (Cushion, 2007; Lyle & Cushion, 2017; Lyle & Vergeer, 2013). As an illustration of both these difficulties, the cognitive processes of coaches do not happen in isolation and therefore, research considering such processes should not be constrained in such a manner. Coaches do not operate in sterile laboratories; they practise in a plethora of environments, many of which are dynamic and almost overwhelmingly in the presence of athletes or stakeholders (Araújo & Davids, 2009). The result of attempting to conduct *in situ* research to overcome this complexity is that it preserves the ecological validity of the setting, but presents practical difficulties in terms of data collection and ethical issues because of the unstructured and often imperfect nature of sport coaching (Lyle, 2010a). Asking a coach to articulate cognitive processes during practice will, to some extent, interfere with their processes (cognitively or procedurally). Moreover, it is acknowledged that in some high-performance domains, the content of communication between coach and athlete may be sensitive due to the pressure of performance outcomes. Undoubtedly, *in situ* research is relevant and appropriate for the field and yet, it presents researchers with a host of challenges both conceptually and methodologically when exploring coaching cognitions if they are to overcome problems such as data collection and preservation of the sporting ecology. Despite advances in sport coaching psychology research, *what* and *how* coaches think is under-researched (Lyle & Vergeer, 2013) and, as this thesis will identify and to some extent address, there is potential for further qualitative research in terms of situating coach-thinking (cognition) in the context of its environment (Araújo & Davids, 2009; Araújo, Davids & Renshaw, 2020).

This research study is situated in the domain of sport coaching psychology literature and is referred to by academics as a cognitive approach (North, 2017). Since the 1990s, a growing body of research has sought to provide insight into the mental processes, knowledge, and decision-making of coaches. Cognitive research has, in this time, provided valuable insights and contributed towards a partial picture of the coaching cognition story. The key conceptual debate between researchers from either psychological or sociological camps centres around

a lack of consideration of the environment and social aspect of coaching (Abraham & Collins, 1998; Cushion, 2007; Potrac et al., 2000). The importance of advancing the field further forward in this regard is exemplified by UK Sport's first objective in its elite coaching programme – "Understand the environment of the high performance coach in order to inform appropriate development" (Elite Programme, 2021). Existing cognitive approaches focus on the information processing component of sport coaching which provides a certain level of understanding into a coach's mental workings. However, there is arguably a lack of consideration given to the complexity, sensitivity, or constraints of the coaching environment in which these cognitive processes occur (Saury & Durand, 1998).

Given the research orientation described above, it is evident that cognition in context, or situated, is a fertile area for further research in sport coaching. An approach is required that: 1) establishes common ground about how cognition might usefully be understood in sport coaching; 2) extends academic knowledge of what coaches think about and how they think during practice; and 3) produces findings that can be incorporated in, and positively impact upon, coach education and coaching practice.

1.2 Summary of the problem

Reflecting on the value of research into coaches' cognitions and the limitations of research to date, it is evident that in order to move the field forward an approach that captures cognition in context is overdue (Harvey, Lyle & Muir, 2015). However, the term context is broad and includes a number of equally complex components such as stakeholders, goals and domains. For example, at a macro level coaches operate in cultural systems and organisational structures (Abraham & Collins, 2011; North, 2017). At a micro level, different sports offer peculiar environmental constraints (Araújo & Davids, 2009) and research is made more challenging by the interdependence of cognitive processes and the situational particularity of coaching practice (Lyle, 2020). Furthermore, the interpersonal aspect of coaches working with athletes in an individual or group setting is an additional, yet crucial, component of context.

Accordingly, it is necessary to consider not only what and how coaches are thinking, but their relational positioning with respect to their environment. Without an understanding of situational context any attempt to make judgements about, or even to describe adequately, a

coach's actions is severely limited. This point is further developed by Lave (1988) who proposes the need to move away from the "claustrophobic concept of cognition" (p. 1).

As an example of this in action, albeit in a different domain, during a visit to a school by Ofsted to assess the overall quality of education, aspects such as planning, feedback, pace of lesson and lesson management are cross-examined (Education Inspection Framework, 2021). These criteria are employed, although indirectly, to interrogate teachers and reveal, to some extent, their mental routines and actions. However, overall judgements about effectiveness are intended to be contextualised and recognise the school's historical data and location. In a similar fashion, therefore, the rationale for this study argues that without relevant and appropriate background information, or situational context, the studying of cognition in action has limited applicability and transferability.

1.3 Rationale and significance of the research

Having assessed the problem, it is clear that there is a need to acknowledge that cognition is an important, yet empirically under-researched, component of sport coaches' practice and behaviour (Lyle & Vergeer, 2013), but with an aspiration towards using contextual methodologies. Therefore, it is necessary to adopt a research methodology with an element of 'embeddedness' to capture cognition against its socio-cultural context. This will provide an innovative way of examining what coaches think about and how they are required to think in order to cope within their environment. However, in the first instance, it is necessary to conduct some research of an exploratory nature that examines cognition using traditional and well-established methods. These early findings are designed to offer insights into coaches' cognitions that can subsequently be used to scaffold and provide a framework upon which to build a more intensive ethnographic study.

This study will contribute to the body of research in sport coaching psychology. Given the challenge that studying sport coaches' cognitions presents, this research seeks to provide an alternative perspective in an empirically underdeveloped field. The inclusion and acknowledgement of the rich contextual background within which cognitions are situated offers a more sophisticated understanding of *how* and *why* coaches think as they do within their setting. Moreover, this approach allows their mental processes to be interrogated, judged, and evaluated in relation to the unique setting in which they take place. This

research is significant due to its theoretical and applied implications for the field. The development of a more detailed understanding in this area has the potential to provide coaches with a framework and principles for coach education; to reflect on their own thinking, not only in terms of *what* to think about, but also *how* to think. Although it may seem that the emphasis is on the 'how', in terms of understanding the impact of context on the process of thinking, there is also a need to contribute to a repository of 'content'. This refers to generating an emerging body of situation-specific cognitions. Additionally, this research attempts to contribute to and 'bridge' some of the academic tensions in the field, thus making a significant and original contribution to the sport coaching literature.

1.4 Reflexive summary and emergent nature of the thesis

I began my research journey in 2014 as a part-time doctoral student whilst working at a Further Education College, where I was leading the College's Foundation Degree in Sport Science and Coaching. As part of my professional development, I had obtained several formal coaching qualifications and these experiences fuelled my curiosity to explore the cognitive processes of good, or effective, coaching practice. However, it was through my own rugby coaching practice that I began to reflect on what constituted appropriate practice.

After immersing myself in the available academic literature, it became apparent that researchers had used what could now be termed as 'established' methods to examine coaches' thinking *in situ*, albeit with various degrees of success. These established methods seemed a logical and appropriate starting point from which to formulate my own research. At this point, I was somewhat unsure of exactly what the final destination would look like. Nevertheless, and despite an awareness that there was no 'perfect' approach, I had a sense of wanting to get started and wanting to 'do something' rather than 'do nothing'. At the time, two key factors influenced my decision to begin research using a modified Applied Cognitive Task Analysis (ACTA) and stimulated recall. First, ACTA had not been used at the time in the field of sport coaching, thus providing me with a novel approach. Second, there was much existing literature that supported the use of stimulated recall in this field (Debanne & Fontayne, 2009; Lyle, 2003; Trudel, Haughian & Gilbert, 1999) - meaning that I could repeat the procedural elements of these methods in my own research. However, as I conducted the research and analysed the results, I was disappointed with how coaches in the study struggled to verbalise their cognitions using ACTA/stimulated recall. As a teacher, I was well versed with having to share my thoughts, often in live time, as part of my teaching practice.

Additionally, I had been observed regularly throughout my teaching career, so my recall was, on reflection, better than the coaches I was working with in the study. To be clear, I am not suggesting my practice was better, only that I had been asked to reflect and verbalise more as part of my formal teacher training. Reflecting on my research approach and assumptions when undertaking this first study, I was perhaps unfairly expecting too much of coaches who had received comparatively little formal training in recalling *in situ* events and therefore cognitions.

The decision to employ Think Aloud Protocol as part of study 2 in 2016 was a response to the emergent issue I had experienced in study 1; coaches reflecting on their own practice, instead of verbalising their *in situ* cognitions. As I look back on my decision, this was an important step forward in my quest to understand better cognitions in context. Furthermore, there was a promising body of work in the sport psychology literature that had used Think Aloud Protocol, led by Amy Whitehead. Although Think Aloud Protocol was being used with athletes, it seemed plausible that it could offer a potential solution to my earlier problems and, therefore, offer an important step closer towards answering my research questions. As I conducted study 2 and analysed the data towards the end of 2016, it was apparent that the data were mostly what is referred to as 'level 1 verbalisations'. The research setting prevented coaches from verbalising their thoughts 'away from' players due to the interactive, social, and dynamic nature of the coaching sessions and the environment. This left me frustrated, as my problem was now method, context and content based. On one hand, I had overcome the problem of asking coaches to verbalise cognitions retrospectively by using Think Aloud Protocol. On the other hand, Think Aloud Protocol (and the abundance of level 1 verbalisations) highlighted the difficulty in accessing *in situ* cognitions.

After the first three years of my journey (2014 - 2017), I felt somewhat lost and discouraged by the research methods available to me and the limited success thus far in implementing them. Whilst, to some extent, I had uncovered what coaches were thinking during practice, using the available methods, the subsequent generation of data left me feeling dissatisfied with my approach and findings.

In February 2017, I accepted a Director of Sport position in Santiago, Chile, at what is considered to be one of the premier sports schools in South America. It has links to the Chilean National Rugby and Hockey teams and would best be described as an 'Elite School Sport Domain'. Personally, I found that coaching in this environment was one of the most

challenging experiences I had encountered. Working within the school and leading the sports department, which had a tradition and culture of winning, I found myself forced to reconcile my own coaching practice with that of the institution. As I reflect on the experience, I realise that I was beginning to, or having to, adapt my own coaching practice to what was 'expected' from other coaches, parents, senior leaders, and players. This had a profound impact on my understanding of coaching practice, but importantly my own thinking as a coach – the institutional culture was affecting my own cognitive processes and coaching practice. As a coach, I was operating with colleagues who were not incentivised to reflect on coaching practice whilst their teams were winning. The reasons for the lack of incentivisation were two-fold. First, the performance-based outcomes were being achieved and this satisfied various stakeholders. Second, the institution had created a link between performance-goals and financial reward in the terms of bonuses. In my mind, both factors acted as constraints on improving coaching practice. Moreover, I felt an incongruence between my own personal beliefs and the institutional goals that has been created for the coaches.

Throughout my time in Chile, I became more unclear about the destination of my personal research journey. Although I did not collect any data during my time abroad, I continued to read the available literature and make sense of my own experiences. My experience in Chile was important as it encouraged me to think about how my own coaching cognitions were situated in context. As I look back now at the early origins of my research journey, my approach and conceptualisation of cognition were influenced by my teacher-training, which naturally focused on the cognitive processes of students and teachers in a classroom setting. This appeared to be 'against the grain' of what I, as a coach, had experienced in Chile. It was at this point that I came across the concept of 'situatedness' and the situated cognition paradigm. As I began to read and understand the notion of the situated cognition paradigm, certain themes resonated, namely that of context, social setting, and spatio-temporality. My experience of coaching abroad, coupled with my reading, was a vital step forward in reframing my thinking about cognition in sport coaching being situated. However, whilst the concept of situated cognition was useful in terms of developing my understanding, I was unclear, at that time, as to how it offered a practical way forward in terms of my own research.

I returned to the UK in September 2018 and began to refocus my attention on my academic studies. It was during this period that as a result of staffing changes in the university,

Professor Julian North became my Director of Studies. At our first meeting, Julian introduced me to his ERE model, underpinned by critical realism, as a potential way forward. Equally importantly, it was at this point that I began to work closely with my supervisor, Professor John Lyle, and continued to refine not only my conceptual understanding, but also my academic writing. At the time, it felt like starting over again. However, on reflection it was an important, fortuitous, and essential change of direction in my research journey. As I spent time immersing myself in the critical realism literature, it was apparent that there appeared to be a significant degree of commonality between the ERE model and situated cognition. I saw similarities in terms of how aspects such as relationships (social context) and culture shaped cognition. Most importantly, the ERE model provided an explicit 'road map' and a way forward for my own research. The ERE model and its methodological and method implications offered a guide of where to turn my attention in my third and final study.

Early in 2019 I began to make the arrangements for a final embedded ethnographic study designed to capture cognition in context and over time in ice hockey. In August 2019 I arranged a meeting with Chris, the Head Coach and willing participant within my final study. Chris and I developed a rapport at an early stage, in part, due to our similar backgrounds and desire to understand coaching practice. Thankfully, Chris agreed to allow me access to his coaching practice, team, and institution over a 7-month period. As I began to collect data using an embedded, relational, and emergent approach, my enthusiasm for research was rekindled. It was clear that the data I was collecting were rich and that there were stories to be told. In many ways, this third and final study made sense to me as a researcher. I was able to draw on my findings from my earlier research, my experiences abroad, literature on situated cognition, critical realism and the ERE model. Throughout the 7-month period, I further developed my understanding of situated cognitions as they played out over time and in a rich variety of settings. Moreover, as I became immersed within the research setting, it became apparent how goals, stakeholders and culture were impacting on Chris' cognitions.

Once I had finished my data collection, I began the lengthy process of making sense of and conceptualising the data. It was clear that, unlike the two earlier studies, there were multiple factors exerting influence to differing degrees over the coach's thinking. As I spent time revisiting interviews and interpreting the findings, I was wrestling with how best I could share the emergent stories and convey the rich contextual backdrop. The data I collected were meaningful and contributed significantly towards my research questions, yet I needed a presentational format that would do justice to my final study. After much deliberation, I

decided that the best way to present the findings were through vignettes that acted as short stories. These offer, albeit partial, insight into the world of ice hockey coaching and cognitions.

With hindsight, it is clear to see that the generation of this body of work has been a meandering and, at times, bumpy journey. Nevertheless, as I reflect on my experiences over the eight years, I am now able to draw upon much richer personal resources, think in a more sophisticated fashion about situated cognition, and appreciate the many experiences and people that have shaped my research journey.

1.5 Research questions and aims of the thesis

The research questions and aims have been formulated after an extensive critical review of the literature but subsequently refined as a response to the emergent research journey and need to overcome several issues with the first two studies. These research questions are outlined below in a 'final format' in order to provide the reader with an early overview of the research intentions.

Research questions:

These questions have driven the research and provide the 'markers' against which the findings of the research can be evaluated.

RQ1) What is the nature of the relationship between coaching cognitions and the particularity of the coaching context?

RQ2) To what extent does an appreciation of situated cognition contribute to an understanding of how coaches think and what they think about?

Research aims:

The research aims provide an explanation for the structure and conduct of the research and are necessary steps towards addressing the research questions:

- 1) To investigate coaching tasks, as a starting point, to understand more accurately the fine-grained detail of what coaches are required to do.
- 2) To investigate situated cognitions and explore the patterns of coach thinking in coaching practice.
- 3) To explore how coaches operate mentally and strategise under pressure.
- 4) To examine situated cognitions against a wider socio-cultural backdrop.
- 5) To analyse the strengths and weaknesses of different research methods and approaches when investigating situated cognitions.

1.6 Structural overview of the thesis

The research process begins in Chapter 2 with a review of the existing literature that refines the scope of the study and the related research aims. Included within this is an overview of the research questions and aims that are presented along with a roadmap for the conduct of the two initial empirical studies.

Chapter 3 (Study 1) focuses on the tasks, content and type of cognition of four tennis coaches using stimulated recall (Lyle, 2003) as part of a modified Applied Cognitive Task Analysis (Militello & Hutton, 1998). The intention of this study was to explore what coaches were thinking about and how their thinking might be understood. The findings resulted in the identification of 9 types of higher psychological functions (which also offers new vocabulary in the field) (Cole & Engeström, 1997). The study revealed a partial picture of some of the

stakeholders and wider coaching context. Interestingly, the key methodological limitation of this approach was that coaches were unable to recall their thoughts retrospectively, which could be considered as a type of memory decay. Instead, some of the coaches fell into a 'reflective' mindset. At the end of the chapter a critical reflexive account is presented of what learning has taken place in relation to the research journey.

Chapter 4 (Study 3) sought to overcome the methodological limitations that presented in study 1. Consequently, Think Aloud Protocol was used to explore the content and types of cognitions of six rugby coaches, as well as some of the consequential actions such as feedback and instruction. The purpose of the study was to capture cognitions as they unfolded in real time and overcome the issues surrounding retrospective reflective accounts. The findings from this study indicated that cognitions manifested in a cyclical pattern and demonstrated thresholds and triggers which produced coaching actions or interventions (Harvey, Lyle & Muir, 2015). Additionally, it was found that when coaches were operating in dynamic and time-bound situations, as in this study, it was not possible to detect if coaches were engaging in higher psychological functions such as reasoning and contextualising. The primary methodological limitation of study 2 was the difficulty of coaches attempting to verbalise their thoughts whilst in a micro-management setting. At the conclusion of this chapter, a critical and reflexive account is offered which details the learning to date and emergent research issues.

Chapter 5 represents a distinctive and significant turning point in the thesis. First, it acknowledges what has been learned up to that point and then explains the direction of travel for the following study and the remainder of the thesis. Second, the situated cognition paradigm is explored in detail and is used as lens through which to reflect on the first two studies. The chapter draws to a close with an examination of how 'situated cognition' is used to inform study 3 and navigate the ERE model.

Chapters 6 and 7 (Study 3) engaged with the findings in studies 1 and 2 and sought to explore the content and type of cognitions of an ice hockey coach as part of a researcher-embedded ethnographic study (Cushion, 2014; North, 2017). A variety of research methods were used including interviews, observations, video-recordings, drop-ins and document review. Additional stakeholders were also formally interviewed and interacted with as part of the study, in order to develop further an understanding of the research environment and capture the socio-cultural context in which the coach was operating. This study examined

the coach's cognitions in a range of coaching activities, some of which were time constrained, whilst others afforded the coach more time to deliberate. Chapter 6 outlines the research approach and choice of methods, after which, Chapter 7 contains three non-fictional vignettes that allow the reader to immerse themselves in the context (Callary, Werthner & Trudel, 2012). Chapter 8 provides a detailed discussion of the findings. The outcome of this study demonstrated that as coaches operate within social-cultural contexts, *what* (in terms of content) and *how* (in terms of higher psychological function) coaches think, is influenced by the unique context in which they practise. This illustrates the value of using situated cognition to address the question of how and what coaches think in the field of sport coaching. These empirical studies contribute towards the initial research questions, but also provide a parallel narrative and critical analysis of the limitations of the available research methods.

In Chapter 8, the thesis concludes with a final discussion chapter, which draws upon the three empirical studies and synthesises their findings to provide an 'overarching' summary discussion of emergent themes. At the outset, the concept of rigour is reflected upon and the criteria against which the author wishes this body of work to be assessed is elaborated upon. Throughout this final chapter, a case is made for the importance and value of situated cognition in future research. The notion of influence on cognition is explored and presented as part of a conceptual schema which, it is argued, has both theoretical and applied implications for the field.

Chapter 2

Review of literature

2.1 Introduction and approach

The introduction has mapped out the overall approach to data collection methods employed in this research. Therefore, the purpose of this review is to elaborate on the concepts that are relevant to the study and to scope the academic literature to identify and evaluate the existing research and potential gaps in the fields associated with coaching cognitions. This chapter forms the foundation for the first two empirical chapters within this submission and is intentionally positioned to reflect the available literature and conceptual developments at the time of writing. The review will employ a critically evaluative approach to examine the pertinent literature, around which to frame the methods necessary to address the research questions and to summarise the findings against which the outcomes of this study can be evaluated (Lyle, 2014). The literature review concludes with a refinement process which will inform the final research questions.

The review will begin by examining cognition in a broader sense, before refining the precise meaning of cognitions in the context of this research. First, the review will discuss how cognitions have been viewed and explored in the coaching literature. Second, it will begin by examining various prominent components of cognition including higher psychological functions, decision making, knowledge, mental models, thresholds and catalysts. Towards the end of the chapter, a brief overview of established research methods is included to help orientate the reader with how existing research methods have been deployed to explore cognitions. Third, the chapter concludes with a summary and subsequent refinement of the original research questions that are intended to drive this body of work.

This research is situated within the field of cognitive psychology. Given that this area offers considerable breadth and depth of relevant literature, it is important to narrow the scope of the review and from there, to focus on the most useful and relevant findings. Attempting to review such an extensive academic field as cognitive psychology would not be appropriate or useful. Therefore, the strategy employed is to begin the filtering phase of this review at an early stage and cascade the relevant and applicable concepts in terms of authors, themes,

concepts, and empirical research. To make progress it is helpful to outline the initial and intentionally broad questions that are used to drive the review process.

- i) Which cognitions are most closely associated with sport coaching practice?
- ii) How can these cognitions be best described and accessed?
- iii) What is the existing evidence that the coaching setting or environment impacts upon cognition?

As part of the strategic review process, the salient authors and themes in the sport coaching literature will be explored and critically appraised in terms of their contribution to the field more generally, as well as how their work might contribute to this review in particular (Chenail, Cooper & Desir, 2010). In the first instance, the review will seek to draw upon the available literature and research findings in sport. However, in instances where research is sparse, it is necessary to widen the search parameters and explore relevant research from neighbouring domains. At the end of each section, a set of reflective issues, conceptual debates, or the value of key ideas that have emerged and how they might support this study, is offered to act as a reminder of potential hurdles to be overcome.

2.2 Key components of conceptual papers

Throughout the literature, several key conceptual papers have influenced the field of sport coaching. This is evidenced by the number of citations and their influence on subsequent research agendas. These papers, whilst offering different perspectives and schools of thought (Lyle & Cushion, 2017), reveal some of the underlying concepts, debates, and suggestions for disciplinary focus within the field. Undoubtedly, there has been an evolutionary shift within the coaching literature. Therefore, it is important to identify developments in conceptual thinking and acknowledge the importance and impact of the contribution of key authors whilst, at the same time, acknowledging their disciplinary positions (North, 2013b). Additionally, the exploration of wider conceptual tensions in the field will facilitate a richer understanding of *why* and *how* topics such as cognition and context have come to be established in the literature and acknowledged to be a significant contribution to our overall understanding of sport coaching behaviour and practice. This

section of the review is intended to provide a narrative that reflects the key messages and critically evaluates research in the sport coaching literature.

Conceptual papers are intended to offer a set of ideas, or a re-conceptualisation of existing literature, that the authors suggest require further testing or application in the field. However, conceptual development and coaching practice go hand-in-hand and this relationship can be summarised as follows, “theory without practice is for geniuses, practice without theory is for fools and rogues, but for the majority of educators the intimate and unbreakable union of both is necessary” (Langeveld quoting Gunning, 1979, as cited in Van Manen, 1997).

In one of the most prominent conceptual papers in the field, Abraham and Collins (1998) offer a rejoinder to early behavioural research (c.f. Tharp and Gallimore (1976), as an example of an early key paper on behavioural research in sport coaching). The authors advocate the need for knowledge and, therefore, expertise to be developed and integrated within coach education. The authors concede that by drawing upon cognitive and educational psychology, which was frequently the case in the 1990s and early 2000s, this offers no guarantee of transferability to the sport coaching domain. This acknowledgement is an important reminder of how coaching science has evolved and come to be an established field in its own right.

As a development of their earlier paper, which had made the case for the study of knowledge and expertise, Abraham and Collins (2011) offer Professional Judgement and Decision-Making (PJDM) as a unifying focus to avoid coaching research becoming “increasingly esoteric” (p. 1). As part of PJDM, both cognitive processes and mental models, rather than outcomes, are proposed as ways to overcome heuristics and bias, but also as a pragmatic solution to help coaches improve their practice. The authors acknowledge and reflect on the state of play within the literature at the time, stating that coaches operate within different environments and multiple stakeholders exist at different levels, such as: socio-political (macro), socio-tactical-motivational (meso) and ideo-tactical (micro). Together, these layers form an integral part of the sphere of sport coaching. Moreover, they influence and interact with one another in a dynamic and fluid fashion. The explicit declaration of these coaching components provides a useful vantage point for research. Whilst PJDM is proposed by Abraham and Collins (2011) and there is some ongoing recent research that adopts this approach (c.f. Collins & Collins, 2020), it is yet to be adopted by most other authors in the field.

As a precursor to PJDM, Naturalistic Decision-making (NDM) offers an approach to explore how coaches operate cognitively, in complex and timebound settings (Lyle, 2010a; Lyle & Cushion, 2017). NDM stresses the importance of experiential decision-making and draws upon the contribution of cognitive functions such as recognition and memory as part of the decision-making process. NDM as a paradigm is appropriate for exploring how coaches make and take seemingly intuitive decisions in action. However, its application is limited by the serial nature of coaches' decision-making and the fact that coaches are required to make these decisions in a variety of situations, some of which are time-dependent, whilst others might afford coaches significant time to think, reason, reflect, and draw upon their resources in a more considered way (Harvey, Lyle & Muir, 2015; Johnston & Morrison, 2016; Lyle, 2010a).

In contrast to research that adopts cognitive approaches (Abraham & Collins, 2011; Lyle, 1999, 2010a), Jones, Armour and Potrac (2002, 2004) emphasise the view that sport coaching is embedded within a social and cultural setting. Role, interaction and power are stated as three core concepts by which to interrogate the social sphere in which coaches operate. They propose that this provides an appropriate framework within which to understand and research coaching practice. The emphasis on the social component of sport coaching is undoubtedly important because coaches do not operate in isolation. However, the focus on the social interactions and the adoption of a social-constructivist theoretical approach shifts the focus of research from the cognitive inner-workings of the coach to a wider and inherently complex coaching ecology.

Similarly, Potrac et al. (2000) allude to the humanistic nature of coaching and the social pressures that influence and place constraints upon coaches. Notably, the authors refer to the need for coaches to be effective (successful) in their practice whilst also assuming a level of responsibility for the athletes' welfare, both in and out of the coach's care (Borrie, 1998). Potrac et al.'s (2000) proposal of a methodology to "shift the emphasis in coach education from a mechanical mind/body approach to a sharper focus on the person" (p. 195) includes the use of methods such as systematic observation and group interview techniques to explore routine and complex coaching processes.

Cushion (2007) identifies complexity as a defining feature of coaching and suggests that research, at the time of writing, had taken an overly simplistic approach, which did not adequately represent the coaching process with appropriate detail or sophistication. He

offers a critique of positivistic approaches, arguing that they are reductionist in nature and that they seek (inadvisably in his view) a single unifying model, schema or process that is generalisable. Furthermore, he recommends that coaching is a “dynamic social activity that vigorously engages coach and athlete” (p. 396). In the same paper, Cushion (2007) proposed that coaching situations provide a high degree of novelty, meaning that expertise-based research without application and accommodation to context was of questionable relevance for the further development of the academic field. Within the context of this research, it will be argued that coaches do have planned routines and that there is likely to be a degree of repetition as part of coaching practice. Nevertheless, Cushion’s (2007) point about sport coaching as a social activity rightly emphasises the importance of relationships and stakeholders as fundamental cornerstones of sport coaching practice.

Cushion’s (2007) critique of modelling the coaching process extended the contribution of earlier papers. For example, Saury and Durand (1998) claim that coaching models are overly simplistic and do not represent the reality of what happens in practice. The consensus from three notable studies (d’Arripe-Longueville, Fournier & Dubois, 1998; d’Arripe-Longueville, Saury & Fournier, 2001; Saury & Durand, 1998) is that coaching is unable to be ‘reduced’ from a series of complex interactions that arise in light of emerging circumstances and as a result of a historical backdrop (Cushion, Armour & Jones, 2006). These studies emphasise the inherent complexity within coaching, as well as ill-defined goals that can be explained in terms of a set of constraints and the availability, or scarcity, of physical and social resources (Saury & Durand, 1998).

The notion of orchestrating in coaching (Bowes & Jones, 2006; Jones, Bailey & Thompson, 2013; Jones, Bowes & Kingston, 2010) also illustrates the complex nature of sport coaching and suggests that coaches operate using relational schemas within their coaching practice. Furthermore, it is proposed that these schemas act as cognitive maps and help individuals to engage with their social environment (Fiske, 1993). The notion of conceptual schemas is located within the sport psychology domain and, as such, provides an interesting insight into how these different theoretical perspectives might find some common ground (Cushion & Lyle, 2017). Schemas have capacity to evolve, which, in this case, might be as a consequence of the social environment. Therefore, it is plausible that the coach’s cognitive schemas echo, and are shaped by, the coaching environment.

Reflecting on the proposition that coaching is essentially a social phenomenon (Bowes & Jones, 2006; Jones, Armour & Potrac, 2002; Potrac et al., 2000), there has been a focus in the literature on how an individual's behaviour is situated in a context and its consequential influence on the relationships, power, and micro-politics that occur within coaching. This provides a valuable approach to researching sport coaching because it is argued that cognition precedes behaviour (Toates, 2006). The situational behaviour approach offers a useful holistic lens through which to explore coaching practice. However, it is also evident that the mental inner workings of the coach are equally important, despite being inherently difficult to capture.

Although it can be assumed that coaching practice will indeed provide novel situations for coaches, it has been argued that coaches must draw on experiences that have been gained in similar situations (Lyle, 1999). Without the application of prior experiences, it may be argued that coaches would, in essence, be operating without any relational schemas (Bowes & Jones, 2006) or prior knowledge (Abraham & Collins, 1998). Abraham and Collins (1998) propose that extensive criticism of positivistic approaches is likely to result in "throwing the baby out with the bath water" (p.5). Moreover, Lyle (2007) suggests that the strong emphasis on an assumed 'chaos' in coaching is somewhat exaggerated.

This initial foray into a selection of key conceptual papers has highlighted the emergence of distinctive perspectives in conceptual debates surrounding sport coaching. However, it is important to stress that coaching, as with all human behaviour, is indeed multi-faceted and, therefore, contrasting approaches can only serve to provide additional value and contribute towards a richer holistic understanding of sport coaching (Cushion, 2007).

As with all fields of academic study, there are philosophical, ideological and practical tensions about the very nature of sport coaching and what is deemed worthy of future study; the complexity of the field is apparent but not surprising, given the scope and reach of coaches' practice. In addition, the theoretical lens and strength of magnification (level of reductionism) are key factors for academics wishing to conduct research in the field. Whilst there are conceptual differences, there is also the issue of the enquiry methods that are available to researchers within these theoretical perspectives. These place constraints on research design and data collection. This is particularly significant for those wishing to explore the cognitive functions of coaches. A set of key reflective issues is now offered below and is intended to provide the reader with an overview of the emergent issues and

concepts. This format is adhered to throughout this chapter in order to summarise and distil the critical issues within the context of this research.

Reflective issues:

- i) Contrasting theoretical approaches provide academics and practitioners with different and useful ways to understand sport coaching.
- ii) Decision-making appears to focus on decision-taking - does all thinking have action, outcome or consequence? It is likely that many cognitive processes do not lead to action. Furthermore, it is possible for a considerable time delay between cognition and action.
- iii) How does the social perspective impact this study, which is focused on an exploration of coaching cognitions? This is as much a methodological issue as it is a conceptual one.

2.3 An introduction to early-established accounts of cognition

Cognition, as a concept in isolation, appears to be ill-defined in sport coaching literature. Lyle and Vergeer (2013) list various facets that contribute to cognition as a whole; for example, judgement and decision-making, reasoning, problem solving, mental models and knowledge structures. A great deal of emphasis has been given to cognition in performers or athletes and specifically identifying how skills, at least in a practical sense, can be learned (Fitts & Posner, 1967; Renshaw et al., 2019; Whitehead et al., 2018). However, a corresponding focus within the academic literature cannot be identified for coaches. This means that wider parameters are needed to understand cognition sufficiently well to scaffold research in this area.

Neisser (1976) states that cognition is “the activity of knowing: the acquisition, organization, and use of knowledge” (p. 3). Extending this further, Greeno, Collins and Resnick (1996) note three distinctive branches of the study of cognition: 1) Gestalt Psychology which focuses on the structure of knowledge as a whole and insight as part of learning (Sternberg, 1999); 2) Constructivism which is concerned with how learning and conceptual development occurs; and 3) Symbolic Information Processing which includes the processing of language,

reasoning and problem solving (p.16). Reflecting on Lyle and Vergeer's (2013) list, commonly researched topics in sport coaching appear to be situated within each of the three cognitive branches. For example, knowledge structures (Abraham & Collins, 1998; Nash & Collins, 2006) permit coaches to store information in a fashion that allows them to retrieve the information at the desired time and could be categorised as a feature of Gestalt Psychology. In their paper on tacit knowledge in expert coaching, Nash and Collins (2006) suggest the knowledge structures of experts are easier to recall than for novices (p. 465). In a different approach, Nash (2008) evaluated the effectiveness of coach education programmes using a constructivist paradigm. Finally, the decision-making literature (Abraham & Collins, 2011; Lyle, 2010a) is more concerned with information processing, application of knowledge and particular types of cognition such as: noticing, reasoning and problem solving, all of which can be viewed as symbolic information processing.

It would appear, from the paucity of literature that defines cognition in the wider psychology realm (Allen, 2017), that it is necessary to reflect on, appraise and critique the individual components that are: 1) pertinent to the original intentions of this research, and 2) prevalent in the sport coaching cognitive literature. The separation of the cognitive components (Greeno, Collins & Resnick, 1996; Lyle & Vergeer, 2013) above provides a degree of conceptual clarity in terms of exactly which strand of cognition is being studied. Furthermore, the psychological approaches within sport coaching that have been briefly outlined above can often be discussing significantly different facets of cognition, all of which contribute towards a partial picture of what and how coaches think.

2.4 Narrowing down the field of cognition

As highlighted above, the term cognition is ill-defined (or perhaps better described as so all-embracing that it is difficult to define) and is better understood as an umbrella term. Moving forward towards what constitutes cognition in this study, Bayne (2019) offers the following definition: "all the activities and processes concerned with the acquisition, storage, retrieval and processing of information regardless of whether these processes are explicit or conscious" (p. 609). This definition offers a useful way forward but does not capture the nature of cognitions within context as part of this research. Moreover, it is acknowledged that cognition has tacit and implicit strands (Nash & Collins, 2006) that require sophisticated approaches in order to unearth the complex mental routines and activities.

For the purposes of clarity within this research, it is the notion of *activities and processes* that occur inside the coach's head, whilst coaches are operating in a particular environment and context, that are of most interest within the context of this research. The next stages of this review will critically evaluate a cascade of concepts that are considered to be cognitive processes and are notable themes in the cognitive sport coaching literature.

Reflective issues:

- i) There is a need to understand the information processing aspect of cognition, but not in isolation.
- ii) Now that the scope of the meaning attached to cognition has been refined, it suggests that some initial exploratory research would be needed to gain a better understanding of the cognitive processes, before a situated and highly contextual study is conducted.

2.5 Higher psychological functions

The higher psychological functions proposed by Wundt and explored by Blumenthal (1975) explicitly include reasoning. Within the sport coaching literature, reasoning seems to have gained little attention in its own right. However, there is a wealth of cognitive psychology literature from which to draw and 'thinking' has become part of popular culture; for example, Daniel Kahneman's book *Thinking, Fast and Slow* (Kahneman, 2011) and Matthew Syed's *Black Box Thinking* (Syed, 2015). Robertson (1999) explains that there are two types of reasoning: inductive and deductive. Deductive reasoning is concerned with drawing upon knowledge to form a conclusion about an event. In contrast, inductive reasoning is when generalisations are made from a series of events. This use of higher psychological functions offers a practical foundation from which to conduct future research and has, at times, been referred to in PJDM research (Collins & Collins, 2016a).

The premise of an 'orchestration lens' was first proposed by Jones and Wallace (2005) to emphasise that coaching is socially complex and requires some form of 'accommodation' or 'balancing' to make sense of and act upon a wealth of, often contradictory, information. The

concept of orchestration was proposed as the authors felt that it reflected the subtle and delicate relationships and behaviours that coaches are required to cultivate and nurture within their role. In particular, Jones, Bailey and Thompson (2013), drawing on earlier work (Bowes & Jones, 2006; Jones & Wallace, 2005, 2006), consider ambiguity, noticing and orchestration as ideas through which to develop sport coaching further. This strand of the literature suggests that coaches navigate the complex and chaotic environment by using relational schemas (relational schemas are covered in 2.6.1 as part of Naturalistic Decision-Making).

The concept of orchestration is perhaps best summarised as “steering, as opposed to controlling, a dynamic interactive process involving much ‘behind the scenes string pulling’ towards desired objectives” (Jones, Bailey & Thompson, 2013, p. 272). Critically evaluating this proposal, the idea of orchestration portrays the coach as someone who employs continual oversight to make fine-tuned adjustments during practice, although it downplays the role of planned interventions. It is suggested that the concept of orchestration might not necessarily apply to coaches in all situations, and it is dependent upon the sport-specific context (Cushion, 2007; Lyle, 2010a). Santos, Jones and Mesquita (2013) claim that the concept of orchestration is underdeveloped and attempted to test the ‘orchestration lens’ to understand better how coaches manipulate contexts and relationships. In their study, they found that coaches were having to navigate politically challenging and sensitive environments, which, in turn, required the coaches carefully to plan and strategise their behaviours to optimise relationships (Santos, Jones & Mesquita, 2013). This work appears to offer a distinctive perspective on coaching; for example, the focusing of coaches on coaching outside of *in situ* practice where the affordances offered to them by the socio-cultural environment are unique.

The use of higher psychological functions, which for the purposes of this study can be considered as *types of thinking in which specific cognitions can be grouped*, might constitute an approach by which to explore cognition against a socio-cultural backdrop. As an example of a type of thinking, it is possible to draw on the contribution of Jones, Bailey and Thompson (2013), who list “noticing” as a component strand of orchestration. Mason’s (2002) work on noticing was intended to equip teachers with a set of ideas and pragmatic activities in order to refine the cognitive skill of noticing. Although noticing might, at least superficially, appear to be a simple concept, it acts as a platform for more questions to be developed in light of what has been noticed. For example, could a distinction be made

between what has been consciously or subconsciously noticed? It is possible that noticing is intentional which leads to the question 'what is most worthy of being noticed?'. Furthermore, it has been established in teaching that noticing can be used as an instrument for reflection by engaging in activities such as marking and recording (Mason, 2002, p. 33). The connection between reasoning and noticing is eloquently phrased as "at the heart of noticing lies the distinction between accounts-of and accounting-for, of distinguishing the phenomenon to be explained and the explanation" (Mason, 2002, p. 179). This suggests that the concept of noticing ought to extend beyond conscious non-processual observations and act as a catalyst from which coaches might begin to process the information to account for what they have witnessed.

Whilst the concept of noticing has been adopted as a mechanism for perception in the coaching literature (Morgan, 2017), it may hold further value in the context of this study. To understand how coaches mentally operate within their environment, detailing *what* they are noticing in the first instance would provide a useful insight into *why* and *how* they notice. Furthermore, the discipline of noticing may 'translate' into various aspects of coaching practice and be a useful concept when conducting research in complex environments. Although not explicitly, it is recognised that much of the work on decision-making must inevitably be concerned with what coaches notice by way of stimuli.

In terms of another higher order cognition, reflection and reflective practice have been widely promoted within sport coaching literature (Côté & Gilbert, 2009; Gilbert & Trudel, 2001; Stodter & Minto, 2020; Whitehead & Richards, 2020). Four, often cited, empirical studies within this area explore experiential learning in youth sport coaches (Gilbert & Trudel, 2001, 2004a, 2004b, 2005) using reflection as a conceptual framework. As part of their findings, they note different types of reflection: reflection-in-action, reflection-on-action and retrospective reflection-on-action (based on and derived from the original work of Schön (1987). Interestingly, they note that reflection-on-action was more prevalent and that coaches tended to engage in reflection retrospectively as part of their routines. Furthermore, the importance of having a network of respected and knowledgeable coaching peers is also highlighted. Significantly, this illustrates the importance of a social network and appears to overlap with work on distributed cognitions (Cole & Engeström, 1997; Hutchins, 1995).

It is claimed that reflection as a concept has been poorly defined (Cushion, 2018; Stodter & Minto, 2020). Historically, reflection in sport coaching has drawn upon research from

neighbouring fields such as education (Schön, 1987) and nursing (Pierson, 1998). Cushion (2018) suggests that reflection is a multi-faceted concept and, in his view, has become increasingly mis-used in coach education. The result of the lack of clarity when researching reflection is that multiple conceptual strands of enquiry are now evident such as “self-reflection, reflective thinking, reflective skills, reflective logs or journals and reflective practice” (Stodter & Minto, 2020, p. 69).

Reflection, as an umbrella term, has received considerable attention within the literature. For example, Whitehead and colleagues (c.f. Whitehead and Richards (2020) as a recent study) have used “Think Aloud Protocol” as a knowledge elicitation tool in order to assist reflection in communities of practice. However, the ultimate purpose of reflection is to assist athletes and coaches in their development by using past experiences as opportunities to learn from and develop knowledge. As a consequence, it is a vital part of coach learning and intended to act as a tool in informal and formal coach education settings and should not be considered as an end goal in itself (Cushion, 2018; Mallett et al., 2009). Extending this further, Schön (1987) states that “reflective practice requires ‘living in’ and not the mere occasional attendance” (p.311). This emphasises the importance of coaches continuously engaging in reflection if it is to be of any value. Therefore, it can be assumed that reflection acts as a tool to help coaches retrospectively make sense of the environment and provide an internal learning environment (Werthner & Trudel, 2006).

In the context of this study and its aims and objectives, reflection provides an interesting and potentially valuable avenue within which to conduct the research. It has been suggested that it is an essential part of helping coaches to refine and shape their ideas (Côté & Gilbert, 2009; Gilbert & Trudel, 2001; Stodter & Minto, 2020). Furthermore, it is conceivable, given its demand on coaches’ internal resources, that reflection will engage (or be a substantial element of) coaches’ cognitive activities and processes, although it is unclear how much of this occurs *in situ*. This area of sport coaching literature is well-resourced and there appears to be a recent surge of empirical research on reflection within sport coaching.

In a similar vein to reflection, critical thinking is concerned with developing an awareness of assumptions that might previously have been taken for granted (Brookfield, 1997). Assumptions are important and necessary for coaches to function within their roles. Assumptions are born out of beliefs (Wolfe & Samdahl, 2005), but coach developers (as part of coach education) cannot purposefully challenge coaches’ assumptions without

understanding the underpinning belief. Therefore, coaches need to be made aware explicitly of their beliefs before their assumptions can be challenged (Abraham & Collins, 2011). In a seminal paper, Streat et al. (1997) employed Brookfield's (1995) model of critical thinking to examine the strategic thinking processes of five coaches in a range of sports. They found, perhaps not surprisingly, that the skill of critical thinking was better developed in experienced and accomplished coaches. Although novice coaches understood the importance of critical thinking and challenging their paradigmatic assumptions, they did not possess the skills or knowledge to engage effectively in such critical thinking. In a comparable fashion to reflection, critical thinking acts as a tool to assist coaches with their cognitive skills. However, it appears that it has not yet received the same level of attention in the literature as reflection.

Finally, whilst there is some research that focuses on cognition in, or during, action, there appear to be fewer studies that focus on the wider coaching context that situates cognitions. The prospect of exploring cognition *in situ* is a considerable challenge and will be further explored within the review of methods-related literature. As part of this exploration, Mason's (2002) concept of 'noticing' provides interesting food for thought. Furthermore, Harvey, Lyle and Muir's (2015) work, which will be further reviewed when exploring the notion of catalysts and thresholds, offers an alternative perspective and, as a result, the possibility of filling a gap in the sport coaching literature. Harvey, Lyle and Muir (2015) present a conceptual framework for understanding the coach's decision-making behaviour. As part of the framework, various cognitive processes in which coaches engage are identified. These, it is suggested, contribute to the likelihood of breaching a threshold associated with a perceived need to take some action. Significantly, the process of 'scanning', which is proposed by the authors, would appear to have similarities with that of Mason's (2002) work. However, there are other terms that Harvey, Lyle and Muir (2015) submit such as 'forward reasoning' and 'typicality' that are classified under the general theme of 'situational assessment' which could appropriately be categorised as higher psychological functions.

Reflective issues:

- i) All coaching environments are likely to make demands on particular higher psychological functions, but it might be assumed that generic functions such as reflecting, noticing and some form of adaptation to the environment are present to some extent in all coaching situations.

- ii) Some features of cognition are more commonly researched in sport coaching than others. This may be a function of research design, accessibility or their importance to goals being achieved.
- iii) The range or types of higher psychological functions necessary for efficient functioning as sport coaches, particularly in the 'heat of practice' have not yet been fully established.

2.6 Decision-making

Abraham, Collins and Martindale (2006) state that coaching is a decision-making process. Undoubtedly, decision-making is one of the most conceptually populated areas within sport coaching psychology. To emphasise this point, Lyle and Muir (2020) propose that decision-making might well be considered the central feature of coaching expertise. The evolution of conceptual development associated with decision-making would support Lyle and Muir's (2020) suggestion. Early decision-making research focused on decision styles (democratic versus autocratic), but gradually evolved into the incorporation of 'types' of decision-making by coaches, such as:

- i) non-deliberative vs associative vs rule-based vs schema-based (Goldstein & Weber, 1995).
- ii) rational vs intuitive vs experiential decision-making (Klein & Weick, 2000).
- iii) 'fast and instinctive type 1 decisions' vs 'deliberative and considered type 2 decisions' (Kahneman, 2011).

The case for decision-making research is made by Lyle (1999) who states that "one of the characteristics of expert coaches is that they make decisions in an apparently effortless, intuitive manner" (p. 210). It is suggested that time, or more specifically the lack of it, appears to be one of the main considerations throughout the decision-making literature. The problematic nature of time was first alluded to by Cratty (1970) who observed that many decisions within sport coaching needed to be made rapidly. Therefore, it seems clear that any investigation of coaches' cognitions should examine the type of decisions that are made and importantly, the context in which these decisions are made.

Within the decision-making literature two prominent, yet contrasting, studies were conducted in the early-mid 1990s. First, Jones, Housner and Kornspan (1995) compared the planning of ten expert high school basketball coaches with ten novice middle school coaches on the 'give and go' concept (a pass–move–receive movement). They found that experts tended to focus on establishing goals, took longer to plan sessions and were intent on noticing cues about the players' skill level and ability more than novices. Significantly, however, this study was conducted in a controlled environment, which some academics criticised as being contrived and too far removed from the real world of coaching (Gilbert & Côté, 2013). This appears to be a reasonable critique of such a research approach as coaching is a dynamic social process, within a particular set of goals and contexts, that cannot be simulated or recreated. Conversely, Duke and Corlett (1992) conducted a study on the factors that influenced the taking of a 'timeout' during basketball games. However, their study employed a survey questionnaire to 35 basketball coaches. In each case, the researchers relied on methods that did not directly represent coaching practice – in one case because the context was controlled and in the other because the context was reduced to a number of personal characteristics. These papers demonstrate the limitations in decision-making research that were later to be overcome, to some extent, by a focus through an experiential NDM lens.

Presently there are two well-established paradigmatic approaches to decision-making, PJDM (Martindale & Collins, 2005) and NDM (Lyle, 2010a). Whilst there are differences in the decision-making approaches used between the above authors, they both provide useful insight into the act of decision-making within a complex, time-bound environment and they both attempt to explain the mental activities and processes that underpin those decisions. It is important to note that decision-making has clear links to knowledge (its type and how it is stored and accessed) as coaches draw upon their experiences and different types of knowledge in order to reach their decisions (Côté & Gilbert, 2009; Lyle & Muir, 2020; Saury & Durand, 1998). Consequently, the decision-making literature has an array of useful features that can be used to inform this study.

2.6.1 Naturalistic Decision-Making (NDM)

NDM emerged as a rejoinder to Classical Decision-Making (CDM), as it was unclear as to how proficient decision-makers were able to make choices that were seemingly intuitive and lacking apparent deliberation. Such decision-making drew on knowledge that appeared to be at an unconscious level (Lyle, 2010a; Vergeer & Lyle, 2009). NDM is a decision-making

paradigm that seeks to explore how experts access their experiences, which it is proposed are cognitively ordered in a manner to allow efficient retrieval during stressful, time-pressured, or high intensity environments. NDM was intended to incorporate the decision-making context and aimed to provide researchers with an understanding of how individuals cope and navigate practical real-world situations (Lipshitz et al., 2001). Klein's (2008) ten features of NDM provide a set of helpful criteria to describe an appropriate environment for which NDM is an appropriate lens: ill-defined goals, uncertainty, dynamic goals, dynamic conditions, action-feedback loops, lack of time, high stakes, multiple individuals, organisational goals and experienced decision-makers (p. 17). Reflecting on Klein's (2008) criteria, it is possible to see how these features match the descriptions of coaching offered by Cushion (2007) and Bowes and Jones (2006). The measure of agreement about the dynamic nature of the environment and context-dependent decision-making suggests that researchers need to find methods of enquiry that can address these challenges.

As part of an NDM analysis, Lyle (2010a) proposes three environments (deliberative, semi-deliberative and non-deliberative) that are classified on the basis of the time afforded to decision makers and the level of complexity that exists within the setting. This categorisation provides a useful conceptualisation of coaching environments within which researchers could identify the demands of the coaching environment when collecting data. Nevertheless, it is conceivable that not all situations can be neatly classified, as some sports provide coaches with a variety of particular affordances, dependent upon the sport's specific characteristics (for example, team vs individual sports, training vs matches, and whether it is possible to provide immediate feedback). As part of NDM, descriptive models are employed, such as the well-established Recognition-Primed Decision-making (RPDM) which focuses on pattern recognition and the selection of the first course of action that is deemed to be appropriate (Klein, 1993).

Examining the concept of ways in which coaches make decisions, Lyle (1999) proposes five models of decision-making: 1) the schema model which draws upon domain-sensitive knowledge structures which are activated by recognised patterns, 2) the script schema model which involves a coach recognising the first part of an event as it unfolds, 3) the case script model which is employed when coaches recognise a pattern that is similar to a previously encountered situation, 4) the slow interactive script model which is deployed when coaches are operating in an environment that affords the coach a certain degree of deliberation and there are limited decisions to be made, and 5) an integrated model which

outlines possible outcomes such as expectancies, cues, plausible goals and actions (pp. 221-225). These models of decision-making place emphasis on the coach having knowledge to draw upon and match and select information. However, there are instances where coaches are faced with novel or chaotic situations. It is therefore proposed that coaches are still likely to draw upon and apply their knowledge, as a best fit approach, to novel and complex situations.

These models might usefully be further explored within this research as a potential framework that helps to explain how coaches mentally operate within different sports, domains and contexts. Notably, the synthesis of these models with research on types of higher psychological functions seems likely to contribute positively to an in-depth insight into how coaches cope and navigate within their environments.

Despite its conceptual grounding, there are surprisingly few empirical studies that embrace the NDM paradigm in sport coaching research and therefore, only a select number of studies contributing to a body of empirical findings. This reflects the methodological challenges that act as barriers to: a) capturing cognitions in the field, and b) capturing the in-action cognitions of coaches, and c) conducting this type of research in comparison with other behavioural methods. The work of Debanne and others (Debanne & Chauvin, 2014; Debanne & Fontayne, 2009; Debanne & Laffaye, 2015) has explored cognitive strategies which, it could be argued, have links to the NDM paradigm. Debanne and colleagues' work is reviewed under section 2.11 (strategies to support cognitive engagement). Notable studies that have adopted the NDM paradigm include Macquet and Fleurance (2007) (on badminton), Harvey, Lyle and Muir (2015) (on high performance team sport coaching), Johnston and Morrison (2016) (on rugby league), and Menn et al. (2019) (on handball). These studies are briefly outlined below.

Macquet and Fleurance (2007) used self-confrontation interviews and video recordings of two competitive games as part of a study on four elite badminton players. They found that situational context and history influenced the player's intent during rallies. Harvey, Lyle and Muir (2015) devised a conceptual framework which was then populated with data from stimulated recall sessions using three high performance coaches in basketball, field-hockey and volleyball. They found that coaches used a slow script method of decision-making, and that situations that present a catalyst were established, triggering coaching interventions. Johnston and Morrison (2016) studied ten rugby league coaches using retrospective and

prospective semi-structured interviews as part of a Cognitive Task Analysis methodology to explore how cues within matches impacted the players' decision-making. Their findings suggested that novices reacted to cues at a 'rule-based' level, whereas experts responded at a 'skill-based' level in a seemingly intuitive fashion. Lastly, Menn et al. (2019) studied the decision-making of one elite level handball goalkeeper in one competitive game using video recordings of games and a video-cued recall interview. It is evident from these four studies that NDM offers researchers a broad framework to explore various components of cognition. Moreover, these studies contribute towards a better understanding of the mental processes and activities of coaches. However, these and other NDM studies, not only require a significant amount of researcher time, but they do also not explicitly capture the social ontology, resulting in an in-depth, but partial, understanding of a particular strand of cognition.

2.6.2 Professional Judgement Decision-making (PJDM)

In a prominent paper on decision-making, Abraham and Collins (2011) present PJDM as a "unifying theory" (p.15) to encapsulate a range of epistemological positions. In contrast to NDM, PJDM acknowledges that a blend of NDM and CDM is an alternative way to consider how decisions are made in sport coaching. PJDM as a concept is illustrated by its application in the context of Abraham's model on nested thinking (Abraham, Collins & Martindale, 2006) in which it is posited that decision-making occurs at a variety of levels (macro, meso, micro). Central to PJDM is the notion that decision-making does not necessarily fall into either CDM or NDM categories, rather, it is likely to be better explained by being placed on a continuum somewhere between these two extremes. PJDM offers an interesting perspective, partly because it explicitly recognises that coaching tasks take place in contrasting environments that place different levels of demand on coaches (e.g., planning vs game management). This interpretation of decision-making in coaching suggests that particular types of higher psychological functions might be associated with the cognitive activities resulting from coaches performing different tasks.

PJDM has continued to be employed as a paradigm for empirical research, most notably in adventure sports (Collins & Collins, 2016a, 2016b, 2017; Simon, Collins & Collins, 2017). PJDM is now an established and growing area of research within the sport coaching field and three recent papers are examined below. In an effort to explore observational heuristics in six paddle sport coaches using semi-structured interviews, Simon, Collins and Collins

(2017) found that heuristics were a significant part of how coaches managed the complexity of their environment. Subsequently, the authors proposed that the coaches' mental models and technical templates were prone to heuristic bias. Collins and Collins (2015) used semi-structured interviews and a type of stimulated recall to investigate decision-making practices in five adventure sports coaches. The authors comment on how the 'epistemological chain' (how individual decisions are made based on beliefs about knowledge and learning) (Collins, Collins & Grecic, 2015) is a central part of how coaches help to develop their athletes. As such, they propose that coaches need to personalise the learning environment and process, which in turn places a higher cognitive load on the coaches during practice. Finally, Collins and Collins (2017) build upon their work with adventure sport coaches to explore practical and pedagogical strategies that are employed by coaches to 'buy time' to make decisions. Interestingly, they found that coaches developed mental models of their participants, which were created by a process of questioning and observing both in and out of the adventure sport environment. This suggests that mental models can be enriched and developed by a process of coach enquiry. Consequently, the coaches' mental models were considered to shift and adapt as they gathered more information throughout the sessions.

2.6.3 Summary of decision-making

NDM studies have employed a range of research methods and typically used small sample sizes. In addition, NDM research requires a developed level of expertise in order to conduct knowledge elicitation methods, as they are procedurally complex. However, in the context of this study, it appears that methods (for example, stimulated recall and Think Aloud Protocol) used in empirical research might be the most appropriate to further academic enquiry into sport coaches' behaviour and practice. In contrast with NDM, many studies adopting the PJDM paradigm have tended to use semi-structured interviews as the primary research method, presumably because of their emphasis on an assumed dualism between NDM and CDM. Given the variety of methods employed in decision-making research, it might reasonably be argued that a range of sophisticated research methods (constituting an eclectic research design) are required to reveal more than a 'partial picture' of *what* coaches think about and *how* they think during practice. Lyle (2010a) concludes that in order for NDM to be a viable way forward for coaching research, there is a need to establish or incorporate some specific vocabulary within the literature, for example, terms such as 'pattern recognition' and 'diagnostic hypothesising' which could be conceptualised as types of higher psychological functions. It is advocated that subsequent research incorporates these terms

as part of a contribution to coach education (Lyle, 2010, p. 37). Despite the emergence of, and ongoing work within, PJDM, the decision-making literature will benefit from more empirical practice-based research that attempts to explore, in more direct fashion, the coach's situational assessment and behaviour.

Finally, the primary critique of the existing decision-making literature is its focus on the coach's thinking without acknowledgement, or reference to, the wider socio-cultural context (Cushion, Armour & Jones, 2006). This criticism may be partially addressed by Collins and Collins' (2015, 2017) attention to the physical environmental in adventure sports and its impact on the coaches' cognitive process. Although this acknowledges the impact of an external situational factor, it falls short of addressing the socio-cultural context alluded to earlier by Jones and Wallace (2005, 2006) and more recently Jones and Corsby (2015). Consequently, the incorporation of contextually-sensitive research designs into sport coaching research is both a pressing need and an opportunity to address a gap in the field.

Reflective issues:

- i) NDM and PJDM paradigms do not explicitly provide research approaches that account adequately for the socio-cultural context.
- ii) It appears that the relevance and applicability of findings from decision-making research is somewhat limited by the research methods at the disposal of academics.
- iii) There are potential opportunities to contribute towards empirical research in the field of decision-making by sport coaches.
- iv) Could NDM and PJDM be used to elaborate further the higher psychological function vocabulary?

2.7 Coaches' knowledge

2.7.1 Knowledge structures

Lyle (2002) states that "knowledge is stored in abstract cognitive frameworks known as schemata" (p. 139). There is much research in the literature that has sought to expand upon

types of knowledge, also referred to as knowledge structures (Abraham, Collins & Martindale, 2006; Côté et al., 1995; Côté, Salmela & Russel, 1995a, 1995b; Lyle, 2002). Abraham and Collins (1998) distinguish between two types of knowledge: procedural and declarative. Declarative knowledge can be described as 'the knowledge of understanding' (Abraham & Collins, 1998) or 'knowledge about things' (Lyle, 2002). This is further elaborated on by Kihlstrom (1999) who notes that declarative knowledge is factual and can be illustrated with "sentence-like propositions" (p. 181). In contrast, procedural knowledge is concerned with 'knowing how to' (Lyle, 2002). Kihlstrom (1999) states that procedural knowledge involves mental and behavioural operations, best understood as a system of condition-action rules. In a coaching context, the condition might be thought of as features of the coaching environment that change and trigger an associated action (perhaps best thought of as an 'if-then' relationship). Both declarative knowledge and procedural knowledge are available to conscious introspection which can be associated with critical thinking (Brookfield, 1995, 1997).

Abraham and Collins (1998) conclude that coaches ought to acquire and reflect on declarative knowledge to challenge/improve procedural knowledge, although the relationship from one to the other is not made clear. The distinction between these types of knowledge is important in the context of coach education. For example, whilst there may be value in young or inexperienced coaches gaining procedural knowledge (for instance, young or inexperienced coaches may need to gain experience using prescriptive formulas before they are afforded the opportunity to critically unpack their practice), there is limited value to experienced high-performance coaches in teaching and developing procedural knowledge without an appropriate level of underpinning declarative knowledge, as, without it, critical appraisal and changes to practice are less likely.

As part of an attempt to define coaching effectiveness, Côté and Gilbert (2009) propose three types of knowledge: professional, interpersonal and intrapersonal. First, the authors group declarative and procedural knowledge under the general theme of 'professional knowledge', proposing that it can be understood as 'knowledge required to coach'. In a subsequent paper, Gilbert & Côté (2013) explain that procedural knowledge can be viewed in two ways, 1) from a skill perspective and 2) from a decision-making perspective. However, they also suggest that there is a degree of commonality between the two approaches. For example, procedural knowledge relies upon forward-reasoning whereas the skill perspective relies on the predicting of outcomes. Using this example, it is possible to see some of the

similarities in the research. A wealth of research on coaching knowledge literature appears to have adopted the decision-making perspective, which, presumably, is because there is a sufficient body of existing literature upon which to base findings. Second, interpersonal knowledge offers a different focus from the declarative and procedural types of knowledge that have been proposed. Coaches are required to have 'knowledge of' and 'understand the needs' of their athletes (Côté & Gilbert, 2009). This form of knowledge has its conceptual roots in leadership literature (Becker, 2009) and conceivably links with the concept of orchestration (Bowes & Jones, 2006; Jones & Wallace, 2005) if this is interpreted as a form of integration and aggregation of knowledge. Undeniably, this form of knowledge is important, and it is likely that only longitudinal methods, such as case study or ethnography, will offer sufficient depth to capture coach-athlete relationships to a useful level of detail.

The third type of knowledge that is suggested is coaches' intrapersonal knowledge (Côté & Gilbert, 2009). This knowledge is concerned with the extent to which coaches understand themselves. There are obvious links between intrapersonal knowledge, reflection (Cushion, 2018; Gilbert & Trudel, 2001; Stodter & Minto, 2020; Whitehead & Richards, 2020) and critical thinking (Brookfield, 1995, 1997) as coaches consider not only the effectiveness of their behaviours, actions, cognitions and paradigmatic approaches, but also their motives, goals, resources and values.

Saury and Durand's (1998) paper on practical knowledge in expert sailing coaches is one of the most cited papers in sport coaching literature. Interestingly, they found that coaches drew upon procedural and personal knowledge to cope with the complexity of the environment. Furthermore, they suggested that coaches implemented strategies and routines to negotiate the complexity of their environment. Saury and Durand's (1998) work on sailing coaches highlights the complexity of the research environment, but it also demonstrates the impact of a dynamic, ever-changing and high stakes coaching setting on cognition.

In the context of this study, coaching knowledge is assumed to be a central component of cognition. Specifically, it is the access to and application of this knowledge that is central to the original research questions. Clearly, the study of coaching knowledge is sufficiently vast to merit a study in its own right. However, this research is less concerned with the categorisation of a coach's knowledge or whether the application of this is effective. The central concern here is the cognitive organisation that deploys knowledge in many forms.

2.7.2 Sources and the development of coaching knowledge

There is a wealth of research on coach education and its importance to coaches' learning (Cushion & Nelson, 2013). According to Mallet et al. (2009), learning takes place in a variety of locations and is dependent upon the coach's stage of development. In a systematic review, Walker, Thomas and Driska (2018) examined the context, methods and means of informal and non-formal learning for sport coaches. Their findings were classified into four chronologically assembled categories: 1) early coach learning research from 1970 – 1990, 2) defining and tracking coaching expertise from 1990 – 2000, 3) conceptualising coach learning: informal, non-formal and formal learning from 2000-2009 and 4) finding a balance in informal and formal learning from 2009-2016 (pp. 694-695). As part of their findings, they concluded that there was a diverse range of research approaches across publications. The research focused on elite sporting environments and qualitative cross-sectional methods tended to be the most frequently used. Finally, coaches were found to be open to a variety of ways in which to learn, such as interpersonal interaction and independent study.

Cushion and Nelson (2013) summarise optimal coach learning as a blend of informal and formal opportunities that contain appropriate reflection on experiences and beliefs. There is recognition in the literature that coach learning ought not to be prescriptive, rather it must account for the social context in which coaches operate and encourage coaches to engage in learning as a personal, social, tacit, explicit and emergent process. This sentiment is reflected by Cushion and Nelson (2013) and in recent work by Vinson, Huckle and Cale (2020) on 'landscapes of practice' that aims to employ a sociological perspective to examine 'boundary encounters' as mechanisms for learning. This provides an interesting perspective to understand how coaches learn, as well as a reinforcement of, the significance of understanding communities of practice and social influences, i.e., context, on coaches' mental operations.

Reflective issues:

- i) There are few studies that explicitly attempt to address access to coaching knowledge *in situ*.
- ii) It is suggested that decision-making, to some degree, includes coaching knowledge.

- iii) Do certain coaching environments hinder a coach's ability to retrieve and access information?

2.8 Mental models - existing conceptual treatments

One of the most prominent academics on mental models is Philip Johnson-Laird (2005). Much of his work underpins the concept of mental models in the sport coaching literature. Johnson-Laird (2005) states that "mental models represent entities and persons, events and processes, and the operations of complex systems" (p. 187). The concept of mental models was originally intended to explain how 'thinking' might be influenced or informed. Mental models provide individuals with a mental construction, for example, a diagrammatic layout, that provides a richer understanding of a concept than written words (Johnson-Laird, 2005). Mental models are considered to be an important aspect of Lyle's (1999) schema models as discussed in 2.7.1 (Naturalistic decision-making). The formulation of these mental models allows coaches to compare and mentally manipulate variables which facilitates a more informed choice of action.

Lyle (2002) and Lyle and Cushion (2017) propose three models that might be used by coaches: goal model, performance model and simulation model. First, the goal model is used as part of the process to allow coaches to identify 'macro-level' planning, establish milestones and consider contingency strategies, akin to a 'what if?'-type scenario. Second, the performance model is a technical framework concerned with what the coach expects from the athlete's performance, for instance, time scales, stages and the rate of progression. Third, the simulation model involves mental scripts that predict future events, drawing on what has happened in the past. It also focuses on action-based solutions to remedy potential threats to objectives being achieved.

'Good' mental models are suggested by Abraham and Collins (2011) as an integral part of PJDM. The authors suggest that accurate and effective mental models require a high level of cognitive engagement, critical analysis, and time to make decisions. Whilst mental models require all of the above in order to be constructed, it could be argued that once formed, they act as resources at an individual level, but will also require a level of cognitive engagement to ensure that they remain up to date and accurate (Lyle & Cushion, 2017). This is an aside, however, there appears to be a great deal more conceptual attention to

mental models within the literature, in comparison with the number of empirical studies that have been conducted. Furthermore, most of the research on mental models within sport coaching has focused on mental models in team sports (e.g., Filho, Tenenbaum & Yang, 2015; Gershgoren et al., 2013) and the extent to which they are shared, rather than their genesis. These findings demonstrate the need for additional empirical research within the area.

One of the few, yet seminal, empirical research papers on mental models in individual sports is Côté et al.'s (1995) paper assessing expert gymnastic coaches' knowledge. The authors present mental models as a concept to explain how knowledge might be structured and rearranged to make sense of a new situation. They suggest that coaches might develop mental representations of a task that can be drawn upon to direct their behaviours. Coaches can manipulate these internal structures to create a working model (Côté et al. 1995). Interestingly, the authors acknowledge that mental models might not give a complete understanding of the inner mental workings of a coach, but they do offer a useful representation of how ideas and concepts might be situated and interact with one another. More recently, Harvey, Lyle and Muir (2015) allude to coaches' mental models as part of their study on NDM in team sport coaches. They introduce a conceptual model framework designed to elaborate on decision-making cues. The authors discuss the need to clarify the coaches' goals, which in turn help to establish richer performance and simulation mental models. This would appear to be an example of 'purposive' psychology (Moskowitz, 1977), which is concerned with goal directed behaviour and was discussed in approaches to cognition. Consequently, it is apparent that goals, or 'purpose', is a central component that warrants consideration in the future research of cognition.

Lyle and Cushion (2010) conclude that mental models are a priority research topic to inform coach education. They state that "the action behaviour that operationalises coaching practice is reliant on some forms of mental representation" (p. 248). Côté et al. (2007) propose that contrasting sports will require different mental models, adapted to fit the sport-specific goals and available choices of action that are unique to the sporting context. It is reasonable to suggest that there is, as yet, and despite some consensus about their importance, no clear understanding of how mental models work in practice. It would appear from the literature, that, despite the absence of a significant research base, drawing upon mental models would provide a useful lens to explore coaching cognitions and better

understand how coaches interpret their surroundings under the influence of a wider socio-cultural coaching environment.

Reflective issues:

- i) One of the main challenges for capturing and researching mental models is the methodological approach.
- ii) Mental models are likely to be devised and shaped dependent upon sport, context and domain.

2.9 Thresholds and catalysts

Reflecting on Mason's (2002) concept of noticing, it is important to appreciate that simply because something has been observed and processed by a coach, there is no guarantee that it will result in an action. Lyle (2007) states that "decision-making (including deciding not to take action!) is triggered by the recognition of a pattern of behaviour or circumstances. This is matched with a 'catalogue' of problem patterns and an action decision may follow" (p. 4). Having stored the information, the level of concern that this causes the coach in relation to expectations may breach a threshold and stimulate the coach to act. Of course, the notion that coaches see and then act upon everything in their sessions is implausible. No-one, coach or otherwise, has the mental capacity to make such a continuous stream of judgements. Coaches are faced with a wealth of information that is, at times, received in stressful and time-sensitive environments, and in the presence of many other individuals (Lyle, 2007a). The important question is how do coaches decide on which 'noticing' and 'reasoning' should lead to action? It is the situational assessment, scanning and recognition of catalysts (something that has the potential to evoke change within sessions) that is the essential precursor to a resultant action (Lyle, 2002). Coaches use thresholds as mental markers that act as mechanisms to overcome complexity in the environment in which they receive the information. Thresholds that are breached result in triggers that cause an action to be taken (Lyle, 2002, 2003; Lyle & Cushion, 2017).

In a frequently cited paper on stimulated recall, Lyle (2003) refers to different types of competition triggers within volleyball, for example, score lines, momentum changes and flow

of points. These situations inevitably arise within games, and they have the capacity to cause a coach to take associated action. Importantly, this also demonstrates how coaches give priority to certain events within games. Consequently, high priority incidents, such as a goal being conceded, are more likely to trigger an intervention. Similarly, Debanne and Laffaye (2015), adopting an NDM lens, employed regulatory focus theory to model decision-making processes in handball coaches. They noted a total of 18 cues that impacted the choice of the coach's defensive system. However, they also commented that cues were not isolated features of the decision-making process and multiple cues were sometimes considered by coaches when making decisions. This is an interesting finding, as it suggests that cues may not act in isolation and that it may be inappropriate for researchers to treat them as independent variables.

Lyle and Cushion (2017) concede that one of the weaknesses of their 'control box of the coaching process' is the concept of thresholds. For instance, they draw upon previous work and highlight that coaches within different sports (such as athletics, volleyball and swimming) stated that they would wait for different periods of time before intervening. This points towards the importance of context and domain on the timing and type of coaching interventions. Additionally, the authors note the difference in thresholds when athlete targets are not being met, compared to when a performance deficit occurs. This is an important distinction as it suggests that performance deficit could be considered a primary goal which causes a threat to the athlete's outcomes. In contrast, secondary goals, for example ensuring team cohesion, are unlikely to cause a threshold to be breached immediately. This illustrates the complexity of using a threshold lens and it is suggested that there are likely to be a wide range of coaching tasks that govern and inform a coach's threshold at a particular point in time. Harvey, Lyle and Muir's (2015) study on NDM in high-performance team sport coaching provides a further insight into coaching thresholds. Within the study, they devised a conceptual framework which was then populated using data from a total of 18 stimulated recall sessions. The authors identified several catalysts that had the potential to breach a coach's threshold and trigger an action. Significant catalysts that were identified included: a threat to goals being achieved, drills not working, opportunities to build on success, and momentum shifts.

The literature suggests that thresholds are an area that would benefit from further research (Harvey, Lyle & Muir, 2015; Lyle & Cushion, 2017). Overall, there is limited empirical research within the sport coaching domain despite recommendations for attention to this

area on thresholds. Although the greater part of the academic writing is focused on performance management, this area might be developed to incorporate a coach's or athlete's social relationships and organisational or other contextual resource features that result in changes to coaching practice.

2.10 Strategies to support cognitive engagement

Coaches employ strategies such as mental models and the setting of thresholds to overcome and cope with complex environments (Lyle & Cushion, 2017). The expert-novice paradigm has been used within the sport coaching literature (Nash & Collins, 2006; Vergeer & Lyle, 2009) as a way to explore how expert decision makers can make better decisions. The expertise-based literature in sport coaching concludes that experts can adapt to situations, structure knowledge, develop routines and solve problems, better than novices (Nash & Collins, 2006). In the context of this study, it is the notion of routines, as a response to complexity and limited capacity for continuous action, that is of particular interest.

Previously, the review has discussed types of higher psychological functions (i.e., types of thinking) that might usefully be elaborated upon as part of this study. This is because it is speculated that coaches who regularly engage (perhaps consciously) in higher psychological functions such as noticing, reasoning and problem solving will be more effective in situations that afford coaches more time and fewer distractions. As an example, Bloom, Durand-Bush and Salmela (1997) explored the pre- and post- competition routines of 21 team sport expert coaches. They found that the coaches planned extensively and had devised embedded routines as part of their practice. This allowed them to focus their attention on tasks over which they had little control, in the knowledge that they did not need to be concerned about routine pre-match tasks. Organisational routines are also discussed by Saury and Durand (1998) who found that the development of pre-activity routines resulted in greater efficiency and maximisation of time within sessions.

Debanne and Fontayne's (2009) study on an elite handball coach's cognitive processes revealed that the coach engaged in many adjustment routines during a match. Interestingly, the authors found a series of pre-established routines that the coach had devised to allow him to focus on key aspects of the game. Debanne and Fontayne (2009) also explored the concept of distributed cognition as part of their study, noting that there are appropriate times

within matches, such as half-time intervals, when cognitions and concepts can be shared with the players. Similarly, Debanne, Fontayne and Bourbousson (2014) explored how handball coaches managed their players' understanding at various times throughout the game. Their findings revealed that coaches adopted different strategies to communicate with individual players or the team as a whole, dependent upon the score line in the match. The authors suggest that attention to *team* mental models are more prevalent when the team is losing. In contrast, when the team is winning, coaches focused on helping to develop *individuals'* mental models. This paper is noteworthy as it adopted a distributed cognition paradigm which appears to be a novel approach in the sport coaching literature.

To date, few studies have explored how the sport coaching environment might be manipulated to facilitate cognitive strategies being used and in turn support coaches in engaging with types of higher psychological functions. This line of research is further complicated by the differences in sports and the idiosyncratic nature of coaches (Lyle & Cushion, 2017). However, it suggests that cross-sport similarities may be possible as a basis for such research.

Reflective issues:

- i) How might the concept of thresholds or 'selective noticing' be developed into a more general framework across multiple sports?
- ii) The benefit of focusing on key indicators and the limited capacity to absorb and act on all information identifies the need for coaches to 'reduce' their cognitive load. Routines and established practices look to be part of the answer. How do coaches in different sports operationalise their strategies to facilitate cognitive offloading?
- iii) Some sports and coaching environments are more dynamic than others. Another way to present this is to recognise the extent, intensity and timing of the coach's intervention. For example, team sports have more participants, a greater number of interactions, and, arguably, a more complex tactical environment. This, therefore, might require different or additional coaching strategies to overcome the environmental affordances.

2.11 Research methods and approaches used to explore cognition

As part of this review process, and thus to refine further the original research aims, it is necessary to consider the methods used by researchers to explore coaches' mental processes and activities, and, thereby, to suggest how this study might best proceed. This section is intended to provide an overview of a range of research methods that have been used in the field. Furthermore, it is intended to familiarise the reader with the specific methods of enquiry. This provides a further layer of detail and demonstrates how previous research has, to some degree, been limited by the available research methods. Chapter 3 (overview of research design) is deliberately positioned to discuss and establish general methodological approach and direction of travel for the remainder of this research.

The common criticism of research approaches and methods used in this area of study is that they fail to account for, or capture, the complexity of the socio-cultural context (Cushion, 2007). Lyle and Vergeer (2013) feel that this is overstated, and that decision-making must indeed be included in the situational context (even if existing methods are limited in their capacity to acknowledge this), as this is what coaches are having to navigate and manage in a practical sense, whilst also engaging their mental capacities.

What follows is not intended to be an exhaustive review of the literature regarding research methods, approaches and procedures. It is a brief account, designed to provide the reader with a summary overview of existing potential research methods that are situated and have been deployed within the wider sport coaching literature, followed by some conclusions about which research methods and approaches might be viable and appropriate to employ within this research.

2.11.1 Questionnaires

Lyle and Vergeer (2013) list questionnaires as the most frequently used research method, although their usage within the field of cognitions has been sparse in recent years. Survey instruments were a common feature of earlier research on 'types' of decision-making, particularly on leadership styles in coaching (Reimer, 2007). Whilst questionnaires provide the opportunity to capture what decisions a coach would like to select; they do not reveal

much about the coach's mental processes. In addition, questionnaires tend to be reductionist in nature in order to increase their reliability. This reduces their contextual relevance. Furthermore, they are of limited value to research approaches that adopt the NDM paradigm, which are directed towards the nuances of decision contexts, and are rarely, if at all, employed in NDM empirical studies.

2.11.2 Interviews

Interviews can be categorised as either structured, semi-structured or unstructured (Purdy, 2014). Interviews have been used extensively within sport coaching and are evident, in some form, in many empirical studies. Gilbert and Trudel (2004a) performed an extensive analysis of coaching research between 1970-2001 and found that, although questionnaires were the most common research method, their decline was due to an increase in researchers using interviews. Cushion (2014) suggests that while the field of sport coaching has adopted qualitative research methods, to its detriment, singular methods have been employed that focus on individual responses or case contexts, with interviews being the most commonly used. Purdy (2014) comments upon the importance of ethics and rapport when conducting effective interviews. This is of particular significance when cognitions are explored in a broader social-cultural context, as coaches might be sharing confidential and sensitive information. Interviews offer an opportunity to capture rich information and interrogate the coach's thought processes. However, the main critique of this approach is that they are retrospective and 'indirect' methods do not capture 'cognitions in action'. Furthermore, interviews are susceptible to fallible individual accounts and do not, at least in isolation, challenge or triangulate individual narratives (Purdy, 2014). Such an emphasis on 'reported behaviour' requires a careful consideration of the biases that might be influencing the participant's responses.

2.11.3 Cognitive Task Analysis and Applied Cognitive Task Analysis

Mental models have typically been explored through methods that attempt to examine knowledge, such as Cognitive Task Analysis (CTA) (Abraham & Collins, 2011). Nash et al. (2012) suggest that CTA might be used advantageously to explore what coaches know and what they believe they might do with that knowledge. Militello and Hutton's (1998) adapted version of the method, Applied Cognitive Task Analysis (ACTA), has recently been used by

Collins and Collins (2020) as part of a mixed-method research approach, to explore coaching processes and decision-making in lead climbers. This method therefore has some promise as an effective means of exploring mental models and knowledge, yet may need some modification if it is to capture coaching knowledge during practice/sessions. A vital step in an ACTA methodology is a simulation interview, which, it is suggested, would prove valuable in the context of this research, albeit with some modification to capture data *in situ*.

2.11.4 After-action reviews

After-action reviews require participants to comment retrospectively on the thoughts underpinning their actions. Of these methods, stimulated recall appears to be the most prominent. Stimulated recall using video footage offers researchers the opportunity to explore coaches' real-time decisions and analyse the rationale and thinking that underpins those decisions. Lyle's (2003) paper on stimulated recall outlines the benefits of this method, suggesting that it is highly appropriate for use in naturalistic settings. Furthermore, stimulated recall is free from time pressure (although needing to be conducted relatively soon after the event) and affords researchers a degree of freedom in probing more deeply into relevant responses. However, there are many variations of this method, and it is important that the research design matches the researcher's intentions (Gass & Mackey, 2016). Interestingly, Lyle (2003) concludes that "[Stimulated recall] SR has the potential to identify and establish interactive classroom skills such as pattern recognition, diagnostic hypothesising, impact-forestalling techniques, and meta-recognition capacities" (p. 874). To date, stimulated recall is the most common method of retrospective analysis (Lyle & Muir, 2020). Whilst acknowledging its limitations, this supports the potential use of stimulated recall as an appropriate method to explore higher psychological functions (Cole & Engeström, 1997).

2.11.5 Simulation activities

As an alternative method to retrospective approaches, coaches can respond to purposefully pre-designed scenarios which are typically shown to them by video. As an example of a simulation activity, Austin, Sparrow and Sherman (2007) showed 28 coaches four pre-recorded basketball coaching videos. Afterwards, they asked them to recall where their players were positioned and explain their opinion about whether they ought to call a time

out, or not. This approach allows researchers to adopt an experimental research design. However, simulation activities do not capture the coaches' mental processes in an ecologically valid environment, as they lack appropriate social, contextual (as, for example, in-goal direction) or emerging/historical framing.

2.11.6 *In situ* verbalisation (Think Aloud Protocol)

There are a growing number of empirical research studies that have employed Think Aloud Protocol to investigate cognitive processes (Swettenham et al., 2020; Welsh, Dewhurst & Perry, 2018; Whitehead, Taylor & Polman, 2015; Whitehead et al., 2018). Specifically, these studies have typically sought to explore cognitive processes in athletes. Furthermore, they have been used in self-paced sports and often as a mechanism designed to encourage reflection on action (Whitehead & Richards, 2020). Think Aloud Protocol was initially designed to overcome the issue of memory decay which was problematic in retrospective verbalised accounts. For the purposes of this study, Think Aloud Protocol appears to have significant potential as a suitable method for attempting to capture *in situ* cognitions.

2.11.7 Systematic observation

Lyle and Vergeer (2013) identify systematic observation as a potential research method. However, it is recognised that this method has limited applicability and scope as the sole means of accessing coaches' cognitions in the context of the research problem being investigated. Observations provide a useful insight into what coaches do, their patterns of behaviour, yet the underpinning knowledge, goals and mental models are, at best, inferred when using this approach. Nevertheless, a form of systematic observation could usefully be employed as a complementary research method, in conjunction with others, to triangulate and thereby provide a level of additional rigour to studies into cognition.

2.11.8 Ethnography

Ethnography as a research approach (not a singular method) has typically been used by researchers to explore coaching as a complex social phenomenon (Cushion, 2014). Moreover, it has been used within sport coaching to explore a variety of different features.

As an example, autoethnography has been utilised by Townsend and Cushion (2020) to explore reflexivity in high performance disability sport. Ethnographic approaches are longitudinal and involve multiple research methods to capture the social complexity (Cushion, 2014) and intimacy of research settings (Douglas & Carless, 2016). Of the research methods that have been briefly outlined above, ethnography appears to be the most appropriate research approach if cognitions are to be considered against a socio-cultural backdrop.

2.11.9 Conclusions on available research methods and approaches

Upon reviewing the list of research methods and approaches previously used to undertake this type of research, it would appear that there is no one singular 'perfect' method that is unequivocally supported by the academic literature when its purpose is to reveal the mental processes and activities of coaches. This view is echoed by Lyle and Muir (2020) who conclude that, in what is yet a sparse field of enquiry, "what is not clear is whether the methodology is simply underdeveloped in coaching research, or the methods of enquiry into cognitive processes are difficult to conduct" (p. 18). Consequently, it is likely that contrasting, but complementary, approaches will prove most effective in revealing different parts of the coaching picture and contributing towards a better understanding of the cognitive processes and activities of coaches.

Amongst the recent literature, there are three emerging and contrasting conceptual frameworks with associated methodologies that have been adopted in sport coaching for research into cognition: 1) Think Aloud Protocol (Whitehead and colleagues) (used in self-paced sports), 2) PJDM (Collins and colleagues) (used in adventure sports), and 3) Debanne and colleague's work on cognitive processes (principally in handball). These approaches are very useful in providing insights into how coaches mentally operate and cope during practice. Despite this, the limitations attached to each approach suggest that they could usefully be elaborated upon by exploring the wider socio-cultural context and its influence on coaching cognitions. Consequently, it is proposed that the investigation addressing the research questions identified in this study will be most effective if deploying a variety of methods in order to understand better how coaches mentally function in their coaching environments.

Reflective issues:

- i) Singular research methods provide a useful, yet partial, picture of coaching processes. Multiple methods are likely to be required in order to overcome issues of complexity and context.
- ii) The main challenge appears to be in the selection of the most suitable and ecologically valid research methods.
- iii) An ethnographic approach appears to offer the most potential to explore cognitions in an embedded socio-cultural context.

2.12 Summary of review

Reviewing the literature has resulted in a more informed position and, as such, a clearer picture of the problem has emerged - the conceptual themes and issues acknowledged to be significant in the coaching literature are not always accompanied by an existing body of empirical research. This is particularly evident in considerations of coaches' cognitive organisation and processes, especially when focused on *in situ* practice. Consequently, the term 'cognition' as a whole is poorly defined and, as yet a full account of how coaches cognitively operate in practice is not available. To reiterate, the term 'cognition' will be understood in the context of this study as, '*activities and processes that occur inside the coach's head, whilst coaches are situated in a particular environment and context*'. This definition has informed the review of relevant literature in the sport coaching domain.

Reflecting on the overview of conceptual themes and existing research priorities, there appears to be a difference of perspectives and an evident conceptual tension about how best (or at least most appropriately) to represent and understand sport coaching. For example, there are those researchers who stress the importance of social relationships, power dynamics and roles, and those who advocate the significance of cognitive processes. Whilst both perspectives undoubtedly contribute value to the field within their own academic 'bubbles', it can be argued that they are not mutually exclusive viewpoints, and that a more sophisticated and inclusive research approach is required to attempt to redress this schism in the literature.

This review has found that further investigation is needed into the following areas: a vocabulary to describe higher psychological functions beyond decision-making, reasoning, strategising and reflecting; mental models in different coaching environments; elaboration of the concept of thresholds; consideration of cognition in a broader socio-cultural context; and development of research methods used to explore cognition in general. The original, broad research aims that were stated at the beginning of this review, centred around identifying the cognitions on which coaches depended, the emphasis of these in coaching practice, and how these might be described. These questions are situated within an area of research on 'higher psychological functions', about which there is clearly a gap in the sport coaching literature. The summary position, therefore, is that this research study, in investigating how coaches think and what they think about, and by embracing the socio-cultural context, is addressing an aspect of the academic field that is a necessary precursor to a fuller description and understanding of coaches' behaviour and practice, and a subsequent potential contribution to education and development.

2.13 Further research considerations

Before the final research questions that will direct the remainder of this body of work are determined, it is necessary to reflect on some key deliberations, arising from the review of literature, about the structure and direction of the study. Given the inherent difficulty of conducting research in this area, the points below are intended to act as an important set of principles, offering a broad framework for the conduct of the research.

- 1) Coaches' practice is evident in the tasks that they perform. These tasks would be recognised as the day-to-day activities of the coach and are instrumental in achieving the outcomes that they and their athletes have identified. Therefore, the identification of the task in the first instance will serve as a useful starting point from which to situate and explore the cognitive activity involved in such actions.

- 2) Undertaking research of an exploratory nature in the early stages of this body of work, particularly in (a) evaluating methods of enquiry, and (b) using a staged approach to permit an evolving picture of what is inevitably a partial account of cognitions, will be helpful in finally coming to a better understanding of cognitions in sport coaches. As identified in this review of the literature, gaps exist in areas such as higher psychological functions, mental models in different coaching environments and decision thresholds.
- 3) On balance, the evaluation of limitations associated with particular research methodologies in the literature suggests that an ethnographic method is likely to be the most appropriate way to access the richness of the socio-cultural context of sport coaching.

2.14 Refined research questions and aims

There are many areas of potential research that have been highlighted throughout this chapter and the reflective issues offered at the end of each section serve as a useful reminder of some conceptual areas, gaps in the literature and methodological limitations. Finally, as a result of the critical appraisal and the scoping of the literature, it is now appropriate to refine the original research questions and make explicit the key investigative questions that will drive the remainder of this work. With this in mind, and in the light of the review of literature, the research questions and aims are:

Research questions:

RQ1) What is the nature of the relationship between coaching cognitions and the particularity of the coaching context?

RQ2) To what extent does an appreciation of the coaching context contribute towards an understanding of how coaches think and what they think about?

Research aims:

- 1) To investigate coaching tasks, as a starting point, to understand more accurately the fine-grained detail of what coaches are required to do.
- 2) To investigate cognitions and explore the patterns of coach thinking in coaching practice.
- 3) To explore how coaches mentally operate and strategise under pressure.
- 4) To examine cognitions against a wider socio-cultural backdrop.
- 5) To analyse the strengths and weaknesses of different research methods and approaches when investigating cognition

Chapter 3

Study 1: An exploration of coaching tasks, cognitions and higher psychological functions in tennis using a modified Applied Cognitive Task Analysis (ACTA) including stimulated recall.

3.1 Introduction

In the previous chapter, various methodological approaches were discussed and reviewed for their suitability for, and potential contribution towards, the research of coaching cognitions. The purpose of this first study was to: a) describe the tasks that were characteristic of tennis coaches; b) explore cognitions during practice; and c) examine the type of higher psychological functions (types of thinking in which specific cognitions can be grouped) that tennis coaches employ during practice. This study reveals a framework of nine higher psychological functions in which coaches engage during various coaching tasks. These findings have the potential for wider application in future studies of this nature and might be useful to a range of sports. In addition, Applied Cognitive Task Analysis (ACTA) (Klein, 1992; Militello & Hutton, 1998) and stimulated recall (Harvey, Lyle & Muir, 2015; Lyle, 2003) are examined and evaluated in terms of their suitability and ecological validity for research in this field.

As discussed in Chapter 2, early approaches to researching sport coaching adopted methodologies designed to explore various elements of coaching behaviours (Bloom, Crumpton & Anderson, 1999; Tharp & Gallimore, 1976). These approaches are widely recognised in the academic literature and have been expanded upon, resulting in conceptual models 'for' and 'of' coaching (Côté, Salmela & Russel, 1995a, 1995b; Cushion, 2007; d'Arripe-Longueville et al., 1998). Cognitive approaches within sport coaching research have explored 1) decision-making (Abraham, Collins & Martindale, 2006; Lyle, 2010a; Nash & Collins, 2006), 2) knowledge structures (Saury & Durand, 1998, and, 3) decision-making models (Abraham & Collins, 2011). This study adopts a modified Applied Cognitive Task Analysis (ACTA), incorporating stimulated recall, as the knowledge elicitation method to describe *what* coaches are required to do and explore *how* coaches engage Higher Psychological Functions whilst performing these tasks, as a way of situating cognitions.

To date, there are no studies that explore the cognitions of tennis coaches. In the context of this study, tennis presented some particular sporting characteristics which will be outlined below. Reflecting on the sport-specific environment of tennis coaching, it is argued that coaching in individual sports is different from coaching in team sports (Lyle, 2010b). This is largely a result of the complexity and difficulty caused by the larger number of athletes. However, there is some similarity in the coaches' engagement in the micro-management of practice sessions. In circumstances in which coaches adopt such an approach, the capacity to observe and analyse the athlete's performance becomes more problematic. Tennis coaches are commonly required to be the opponent, ball feeder, coach, observer, analyst, and provider of feedback (Swettenham et al., 2020). Undertaking these tasks, often at the same time, is likely to result in a high cognitive and physical load for the coach. Within the sport coaching tennis-related literature, Pill, Hewitt and Edwards (2016) examined effective teaching styles in junior tennis and found that coaches were unaware of the factors that influenced their coaching style, which, it is suggested, stems in part from constraints on cognitive processes. Similarly, Hewitt (2015) found that tennis coaches were unaware of their teaching style within coaching sessions and did not examine their cognitions as underpinning reasons. Both studies suggest a need for coaches to develop greater situational awareness in order to understand the reasoning that underpins their behaviours. Additionally, Reid et al. (2007) explored the teaching of skill acquisition in tennis to facilitate player progress and concluded that, when coaches worked with novice players, they focused on technical development to improve player performance. However, the reasoning behind the emphasis on technique was not explored. Consequently, cognitions and tennis are both under-researched areas and this study addresses both of these gaps in the academic literature.

In responding to the general call for greater *in situ* coaching research (Lyle, 2018; North, 2013a), it was apparent that tennis coaching presented a high degree of challenge to capture cognitions in a naturalistic setting. To address this problem, as a refinement of the ACTA methodology, stimulated recall was chosen as the knowledge elicitation method in place of a simulation interview as it provided the opportunity to collect data within a naturalistic setting (Flett, Sackett & Camiré, 2016) and kept ecological validity within the study. Importantly, there is no singular, overarching or prescriptive method (pre-session interview, post-session interview, video prompting, audio prompting, etc.) for using stimulated recall as a research tool (Lyle, 2003) and, as such, researchers have conducted studies that adopt slightly different approaches depending upon the aims of the investigation (an illustration of these difference in approaches is mapped out in Figure 3.1). Building upon

this literature, this first study employed stimulated recall using video recordings of the coaching sessions, together with a researcher-led interrogation of the coach's cognitive processes whilst the video was played back to them.

Given that the focus of this initial study was on coaching tasks, cognitions during practice and higher psychological functions, it was necessary to adopt a research approach that would strategically collect data on all three areas. Therefore, a modified Applied Cognitive Task Analysis (ACTA) was devised, using stimulated recall as the selected knowledge elicitation tool in place of a simulation interview as it was considered that this would be more likely to reveal *in situ* cognitions.

3.2 The key concepts of Applied Cognitive Task Analysis

In order to understand ACTA, it is necessary to discuss, trace, and understand the origins of Task Analysis, Cognitive Task Analysis, and Applied Cognitive Task Analysis. This next section will explore and summarise the origins and intentions of the three methodologies in turn.

Task Analysis is defined as “what a person is required to do, in terms of actions and/or cognitive processes, to achieve a system goal” (Schraagen, 2006, p. 185). Task Analysis was typically adopted by applied researchers who sought to understand the range and complexity of tasks that people performed in their profession. Freeman and Louça (2001) present a historical review of task analysis in the broader economy by categorising three distinctive periods: 1) The age of heavy engineering (1895-1940); 2) The age of mass production (1941–1973); and 3) The age of information processing and telecommunication (1970–present). Each of these periods contained jobs that were studied in order to improve efficiency and efficacy. During the age of information processing there was a research focus on knowledge structures, or cognitions, of subject matter experts, which prompted the field to employ a range of knowledge elicitation methods. Most significantly, the overarching purpose of Task Analysis was to facilitate an understanding of the tasks, in the hope that it would lead to an improvement in performance (Schraagen, 2006).

Second and more recently, Cognitive Task Analysis (CTA) was developed as an extension of Task Analysis, in response to the research focus on knowledge structures in the information processing age. Howell and Cooke (1989) claim that advances in technology reduced the need for humans to perform procedural tasks, due to automated machinery. As a result, they asserted that tasks had become more cognitive in nature, prompting a need to research cognitively demanding tasks that require decision-making, diagnosing, and judgement (Schraagen, 2006).

CTA began as a suite of methods designed to help researchers in “describing and representing the cognitive elements that underlie goal generation, decision-making, judgements, etc”. (Militello & Hutton, 1998, p. 1618). Typically, within CTA, the majority of the data is collected via interviews with subject matter experts in order to identify “situation assessment strategies, identification and interpretation of critical cues, metacognitive strategies, [and] important perceptual distinctions” (Militello & Hutton, 1998, p. 1618). Seamster, Redding and Kaempf (1997) state that CTA itself is one of a variety of knowledge elicitation methods that are grouped together according to certain similarities; for example, the type of knowledge that they are designed to access (declarative or procedural). Cooke (1994) proposes that knowledge elicitation methods exist as apparatuses to apply when exploring cognitions and that different methods will be more suitable dependent upon the situational context.

Third, the acknowledged limitations of CTA (Hall, Gott & Pokorny, 1994) led to the development of Applied Cognitive Task Analysis (ACTA) as a refined research approach to overcome the significant time and resource limitations of CTA (Militello & Hutton, 1998). ACTA consists of four techniques that when combined constitute an Applied Cognitive Task Analysis. Militello and Hutton (1998) outline the following four techniques: 1) task diagram interview; 2) knowledge audit; 3) simulation interview; and 4) a cognitive demands table. ACTA provides a relatively streamlined, clearly prescribed and, logical approach when conducting research in the field of cognition. In the context of this study, ACTA has the potential to offer a robust chain of procedures under the banner of an established framework that can usefully be modified to reveal the tasks, cognitions and higher psychological functions during *in situ* coaching practice.

This section has explained the rationale and reasoning behind choosing ACTA as a research approach to access tasks, cognitions, and higher psychological functions within

tennis coaching practice. However, it is important to note that the original research intentions of both CTA and ACTA are the same (how people achieve goals through cognitive activity and actions), and within the context of this study, ACTA by itself does not capture data in a naturalistic setting. This *in situ* data collection is essential when undertaking research that focuses on embedded and context-specific cognitions. Consequently, the next sections will elaborate on a series of methodological implications and, therefore necessary, refinements to ACTA.

3.3 Methodological implications

The previous section has outlined the development of ACTA as an approach to understand the cognitive tasks of subject matter experts. In this section, a case will be made for using ACTA as a broad framework. However, its potential fallibility will also be highlighted, which in turn will pave the way for necessary conceptual and methodological refinements in the section that follows.

An ACTA-informed approach provides a robust framework with sufficient flexibility to generate an understanding of the tasks, cognitions, and higher psychological functions of coaches. However, it is acknowledged that in order to understand coaching tasks and coaching cognitions, mere observation of coaches (or coaching behaviours) is unlikely to provide any richness of data or genuine insight into immediately non-observable coaching tasks and, of course, accompanying cognitions. It can be argued that, at best, observable behaviours will facilitate a level of speculative themes. Therefore, ACTA, which includes interviews to identify tasks, is considered more appropriate for unveiling the tasks that coaches are required to undertake in their practice. This stance is supported by Militello and Hutton (1998) who advocate that the majority of the data from any ACTA methodology will stem from the interview phase.

In addition, it is acknowledged that a simulation interview is likely to capture some of the decision-making or critical incident stages of a relevant task. This is an effective method when researching tasks that do not require participant engagement (or thinking) in a social context. However, a simulation interview will not capture data that is ecologically valid or within a naturalistic setting as it does not reflect the complexity of the environment in which a coach is operating. Therefore, a decision was taken to employ an alternative method that is

more appropriate for capturing cognitions and identifying the presence of higher psychological functions, particularly in environments that present coaches with multiple options, a lack of clearly defined goals, and/or multiple stakeholders.

One of the significant benefits of an ACTA informed approach is that it was developed for researchers who did not have a substantive background in cognitive psychology (this is in direct contrast to CTA). As a result, the clearly established steps provide a useful framework that is both logical and achievable to understand when investigating the cognitive tasks of subject matter experts. This section has presented a case for an ACTA informed approach because of its targeted focus on tasks and cognitions. Furthermore, the readily identifiable steps within ACTA are replicable within a number of settings. However, this section has also identified the need for conceptual and methodological refinements to ACTA in order to capture tasks, cognitions and identifying the presence of higher psychological functions during coaching practice.

3.4 Conceptual and methodological refinements

In a recent study, Collins and Collins (2020) employed an ACTA methodology to explore the teaching of lead climbing by adventure sports coaches. By adopting ACTA, a social interaction and focus on the climbers' own experiences emerged as key findings, highlighting the social milieu of climbing as a sport (Collins & Collins, 2020, p. 491). Interestingly, their study focused on the teaching of climbing through a decision-making lens and suggested the sharing of mental models. The intention of the Collins and Collins (2020) study was to explore critical features of practice, an important aspect of adventure sports, and discover any shared mental models between instructors. Climbing has a distinctive sporting profile, characterised by high-risk decision-making, especially in the role of the lead climber (Collins & Collins, 2020). However, it is unclear in their study whether the discovery of a 'social milieu' was intentional or even predicted.

Although it is accepted that there are similarities in the cognitions and actions of coaching across all contexts, there are some potential differences between tennis and climbing that are worthy of mention. First, tennis coaches do not make decisions that place their participants at risk of death, unlike climbing where poor decisions can have fatal consequences. Tennis coaching is likely to manifest as a result of a series of smaller

decisions, with perhaps fewer critical incidents. Second, tennis coaching sessions and matches offer different environmental complexities and mental constraints for coaches. For example, coaching during tennis matches, which was previously against the Women's Tour Association (WTA) rules, but recently trialled by the WTA in January 2020, offers an entirely different coaching environment in comparison to a training session. Third, tennis coaches have the opportunity within coaching sessions to observe and analyse situations many times and from varying perspectives (for example when improving a player's serve).

This section will now outline the methodological refinements that were made to ACTA within this study. Militello and Hutton (1998) advise that "it may be necessary to adapt or modify the scenario (research design) to conform to practical constraints such as time limitations. Developing a new simulation specifically for use in the interview is not a trivial task and is likely to require an upfront CTA to gather the foundational information needed to present a challenging situation" (p. 1623). Consequently, and acknowledging the limitations of ACTA, this study used stimulated recall in place of the simulation interview in order to retain the naturalistic setting of the tennis coaching environment, whilst ensuring that the broad structures of the research were in keeping with the ACTA approach (Militello & Hutton, 1998). The modifications are designed to provide a sharper, practice-relevant, focus on the tasks, cognitions, and higher psychological functions of the coaches in this study.

Table 3.1, which is presented at the end of this section, demonstrates how the ACTA methodology (Militello & Hutton, 1998) has informed the methodological and conceptual refinements within this study. In the first instance, the International Council for Coaching Excellence (ICCE) (ICCE, ASOIF & LMU, 2013) table of competency and responsibility in coaching, which also includes the six 'Coaching Functions': set the vision and strategy, shape the environment, build relationships, conduct practices and structure competitions, read and react to the field and, learn and reflect (illustrated and adapted in Table 3.2 to include an additional emergent 'management function'), provided a robust and established framework to formulate the semi-structured interviews using these Coaching Functions as a stimulus (stage 1 of ACTA).

Importantly, the ICCE Coaching Functions, which were derived from academic literature, offered a wide-ranging insight into broad coaching tasks and were appropriate given the context and focus of this study. The semi-structured interviews with each of the four coaches provided a comprehensive and detailed overview of the tasks that they were required to

undertake as part of their roles. This was closely adjoined to the knowledge audit (stage 2 of ACTA). This approach of using an in-depth interview and observations of coaches *in situ* is supported by Côté and Salmela (1996) who described it as necessary and beneficial in order to understand coaching knowledge during training sessions.

ACTA's simulation interview (stage 3 of ACTA) was replaced with a stimulated recall method involving retrospective verbalisations of coaches whilst watching their video recorded coaching sessions to capture coaching tasks, cognitions, and higher psychological functions without compromising the coach's processes. Although ACTA does not mention alternative knowledge elicitation methods, stimulated recall offered a high degree of confidence, given its use in other research within sport coaching (Harvey, Lyle & Muir, 2015; Lyle & Vergeer, 2013). Furthermore, Cooke (1994) also lists stimulated recall as a viable knowledge elicitation method which is explored later in this chapter.

Finally, in the place of a table of cognitive demands (stage 4 of ACTA), the data from the stimulated recall were thematically analysed (details of this are provided in section 3.5.5 (Data Analysis), resulting in a range of tasks, cognitions and higher psychological functions. This form of analysis, it is suggested, was more effective and appropriate in order to reveal these different cognitive components.

Study, modification and explanation.		Stage 1	Stage 2	Stage 3	Stage 4
Applied cognitive task analysis (ACTA): a practitioner's toolkit for understanding cognitive task demands (Mittello and Hutton, 1998).		Task diagram	Knowledge audit	Simulation interview	Cognitive demands table
Refinements to Applied Cognitive Task Analysis	7 functional areas adopted from the International Centre for Coaching Excellence (ICCE) used to inform the semi-structured interviews in stage 2.	Background and task interviews – more focused on roles and responsibilities, rather than knowledge.	8 videoed coaching sessions – followed by a stimulated recall.	Emergent themes of tasks, cognitions and higher psychological functions	
Explanation, rationale and justification	The ICCE framework headings offered a solution to counter the complexity and breadth of coaching. The purpose of the study was to explore coaching cognitions offering some level of standardisation.	This provided a platform from which to explore the variety of roles that the coaches were required to undertake. This demonstrated what coaches were expected to undertake on and away from the tennis court. This expanded the researcher's understanding of coaching beyond sessions and provided an insight into the socio-cultural context.	So as not to interfere with the coaching processes, stimulated recall was employed, which also allowed the interviewer to prompt and explore the coach's decision-making and underpinning reasoning. Stimulated recall preserved the ecological validity and allowed data to be collected in a naturalistic setting which a simulation interview fails to achieve.	A thematic analysis provided a way to classify and explore the coaching tasks and cognitions. Meaning units were categorised and considered given the weight of evidence.	

Table 3.1: Conceptual and methodological refinements of ACTA in study 1

3.4.1 Stimulated recall as the choice of knowledge elicitation method

Within this study and research environment, stimulated recall is an important methodological option due to the possibility of collecting data with direct reference to the subject's naturalistic setting. Lyle (2003) describes stimulated recall as "a family of introspective research procedures through which cognitive processes can be investigated by inviting subjects to recall, when prompted by a video sequence, their concurrent thinking during that event" (p. 861). This method was chosen with reference to its previous usage in teaching, nursing, and counselling, which offer similar interpersonal interactions to sport coaching (Lyle, 2002, 2003). Stimulated recall methodologies have been adapted and utilised in several different research settings, often dependent upon the research design and the research question in mind (Debanne & Fontayne, 2009; Harvey, Lyle & Muir, 2015; Sparkes & Smith, 2014). Moreover, in this study stimulated recall would allow the coaches to focus on the coaching processes, avoid interference within the session, and provide the freedom for their 'cognitive processes to unfurl' (Flett, Sackett & Camiré, 2016). Figure 3.1 demonstrates the positioning of this study against and within the existing academic literature. This modified ACTA approach acknowledges the sport coaching research environment, when examining tasks, cognitions, and higher psychological functions within tennis coaching practice.

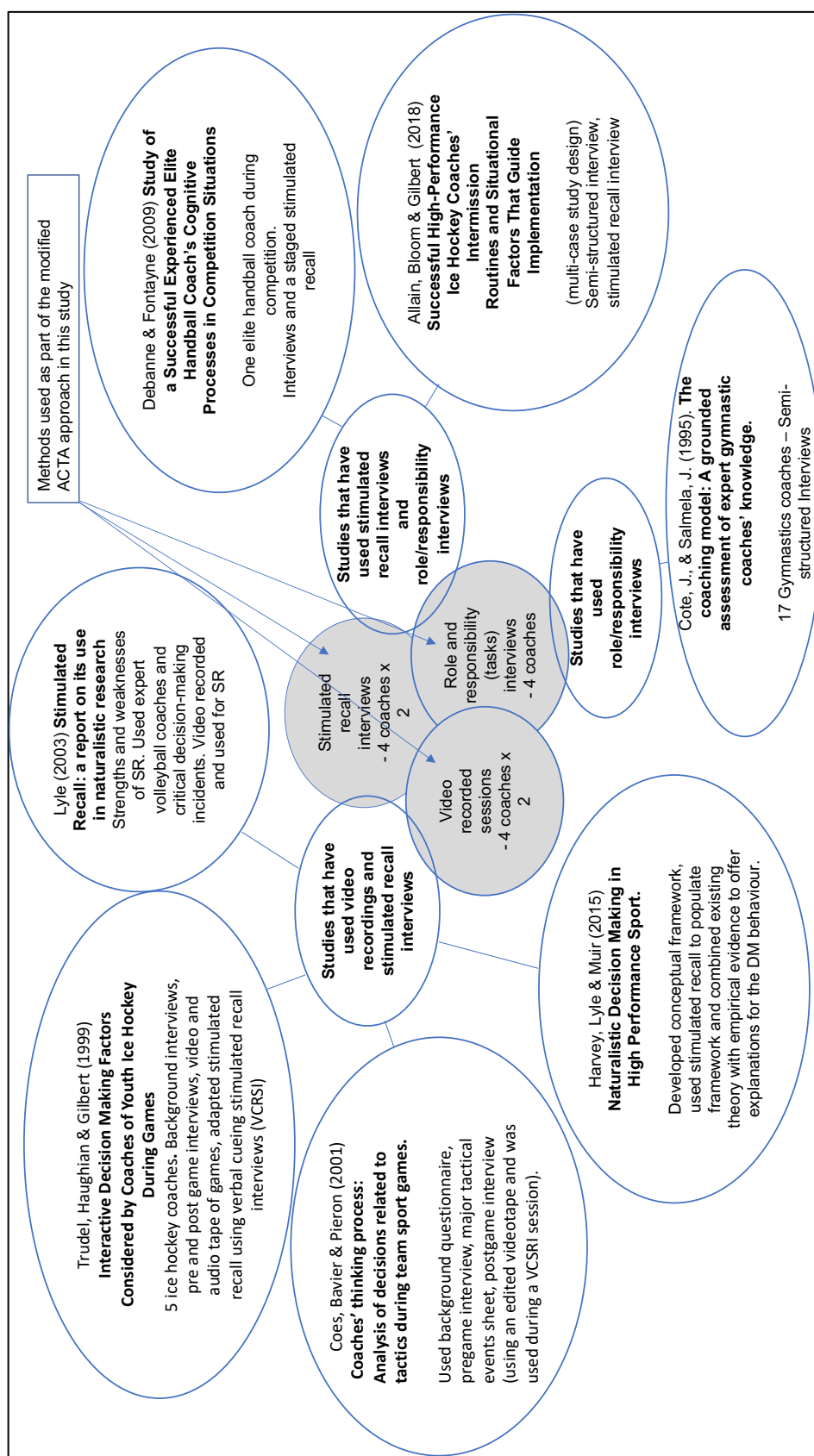


Figure 3.1: Sport coaching studies that have used variations of stimulated recall

In arguably the most rigorous paper on stimulated recall in sport coaching, Lyle (2003) makes the case for and against this method, outlining fallibilities such as memory decay, accuracy of memory accessed by the video, immediacy of recall, and the potential for reordering information in a different setting such as the sequence or location of events (Bahrick et al., 1994; Peterson & Peterson, 1959; Ricker, Vergauwe & Cowan, 2016). However, Lyle (2003) also suggests that despite these potential weaknesses, stimulated recall is a valid method to obtain indirect information on cognitive activities. Considering the factors above, it is argued that tennis as a sport and research context (as with other sports) presents a high degree of challenge for coaches – in other words, a 'higher-order' level of expertise - within which to operate, as well as for researchers to collect ecologically valid data.

3.5 Methodology

3.5.1 Ethical considerations

Ethical approval was sought and subsequently approved by the relevant University ethics committee and written consent was provided by all participants. All data that were generated and captured, including video and audio files, were stored on a password protected laptop and external hard drive in line with the University ethical procedures.

It is acknowledged that the concept of anonymity is a central to sound ethical practice (Tilley & Woodthorpe, 2011). Consequently, all coaches, athletes and stakeholders within the study were guaranteed anonymity. It was explained to the coaches that the identity of the club or academy would also be kept anonymous and any features of the programme that might lead to identification would be removed from the presentation of data (Sparkes & Smith, 2014). Additionally, coaches were informed that pseudonyms would be used if player or coach names were captured and the data would be cleaned (Kaiser, 2009).

Whilst the coaches and their cognitions were the focus of this research, the research context contained athletes, some of whom were children. In this instance, the coach acted as the gatekeeper (Flewitt, 2005) to explain to the athlete that the researcher was there to examine how he, the coach, thought during coaching sessions. When children were being filmed as

part of the research setting, parents were spoken to by the coach prior to the filming to explain the reasoning behind the presence of the camera and the researcher. Furthermore, the coach explained that the camera would be placed behind the coach to capture any audio from the coach during practice. Whilst this allowed for any sensitive conversations to take place at the net, away from the camera, there were often parents or players in close proximity, meaning that the audio was unlikely to capture any conversations that were not overheard by either parents or other players.

3.5.2 Procedures

Participants were contacted initially via telephone to explain the rationale behind the study. Each coach was visited three times: first, to conduct a semi-structured interview to explore the tasks that they perceived were required in their role, second, to conduct a video-recorded observation of their coaching session, followed by an immediate stimulated recall, accompanied by researcher prompting, to explore the coach's cognitions, and third to repeat step 2 with another coaching session to expand the data available and to validate and confirm findings. The research procedures are outlined in Table 3.1 and are informed by an ACTA approach (Militello & Hutton, 1998). The initial semi-structured interviews explored the specific coaching tasks identified by the subject coaches. The ICCE framework headings, Coaching Functions, were used to provide a semi-structured framework and focus for the interviews. During the initial semi-structured interviews, a dictaphone was used to record the coaches' responses and field notes were taken by the researcher. An example of the field notes can be seen in appendix A. Figure 3.2 provides a diagrammatic overview which explains how data were collected, analysed and interpreted.

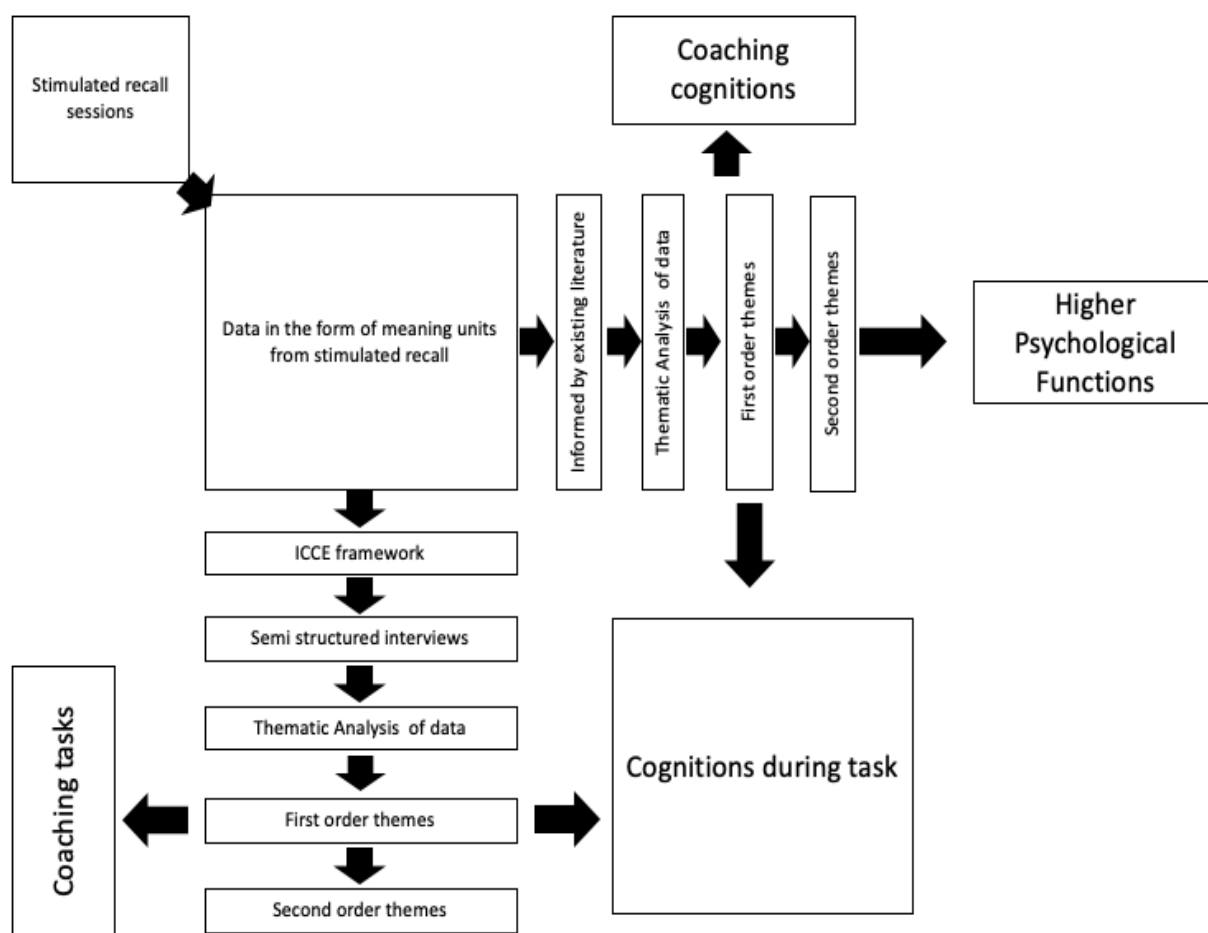


Figure 3.2: Diagrammatic overview of study 1

Coaches were spoken to before all sessions, which allowed the coach to have time with the participants to explain the rationale behind why the session was being recorded. Additionally, the coach spoke with the parents if the child taking part in the session was under the age of eighteen. All sessions were scheduled sessions and were an embedded part of the coaches' coaching programme. The scheduling of the coaching sessions was mutually agreed in advance between the coach and the researcher to ensure that there was availability following the session for the coach to take part in a stimulated recall.

During the coaching session, the camera and researcher remained in a fixed position either directly behind the coach, or at the corner of the court, dependent on the coaches' preferences and available space on the next court. Consequently, the video footage did not capture audio if there was a discussion at the net between the coach and player. Immediately following the session, the coach and researcher met in a quiet space, typically

in the coach's office, to review the coaching session on a laptop. The coach was asked to watch the whole video of the session and simultaneously verbalise their thought processes during the session that they delivered, and these verbalisations were recorded using a dictaphone. As part of the stimulated recall procedure, the coaches' cognitions were interrogated. Below is an extract of a transcript from one of the stimulated recall interviews with the numbers representing the time stamp on the audio file.

0.00

Researcher: Do you remember what you were having a chat about at the beginning?

Coach: Yes, just trying to ascertain her understanding of what she's working on. She said to me right from the start that she wants to work on the shape of the ball, but actually it transpired that it was shape of the racket... she's been injured for a bit – I'm not a big fan of doing this stuff in the boxes here but she's been injured so I'm trying to do it slowly with her and just to get a feel.

1.00

Researcher: What was going through your head at this time?

Coach: I'm basically trying to do a bit of a scan in terms of because I'm aware that she's been out for six months, she's had a stomach issue, I know that's she's seen the biomechanistic last night. I know that she can play for the court now, so just gently.

1.33

Researcher: What are you scanning for?

Coach: The key thing at the moment is trying to ascertain – right at the beginning I was trying to work out what she wants to work on. And now I'm just trying to see what she's telling me, is it actually translating to what I can see on the court, and what other people have been telling me? Obviously, I had a chat with the biomechanistic last night, spoken to Steve [here is an example of cleaned data] last night, Steve's the programme manager...and seeing if the pictures of what they're telling me is matching up with what I'm seeing in front of me. We're working with all the players to try and help them have a greater understanding of what they're doing, but also with Izzy [cleaned data], I'm very aware that if you set the environment, she actually responds to that, and you can see that later on.

2.18

Researcher: So, was it matching up then?

Coach: One of the things we were working on was her getting low and I wasn't sure how low she could get, but as you can see, she's extremely straight-legged here at the moment, and you can see recessional work on her getting lower, so – no, she isn't as low as she thought, the shapes are, as I anticipated. I thought she would set quicker behind the ball than she does, you can see she's a little bit later on that one. And the other thing that's going on it to work out whether I'm better to be hitting with her, from my side, or whether it's better than I be doing it from out of the basket so I can focus on what needs to go on. That's interesting.

3.08

Researcher: What, determining whether you should hit or basket feed?

Coach: The quality of the ball that she's hitting and the quality of the ball that I'm giving her and challenging her with. In terms of her working on shape, she's better if I do this stuff out of the basket because then I can look at the shapes.

Figure 3.3: Example of stimulated recall transcript

3.5.3 Apparatus

Semi-structured interviews were recorded using a Dictaphone and took place in the coach's place of work. Coaching sessions were recorded using a video recorder fixed to a tripod and placed by the side of the court. In all coaching sessions, the researcher stood behind the video recorder to change (if required) the focus and direction of the video camera. This created a perspective whereby it was possible to: 1) note both coach and player positions on the court, 2) observe the quality of ball outcome (including landing area on court, speed of ball and spin on ball), and 3) overhear any coaching comments that were communicated during drills. Due to the fixed position of the camera, any dialogue between the coach and player at the net was not recorded. Within one hour of the session's conclusion and as part of the stimulated recall method, the coach and researcher watched the session on a laptop screen. The coach's verbalisations were recorded using a Dictaphone and accompanying notes were made by the researcher during the process.

3.5.4 Participants and setting

The four coaches in study 1 were a purposive sample, chosen because of their level of coaching qualification (UKCC Levels 4 and 5), number of years as practising coaches (15–

30 years) and their role as Head Coach of their respective clubs. Given the above factors, it was deemed that these coaches had a proven track record of success within their clubs. Their typical coaching sessions lasted between 45 minutes to 75 minutes dependent upon the type of session and the players involved.

The Head Coach position held by the coaches meant that although the coaches were required to conduct on court coaching sessions, they were also required to manage the coaching programme and, in some cases, other coaches. Consequently, these connections and responsibilities meant that the coaches had knowledge and relationships with many of their players.

Although all coaches were qualified to Level 4 or 5, two of the coaches worked predominantly with performance players, whilst the other two coaches worked with mostly participation players (Lyle, 2002). However, none of the coaches worked solely in either a performance or participation domain. For clarity, the coaches who worked more extensively with the top players in their club will henceforth be referred to as 'performance coaches'. In contrast, the other two coaches tended to work with regular clients and recreational players who were at a beginner/intermediate level, will for the purposes of this study, be referred to as 'participation coaches'. None of the coaches within this study had played professionally and coaching was their full-time profession.

3.5.5 Data analysis

Phase 1: The initial semi-structured interviews and field notes were deductively analysed to generate a list of coaching tasks which is displayed in Table 3.2.

Phase 2: The interviews from the stimulated recall sessions were transcribed verbatim. The transcripts were then broken down into a total of 514 meaning units (Becker, 2009; Côté et al., 1995; Harvey, Lyle & Muir, 2015). Meaning units were created to capture specific cognitions. Therefore, they were required to be sufficiently concise, yet long enough to capture and represent the thought. To ensure rigour within the study, a blind 10% sample of the data was independently verified by another researcher with a Ph.D. in Sport Coaching. There was a 90% agreement rate across the identification and categorisation of the meaning

units. Where there was disagreement, a discussion took place before a consensus decision was reached on the appropriate coding of the meaning unit.

Phase 3: The meaning units were initially deductively analysed using the list of tasks that was established in Phase 1. Thematic analysis provided the means to comprehensively analyse and provide a rich account of the data (Braun & Clarke, 2006, 2013). The coding process was performed using Microsoft Excel so that the meaning units could be transferred and placed under appropriate headings. Within Microsoft Excel, the cells were colour coded to allow the researcher to identify the coaching session and coach from where the meaning unit originated. After the initial coding process and researcher immersion within the data, there was subsequent refinement and elaboration of the coaching tasks. This meant that inductive analysis was also required in order to make sense of the emergent themes and reconcile meaning units that did not initially fall into the primary categories (Fereday & Muir-Cochrane, 2006). Once established and validated, second-order themes were created providing specific cognitive coaching tasks. These results are illustrated in Table 3.3 and constitute a fine-grained and detailed account of the coaching tasks as they emerged during *in situ* coaching.

Phase 4: The meaning units were inductively analysed to generate a framework of higher psychological functions (types of thinking in which specific cognitions can be grouped). This provided a broad framework of type of cognition, also referred to as Higher Psychological Functions. The higher psychological functions were further analysed and grouped, resulting in a configuring of second order themes, for example, 'noticing, questioning and confirming' were grouped together as diagnostic cognitions.

3.6 Results

To help orientate the reader within this section, the following presentational structure has been used: First, the broad coaching tasks unearthed (Phase 1 of analysis) are presented in Table 3.2 along with a detailed explanation and interpretation. Second, *in situ* coaching tasks that were established as a result the thematic analysis (Phase 3 of analysis) are displayed in Table 3.3. Finally, after the re-coding of the data and thematic analysis, a framework of first-order and second-order higher psychological functions is presented (Phase 4 of analysis) in Table 3.4.

3.6.1 Coaching tasks

A descriptive overview of the coaching tasks that emerged from the semi-structured interviews and the Coaching Functions of the ICCE framework is provided in Table 3.2. Examples of these tasks include consideration of the player's mental state, physical state, and the consideration of the wider competitive environment such as tournaments and other competitors and coaches. This analysis provides a glimpse into some aspects of the wider socio-cultural context. These tasks are specific to tennis coaching and several stakeholders (Lawn Tennis Association, club, parents, coaches, and club chairperson amongst others) alluded to within the table. A range of administrative and management tasks, that were expected of all coaches, emerged and are presented at the foot of Table 3.2 as an additional 'Functional Area'. Connections can be made between the reporting of management and administration and earlier work by Rynne, Mallet and Tinning (2006) who acknowledge the roles of management and administration in their paper on institutes of sport as sites for learning. However, they suggest that it is more prominent in participation coaching which is in contrast to what was found in this study.

Functional Areas	Coaching Tasks
Set Vision and Strategy	Understand player ambitions Oversee and lead alternative tennis initiatives e.g. cardio tennis and tennis in schools
Shape the Environment	Ensure players and coaches are appropriately matched Organise the supporting cast around the player (e.g. strength and conditioning coaches and nutritionists) Agree goals and targets with players off court Plan individual player programmes Manage and meet with other coaches to discuss player progress Budget management Model behaviours and educate players Recruit and retain coaches Allocate players to coaches
Build relationships	Manage player expectations Manage players in all aspects, both tennis and non-tennis related Establish and develop relationships with various stakeholders, e.g. parents, LTA, Coaches etc. Educate others. e.g. parents and other coaches Act as a point of contact for all other coaches and players Assess customer or player satisfaction through formal and informal mechanisms Provide other services such as racket accessories, bookings etc. Report to the chairman annually
Conduct practices	Manage and deliver strength and conditioning Focus on improving specific tennis aspects such as patterns of play Set targets with players during sessions relating to progress and future goals Plan and deliver court coaching Evaluate and reflect on coaching session in the moment Assess mental state of players on court Agree goals and targets with players on court Evaluate player progress on court
Structure Competition	Organise player schedule and logistics Provide information for other coaches who will be travelling to tournaments with players Adaptation of competition rules to benefit players Provide competition and tournaments structure for players at the club Introduce players to competitions and decide appropriate level of competition entry for tennis teams
Read and React to the Field	Attending tournaments with players and noting observations Video players for later analysis Evaluate progress based on results and rankings Evaluate player progress off court Assess mental state of players off court Evaluate workload of players and if it is sufficient for improvement
Learn and Reflect	Understand Ofsted requirements Explore new avenues through which to learn, e.g. guest speakers or other well-known coaches in other sports Collaborate with other coaches on future direction of the programme Evaluate player numbers on programmes Retrospectively evaluate on court sessions Evaluate own coaching behaviours Look at other coaching sessions for new ideas Attend LTA courses to learn Innovate with new initiatives for future revenue
Management of tennis as a business and marketing	Evaluate player turn over and explore why retention rises or falls Maintain continuity of coaching for players Evaluate what is value for money Evaluate membership numbers Marketing of the programme Understand and promote sessions which generate most income Provide down payment of time to participation tennis in order to use facilities for performance purposes Writing bidding for funding Management of facilities

Table 3.2: Table of coaching tasks

The list of tasks illustrates that many facets of coaching extend beyond on-court sessions with players. All coaches were additionally required to perform managerial roles such as providing accounts, writing reports, and recruiting other junior coaches or supporting staff (for example, the strength and conditioning coaches working within the programme). Indeed, many of these tasks are part of the development and running of an academy or club programme.

The results from this study demonstrate that tennis coaches are expected to lead their programmes, work with stakeholders, manage players' engagement with the sport, and demonstrate sound financial management. This illustrates the diverse skills (e.g., planning of budgets and influencing stakeholders) that are required of Head Tennis Coaches. Although none of the coaches explicitly mentioned 'critical' thinking' (Brookfield, 1995, 1997) coaches did mention the need to reflect and evaluate coaching practice. However, the mechanisms through which they engage in this process were typically suggested to be a blend of informal opportunities and formal coach education courses.

All coaches mentioned the need to develop goals with players, which were either at a macro, meso or micro level. It is important to note that the coach-player relationship is likely to be significantly different dependent upon the particularities of the domain and context (Lyle, 2018). For example, the performance coaches were expected to agree goals and targets with players off court. In contrast, participation coaches who worked with players at a more recreational level were likely to set 'in-session' targets which could be construed as short-term goals. This, again, demonstrates that coaching occurs both on and off court, an observation that has important implications for doing research (Cushion & Lyle, 2017).

3.6.2 Thematic analysis of *in situ* coaching tasks

A feature of the analysis of the coaching tasks was a recognition of their cognitive (thinking) components: identifying, assessing, and/or evaluating. Specifically, second-order themes were incredibly varied, going beyond observation, analysis, technical and tactical adjustments to a more subtle and nuanced consideration of players' psychological and physical states using background and contextual information. These findings have significant links to literature that is cognitively orientated such as noticing (Mason, 2002), PJDM (Abraham & Collins, 2011) and mental models (Lyle & Cushion, 2017; Lyle 2002). Moreover, the

results suggest that what was being observed during on-court coaching practice was only a partial-picture of the scope, complexity and nuance of the coaching process, and that other environmental, social and contextual factors were, to a greater or lesser extent, influencing the coaching process and therefore what coaches were thinking. The tasks highlight the importance of the 'supporting cast' (strength and conditioning coaches, financial investors, Ofsted, parents, and the relevant governing body (The Lawn Tennis Association)). One performance coach listed the various tasks that he was required to perform as part of his role, including booking flights, finding accommodation, sourcing appropriate dining arrangements, and finding players who were of the correct level to practise with his athlete during their tournament off-days. These tasks reflected a level of 'investment' and personal sacrifice that coaches made for their player's success.

It was evident that as the first-order themes were populated with data, second-order themes were required to appropriately illustrate the variation and diversity of coaching tasks. Whilst there were some meaning units that were categorised as 'Reflecting on the coaching session retrospectively', these are not analysed within this study, rather it is acknowledged later that this particular finding proves to be a specific methodological limitation of stimulated recall.

Coaching tasks first order themes	Coaching tasks second order themes	Meaning units
Management and delivery of all aspects of physicality on and off court	Noticing player's injuries	"I'm overly cautious about what she's done with her tummy"
	Detecting physical restrictions	"She can't stay low for more than one in a row here"
	Player's previous workload	"Shaun was a little bit tired in the morning – played a lot of tennis the day before"
	Player's energy levels	"I'm listening to her and she's really puffing"
Identification of how players can improve in situ	Identification of need for technical body adjustments	"You can see she's extremely straight-legged here at the moment"
	Identification of need for technical racket adjustments	"You want them to try and catch the ball in their contact point"
Structure of coaching session insitu	In situ planning	"I was thinking about which exercise we were going to be doing at this stage"
	Noticing safety	"I had visions that they were moving around, one of them's going to get clattered"
	Instructing	"I could get more improvement with him by breaking it down still further, maybe doing some basket feeding"
Evaluation and reflection on the coaching session in situ	Deliberating over session content	"How much are we going to do his strengths and how much are we going to work on the things I know he needs to work on"
	Aligning coaching ability to suit player's needs	"I can make that drill better and better which is fine, but I want to make it as close to the match and realistic as possible"
Assessment of player's mental state	Assessing player mood through cues	"I was most interested in Dan, gauging the temperature of him"
	Protecting player confidence and self esteem	"If he's fragile at that moment, we won't do anything which is going to be too challenging for him"
	Assessing mental readiness to learn	"Joy's away with the fairies"

Table 3.3: Thematic analysis of coaching tasks

Coaching tasks first order themes	Coaching tasks second order themes	Meaning units
Evaluation of player progress	Identifying player improvement in a larger time scale and context	"He's doing it better than he was last week"
	Identifying player improvement within the session	"As we went on, he was beating off ground no problem"
Assessment of session flow	Assessing flow of session in action	"They were ready to do points. We've been on court so much I know how long they need"
	Assessing flow of session as a reflection	"I'd be stepping in, now I'm not going to do that"
Assessment of the quality of player's performance	Assessing the players' performance using coaches' performance mental models	"The key thing on that was matching pictures, she was doing okay and then she missed a couple and it was like great, okay, she made the first few and then she missed the last few"
	Assessing player's performance against coach expectations	"Now what's surprising me here is how undisciplined she is"
	Assessing the quality of ball outcomes live and over a several minutes	"She's missed four of the short ones and the deep – and again, that's why she's being fed another deep one"
Assessment of player's understanding	Asking players questions in order to assess level of understanding	"Just trying to ascertain her understanding of what she's working on"
	Observing quality and type of play to assess whether player is problem solving	"She hasn't really understood and bought into the fact that it's at one o'clock that I'm giving myself the best chance"
Consideration of individuals and wider competitive environment	Recognising how this training session will help players in competition	"How will this stand up under pressure because it's all about what's going to happen in the match situation"
	Reflecting on what level of competition players will be performing at	"Claire's one of the best in the world in her age group"
	Mindful of player's personality in general and adjusting the session accordingly	"I know his character and it would have gone the wrong way"
	Aware of the player's state of mind in relation to their general development	"John who's 26 and more articulate, intelligent professional, what he tells us that he's worked on with serves we'll obviously take as gospel"

Table 3.3: Thematic analysis of coaching tasks (continued)

3.6.3 Coaching cognitions and emergent higher psychological functions

After analysing the meaning units, nine first-order themes emerged (Table 3.4), suggesting different types of cognition, better understood as higher psychological functions, that coaches engaged during practice. These were: noticing, questioning, confirming, risk evaluating, forecasting, contextualising, normalising, problem solving, and deductive reasoning (Harvey, Lyle & Muir, 2015; Mason, 2002; Robertson, 1999). These higher psychological functions will now be explored below in four parts with example statements from the meaning units used to illustrate how they have been classified.

Higher Psychological Functions first order themes Derived from Robertson (1999); Mason (2002); Havey, Lyle & Muir (2015)	Higher Order Psychological Functions second order themes	Exemplar Meaning Units
Noticing		"She can't stay low for more than one in a row here"
Questioning	Diagnostic cognition (Klein et al., 2018)	"Just trying to ascertain her understanding of what she's working on"
Confirming		"I'm listening to her and she's really puffing"
Risk evaluation	Concept formation cognition (Feltovich, Prietula & Ericsson, 2006)	"I had visions that they were moving around, one of them's going to get clattered"
Forecasting		"I know his character and it would have gone the wrong way"
Contextualising	Schematic cognition (Robertson, 2009)	"Claire's one of the best in the world in her age group"
Normalising		"Also, to be honest, cameras on, you're there, the environment – I'm not going to grill the guy in front of people he might feel uncomfortable"
Problem solving	Reasoning cognition (North, 2017; Robertson, 2006)	"I could get more improvement with him by breaking it down still further, maybe doing some basket feeding"
Deductive reasoning		"How will this stand up under pressure because it's all about what's going to happen in the match situation"

Table 3.4: Thematic analysis of higher psychological functions

3.6.3.1 Noticing, questioning and confirming (diagnostic cognitions)

Coaches appeared to spend a great deal of time processing information to diagnose problems within the session. The cognitive skills of noticing, questioning, and confirming equipped the coaches with information, in some cases better preparing them to act, or to store information to be used at a later time. These findings extend Mason's (2002) work, regarding the concept of 'marking' an event, such that it can be 're-marked' upon later, to someone else (p. 33). The three higher psychological functions of noticing, questioning, and confirming are grouped under the umbrella theme of 'diagnostic cognitions' (Klein, Borders & Newsome, 2018) as their purpose was to provide the coach with information from which they could select (or not) an appropriate course of action.

Noticing, questioning, and confirming are classified as first-order themes, whilst diagnostic cognition emerged as a broader second-order theme (Klein, Borders & Newsome, 2018). It was evident that some coaches 'noticed' more than others. Whilst observing his player on the computer screen during stimulated recall, one coach noticed that there was, "no routine here at all" (Coach #3), whilst another stated, "now I can really see what's going on, I haven't put any time or focus into the actual playing, I can just see what mood the players are in" (Coach #2). Both statements provide examples of what coaches noticed during sessions. This suggests that cognitive and physical routines can act as strategies to allow coaches to overcome environmental constraints using embedded routines within their coaching or instilling routines in their players (Bloom, Durand-Bush & Salmela, 1997), the result of which, is a capacity to focus on a narrower range of relevant cues.

As part of diagnosing, coaches questioned and confirmed what was happening in the session. In some cases, the questioning was internal, whilst at other times it was directed at the player. For example, one coach revealed his internal questions, "is he feeling energetic? focused? happy?" (Coach #2). Both questioning and confirming appeared to be primary cognitive processes relied on by coaches to be certain about what was happening in their sessions. A different coach expressed, "and again, straight through the test, she can do this no problem ...that's the one I've been keeping a special eye on, the way she has to back off" (Coach #1), illustrating that confirming was a cognitive process (that in some cases demands social interaction) required to allow the session to progress, or for future intervention to be structured. In some cases, those particular higher psychological functions

of confirming, noticing and questioning were strategically supportive for the coach, serving as a way to triangulate data, verify findings, and contribute to the coach's understanding.

3.6.3.2 Risk evaluation and forecasting (concept formation cognitions)

Risk evaluation within sessions accounted for a relatively small quantity of the overall data. However, risk evaluation is an important aspect of *in situ* coaching. Risk evaluation referred to some of the more general health and safety concerns – particularly related to injury - that arose in sessions. Additionally, it also signified a risk of a coaching strategy not bearing the desired outcome, or adequate progress not being achieved.

Considered more broadly, risk evaluation alludes to an assessment of potential outcomes, notably negative, related to a particular goal context and course of action. In one instance, a performance coach was particularly concerned about his young female player returning from injury and it was clear to see that he was constantly evaluating the risk of her continuing in the session. He remarked, “I was just nervous about where she'd been with the injury. That's the stuff that's going to be undone maybe when she first goes back into play” (Coach #1). In contrast, a participation coach voiced his concern over two players – “my main concern at this time, believe it or not, was safety – I had visions that they were moving around, one of them is going to get clattered” (Coach #4). These examples suggest a ‘forward orientation’ in the coaches' thinking. It was noticed that risk evaluation is equally likely to occur in the planning phase and delivery phases of sessions and is an ongoing task and cognitive process, constantly running in parallel to other ongoing physical and mental activities.

The ability to forecast what was going to happen was a common type of higher psychological function throughout this first study. This type of thinking has links with Lyle's (2010a) suggestion of ‘diagnostic hypothesising’. As an example, when recapping his focus on a player during a coaching session, a coach stated that, “when we swap round later, he'll be the guy who's having to perform and will be in the spotlight” (Coach #2). In another example, a different coach forecasted how a player was likely to perform in a drill by saying, “my expectation here is that she'll know all this, she'll nail the nine, no problem whatsoever” (Coach #1). These quotations demonstrate how coaches are required and able to think about the future using previous information to forecast how situations are likely to play out.

Both risk evaluation and forecasting appeared to be important features of how coaches mentally operate within sessions. The ability, or willingness, to think about what might happen in the future influences decisions that are made in the present reflecting Lyle's (1999) work on schematic models of decision-making.

3.6.3.3 Contextualising and normalising (schematic cognition)

Coaches demonstrated that they were synthesising information and drawing on their knowledge bases to piece together different strands of information (Côté & Gilbert, 2009; Côté & Salmela, 1996). The reliance on utilising appropriate information that had been gained (both in and out of the session) proved to be an effective strategy to inform a course of action and strategy for the future. Example pieces of contextual information included a wide range of factors such as knowledge of what had happened prior to the session, understanding of the nature of the wider competitive environment, and absorbing current information in the form of the players' mental state and physical condition. This was articulated by one coach who suggested, "when we spoke the other day about the environment, atmosphere of the court – the first few minutes is me soaking up what's going on with everyone" (Coach #2). This cognitive process highlights the temporal aspect of coaching (Lyle, 2018; Potrac, Smith & Nelson, 2017) and the significance of how what has happened previously will inevitably influence cognition and action in the present. Consequently, it demonstrates the challenge of how best to gather prior and contextual information to understand the rationale behind the engaged cognitions.

When analysing a particular context, coaches evaluate whether what they are seeing is normal, that is, not out of the ordinary. For this to happen, the coach needed to have extensive knowledge of the context, the tasks, and the players in order to compare past events to what was unfolding in the session currently taking place. The concept of normalising is closely reflected in Lyle's (1999) script schema model which proposes that coaches have a mental script that is followed and an array of available solutions for when sessions deviate from the inner-mental script (although with an acceptable level of variability built into the evaluation). In this study, coaches used specific past events as a frame of reference from which to refer, for instance, "he wasn't playing great, his forehand's been a bit of a problem recently" (Coach #2). Normalising relied heavily on coaches having extensive knowledge of their player and the awareness to identify when, or if, an event was significantly 'out of place' or unexpected. Whilst participation coaches were able to make

more generalised comments about a player's ability in the wider context, performance coaches were able to give relatively more detailed accounts and examples of normalising in action, for example, "his footwork wasn't great, the court is different to what we've been playing over the last few days, so it's nothing which is a longer-term issue, just in that moment" (Coach #2). This finding illustrates how coaches who work with players frequently and over longer periods of time are able to make more informed decisions and draw upon information that can only be gathered by developing coach-player relationships. It also suggests that cognitions, such as normalising, reinforce the place of mental models of performance/expectations in providing a reference point for coaches' evaluations of performance/progress.

3.6.3.4 Problem solving and deductive reasoning (reasoning cognition)

In all sessions it became apparent that coaches encountered problems or 'moments of crisis' (Lyle, 2018), whether it was a less than ideal set of circumstances before the session, a player that was injured, or a player that was lacking in confidence. In all cases, coaches were required to identify the problem (Robertson, 1999), find a solution, and implement their proposal in the form of an action or intervention (Harvey, Lyle & Muir, 2015). In this case, the higher psychological function of problem solving took place, based on the availability of information and falls under the second-order theme of reasoning (Soltanzadeh & Mooney, 2016). In one example, a performance coach said, "the stuff he really needs to work on is more of a defensive out wide movement" (Coach #2), illustrating the specific issue that needed to be addressed. It would be useful for future research to explore the next phase of such a cognition, specifically, how the problem which has been cognitively identified, marked and categorised is manifested in terms of a consequent coaching strategy or action. There is potential for further work that addresses the catalyst, identification, analysis, action chain; specifically, the underlying causes that trigger coaching actions and the selection and implementation of solutions (Harvey, Lyle & Muir, 2015).

Deductive reasoning involves the application of logic or rational calculation when considering a likely outcome of an event (Robertson, 1999). The process of deductive reasoning became apparent when coaches appeared to engage in an inner dialogue, whereby they offered a justification or logical explanation of what they were thinking. This particular psychological function is reliant upon other types of function taking place, or having occurred, such as contextualising, noticing, and forecasting. As an example, a performance coach offered a

justification of why he made a decision in a session stating that, “because what I’ve got in my head, what we’ve done is we have a grid so that we know what the qualities are and where they relate to ranking around each of the court patterns” (Coach #2). Similarly, another coach offered, “I was also thinking how much do I need to be cheering her on? but then thinking - hold on, her aspiration is this, to be a full-time professional player, and [the] reality is very often [different], it’s just get your head down and get on with it” (Coach #1), demonstrating his internal deliberation and logical thinking before choosing not to praise his player at the moment, as it was incongruent with their long-term goals.

It was significant to note the influences on coaches’ thinking. Coaches frequently commented on whether what they were seeing was out of the ordinary. Often, pieces of information were either overlaid or joined together to inform a judgement. This finding is supported by and links to Lyle’s (1999) ‘script schema’ model whereby coaches rapidly scan and utilise appropriate clues to inform their decision-making. Problem solving and deductive reasoning were most prevalent with performance coaches. It is interesting to note, but perhaps not surprising, that performance coaches exhibited both of these particular cognitive skills more frequently, as they were required to focus on performance-based outcomes (or goals) with their players. In contrast, the participation coaches most likely had different domain-dependent goals, for example retaining clients, resulting in less problem solving and deductive reasoning, as less importance was placed on the outcome of their player’s next match. These findings illustrate that coaches work with different goal-derived mental models (Lyle & Cushion, 2017) dependent upon their particular context. Whilst goals are evident in all domains, their significance and level of complexity are likely driving forces behind how coaches are required to operate cognitively.

It seems entirely plausible that problem solving and deductive reasoning are interlinked and dependent upon one another. For example, coaches who appear to spend little time diagnosing may well make a poorly informed rationalisation of a situation, resulting in inappropriate decision-making and subsequent action. Although the relationship between problem solving and deductive reasoning was not explored within this chapter, as it was not intended to investigate the interconnectedness of cognitive skills, it does illustrate that coaches in different contexts are reliant on a different blend of cognitive processes or ‘cognitive alchemy’ (Saury & Durand, 1998). The findings from this study suggest that domain-specific goals, and the interventions and behaviours that follow from these, are likely to require coaches to engage particular types of higher psychological functions.

3.7 Discussion and substantive conclusions

This discussion section has been divided into two sections (tasks and cognitions) and is intentionally short as much of the interpretation has been covered within the results. Significantly, this study was intended to be a valuable stand-alone investigation into the coaching tasks that characterise tennis coaches' practice, but also a precursor to subsequent investigation into coaches' cognitions.

3.7.1 Discussion of tasks

A range of clearly identified tasks (table 3.2) in tennis coaching has been established. These tasks served as a valuable navigational tool to draw upon when coding the data from the stimulated recall sessions. It has been demonstrated that coaches are required to offer more than on-court coaching (Côté & Salmela, 1996) and, although they were not listed in the coach's formal job description, they did provide an insight into the additional tasks required of a performance coach (for example, attending tournaments and providing video analysis). These findings illustrate the significance of the social (and often organisational) context and a range of linked factors at play that influence the coaching tasks (d'Arripe-Longueville, Fournier & Dubois, 1998; d'Arripe-Longueville, Saury & Fournier, 2001; Saury & Durand, 1998).

This study has demonstrated that it is possible, to some extent, to describe a sport-specific context of coaching and identify the assortment of tasks that are required of tennis coaches. This addresses one of the limitations of coaching research, that is, that the context, role and balance of coaching tasks of the participant coaches is rarely described in research papers (Lyle, 2018). However, it is acknowledged that there is likely to be a greater number of contextual factors and interrelationships that were not captured as part of this study. For example, it is reasonable to assume that coaches will have overlooked some tasks as they might be perceived as routine and not worthy of consideration. Therefore, as the modified ACTA approach was unable to systematically capture these factors, an alternative approach may be required.

Of the emergent coaching task first-order themes (Table 3.3), the most frequent task that coaches were required to perform was that of 'assessing'. The task of assessing was evident in a variety of forms and included aspects such as: assessing the flow of the session, assessing the performance of the player, and assessing the player's understanding. The notion of assessing in this instance is a purely cognitive task (that requires a combination of higher psychological functions to be engaged) and requires a high level of expertise for coaches to assess accurately and with consistency. The next stage in 'assessing' is evaluation, that is, putting some interpretation on what has been observed/noticed. The finding that there is, in part, a reliance on higher-order cognitive functioning is supported by the concept of orchestration that seeks to explain how coaches manage sessions (Bowes & Jones, 2006; Jones, Bailey & Thompson, 2013).

In the context of this study, a case has been made for the development of a (modified) ACTA incorporating stimulated recall in place of simulation interviews and highlighting the importance of cognition in sports coaching. This has facilitated the identification of coaching tasks which have formed the basis for cognitions and higher psychological functions to be situated against. The implications of these findings are that, although some tasks are understandably 'universal' to all coaching – given a common purpose of performance enhancement, the specific balance and prioritising of tasks is more domain, sport and context-specific. Significantly, the identification of tasks provides researchers and coach education with an opportunity to evaluate (or equip coaches to self-evaluate and reflect) upon the appropriateness of higher psychological functions that coaches engage during *in situ* practice.

3.7.2 Discussion of cognitions

Diagnostic cognitions (Klein, Borders & Newsome, 2018) pertain to when coaches are seeking to identify a root cause of a problem. When coaches diagnose problems, it is suggested that they engage higher psychological functions such as noticing, questioning or confirming in order to gather information that can be conceptualised and made sense of (Bateson, 1994). In order to diagnose problems, coaches are required to engage in cognitive processes so that they can obtain information from their surroundings (Mason, 2002; McLaughlin, Rikers & Schmidt, 2008).

In this study, the consideration of risk and the forecasting or predicting of future events emerged as concept formation cognitions (Feltovich, Prietula & Ericsson, 2006). Coaches are required to generate ideas and make sense of information around them as part of the process of considering what might happen in the future (Kirsh, 2009). Furthermore, it required coaches to think about (and, at times, make informed predictions about) the future, drawing on information gained from the diagnosis phase and previous experience, in order to make an informed judgement about not only what might occur but what the likely outcome would be.

Schematic cognitions (Bowes & Jones, 2006; Robertson, 2009) are best illustrated when coaches draw upon their sport-specific, player and pedagogical knowledge (Nash & Collins, 2006). Within this study, coaches used strands of information that were obtained both in and out of the session to help them make sense of what was happening. In some instances, coaches alluded to knowledge of their players' personalities. Interestingly, it is suggested that schematic cognition emerged due to the particular nuance of stimulated recall as a knowledge elicitation method (*in situ* cognition as well as unintended post-session reflection) which is discussed in the next section.

The second-order theme of reasoning (Robertson, 2009) included both problem solving and deductive reasoning. Kirsh (2009) remarks that "Environments in which people regularly act are laden with mental aids, so problem solving is more a matter of using those aids effectively" (p. 284). It is suggested that coaches engage in these cognitive processes when they are afforded time to deliberate in sessions. In this study, stimulated recall provided coaches with the opportunity to demonstrate this type of thinking. However, it is possible to argue that this was a finding resulting from an unforeseen methodological limitation of *post hoc* rationalising (which is discussed in the next section) of the chosen knowledge elicitation tool. In this study, reasoning was found to be deductive in that, coaches were following a logical train of thought, rather than making generalisations from what they saw. However, it is acknowledged that both inductive and deductive reasoning are likely to be used by coaches.

This study has revealed that coaching cognitions require both a broader and deeper understanding of the surrounding context in order for judgements and relevance to be considered. The establishment of higher psychological functions offers a useful framework and vocabulary to explore cognitions and contribute towards a better understanding of

cognitions in context. Moreover, this study has revealed that there is a link between situational context and types of higher psychological functions. However, what remains unclear at this stage, is the strength of influence of the environment on these types of cognitions.

3.8 Methodological conclusions

This section begins by discussing the refined ACTA methodology employed. Subsequently, an evaluation of the effectiveness of stimulated recall as a knowledge elicitation method is presented.

ACTA's stepped approach was a helpful scaffold upon which to frame this study. Consequently, without such an approach and necessary refinements, the results would have had limited ecological validity. Whilst the stage 2 semi-structured interviews detected some aspects of the wider socio-cultural backdrop, it is acknowledged that this was not the original intended purpose of the interviews. Additionally, the stage 2 semi-structured interviews only detected the presence of wider contextual factors and, on their own, semi-structured interviews lack the required sophistication to explore such context.

Stimulated recall as stage 3 of the modified ACTA approach in this study provided a lens for coaches to watch themselves retrospectively during practice. However, this was problematic and the findings within this research provide support for the use of stimulated recall as a reflexive tool in order to help coaches critique their own coaching, or perhaps offer an alternate perspective on incidents that might otherwise have been witnessed in the coaching session. Stimulated recall, as much as possible, preserved the ecological validity and 'flow' of the coaching session. Whilst there were a few instances where the coach alluded to the camera and researcher being present, in general the procedures reinforced the notion that stimulated recall is an unobtrusive knowledge elicitation method (Lyle, 2002), affording the coach and player opportunities to have private conversations, where necessary, and to retain the unaffected nature of the sessions.

Video recordings of the coaches' sessions were only played once, with necessary and appropriate pauses, which intentionally reduced the propensity for interference with their

memory recall. However, this study found that interrogating and providing coaches with the opportunity to comment on how they perceived the quality of their session interfered with the authenticity of the cognition itself, for example, some coaches were more concerned with the appearance of their coaching (how they, the coach, looked and acted) whilst watching themselves on the screen. Conversely, it is important to note the limitation of only providing coaches with one opportunity to comment on their cognitive processes, potentially resulting in an oversight of key incidents.

The thematic analysis (stage 4 of modified ACTA in place of the cognitive demands table) facilitated the identification of common themes. It is suggested that this form of analysis was more rigorous than the recommended cognitive demands table (Table 3.1) and provided a deep level of insight into not only coaching tasks, but cognitions that coaches engaged in order to complete these tasks.

It is important to consider the quality and validity of coaching cognitions that were captured. When coaches fell into a more reflexive mindset whilst watching themselves on the video after the session, it encouraged them to dwell on 'what could have been' or 'what they missed when they were coaching', rather than verbalise what cognitions were 'happening at the time' (Werthner & Trudel, 2006). This methodological limitation highlights the fallibility of coaches' retrospective accounts in terms of how well they can recall *in situ* cognitions. The issue of memory decay also appeared prevalent, particularly with participation coaches, who were unable to provide the same richness of data in comparison with their performance coach counterparts. The problem of memory decay is a methodological limitation; however, this was guarded against, so much as was possible, by asking all coaches to take part in the stimulated recall within one hour of their coaching session finishing.

Finally, this section has reviewed the effectiveness of a refined ACTA approach and stimulated recall as a knowledge elicitation tool. In conclusion, this research has provided a partial picture into what tennis coaches are required to do (tasks), what they need to think (in terms of content) about and how they think (in terms of higher psychological function). This was a useful study and methodological approach. However, it may also be useful to gain insight into 'real time' cognitive processes reveal some of the mental strategies that coaches deploy in order to cope within their setting.

3.9 Reflexive account of study and research process

The purpose of this section is to present a reflexive account of the study and share with the reader what has been learned at this stage of the journey in relation to the research process. First, I will begin by examining how my own biography and sport-specific knowledge was, to some extent, impacting upon my relationships and procedures with the coaches. Next, I will share the difficulties that I experienced in terms of methodological procedure and frustrations. Finally, I will elaborate on what I have learned from this study as an emerging researcher.

I originally chose tennis as I had gained my Level 4 tennis coaching qualification at the time the study was conducted. Undertaking this formal coaching qualification had encouraged me to reflect on my coaching practice, but it also provided me with rich resources in terms of language and sport-specific knowledge that I drew upon. Moreover, my coaching qualification acted as a 'way in' and source of credibility with my coaching participants. On reflection, my familiarity with the sport influenced how I, as a researcher, interacted with the coaches. On one hand, I drew upon my own knowledge of tennis as a resource to interpret language and engage with coaches on a deeper level. As a result, the coaches felt comfortable with my presence as I understood the sport and was able to sympathise with the challenges that they faced (e.g., pressure from parents or other stakeholders).

However, whilst my sport-specific knowledge, or familiarity, helped me in the contact-making phase, during interviews, dialogues with the coaches and interpretation of results, it has to be acknowledged that, at times, coaches relied on my interpretation, rather than explaining in detail, their cognitive processes as clearly as they could have done. Moreover, it was possible to note the different relationships that I developed with each coach. The two coaches who worked with nationally ranked players were more 'inviting' of me into their world and were keen to share their knowledge and 'world of tennis'. In contrast, the club coaches appeared to feel that they had less to share and that their stimulated recall responses were perhaps not as detailed as other coaches might be. Despite my observations, I made every effort to give each coach the same amount of attention and follow the same procedures, whilst also not sharing the background of other coaches in the study.

As part of this study, I experienced several difficulties with the methods that I employed, resulting in a sense of disappointment and at times, frustration. As I look back now, asking coaches to reflect and offer a commentary on a coaching session requires significant training. As I shared earlier in this chapter, the coaches tended to make comments like “that’s interesting” when watching the video screen. This signified to me that coaches were making observations about what they were *retrospectively* seeing and thinking. Whilst these comments provided some insight into what coaches were looking at and the value they placed upon certain actions, I felt frustrated that the coaches’ responses were not always true representations of what they were thinking during practice. As I began to transcribe and analyse the data, I was aware that with some training, coaches might have been more aware of what I was asking of them. Despite my best efforts and limited researcher expertise at the time, I did attempt to ‘steer’ the coaches several times, so that they would verbalise their *in situ* cognitions, rather than their retrospective ones, as was sometimes the case. Additionally, I was very conscious of minimising researcher bias because any ‘steer’ might impact on the rigor and validity of the study.

As this was my first study and being an emerging researcher, I felt that the overall methodological approach (modified ACTA and stimulated recall) was overly ambitious. At the time of the study, I was convinced that I needed to modify ACTA and that stimulated recall was a logical solution. However, on reflection, stimulated recall alone, with appropriate training, might have generated higher quality data. Consequently, in a study of this nature, it was clear that I would need to formalise a training programme clearly outlining what sort of data this method should generate. As a cautionary piece of advice for future work, I would integrate better training, isolate key incidents to elaborate upon and try and create ‘memory anchors’ (events that are memorable and can be elaborated upon later) in sessions, generating prompts to facilitate coaches talking about their cognitive processes during the sessions.

3.10 Direction of the next study

Whilst an ACTA informed approach, including stimulated recall, offered a platform through which to explore coaching cognitions, it is necessary to refine the methodological approach to overcome the issue of coaches falling into a reflective mindset when watching themselves coaching on the computer screen and therefore, not verbalising *in situ* cognitions. It is suggested that an approach that captures ‘live’ coaching cognitions would provide a way

forward to provide a more thorough and rigorous account of cognitions in context, but without intruding unreasonably upon the coaching processes.

Upon reflection, it is further recommended that team sports might offer more opportunity to capture coaching cognitions during the coaching intervention as the coach is likely to be required to think and verbalise as events unfold.

In conclusion, the next study will:

1. Apply the devised cognitive higher psychological function framework from study 1 to coaches who are operating in a sport that does not require a significant physical workload.
2. Describe the 'live' coaching cognitions during sessions using a different methodological approach to provide an insight into how different types of cognitive higher psychological functions are engaged, ordered, and arranged.

Chapter 4

Study 2: An exploration of cognitions, higher psychological functions and actions of *in situ* practising rugby coaches using Think Aloud Protocol

4.1 Introduction

Study 1 provided an insight into coaches' tasks and how they engaged a range of cognitive skills, reported as higher psychological functions (types of thinking in which cognitions can be grouped) in tennis. Study 1 also highlighted the methodological strengths and weaknesses of modified Applied Cognitive Task Analysis (ACTA) and stimulated recall. For example, the coaches exhibited a tendency to fall into a reflexive mindset as they watched themselves on video, the novelty of seeing themselves coaching on a computer screen causing them to comment on what they were seeing and should have done differently, rather than describing their *in-situ* cognitions. Additionally, there were issues arising from memory decay in terms of coaches accurately recalling their thought processes. Study 1 provided an insight into how coaches embedded/situated tasks were underpinned/facilitated by different types of higher psychological functions and specific cognitions. Unfortunately, ACTA and stimulated recall were limited in terms of their capacity to explore *in situ* coaching cognitions as they *unfolded in real time*. Consequently, it became evident that further research was required in order to understand *what* and *how* coaches think *in situ*.

Typically, the appropriateness and/or effectiveness of coaching choices are only revealed retrospectively. Rather, there are cognitive and social processes at play, particularly in relation to interpersonal interactions but also in matching incremental performance improvements and preparation with appropriate interventions, resulting in a plethora of available choices for the coach (Cushion, 2007; Potrac et al., 2000). Similarly, new and uncharted situations may also arise in any practice session. No two coaching sessions are ever exactly the same due to the number and nature of variables (such as practice structure, participants and coaching environment) within every session (Smith & Conrey, 2009). Therefore, careful consideration must be given to the specifics of the coaching context as a site of research enquiry when contemplating the suitability and validity of a potential knowledge elicitation tool.

Specifically, the aim at this point in the research journey was to pinpoint the coaching cognitions ‘in the act of coaching’. It was felt that the only way to overcome the problem of coaches’ retrospective reflections was to implement a research strategy that attempted to capture cognitions in the act of coaching practice. Think Aloud Protocol emerged as a plausible and viable approach to overcome the methodological problems that were identified in Study 1. This second study builds on Chapter 3 by exploring the *in situ* coaching cognitions and actions of six rugby coaches by using Think Aloud Protocol.

4.2 The key concepts of Think Aloud Protocol

‘Think aloud’ procedures emerged as a result of a desire to understand the cognitive processes of experts (Gardin, 2010). The origins of Think Aloud Protocol as a knowledge elicitation tool can be traced back to Watson (1920) and Duncker (1945). Watson (1920) claimed that cognitive activities were inherently complex and were a series of continuous processes. Furthermore, it was suggested that cognitive processes had what was termed concurrent covert neural activity (which could be viewed as non-conscious) of the speech apparatus, referred to as inner speech (Ericsson & Simon, 1993; Watson, 1920). Therefore, it was proposed that Think Aloud Protocol would provide a mechanism by which the inner speech could be verbalised without impacting on the process of thinking. The underpinning rationale for Think Aloud Protocol as a valid knowledge elicitation tool is evident in Vygotsky’s work of *Thought and Language* (1962) and has roots in cognitive psychology literature.

The difficulty of application of Think Aloud Protocol lies in how inner thoughts are verbalised (Ericsson & Simon, 1993). Whilst thoughts may be generated in the mind in a matter of seconds, the articulation of such thoughts may take considerably longer and indeed may never truly reveal the complexity of the web of thoughts (Ericsson, 2006). Furthermore, it is possible to view thinking as a process which may go through a series of phases before culminating in an action. This suggests that Think Aloud Protocol could make a valuable contribution to this research as the purpose is to explore the inner-mental workings of *in situ* coaching, as they unfold in ‘real-time’ and within an ecologically valid setting.

Ericsson and Simon (1993) undertook the task of reviewing literature to understand how, or if, verbalisation of thought processes interfered with task performance. They suggested that

the best link between authentic and verbalised thoughts was when subjects were asked to simultaneously articulate their thoughts whilst completing a task. They found that there was little evidence to suggest that verbalisation impinged upon cognitive processes. Therefore, given that the verbalisation of inner thought does not significantly interfere with the cognitive sequence, it is conceivable that the performance of the task should not change. This is supported by Ericsson and Simon (1993) who found no evidence to suggest that thought sequences changed when subjects were asked to think aloud during the completion of a task. Ericsson (2006) proposed that although articulation did not cause a change to the cognitive order of events, novice subjects took longer to complete tasks, indicating that their knowledge, or application of that knowledge, was inherently different from those who were deemed experts.

In the context of this research, the complexity, contingency and difficulty of embedded socio-technical tasks within sport coaching present problems using Think Aloud Protocol. However, given the nature of the research design and previously outlined difficulties, it is important to reiterate that the purpose of this step in the research journey was to gain more of a partial picture into cognitions in context. Significantly, Think Aloud Protocol might provide a deeper and more complete account of *in situ* cognition in comparison with retrospective-based methods such as modified ACTA and stimulated recall. Much of the academic literature on Think Aloud Protocol outside of sport coaching has focused on tasks that: 1) take place in environments with limited external or peripheral distractions; and 2) have a defined sequence with a clearly expressed outcome. In turn, this has allowed participants to deliberate over decisions and therefore, may present problems (or only a partial insight) for researchers in situations where there is a high cognitive load placed on the participant (Jääskeläinen, 2010).

The key element in the evolution of this research journey was to match the research method to the need to 'get closer' to the coach in action. The initial study provided an overview of the coaches' higher psychological functions and specific cognitions, but it was limited by its 'distance' from the coach's actions. The adoption of Think Aloud Protocol is intended to offer different, yet complementary, insight into coaches' cognitions. Therefore, whilst acknowledging potential limitations, Think Aloud Protocol will provide further insights into coaches' cognitions. It is a useful and important step to gaining additional insight before adopting a research method that might offer an alternative approach to identifying cognition

in context and is becoming increasingly well established in the sport coaching literature (Whitehead, 2015; Whitehead & Jackman, 2021).

4.3 Methodological implications

In light of the above discussion, Think Aloud Protocol was chosen as it offered an alternative method to capture live and 'in the moment' coaching cognitions and associated actions (Whitehead, 2015; Whitehead et al., 2016a; Whitehead et al., 2016b; Swettenham et al., 2020). Within verbal report protocols, three different levels of verbalisation have been identified (Eccles, 2012; Ericsson & Simon, 1993): Level 1 verbalisation is the vocalisation of inner speech which requires no cognitive effort to provide whilst performing a task; Level 2 verbalisation is the articulation of thoughts that are not originally in a verbal format or code. These thoughts might conceivably be represented in terms of mental models or images. This level is concerned with discovering what the subject is focusing on and is not revealed within Level 1 data. Level 3 verbalisation requires subjects to rationalise and explain their thought processes, for example, why they chose to make an intervention in a session (Ericsson & Simon, 1993). The aim of this study was to capture Level 1 and 2 verbalisations as they would reveal insight into cognitive processes without coaches having to rationalise or justify their thoughts and actions which would most likely impact the flow of the session.

In sport coaching, Think Aloud Protocol has been used as a knowledge elicitation tool to understand how athletes think, strategise, and operate in different situations, for example, during training or in competition. Whitehead et al. (2017) investigated the changes in athlete cognition during a 16.1km time trial and found that as the distance and level of pain experienced by athletes changed, different cognitions were evidenced by athletes at different stages in the trial. Similarly, Samson (2017) used Think Aloud Protocol to examine distance runners' thought processes over the course of a race and suggested that their cognitions could be categorised into three groups: pace and distance, pain and discomfort, and environment. In addition, Massey et al. (2020) used Think Aloud Protocol within cycling to investigate the differences in eye tracking and cognitive strategies between experts and novices. They reported that there was a difference in cognitive processes between experts and novices, yet no difference in information seeking behaviour, which coaches may well need to consider to inform interventions either in or out of sessions. These studies illustrate the use of Think Aloud Protocol in research involving athletes, but not coaches. There are notably task and experiential differences between athlete performance

and coaching; athletes are likely to be focused on their physical and mental response to the performance itself, although its conduct will also involve decision-making cognitions. Coaching, on the other hand, might be seen as more cognitive and deliberative in nature (Abraham & Collins, 2011; Lyle, 1999, 2010a).

Studies adopting Think Aloud Protocol in competition situations have typically focused on athletes in sports that allow for decision-making under 'closed' conditions (Elliott, Whitehead & Magias, 2020; Samson, 2017; Whitehead et al., 2017). For example, golf has received much attention in Think Aloud Protocol studies as an intensive decision-making sport. However, it is important to note the sporting characteristics of golf; specifically, its lack of time pressure (relative to some other sports) and no necessary interaction with other players (Nicholls & Polman, 2008; Whitehead, 2015). However, it is acknowledged that golf does present complications such as differing weather conditions, pin placement and time-pressure in a competition format. Given the above, golf, as a sport, can be considered to offer 'enabling conditions' that contribute towards researchers accessing Level 1, 2 and 3 verbalisations. A range of studies have engaged Think Aloud Protocol to investigate the cognitions of golfers at various stages of competition (e.g. Whitehead et al., 2015) and during practice situations (e.g. Whitehead et al., 2016). Specifically, Whitehead et al. (2016) explored skill level differences as they impacted on the thought processes of golfers in high- and low-pressure situations, finding there were differences in the planning phase of shots between novice and expert golfers. It was also noted that under the influence of intense competition, experts tended to change their cognitive processes to be more analytical and routine in nature. Finally, Nicholls and Polman (2008) used Think Aloud Protocol to examine stress and coping mechanisms in experienced golfers. They found that stressors were not always reported to the researcher and that players' coping strategies shifted, dependent upon the situation and context within the round of golf.

In a study involving gymnastics judges, Lee, Knowles and Whitehead (2019) identified the focus of the judges during their scoring assessment of gymnasts' performances, for example, lack of balance, bending of arms and knees, pointing of feet etc. Whilst the study revealed the information that informed the judges' decision-making, some judges stated that engaging with Think Aloud Protocol interfered with the task of judging. These findings are interesting as it could be argued that the act of judging is a cognitively demanding task and is serial in nature (a series of instances that present themselves with no opportunity to revisit them). In this instance, judging is a reactive process, requiring diagnostic-perceptual skills

such as noticing, questioning, and confirming, and it is significant to note the potential complication of using Think Aloud Protocol in this environment. Bowes & Jones, 2006; Jones & Wallace, 2005, 2006; Lyle, 2010a). The interactive nature of the coaches' role may add an additional cognitive load that impacts on their comfort with Think Aloud Protocol. Another consideration is the communication/verbalisation between coach and athlete that may interfere with an immediate account of the thinking process.

More recently, Stephenson, Cronin and Whitehead (2020) advocate for the use of Think Aloud Protocol in the coach development realm. They investigated a coach's experience of using Think Aloud Protocol, revealing themes of improved self-awareness, pedagogy, communication skills, feelings of apprehension and distraction. However, it is unclear if the researchers undertook an assessment of the impact of Think Aloud Protocol on the coach's practice. Similarly, Whitehead and Richards (2020) review Think Aloud Protocol as a tool by which to facilitate reflective practice and note that it is in its infancy in being adopted by the wider coach education field.

Considering the findings in study 1 and after reviewing the available Think Aloud Protocol literature, it is reasonable to assume that Think Aloud Protocol might provide a deeper level of understanding and extension of knowledge into coaching cognitions, patterns of thinking and strategies to cope under pressure. Naturally, a degree of caution is advisable because Think Aloud Protocol has not been used previously to investigate cognition in coaching and in a dynamic micro-management setting. In addition, the setting and design in this research were made more complicated by the fact that coaching practice involves the acts of instruction and feedback to players (Cope & Cushion, 2020; Hodges & Franks, 2002; McMorris, 2015).

This second study attempted to capture Level 1 and 2 verbalisations and was focused on capturing the coaches' emergent higher psychological functions, the content of cognitions and patterns of cognition that do, or do not, result in actions being taken by coaches. This study seeks to explore the cognitions, higher psychological functions and actions/interventions of six Rugby Union coaches. By adopting Think Aloud Protocol as the knowledge elicitation tool, a different type of data was obtained as it captured the coach's verbalisations in a semi-deliberative, verging on non-deliberative, context (Lyle, 2010a). A semi-deliberative situation is viewed as one where there is an element of time-pressure (largely as a result of the need to intervene in the practice session or game), but the

response is not reactionary, a cognitive process takes place, albeit under an element of environmental 'stress' (Lyle 1999, 2010a). In essence, it would capture *everything* that was said by the coach: instruction, coach-player dialogue, and feedback; but also, snippets of inter-player dialogue and feedback from players. Decisions that are non-deliberative in nature are made in time-precious situations (Lyle, 2010a) and where there appears to be little or no opportunity for coaches to engage in a logical chain of thought. These circumstances present themselves in game situations and, at times, within practice sessions (Allain, Bloom & Gilbert, 2018). However, it is rare that coaches operate in situations where there is absolutely no time at all (completely reactive), or indeed where time is unlimited. As such, it is suggested that coaches generally work in a manner somewhere between these extremes, which should be classified as semi-deliberative, or time constrained.

4.4 Methodology

4.4.1 Ethical considerations

Ethical approval was sought and subsequently approved by the University ethics committee and written consent was provided by all participant coaches in the study. All data that were generated and captured, including video and audio files, were stored on a password protected laptop and external hard drive in line with the University ethical procedures.

Coaches were informed as the purpose of the study and that pseudonyms would be used to protect the identity of the coaches, players, and institutions. Throughout this study, the principal focus of this research was on capturing and unpacking the coaches' cognitions. Participant images and audio would also be recorded. Before coaching sessions took place in an educational setting, the Designated Safeguarding Lead and Headteacher were consulted about the purpose of the study and the procedures to be employed. In each case, the school policy about filming children was checked to confirm that it explicitly stated it was acceptable for children to be filmed for educational purposes. In the case of the rugby academy, players had given consent to be filmed under the academy's umbrella policy, which allowed filming for analytical purposes.

Think Aloud Protocol captures all audio that takes place near the coach. Therefore, this could include conversations of a sensitive or personal nature. As a result, and as a preventative measure, coaches were reassured that any material that could be considered sensitive would be removed from the transcripts and presentation of results in the study.

During the data collection phase, the researcher was both 'in and out' of the coaching session. The primary goal was to maintain a certain distance from the coach and players to let the session flow naturally. However, it was also necessary at times to prompt the coaches to verbalise their cognitions. The researcher did not interfere with the conduct of the coaching session or engage with the athletes.

4.4.2 Procedures

All coaches were briefed prior to the study on how Think Aloud Protocol was conducted and what equipment would be used and how that might impact the session. The objectives around collecting Level 1 and 2 data were explained to the coaches at the outset of the study. The difference between level 1, 2 and 3 verbalisations was explained to the coaches, with illustrative examples provided by the researcher. The coach and researcher undertook a 30-minute 'run through' prior to the session. During this time, the coaches walked through the set-up of their session, including the layout of activities and how they were expected to play out. Throughout this run through, the researcher was present to listen in, but also to provide the coaches with any further information in terms of how much and what level of verbalisation they were offering, as well as attempt to remedy any difficulties that they found with the method (Birch & Whitehead, 2020).

As participants arrived at the session, the coach informed them that he was wearing an audio microphone for the session which was designed to record what he was saying during the practice. Additionally, athletes were made aware of the video recorder which was positioned on a tripod at the side of the pitch. Coaches were encouraged not to deviate from their typical structure and style of coaching. Below, part of a Think Aloud Protocol Transcript is presented with the names of players redacted.

Time	Verbalisations	Comments to players	Comments from players	Actions
3 03.05 – 5.50	OK, so just coming in a bit high up top. Ok, so he got under the target, but just didn't get his hips low enough to go through. Ok, so came over the top, hit too high, dragged him out though. OK, so he's gone over the top, he's clearly not going to take him out there. OK, won the race, not very well, he's got to start working with the ball.	Ok, cool, right, have another go. Join the back of the queue. You can start when you want, we just go to move XXXX a few more times. You can have a go at whatever you want, you just have to have a go at all of them. Play OK, right, let's go, let's go, three more, then we change. Play Ok, that's alright. Two more. Ready play. Alright, back we go. One more for XXXX. Play. Ok, right, you've had three goes, three goes, tell me some of our observations from what we watched and some of our own experiences. So, good, yeah, consistently that's what I saw, saw the guys were going over the top of XXX, rather than going underneath him. Alright, if we've got a situation		

		where a guy is beating us to the height of the ruck, what are our other options we've got to use to start clearing him out? We could roll, I'd like us to put that right at the bottom of the list of things to do because we lose real momentum in our attack if we end up rolling out, so we stop. What are our other options might we have? Yeah, we've got to hit him had every time, what else? A bit of detail Yeah, yeah, good. So when XXXX stepped over the ball, bend over for my XXXX, you guys come in see XXXX and the height but you just come in and hit him there straight on. So we've talked about before that we've got to manipulate and hit him where he is weak. So, I've got to try and get in to here, come into here in that space there. What does that also allow me to do that's going to clear him out? I can swipe an arm, I can lift a leg, I can get him out of balance and that's what I'm trying to do. Alright, so we're going to change the two people in the middle and I want us to focus on cueing in on, have I won the height? If	I don't think the clearing man was low enough. He was trying like to get on top of him. Roll, go over the top of him. Hit him hard. Get your head between his shoulders.	Coach demonstrates body angle and levers.

		I've won the height, blast him out beyond the ball. If I've lost the height, I want to be able to see you adjusting for that loss of height and looking to try and take that lever out, cool. Alright with that? OK, two new players here please.	Inaudible player comment.	Coach sets up the drill again.

Figure 4.1: Example of Think Aloud Protocol transcript

4.4.3 Apparatus

All coaching sessions were recorded using a video camera attached to a wireless audio receiver. The audio receiver was placed in their pocket and was attached to a microphone on to their collar.

The video camera was placed either at the side or end of the pitch to capture all players within the frame. The camera was fixed to a tripod and was rotated by the researcher when needed to ensure that the coach and players remained in the centre of the screen.

4.4.4 Participants and setting

A purposive sample of six male Rugby Union coaches were selected based on their experience, coaching qualifications, and position within the RFU (e.g., Rugby Development Officer) or Premiership Academy. Coaching qualifications within the group ranged from Levels 2-4, with all individuals being employed in full-time professional positions. The range of coaching experience was from 7-25 years. The table below provides a breakdown of the coaches' and participants' details within the study.

Coach number	Level of coaching qualification	Coaches' years of experience	Age of participants (yrs)	Description of participants (gender and playing level)
1	3	14	15 - 16	Male, high performance
2	3	17	17 - 18	Male, high performance
3	2	15	15 - 16	Male, high performance
4	2	25	17 - 18	Male, club
5	4	23	11 - 12	Male, beginner - club
6	2	7	14 - 15	Female, beginners

Table 4.1: Table of coaches and participants

In total, 6 coaches were observed twice, meaning that 12 sessions were recorded with an average length of 50 minutes. They lasted for between 30-90 minutes and were representative of what the coaches deemed to be a typical coaching session as part of their overall schedule. Male and female players (aged between 12-18 years of age) took part in the coaching sessions. Their level of ability ranged from of having been recently introduced to the sport to competing at junior academy level.

4.4.5 Data Analysis

Phase 1: The video recordings from the coaching sessions were transcribed verbatim.

Phase 2: The transcripts were broken down into meaning units, coded using the framework of nine higher psychological functions established in study 1 and thematically analysed (Braun & Clarke, 2006, 2013). A researcher with a PhD in Sports Coaching verified the creation of meaning units and their categorisation. There was an 80% agreement rate between both parties. Significant attention and thought were given to the creation and coding of the meaning units. For example, the statement “yeah, good adjustment getting over the ball” (Coach #2) was discussed as either a technical evaluation, or a comment

about the general quality of the session. In this instance, an agreement was reached that it was more suited to the technical evaluation category.

In another example, there was a discussion about the following statement, “yeah, that’s pretty much the only time, but you would try and come in on the angle to begin with. So, if you just get into a really good jackal position for me now, just jackaling over the ball there, really ridiculous, like that, you would just try and hurt him really and come in and hit him there. You’ll hit him there and that will dislodge him, at least it will get you a bit of movement and your follow through might get him out of there” (Coach #2). This provided a problem because of the length of the statement. However, it was agreed that breaking it down into smaller sentences would have resulted in a loss of meaning and sentiment. In order to proceed, meaning units that were not agreed upon were left until the end of the process. The remaining meaning units were assembled into groups of similar disagreements and a general decision regarding their categorisation. In total, 1337 meaning units were created and then coded. The coding process was performed using Microsoft Excel so that the meaning units could be transferred and placed under appropriate headings. Within Microsoft Excel, the cells were colour coded which allowed the researcher to identify the coaching session from where the meaning unit originated. In the first instance, the framework of higher psychological functions facilitated the data to be analysed deductively.

Phase 3: As the coding process unfolded, the data were also analysed inductively in order to make sense of and create second order themes (Fereday & Muir-Cochrane, 2006). This provided the specific detail of, for example, *what* coaches were noticing (e.g., technical or tactical aspects). In total, 815 meaning units were coded as cognitions (Table 4.2). A further 522 meaning units revealed themselves to be instruction or feedback and consequently, these were coded as ‘actions’ as seen in table 4.3.

4.5 Results

The higher psychological functions that were found within the study are depicted in table 4.2. Significantly, noticing and questioning were prevalent in all sessions. This revealed first-order themes which are displayed with exemplar quotations. Noticing emerged primarily through Level 2 verbalisations as coaches appeared to be more at ease when they were physically distanced from players and with no need to verbally engage with players.

Higher Psychological Function	First order theme	Meaning units	Level of verbalisation
Noticing	Intensity of session	"Ok, it's really slow and lethargic. Need to get stuck into them a little bit before we move on."	2
	Quality of the session	"A lot of one up stuff at the moment. Close support is probably quite good."	2
	Inter-player communication	"Ok, so we've got some really good organisation. The chat is really good, but we're not listening wider"	2
	Technical evaluation	"Billy just came a bit straight on, rather than coming from the side which made it a less effective clear than it could have been."	2
	Positioning on field and use of space	"So, we have got the players now starting to work on recognising where the space is, with Jack, the tendency is to try and go laterally initially to try and find space."	2
	Tactical evaluation	"We've got XXXXXX on the ground which is always cutting back into the 10s space which bunches up our space."	2
	Decision-making	"Ok, again, he's waiting for the guy to react."	
Questioning	Player's level of understanding	"Ok, so we've got some lack of understanding, or lack of application by wide support players of what they need to do to contribute towards the game. It's not something that's new to them but it's a real issue that we're getting is the guys are really good at playing and controlling when they get close to the ball but wider guys just aren't feeding any information in, partly due to where they are looking."	2
	Questioning player communication	"What good chat was happening up here?"	1
	Questioning what players are seeing	"Let's go, Jack, where is the space?"	1
	Questioning player knowledge of game (rules)	"Ok so now. If the ball goes to the floor, what are you going to do? Can the ball go on the ground?"	1
	Questioning player knowledge of tactics (strategies)	"What does that give us? If we're in behind the defence and we're trying to play it quick"	1
	Questioning player knowledge of session or drill goals	"What are we trying to do here, what are we trying to do?"	1
	Questioning player knowledge of how to improve	"Good Kai, miles better. Why was that one better than your last one?"	1
Problem solving	Explaining and teaching - resolving problems with appropriate solutions	"Yeah, pushed up, he pushed up. So what we're seeing is that if we copy his intent to get to the contact area, we're making the clear-out miles easier for ourselves. If we're kind of lazy and lethargic on this part, it's having a massive impact on the ball here. So let's just make sure we're cueing on what we're seeing the collision is, and if you see that Harrison has won that I want to see you flying over there."	1
Deductive reasoning	Explaining a rationale through a logical chain of reasoning	"So now there are a couple of bits where obviously the players will have a look at a little bit of technique because there is some handling going down, but generally its pretty good, impressive. But I don't want to take it out the game at this moment in time because the support, the go forwards, the recognition of space, they're having a good look to find out where players are."	2

Table 4.2: Thematic analysis of *in situ* higher psychological functions

The results in Table 4.2 revealed a range of questioning, directed both at players and as part of the coach's inner thoughts, used within sessions. Importantly, questioning can be considered as both a cognition and an action. However, it is proposed in this instance that questions were representative of the coach's cognitions prior to actions and therefore, were part of the broader theme of diagnostic cognitions that were discussed in Chapter 3. As anticipated, problem solving and deductive reasoning emerged from the findings. Problem solving was mostly evident from Level 1 data, whereas deductive reasoning was more prevalent within Level 2 data. However, Table 4.2 does not include higher psychological functions such as confirming, evaluating risk, forecasting, contextualising or normalising, due to the sparse number of meaning units. This finding will be reviewed later in the discussion section and commented upon as part of methodological limitations.

A significant amount of the data that were collected (522 meaning units) could be categorised as 'instruction' and 'feedback' (actions), which reflects their importance and use by coaches. Coaching actions manifested in four different ways: direct instruction to players, collaborative instruction to players, feedback during drills and feedback during interventions (interventions in this instance are recognised as when the coach stopped the session to deliver information). Examples of coaching actions are displayed in Table 4.3 and were consistent across all coaching sessions.

Action	First order theme	Exemplar meaning unit	Level of verbalisation
Instruction	Direct instruction to players	"Ok so you boys now stay in line with me, on the countdown 3,2,1 and then all you defenders are back in play."	1
	Collaborative instruction to players	OK, ready? You call play when you are ready.	1
Feedback	Feedback during drill	"Keep going Mac, well done good offload, Great stuff."	1
	Feedback during intervention	"Harry I want you to pin your legs together and be strong mate, be strong and you know we talked about line outs, this is you, you need to be there, biceps to ears, yeah show me your biceps to ears this time."	1

Table 4.3: Thematic analysis of captured *in situ* coaching actions

Figure 4.2 which is presented towards the end of this chapter demonstrates how the emergent cognitions and actions can be considered situated and interdependent on one another. The data paints a picture of a coaching process that was dynamic, complex, and time-bound, yet seemingly not chaotic. In addition to the cognitive aspect of this study, two actions were also evident: instructing and feedback. These themes provide a structured approach through which to frame the detailed content of the cognitions and actions. It is suggested that these themes were revealed, in part, due to the micro-management context of the sessions and sport-specific requirements within rugby such as: team sport, high level of physicality, often more than 20 players, and invasion game tactics (Lyle, 2010b). It is proposed that other sports may require different cognitive *patterns and arrangements* of higher psychological functions dependent upon the particularity of the environmental characteristics. Understanding the coaches' cognitive processes within this dynamic environment provides insight into session micro-management from an organisational, cognitive, and action-based perspective. The presentation of results below begins with the emergent higher psychological function (noticing, questioning, problem solving and deductive reasoning) and is then followed by the resultant actions (instruction and feedback).

4.5.1 Noticing

In total eight second-order themes emerged under the category of noticing. These themes illustrate *what* specifically was noticed by coaches. These provide the detail of the content and reveal particular aspects that the coaches in this study spent time focusing upon.

4.5.1.1 Intensity of session

Several coaches made generalised comments about the intensity of their session. Early in a session one coach remarked "Ok, it's really slow and lethargic. Need to get stuck into them a little bit before we move on" (Coach #2). This suggests that the coach had a preconceived idea, or set of expectations, about what should be happening (and when) and was comparing this to what was unfolding before him (c.f. Lyle's (1999) schema model and script schema model). Reflecting on Cushion and Lyle's (2017) work on mental models, it is suggested that this coach was operating using a simulation model, matching his 'day-to-day'

or sessional expectations, and using this as a tool by which to compare against what was unfolding during the session. In other cases, coaches engaged this type of higher psychological function to ascertain if there was an immediate need for an interjection caused by a threshold being breached (Harvey, Lyle & Muir, 2015). As an example of this in action, at the beginning of a session, Coach #1 shouted “If you don’t work f***ing hard enough fellas you’ll just be going to running shuttle alright, because we aren’t getting out of it what we need on the pitch and cues that we need to be picking out of it”.

4.5.1.2 Quality of the session

The overall quality of the session was something that all coaches frequently deliberated. Early in his session, Coach #6 verbalised, “Loads of dropped passes. Loads of imposition. Loads of people not running lines. Loads of people passing the ball badly. Which is not what we want at all, but ok”. This meaning unit could arguably be broken down further. However, the sentiment of the statement by the sum of its parts implies that the coach was dissatisfied with the quality of the session. For example, the use of the word ‘badly’ signifies an internal judgement that has been made by the coach (McMorris, 2015). Furthermore, the coach finished his thought by acknowledging that it was not ideal, but that it was “ok”, suggesting that he was not ready to act immediately. This suggests that coaches might take the view that, at times, the standard of performance at a given time is ‘good enough’ or ‘satisfactory’ for the purposes of the goals within the session (c.f. Simon’s theory of bounded rationality or ‘satisficing’ (Prabha et al. 2007)). The incident outlined above was notable due to the resultant action and feedback from the coach (upon further examination of the original transcript) who said “Come in. Couple of things boys just to make the exercise work... I just let you do that because I just wanted to get our hands going basically” (Coach #6). This reveals that the coach was able to identify that the quality of session was not sufficient at that point, yet he was willing to overlook it as it served a purpose. The above example demonstrates that coaches afford their players or teams latitudes that are likely to fluctuate dependent upon a range of contextual factors, for example, time within the session (warm up or main part of the session) and team/player success. Furthermore, consistent and early intervention may unduly distract from the overall goals of the session if time was spent fixing the first minor problematic issue that Coach #6 noticed.

Other coaches made generalised statements, for example, “Defence working well in a little unit there” (Coach #3). These comments were plentiful, and coaches appeared at ease

when making judgements about how their players were performing. It is suggested that coaches were using simulation models to inform their judgements and using background contextual information and prior knowledge of their player's ability level and previous performances.

4.5.1.3 Inter-player communication

Coaches were intent on examining the level of verbal inter-player communication, most likely because of the potential impactful on team performance. To begin, the coaches commented on the incidence of communication, without passing judgement on its quality. For example, "So, the lads are just starting to talk." (Coach #2). Another coach was focused on the location of the inter-player communication: "let's have a look, are we getting the information from out wide?" (Coach #3).

Inter-player communication was a prevalent emergent theme within the study due to the sport specific requirements of rugby and the need for players to share information in order for a team to be effective. Consequently, coaches invested time diagnosing issues when this was happening. The simulation model is most apparent in this situation with coaches exercising their judgement, informed by their expectations, as to whether communication was happening. These findings reflect those of Debanne, Fontayne & Bourbousson's (2014) work on team mental models and distributed cognition.

4.5.1.4 Technical evaluation

Technical evaluation was a significant part of what coaches noticed. Research has suggested that technical concerns are always high up coaches' priority list (Gabbett & Ryan, 2009; Latinjak, Masó & Comoutos, 2018; Rojas et al., 2000). However, safety concerns are also important and due to the contact nature of rugby, the absence of correct technique might result in injury to a player (Podlog & Eklund, 2007). Two different statements reveal *how* and *what* coaches were thinking about in terms of technique. Referring to the technique of tackling, one coach explained, "I'm now going to up this to build technique with Joe" (Coach #5). This suggests that the coach was aware of the current players' technical ability and how best to introduce technique in stages such that it would be safe and minimise risk

to the player. The subsequent review of the video depicted the coach progressing the technique of tackling with the whole group, but offering particular feedback to the one player who he was intending to focus on.

Another coach noted: “Poor on the clear out, body position’s been bobbing really. I know it’s cold and everything, but you just look at it and there’s a few” [bobbing refers to the height of the player’s head and shoulders. Typically, the player with the lower shoulders will win the physical contest] (Coach #2). In this example, the coach was noticing the height of his player’s head in the contact area. However, it is likely that the coach was equally concerned with improving performance as much as player safety as in the above example with Coach #5.

4.5.1.5 Positioning on field and use of space

The theme of positioning and use of space was mentioned by all coaches (which is not surprising with rugby being a team invasion sport in a confined area). It was found that coaches were consistently noticing where players were and how space between players could be exploited. For example, Coach #6 verbalised, “They crossed the gain line, but they are now outside the outside post”, illustrating that he was aware of how much forward and lateral progress his team needed to make [in this instance, the team were practising a line out and driving maul. The maul was not intended to travel in a lateral direction as it means that other attacking players have less space to attack during the next phase of play]. It is speculated that this coach had mentally divided up sections or areas of the pitch (there were no physical divides, such as, white lines or cones) in assessing the progress of players within the drill.

Another coach stated, “Guys aren’t keeping the width on that last one” (Coach #1). This implies that the coach had a mental model of *where* players needed to be on the field and *what* they were required to do in order to gain advantage on a particular play. Lyle and Cushion (2017) identify a performance model by which coaches evaluate and monitor progress. The findings in this study strongly suggest that coaches operate with a performance model when focusing on the utilisation of space within the session as this is a highly technical aspect of rugby. Interestingly, regardless of the differing levels of player ability, all coaches were intent on focusing on space and positioning on the pitch.

4.5.1.6 Tactical evaluation

Tactical evaluation, although initially similar to ‘positioning and use of space’, offers a slightly different set of ideas (Gray & Hall, 2015). This theme is based on team effectiveness, hence the evaluation aspect, and suggests that coaches were considering the impact of player or team tactics in a particular activity or game (Cloes, Bavier & Piéron, 2001). For example, a coach mentioned, “Good enterprise from the defence... allowing people to get back and recover” (Coach #3). The coach was making a judgement about the defensive unit, evidenced by his, albeit short, rationale and in this instance, the coach demonstrated his attention was on a particular group of players (defence, midfield, attack), working together to achieve a particular goal or outcome. Additionally, another coach noticed his players were “looking towards the ball, not so much looking outside” (Coach #6). This suggests that coaches were noticing tactical issues, but also attempting to make a judgement or diagnosis, because this would serve as a potential catalyst to determine whether they needed to spend time resolving the problem. This diagnostic cognitive process is also evident in Harvey, Lyle and Muir’s (2015) work on catalysts and thresholds. Finally, this finding suggests that coaches were using a goal model when making this evaluative judgement as there was a focus on the outcome of the activity to gauge the level of success.

4.5.1.7 Decision-making (of players)

The findings of this study present player decision-making as something that is highly person-specific, contextual, and situational. As an example of how a coach’s prior knowledge of a player was used by the coach when evaluating the player’s decision-making skills Coach #5 stated, “The guy on the ball now is a very capable player, probably just lacks a bit of confidence in himself. But all his passing and decision-making has been spot on”. This suggests that the coach was able to focus on a specific player and identify a range of factors that could influence the players’ decision-making. Furthermore, this statement about the knowledge of the player’s personality and mental state suggests that the coach was able to recognise how these personal and situational factors have the capacity to impact on the player’s performance.

Coaches also noticed players’ decision-making in specific drills and how these impacted on tactical outcomes. Whilst observing a drill that was in action, Coach #6 verbalised, “That’s a

very early kick option, I understand they don't want it to be the same attack" [kicking in rugby can result in the loss of possession for a team]. This implies that the coach was not expecting the kick to occur and, again, was utilising a simulation model which, as discussed previously, contains expectations, or predictions, about how an event is likely to unfold (Lyle & Cushion, 2017). Shortly afterwards, the coach followed up his statement about the kick with a justification of the decision – "I understand they don't want it to be the same attack", suggesting that what he had noticed was insufficient to trigger an action immediately.

Finally, Coach #2 verbalised a rationale as to why his players were not being effective or successful in his drill, "so they were quite focused on hitting hard, but weren't really focused on coming in on the angle to get underneath him (the opponent) and reading the cues off the defender to make the decision. I think that's what we've got to pick up on during the game" [reading the defender means to assess the player's body angle so that they can get lower than the opposition and drive them backwards]. This signifies that although the coach noticed the superficial and surface level errors that the players were making, he was able to problem solve *why* they were making these decisions, note *what* was needed and *how* the problem would be remedied later in the session.

4.5.1.8 Players' level of understanding

This sub-section explores players' level of understanding which is linked to how coaches use questioning and diagnostic judgement to explore that understanding. As an example, Coach #6 verbalised "no running lines, no understanding, ok" [running lines means the direction in which the ball carrier or support players are running. Attackers are typically taught to run at the space in-between defenders]. This suggests that the coach inferred from the players' actions (no running lines) that there was a lack of understanding. However, in this study Think Aloud Protocol does not allow for consideration of whether or not the coach's understanding of the actuality of the drill was sufficient, or if their simulation model was corrigible in relation to the players s/he was working with, resulting in an inappropriate level of expectation.

4.5.2 Questioning

The following discussion and sub-sections will explore types of questioning that coaches engaged in throughout the study. Not all cognitions result in action and it is possible to regard these verbalisations as either mechanisms to acquire more information or to provide the basis to initiate feedback or some other future action. Making comparisons between this study and Robbins and Aydede's (2009) concept of the extended mind offers a useful insight into how questioning, as a higher psychological function, but also as an action, has the ability to extend into the social environment. In this instance, coaches verbalised their cognitions into their (coaching and players') environment. The players can respond to the extended cognition by amending their actions or justifying them verbally through dialogue or physically through game-based actions. As part of this analysis, questioning is viewed as a cognition, but manifests as both an action and tool which coaches use within sessions.

4.5.2.1 Questioning player communication

Communication as an action by players is an important aspect of rugby and is supported by literature in team shared mental models (Cannon-Bowers, Salas & Converse, 1993; Debanne, Fontayne & Bourbousson, 2014). Within this study, coaches tended to focus on *how* players were able to pass information from one to the other during activities. For example, when speaking to a player one coach asked, "Ok, and how are you passing that information on to the players? Because you were doing it at times in that game" (Coach #3). Although this emerged as an action, the cognitive antecedents of questioning were significant as the coach wanted to understand *if* the player was aware of how they were communicating, as it will allow players to identify problems in matches and equip players with the capacity to improve. In addition, a different coach asked a player, "Yes, so what have you got to keep telling him (another player) in the game?" (Coach #2). This implies that the coach noticed and was cognisant of the fact that the player was failing to communicate during the activity. In both examples, the question also serves as a mechanism to prompt or remind the players to communicate during a game or drill situation.

4.5.2.2 Questioning what players are seeing

Questions, first as cognitions and then as actions, allowed coaches to understand firstly the player's conscious in session deliberations (Cole & Engeström, 1997), secondly what they were recognising in the session and in themselves and thirdly, what promoted them to make the decisions on the pitch. In the case of one coach, he asked a relatively simple question to a player, "who is the player in the most space?" (Coach #2). This question implies that the coach was wanting to gain more information about *how* and *what* the player was seeing.

Similarly, a different coach gave an instruction immediately followed by the asking of a string of questions to his players, "fellas let's be feeding it in, what defenders have we got, or might we have? Ok where are they coming from? Do we need to fix? Do we need to straighten up? Do we need to go back at them?" (Coach #1). The quotation is long, but only when left in this format, does it reveal a complex cognition with a richness of content that indicated the variety of components that the coach is focusing on at a particular time. It is reasonable to suggest that these questions were most likely rhetorical as the coach didn't give an opportunity for the players to answer him and they followed an initial basic instruction. In this example, the coach had a significant number of questions based on what he witnessed, these resulted in a flow of questions to the player. For instance, the question "do we need to straighten up?" implies that the coach was wanting the players to question their behaviours and thinking in order to achieve the intended goals (Cole & Engeström, 1997; Debanne & Fontayne, 2009).

4.5.2.3 Questioning of game (rules) and tactics (strategies)

Many coaches questioned players on the rules of the game, which it is suggested is reflective of the domain in which the study was situated, that is, rugby is a game with many rules. For example, one coach asked a player, "ok, so now, if the ball goes to the floor, what are you going to do? Can the ball go on the ground?" (Coach #2). From this, it is possible to infer two possibilities, firstly that the coach was merely questioning if the player was aware of the rules or laws of the game. Secondly and arguably more likely, the question allows the coach to identify a mistake or irregularity with the player which can be explained by inferring that the coach was using the performance model when verbalising.

Tactical or strategic knowledge of the game was a prevalent theme in most coaching sessions, evidenced by Coach #3 who asked a player: “and if they spread, what do you do then?”. This suggests that the coach wanted to know if the player was strategically aware of what he needed to do next. This questioning of players’ tactical knowledge is important as rugby is a dynamic invasion game that requires players to make decisions with time-constrained deliberation. In this instance, by the coach asking the player what he would do next, it is plausible to infer that the coach was cognitively questioning if the player had the required knowledge to take an effective course of action if the situation of the defenders spreading out were to occur. Problems caused by a lack of understanding from players of basic rules are likely to result in players in the wrong position, technical errors and a subsequent loss of possession.

4.5.2.4 Questioning of session or drill goals

Most coaches did not explicitly state the session goals at the beginning. However, it was possible to infer that coaches were working towards a set of goals and the questioning of player knowledge about session goals demonstrated the accompanying cognitive activities. For example, one coach asked, “What are we trying to promote in this game?” (Coach #1), whilst another questioned, “What are we trying to do here, what are we trying to do?” (Coach #2). In both cases, it is suggested that the coaches were establishing expectations about the goal context, likely as part of broader programme of work, and then detecting deviance away from this and their questions acted as mechanisms to steer the session back on track. These findings suggest that the coaches had established session objectives or goals and, although they were not explicit in stating them in the session, they emerged when the coach perceived a threat to achieving those goals through interactions with the players.

In a different example, a coach asked a question and then explained a condition he was going to impose on the drill and finally repeated his original question - “What challenges have we got in this narrow channel then? Every time you retreat now, I’m going to pull a player out, to start off with. So, you might be, ok, the fourth player holding back with me and Ben, you might be going 3 on 3, you might be going, 3 on 2, what challenges are we getting immediately in this channel?” (Coach #1). This illustrates how the coach was intent on finding out if the players were aware of the situational challenges that he designed. The way in which the coach presented the information by a question-condition-question formula helped provide a frame of reference for the players for them to reflect upon the coach’s

questions. This demonstrates how questions accompanied by contextual information offer the recipients a narrower degree of focus and about what they ought to consider.

4.5.2.5 Questioning of how to improve

Coaches often used questions as mechanisms to provide either feedback or gain a deeper understanding of their players' understanding. However, they also served as tools by which to raise awareness and prioritise player's cognitions and mental processes (c.f. Memmert (2009) for a comprehensive review of visual attention). In one example, emotions were running high and the coach made an intervention and asked, "When you get upset with yourself, what do you think is going to happen, are you going to get better or worse?" (Coach #2). This statement demonstrates that the coach was operating with a performance model when noting the player's decline in performance. However, it also illustrates the value of questioning a player's internal knowledge of how to improve, resulting in the player becoming more independent and self-sufficient. It is speculated that the desire for players to be self-sufficient might be a long-term goal for coaches and this could emerge if an approach that was longitudinal in design were to be adopted. In this instance, the coach knew the answer to his questions and wanted to ensure that the player was also able reach the same conclusion.

4.5.3 Problem Solving

Problem solving was mostly evidenced through player-coach or coach-coach conversations. As an example, one coach explained to his player, "The only time you'd want to roll someone is if you come in at a bad angle and you're not able to get to a lever or if you got to the ruck quite late and there's a lot of bodies there you just need to take him out" [rolling refers is a method for a player to remove an opponent in a ruck. Instead of driving the player backwards, the player latches onto the other player, then rolls sideways thus taking the opponent with them] (Coach #2). In this instance, the coach solved the problem of his players performing a roll. Although not explicit, the coach offered a solution to the problem (approach at a different angle to gain more leverage) to avoid players having to roll the opponent when competing for possession. Problem solving requires two things: 1) noticing [in this instance, the angle of approach] and 2) use of a schemata-based knowledge framework (Lyle, 1999) before the coach could select and offer a proposed solution. In a

variation of problem solving, a different coach verbalised “Ok so they panicked there because the issue is a pass backwards but they haven’t gone forwards. I want them to get the main principle of play, which is to go forward” (Coach #1). In this instance, the higher psychological function of problem solving is clear and explicit.

It is suggested that coaches are continually problem solving in sessions and the outcome of these processes is evident in coach feedback. Coaches often problem solve using simulation and performance models to identify what is ‘out of place’ in front of them. However, whilst problem solving is often inferred through action, the teams’/players’ performance outcome are equally important as it validates the quality of problem solving. Significantly, these findings point towards the need for a longer study that provides an immersive-researcher experience such that coaches’ cognitive processes can be evaluated against wider-contextual factors such as goals, domains and outcomes.

4.5.4 Deductive reasoning

Deductive reasoning proved to be one of the more challenging cognitive processes to observe in this study using Think Aloud Protocol. Deductive reasoning was mostly evident through coach-player conversations and was exemplified by meaning statements that were longer and offered a narrative. For example, one coach mentioned “So now, the thing is early on I’ve done a lot more intervention than I would have wanted to. So now is the chance to really get them playing and let them just have a go at doing stuff knowing that there is no whistle and they are managing this.” (Coach #5). In this instance, the coach confessed that he had deviated from his session plan. However, it was justified in the mind of the coach because the players were now autonomous as a result of his coaching interventions and long term goals.

A different coach verbalised “So, we are sorting out a passing game now to try and get the girls used to passing backwards. So, progressing on to the idea that from the game, we are now bringing in the backwards pass, which should progress now. We are doing it as one big line, I would probably want to do this in a smaller group, or a couple of groups to try and get more ball use” (Coach #1). This coach was able to explain his thought processes and progressions within the session, whilst also reflecting on the fact that it was not the ideal environment or group size in which to do this drill.

4.5.5 Instruction

In this study, two types of instruction emerged: direct instruction to players and collaborative instruction. As would be expected, direct instruction was the prevalent activity within all coaching sessions. However, it is suggested that collaborative instruction is a supportive strategy designed to engage and motivate players. In one instance, a coach gave an instruction during a set up for a drill “ok, so Josh if you just stand here with Ted, so Ted’s got the ball, you’re going to be the tackle on Josh” (Coach #2). In this case, the instruction does not imply a great deal of cognition on its own. The same coach offered an instruction for a different drill “This game is going to be a tackle game, we’re going to take the principle of the stuff that we’ve done with me around the contact area. We’re going to put it into a game, it’s going to be an overloaded attack game, so you’re going to need to make sure you were defending like you were with Jay and Adam, ok it’s like making a cake, we’re putting it altogether now.” (Coach #2). Once again, this is an example of an activity that might be broken down further but left in this longer format, it reveals a chain of ideas. This indicates a certain level of reasoning that the coach considered pre verbalisation, for example, taking what was learned earlier on in the session and encouraging the players to apply it in a conditioned game scenario. This provides a glimpse of how instructions might indeed act as an end point to precedent singular or multiple cognitions.

4.5.6 Feedback

Feedback emerged in two distinctive ways - during drills and during interventions. Within this research, a drill was considered to be a physical activity undertaken by players.

Interventions were considered to be the time between drills whereby coaches could offer feedback in some form. These stoppages could either be caused by the coach intervening, or as a result of the natural conclusion at the end of an activity. Additionally, there was difference in the depth of feedback dependent upon the specific situation. Whilst players were engaged in the task, feedback from coaches tended to be short, sharp, and specific about a technical point. As an example, coaches made several statements such as, “Harrison, good work” (Coach #1). This type of feedback could be perceived as more motivational than instructional, particularly as it did not inform the player what exactly they had done well. This type of feedback might be more frequent in micro-management settings in which there is little time to offer detailed feedback during drills. As an alternative example, another coach feedback to a player, “ok, so Barney, don’t worry about lifting him, you’re just

there then, you're going to come forward and get out of his way so you can track through, alright?" [The lifting in this case refers to raising a person to catch the ball from a line out] (Coach #2). This time constrained deliberation and action was not an intervention, but a natural pause in the stop-start flow of the session. Most coaching sessions have 'flow' and are interwoven with natural pauses and breaks. This results in all coaching sessions being different in style and approach, resulting in variations in the type and quantity of feedback that is provided.

Feedback during interventions afforded coaches more time in which to deliver the feedback to their players. As such, actions linked to particular interventions were more difficult to interpret and it was necessary to retain their length in order to maintain the naturality, originality and sentimentality of the coach's expression. During a feedback intervention, one coach offered, "But we've been on at you for weeks and now you are getting it and you are getting into more and more positions and getting in behind, that's fantastic Harry. But it's tough at the minute for you to organise that outside, right, so Benny, if you are outside him, I want you to be feeding him that information, likewise if you're behind, I want you feeding it in to Dunny, yeah it's on, it's on, it's flash, then you can call flash, I'm not going to not allow you to call it, but you can only call it if he's saying it's on. But, it might come from outside from Lou, it might come from outside from Boydy, do you get that?" (Coach #1). This feedback involved four different players and demonstrated how the coach needed to provide feedback to all players for them to understand their roles and develop a shared understanding or mental models (Cannon-Bowers, Salas & Converse, 1993; Debanne, Fontayne & Bourbousson, 2014).

Coaches appeared to be operating with performance models whilst providing feedback, which might be expected if coaches are attempting to get their team to perform at a certain level or in a particular fashion. A coach will be unable to script each player's specific role and provide direct instructions of where they should be during the game. However, they can instil a common understanding or shared mental models between players in order to allow them to be more successful. Another example of this is provided by a different coach, "Because it's a pass off the right hand, so if we want any width on the ball, if I want a wide attack, it will be better to do it from that side because you are righthanded." (Coach #6). This statement exemplifies how the coach can explain to all the players *what* needs to happen and *why* it must happen in this way.

4.6 Discussion and substantive conclusions

Coaches continually sought to gather information in the way of noticing and questioning (Mason, 2002), both of which are diagnostic cognitions (Klein, Borders & Newsome, 2018). This provided a stream of information for coaches to interpret, question, solve problems, reason and act upon. The gathering of data by the coach was part of their embedded routines and an essential precursor before making any decisions. It seems that coaches engage different higher psychological functions in a cyclical fashion (c.f. the conceptual model in Figure 6.1).

Noticing is the first, and arguably most important, of these processes, for without the identification of a problem, there can be no subsequent cognitive routines (Mason, 2002). Noticing emerged in three distinctive ways: *how* the session was going, *what* the players were doing and *what* the players knew. These three considerations summarise what coaches were focused on and were embedded cognitive routines. The use of questioning revealed that coaches verbalised this cognitive process for it to act a tool to verify and challenge what had been noticed. In some cases, the act of questioning served as a deliberate mechanism engage with players and facilitate the gathering of information. As such, the action of questioning could be viewed as a strategy to shift the decision-making environment from non-deliberative to semi-deliberative, allowing coaches opportunities to problem solve rather than operating in a reactive fashion or using heuristics (Brighton & Todd, 2009). These findings link to Mason's (2002, p. 122) concept of 'gathering gambits' which explores ways of acting or working to gain an advantage.

Overall, there were few examples in this study to support the notion of problem solving and deductive reasoning and these were mostly inferred, rather than naturally emerging from the data. Problem solving and deductive reasoning were revealed through longer composite quotations, often in the form of a 'chain-of-instruction' demonstrating the coaches' logical thinking. This suggests that these higher psychological functions occur, but methodological limitations are likely to be responsible for their absence in this study. As an example, research environments that offer little time for deliberation are less likely to detect deductive reasoning as coaches are reacting and making decisions without time to evaluate options and apply a chain of logical thinking (Simon, Collins & Collins, 2017).

Although coaching can be viewed as a flow of serial events (Cushion & Lyle, 2017), cognitive processes can be viewed in a different fashion. Instead, it is proposed that the cognitive processes operate in an intermittent style, e.g., notice, question, notice, question, problem solve, question etc., until a threshold is reached, manifesting in feedback or instruction (Harvey, Lyle & Muir, 2015). Consequently, any of the outlined contextual conditions, might trigger a particular cognition and then an action. However, what warrants further investigation is whether there is a 'weight of importance' given to cognitions that could be attributed to the breaching of thresholds and triggers, or interventions, being activated.

As a consequence of using Think Aloud Protocol and the capturing of data such as coach-coach and coach-player discussions, this study highlights the quantity of instruction and feedback within sessions. Although the quality of instruction and feedback was not explored in this study (as this would require a more embedded and longitudinal research approach in order to an evaluation), it is acknowledged that instruction and feedback are essential components of coaching and, when provided in an appropriate fashion, have the capacity to improve team/player performance (McMorris, 2015). Coach instruction and feedback can be viewed as 'checkpoints', as part of emergent cognitive routines.

4.6.1 A conceptual model of the relationship between cognitions and actions in a micro—management setting

Given the complex interaction of cognitive processes and actions that emerged within the study, it is important to acknowledge the concept of orchestration (Bowes & Jones, 2006; Jones & Wallace, 2005, 2006;). In this study coaching practice revealed an intense and dynamic manifestation of cognitions (including noticing) and action. This fine-tuned balance reflected coaching as a dynamic, yet not chaotic process, with the coach acting as the conductor. This has been tentatively proposed in a conceptual model of cognitions and actions in Figure 4.2.

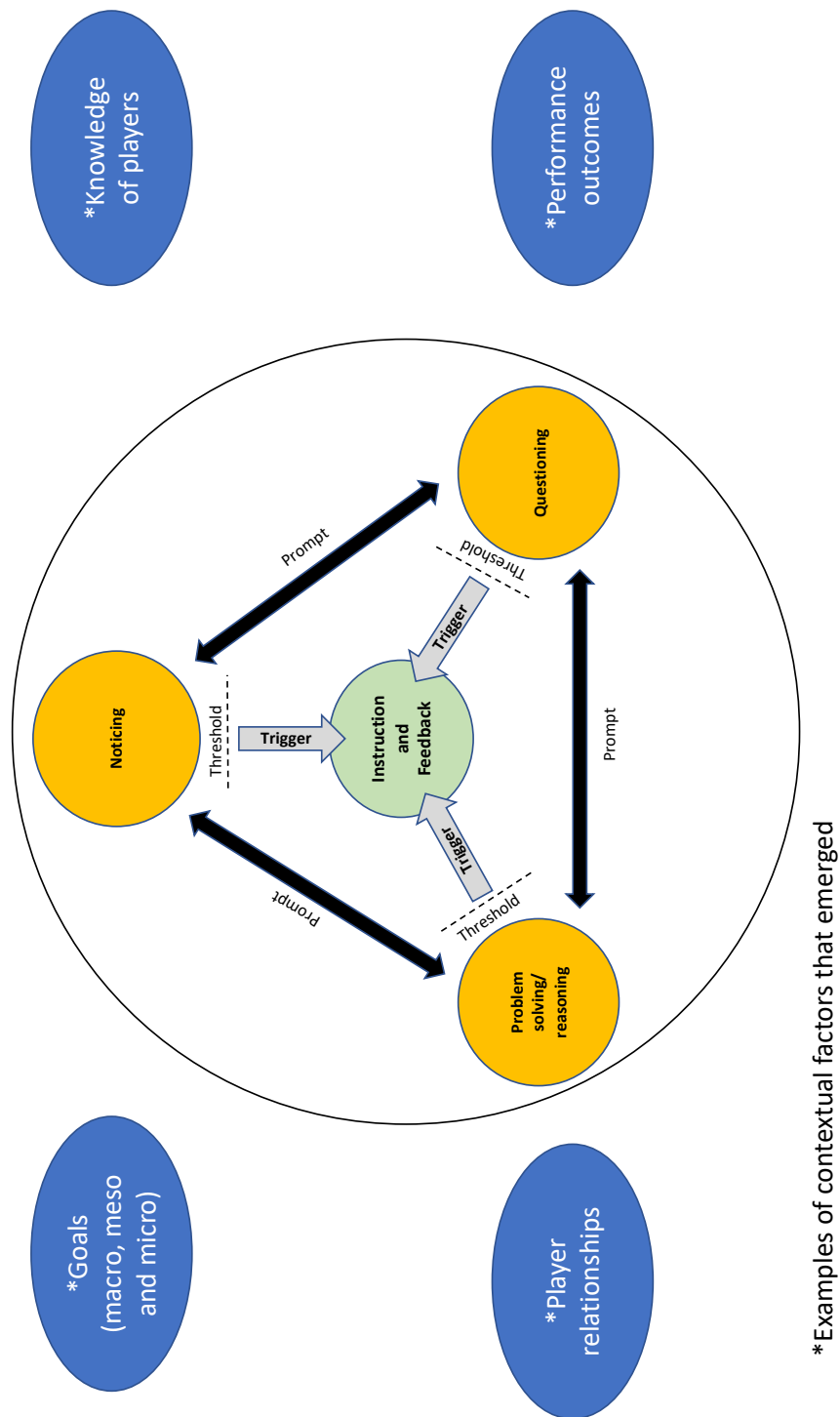


Figure 4.2: A conceptual model of the relationship between cognitions and actions in a micro - management setting

In Figure 4.2, problem solving and deductive reasoning have been grouped together as a result of their perceived similarities within this context. Although these higher psychological functions emerged, it is acknowledged that they did not emerge to the same extent as 'noticing' and 'questioning'. This may reflect the narrower focus in the study and the emphasis on what might be termed the micro-management of the session. Subsequent investigation might examine the possibility that expert coaches are able to 'find time' for more deliberate cognitions, whereas less expert or experienced coaches become more focused on the immediate action. This may also point to the advantage of Head Coach roles, in which coaches are able to 'stand back' while assistant coaches engage with the players.

The conceptual model in Figure 4.2 illustrates how the higher psychological functions (depicted in yellow) are interlinked and dependent upon one another. For example, when coaches notice something, it often prompts some form of questioning to gain more information. Whilst problem solving and deductive reasoning could be viewed as a result of the 'noticing – questioning' pattern of thinking, they may prompt further noticing and questioning to gauge whether the solution was indeed correct in the form of feedback (Lyle & Cushion, 2017; McMorris, 2015). These higher psychological functions operate serially and in concert, each one contributing towards the coach's knowledge and providing coaches with opportunities to test their understanding and make necessary interjections.

These four higher psychological functions noted in Figure 4.2 influence the type of instruction and feedback (depicted in green) that the coach will provide. It is possible to view the move from cognition to action (orange to green) as a result of a threshold being breached (Harvey, Lyle & Muir, 2015; Lyle, 2002) which causes a trigger, whereby the coach then intervenes. There were several examples in the Think Aloud Protocol data in which coaches acknowledged an issue but decided not to take any immediate action. Only once a trigger has been activated does it lead to a resultant action from the coach.

The conceptual model in Figure 4.2 illustrates some of the partial emergent wider contextual factors such as goals, player relationships, knowledge of players and performance outcomes. Even though these wider contextual factors were not explicitly considered a part of study using Think Aloud Protocol, it is acknowledged that they exist and influence both cognitions and action. However, it is unclear based on the findings of this study *how*, or to what extent, they might underpin or influence what happens during the coaching sessions. It might be reasonably speculated that this 'background' knowledge forms part of the coaches'

modelling of the coaching process and would be evident in performance (both individual and team), goal and simulation models – in other words the coaches' expectations exist within a framework of contextual knowledge. To capture the coach's consideration of these wider contextual factors within coaching sessions, a different method of verbalising *in situ* cognitive processes is necessary. This might also highlight the issue of research designs in more controlled conditions in contrast to *in situ* practice. Finally, it is suggested that settings which afford coaches time to deliberate such as planning or reviewing games/practices, are more likely to reveal deductive reasoning, contextualising and problem solving.

4.7 Methodological conclusions

Think Aloud Protocol presented coaches with an interesting dilemma. After the sessions, some coaches noted that were unable to verbalise their inner thoughts as their players would hear them. In some cases, coaches were concerned that players would be affected by their comments as they reflected a more 'direct' style of thinking and evaluating. However, in coaching sessions, the subsequent verbalisation of thoughts to players is typically more considered and diplomatic in nature. Furthermore, some coaches found Think Aloud Protocol to be an intrusive process and believed that it impacted on their coaching practice, most likely because they felt that the quality of their coaching would, in some form, be judged.

Due to the sport-specific context within rugby and in particular, the need for management and instruction within the sport, coaches often found themselves having to direct participants. In some cases, coaches also refereed conditioned games, requiring them to provide continual feedback to players. These particularities of rugby meant that some coaches were unable to provide much in the way of Level 2 verbalisation. This suggests that asking coaches to attempt to provide Level 2 data within micro-management settings is unnatural and may therefore affect the originality and authenticity of the cognitions.

Think Aloud Protocol data were collected when the coaches were (assumed to be) thinking and speaking at the same time. In essence, the two processes were happening in parallel. This provided a vast amount of data to be analysed, which posed challenges in terms of data analysis. For example, as part of the rigour of the study, it was necessary to transcribe the coaching sessions verbatim before being able to devise meaning units. When creating

meaning units from the data, there was difficulty in ensuring that they retained their originality of intent and sentiment. In some cases, it was necessary to create meaning units consisting of more than one sentence, as they represented higher psychological functions such as problem solving and deductive reasoning that would otherwise have been lost in smaller meaning units.

Within this study, there was more Level 1 data than anticipated and it is speculated that perhaps over time, coaches might have become more familiar with the technique of verbalising inner speech thereby allowing for more Level 2 data. Although there was no correlation between the coaches' experience and the level of verbalisation, different types of structure (thus allowing coaches to be more interactive or deliberative) within coaching sessions resulted in variations within data. For example, one coach was intent on letting the team play and providing concurrent feedback whilst they were playing. In contrast, a different coach used a whole-part-whole structure to deliver his session, and comparatively, this afforded him more time to deliberate and offer more considered verbalisations.

The use of Think Aloud Protocol was intended to build on study 1 by exploring the higher psychological functions, cognitions and actions of coaches as they delivered their coaching sessions. However, due to the micro-management context, higher psychological functions that were identified in study 1 such as contextualising, forecasting, normalising and risk management were undetectable. It is likely that they were happening but remained elusive due to the methodological limitation of Think Aloud Protocol. The use of Think Aloud Protocol enabled the capturing of rich data, specifically 'noticing', 'questioning', 'instruction' and 'feedback'. Conversely, by analysing the data in the form of meaning units, it was not possible to detect some of the more subtle interactions, such as intonation or inflection, that coaches used when speaking to players.

The study has provided some rich insights into coaches' cognitions in a micro-management or 'delivery' mode. Once again, it was evident that this was a partial picture of coaches' cognitions. This was partly a result of methodological specificity and practice context, which, in turn, focused attention away from the wider environment within which the coaching was taking place. The coaches' cognitions could be related directly to the demands of the session but failed to explicitly account for any organisational, social, or cultural factors that would further situate these cognitions. The findings demonstrated the emergent methodological limitations that prevented recognition of these wider contextual influences

and therefore, it is acknowledged that in order to situate cognitions against this wider socio-cultural backdrop and to provide a more complete account of coaches' cognitions, an alternative research strategy is required that will explore an array of peripheral factors that contribute to a better understanding of cognitions and mental processes.

4.8 Reflective account of study and research process

The intention of this section is to share what had been learned at this point in the research journey. I will begin by examining my position as a researcher in relation to the sport and participants. Following this, I will then share my thoughts surrounding how I conducted the procedures and the challenges that I experienced. Finally, I will outline what I had learnt regarding the research process and briefly present my general position at the conclusion of this second study.

Rugby, as a sport, was chosen for two reasons. First, it was a team sport and offered a different set of challenges that coaches had to overcome in comparison with those of my first study. Second, I was reasonably knowledgeable about the sport due to my playing and coaching experiences. I felt that my acquaintance with the associated technical and tactical nuances would be helpful in engaging with coaches throughout the study, as well as interpreting the results. Upon recruiting participants for this study, I found that the initial meetings and conversations were useful, and coaches were positive about being involved. However, I recall that for some coaches, there was a sense of 'giving it a go' which, with the benefit of hindsight, should have been an indication that more training was required to provide the coaches with the experience and tools to competently think aloud.

I noticed that, in some sessions, coaches struggled to verbalise as they coached. I observed that this was because they needed to engage with players and offer instruction and feedback. At the time, I was surprised by how much feedback and instruction some coaches offered. It seemed like a continuous stream of information and different to how I had been encouraged to coach. In contrast, some coaches appeared to be more considered, which I attributed to their coaching structure that allowed them to observe and analyse activities. Despite the differences between coaches in terms of data generation, it didn't feel appropriate for me to ask them to modify their coaching for my own purposes. Furthermore, I was intent on trying to preserve the natural quality of the environment. In some instances,

coaches were preparing their team for a competitive match (in three days' time) and there was a 'sense of urgency' in terms of content, material, and messages that the coach wanted to deliver. As a result, some coaches wanted to focus more on coaching and the Think Aloud Protocol appeared to be a hindrance to their process (both practically and cognitively). As an illustrative example of this in action, I recall during one session that I was walking around the perimeter of the pitch trying to get the attention of the coach who was not appearing to verbalise his cognitions. At the time, I felt uncomfortable and unsure as to how much to encourage and remind the coach to engage with the process.

After my first study, I was aware that I had to attempt to prepare or train the coaches in some fashion. At the time of this second study, there was scant guidance on how to prepare coaches to engage with Think Aloud Protocol and none in terms of using it with coaches. On reflection, whilst my attempt to familiarise the coaches with the protocol before the session helped to some extent, I now recognise that substantial training is required to obtain level 2 verbalisations. Moreover, I understand the significance of asking coaches to plan sessions to identify better when cognitions might be best, or most appropriately, verbalised. Suffice it to say, I now feel much more informed about the potential pitfalls and the need to establish participant familiarity with the procedures of Think Aloud Protocol.

The decision to engage Think Aloud Protocol was a necessary response to the emergent issues that I had encountered in my first study. However, it also presented me with an array of new problems (practice structure, problems of verbalising during practice and type of verbalisations during practice). Overall, I was dissatisfied with the data I had collected. I had hoped that it would be rich, and coaches would provide a continual stream of level 2 verbalisation and clear information that I could analyse. Instead, I was faced with the difficult task of distinguishing between feedback, instruction, and cognition. Subsequently, I was uncertain how to proceed and unclear as to how, or if, Think Aloud Protocol was indeed a suitable method to understand coaching cognitions. Whilst I felt that I had made some headway and revealed a partial picture of what coaches were thinking, I was still in need of an approach that recognised, embraced, and accounted for the complexity of capturing cognitions in context.

4.9 Direction of the next study

It is evident that further research is required, and a more sophisticated research approach is required to describe and explain the causal mechanisms behind coaching cognitions and reveal the layers of both meaning and decision-making within the coaching process itself.

Therefore, the next study will:

1. Utilise the emerging higher psychological function framework of cognitions from studies 1 and 2 to explore coaching cognitions in contrasting coaching environments.
2. Explore coaching cognitions against a wider socio-cultural backdrop and examine how components such as stakeholders, goals, and competitive landscape influence *what* and *how* coaches think.

Chapter 5

A new direction: the situated cognition paradigm and ERE model

This chapter describes a significant turning point in the research journey. To begin, reflections on the research journey and a new direction in my thinking about the problem of exploring coaches' cognitions are outlined. This centred on the potential of situated cognition as a means of both conceptualising and investigating the coaches' cognitions. Following this, the situated cognition paradigm is examined in some depth as a lens through which to understand better cognitions in context. The next section draws upon the situated cognition paradigm to reflect on the previous two studies. The shared concepts between situated cognition and North's (2017) ERE model are outlined, but first, a full analysis of the ERE model is necessary to identify this framework as a practicable way forward in the context of this research. Following this analysis, the crucial link between situated cognition and the ERE model is examined, summarised, and presented within table 5.1. The table describes how the 5 interlocking hypotheses of the situated cognition paradigm are evident in the ERE model. The chapter concludes with a summary of the key messages and future direction of the research in light of the arguments presented in the chapter.

5.1 Reflections on my own experiences and a new direction

After conducting the two initial studies, I was faced with several conceptual and methodological challenges, which have been detailed in the reflexive sections of the previous chapters. The result was a combination of personal frustrations and level of uncertainty about how to build upon the work already undertaken, but, crucially, how best to address the original research questions.

In February 2017 I moved abroad to take on a Director of Sport role in Santiago, Chile. My time abroad provided a series of challenges and facilitated a period of deep reflection on my own coaching and the subsequent reconceptualization of my academic research. My time in Chile resulted in a 'sense-making' phase and, although I hadn't been conscious of this at the time, was significant as I experienced how my surroundings influenced my thinking and coaching practice. I will now share below some of the key factors and influences on my journey.

As a coach, I aspired to work with high performance players and my newly appointed Director of Sport position enabled me to fulfil this ambition. However, the culture and environment in which I was working presented a series of unforeseen challenges which impacted upon my coaching practice. First, 'winning' appeared to be the singular goal. This contradicted my own personal values as a coach and educator in almost every single way and I had to reconcile these differences cognitively and emotionally. Moreover, the primary goal of winning was evident at a range of stakeholder levels, demonstrating the breadth and depth to which this goal was entrenched in the environment in which I was working. Second, the institution had been in existence for approximately sixty years and the ethos of winning was part of the culture and therefore, had become a tradition. As I reflect on this now, I recognise how the notion of tradition can be both positive and negative. At the time, it acted as a barrier to making the changes that I viewed as necessary and to practices that were embedded within the department. Third, attempting to convince coaches to be creative and reflect on their practice was problematic. I quickly came to realise that this was, in part, due to the financial incentive-laden goals that were annually dictated to the coaches. Linking this back to winning and culture, these types of financial goals had existed for many years before I inherited my leadership position. Fourth, all stakeholders had a level of 'expectation' and preconceptions about how teams and players ought to be coached. Therefore, alternative coaching philosophies and methods were perceived as a threat to winning - the singular overarching goal. The result of these perceived threats to goals being achieved was scepticism and a view that change was not necessary as it might jeopardise the existing approach to winning. I was gradually coming to realise that there were connections between coaching practice and the context or circumstances that surrounded it.

The factors above brought about a realisation that coaching and coaching cognition were inherently more complex and more subject to contextual interference, than my earlier research conveyed. Accordingly, I needed to adopt a research approach that embraced the proposition that cognitions and context are inextricably linked. The significance of context was becoming more obvious to me as I reflected in my recent surroundings. As I look back now at my time abroad through a more sophisticated lens, I recognise that goals, stakeholders, and culture were prevalent and influential features of my surrounding environment.

I continued to ruminate on my experiences and attempted to reconcile how the factors above could be drawn upon to inform my future work. I continued to read around the literature on

cognition and came across the concept of situated cognition, which to that point had not been used or explored in the sport coaching literature. As I began to expand my reading and familiarise myself with the situated cognition paradigm, certain features resonated with my own experiences such as embeddedness, social context, and emotion.

Having acknowledged to myself that my existing research into coaches' cognitions had been limited by its failure to account adequately for contextual elements, the situated cognition paradigm appeared to have the potential to offer an appropriate way forward. It seemed to capture the complexity illustrated by my own experiences and to extend my research by offering a deeper and more sophisticated explanation of contextual factors than my previous research. What follows below is a detailed overview of the situated cognition paradigm.

5.2 Overview of the situated cognition paradigm

Guba (1990) states that a paradigm is "a basic set of beliefs that guide action" (p. 17). Understanding underlying paradigms is essential as they inform the reader about the researcher's standpoint and how the researcher intends to overcome multiple and contradictory values that are encountered (Lincoln, 2010). Paradigms inform researchers about *what* to research and *how* they might conduct investigations without revealing to participants the underlying assumptions that accompany the paradigm (Sparkes & Smith, 2014). In the context of this study and phase of the research journey, the situated cognition paradigm that underpins the future research is examined below.

The concept of situated cognition within cognitive science has evolved in order to reconcile different disciplinary perspectives. The situated cognition paradigm is concerned with how cognitions are shaped by and formed in response to contexts (Wilson & Clark, 2009). Traditionally, the study of cognition was viewed using an 'information processing' approach, with a computer offered as a metaphor for how the mind works (Roth & Jornet, 2013). However, it has been interpreted in some fields, such as social psychology, that the purpose of cognition is to stimulate action and is most often deployed for practical and social ends (Anderson, 2003). Therefore, embodiment and situation serve as constraints upon cognitive processes (Roth & Jornet, 2013). Reflecting on mental constraints, Robbins and Aydede (2009) propose that situated cognitions can be viewed from three distinctive perspectives: 1) embodied, 2) embedded and, 3) extended. Each of these three themes offer an alternative

viewpoint about what is worthy of consideration in situated cognition and are briefly elaborated upon below.

First, the embodiment perspective considers that the body itself, body image and body schema have the potential to shape the mind using the sensorimotor system (Gallagher, 2005). Embodiment seeks 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 the world and act within it. As a simple example of this, Anderson (2003) considers the concept or mental symbol for a 'chair'. He suggests that the concept (and experience) of 'sitting', which, incidentally, is performed using the sensorimotor system, must be understood before it can be appreciated that the term 'chair' is not one item and that many different objects can be used as chairs. Significantly, this conceptual understanding of cognition being embodied appears to be most useful in the case of sport 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 and coach's physical experience of them. This raises an interesting issue of the commonality of understanding between coach and athlete, when their 'sense' (visual or experiential) may be different.

Second, it is claimed that the mind is embedded within a particular context and does not operate in isolation. Hutchins (1995) suggests that the endeavour of studying cognition 'in the wild' presents new challenges for researchers to examine how the mind works. Therefore, studying the thinking of individuals without consideration of the interaction between the mind and the 'external' world only tells part of the story. It is the transactions between the mind and the physical and social setting that provides significant additional insight into how individuals cope in the world and particularly within complex environments. As an example of this, Kirsh and Maglio (1994) offer the concept of cognitive offloading, using the video game Tetris and the rotation of 'zoids'. The Tetris example is used to explore two types of actions - pragmatic and epistemic, which seek to explain how the embedded mind can deal with environmental complexity. Pragmatic actions contribute towards an overall goal, typically by manipulating objects within the physical environment. In contrast, epistemic actions are physical actions that reduce the cognitive load on an individual. For example, Kirsh and Maglio (1994) found that Tetris players physically rotated the zoids to identify their 'best fit', rather than mentally rotate them. This form of cognitive offloading thus

allowed individuals to overcome the environmental complexity, which in the case of Tetris, was an ever-reducing amount of time (Robbins & Aydede, 2009).

The concept of embeddedness is wide ranging in its meaning and can be viewed in conjunction with that of embodiment. For example, the moving of objects and perception draws upon sensorimotor mechanisms and functions. The focus and acknowledgement of the environmental ecology has influenced various fields of study. For example, Gibson's (2014) work centres around ecology as a lens to explore visual perception. Significantly, this work examines the level of permanence and layout of the environment and suggests that these are essential factors to consider when exploring how people recognise objects and locations. These considerations are of particular importance for gaining a better understanding of coaching cognitions, as they reflect the propensity for change within the environment and how the (constantly) changing environment might influence *what*, and *how*, a coach is thinking in a particular situation – and, indeed, how the coach copes with the already acknowledged dynamic nature of coaching practice.

Third, the extended mind is presented as a final concept through which to understand cognitions. Unlike embodiment and embeddedness, the extended mind concept is a significant 'leap' away from traditional cognitive science (Robbins & Aydede, 2009). This concept suggests that the mind can exist, or rather, be extended to objects outside of the body. Clark and Chalmers (1998) present a fictional case study of how an Alzheimer's patient uses a notebook to store information, thus augmenting mental processes. The extended mind concept primarily suggests that objects in the world can complement and facilitate cognitive processes. The notion of the extended mind is certainly the most radical of all three concepts.

The three concepts outlined above provide different and insightful ways with which to study and explore cognitions. Significantly, they offer an alternative perspective to some of the existing approaches to the study of cognitions within sport coaching. In particular, the concept of embeddedness provides a useful starting point and potential for applicability to sport coaching research in order to study cognitions in context.

Extending and complementing the three pillars described above, Roth and Jornet (2013) present five interlocking hypotheses that convey the complexity of situated cognition and

draw attention to the need for an interdisciplinary approach in future research that adopts this paradigm. These are:

1. *Cognition arises from, and is connected to, the interactions that the material body of an agent entertains with its physical environment; cognition is embodied and situated.*
2. *Cognition arises from, and is connected to, the interactions that an agent entertains with its social environment: cognition is situated in its social context. This context may be immediate, when typical behavior arises in relation to other agents, or mediate, such as when typical behavior arises within larger social contexts (communities, social networks, society).*
3. *Cognition arises in, and for the purpose of, action: cognition is enacted. Relations of reference to the surrounding world and purposes (intentions) characterize human behavior and tool-use: in-order-to, what-for, what-in, and for- the-sake-of-which.*
4. *Cognition is distributed across material and social settings because of features (1)–(3). Language-use and material practices are relevant categories that capture such features.*
5. *A lot of intelligent behavior does not require explicit internal (mental) representation. What is important instead is how the world presents itself to the agent.*

(Roth & Jornet, 2013, p. 464)

These interlocking hypotheses underpin the situated cognition paradigm and provide a valuable perspective from which to reflect and elaborate on cognition. Reflecting on the first hypothesis, the concept of situatedness involves the location of the mind within a physical setting. Prinz (2009) remarks *“The thoughts you are currently having are in your brain, and your brain is in a specific geographical location. We could locate your thoughts if we affixed a GPS device to your cranium. Defenders of situated cognition mean something stronger, of course. They mean that being located in a physical environment makes an essential contribution to our mental capacities”* (p. 420). Therefore, given that the physical environment shapes cognition, it is reasonable to assume that the body itself, hence embodiment, in the sense that it is configured within and responding to its physical boundaries, similarly holds the capacity to influence thought.

Arguably what is the most significant and perhaps relevant feature in relation to this research and associated research questions, is the explicit acknowledgement of a social context. Building on the second hypothesis above, Smith and Conrey (2009) propose that the

concept of social context can be considered in three distinctive research areas: 1) Social Perception, which includes the perception of self and other individuals and how these interpretations influence emotions and social behaviours; 2) Social Influence, which encompasses how thoughts and behaviours are influenced by individual and social groups that might result in conformity and regulation of actions; and finally 3) Social Relationships, which comprises of how relationships are formed and shaped that, in turn, impact on thoughts, feeling and behaviours.

The third hypothesis above suggests that cognition is inextricably linked with actions and therefore, intertwined with goals. Cognition itself is underpinned by intentions and the relation of reference to the world. Smith and Semin (2004) explain that cognition is situated, interactive and in a state of flux with the social environment in which it manifests. Therefore, there is a need for adaptive action dependent on the intentionality and actions of the individual and others in the setting.

Given the above, it is necessary to consider briefly how best cognition can be captured. The fourth hypothesis suggests that both language and material practices, or behaviours, are appropriate ways in which cognition might be captured. The premise of language, which might usefully be understood through the lens of conversations, offers an interesting insight into how cognition might be viewed. Spivey and Richardson (2009) outline three conclusions arising from the supporting literature. First, during conversations individuals are aware of others' cognitive situation in the world. Consequently, language is shaped by assumptions about "an interlocutor's visual perspective, past experiences and beliefs" (p. 392). These might, in other terms, be understood as – language is shaped by individual resources. Second, when conversing, individuals seek to manipulate common ground by gestures and actions in parallel with their speech. The purpose of this is to enhance and build upon what understanding is already shared. Third, the coordination of visual attention is directly correlated to the success of the communication/conversation. These three conclusions clearly indicate the inherent complexity, yet value of, language in understanding cognition.

Finally, the fifth hypothesis proposes that much (intelligent) behaviour does not manifest in terms of mental representations. Instead, it is the perception of the world to the agent or individual that is most important. This emphasises the relevance of the lens through which individuals perceive the world and the biases that they bring to this perception. It also

highlights the important interplay between the world-mind relationship and therefore, it is imperative to consider the two factors as a dualism.

Situated cognition, as described above, provided a new perspective through which to create more contextual appreciation of coaches' cognitions and, potentially, a more productive research study. First, however, it was necessary to re-visit the previous studies and reflect on these using the insights from this paradigm.

5.3 Using the situated cognition paradigm to reflect on studies 1 and 2

Study 1 revealed the emergence of different higher psychological functions such as: noticing, questioning, confirming, forecasting, problem solving, risk evaluating, normalising, deductive reasoning, and contextualising. Using the findings from study 1, a conceptual model was presented in the discussion of study 2 that depicts how cognitions might be situated and thus manifest during coaching practice. To date, the findings have been used to make a case for a framework of higher psychological functions, which can be used to explore what coaches are thinking and may consequently be useful in coach education and the further development of coaches' expertise.

Another consideration in conducting this work concerns the sport-specificity of the different contexts. For example, tennis coaching placed a high level of physical and cognitive demands on the coach, which made the task of memory recall somewhat challenging. Rugby coaching demonstrated that coaches could step backwards, observe, and retain a certain degree of distance within the session. However, many of the rugby sessions were in fact micro-managed by the coaches, resulting in higher psychological functions of a (immediate) diagnostic nature. It is reasonable to suggest that these sport specific differences might influence the coach's cognitive capacity to notice, question, problem solve, contextualise etc. Therefore, any further empirical studies should consider how coaches' cognitive functioning might be facilitated or constrained by their particular coaching practice setting.

From a methodological standpoint, modified ACTA and Think Aloud Protocol proved useful in providing insights into coaching cognitions. Stimulated recall (as part of modified ACTA)

was shown to encounter problems such as coaches reflecting on how they perceived their own coaching when watching it back on the computer screen and accurate recollection of cognitions. Think Aloud Protocol was problematic in complex and dynamic environments, both in the coaches' ability to reflect on decision-making and in the context of serial, and often unexpected or emergent, actions. As a result, it was limited in its ability to provide evidence of contributory contextual factors.

To this point, the research has focused on understanding and describing situated cognitions using tasks and higher psychological functions of *in situ* coaching practice as orientating factors within the overall body of work. When discussing decision-making, Lyle and Vergeer (2013) state that "situational factors such as accessing real time, accountable decisions, contextual dependency, variable objectives, limitations of investigative procedure, and tacit knowledge structures have not yet been overcome by researchers" (p. 128). This research has, to some degree, evidenced that this critique can be extended to research pertaining to coaching cognitions more broadly and therefore, a third study will attempt to overcome these shortcomings.

Supporting Lyle and Vergeer's (2013) assessment of empirical research, it was noted in study 1 that, to some extent, wider contextual factors emerged, such as the existence of stakeholders, wider competitive environment, and coaching goals. It seems likely that these key influences will impact upon cognitions during practice. Although not all cognitive processes may be verbalised during practice due to the tacit nature of the underpinning knowledge (Nash & Collins, 2006), there is little doubt that a more explicit focus on the social factors that influence coaches' thinking, behaviours and actions is important.

Therefore, in order to: 1) embrace the nuances of the coaching environments; 2) describe situated cognitions within an embedded context; and 3) detect what contextual factors might be influencing situated cognitions within these environments, a more sophisticated approach was required to address the problems that were identified in studies 1 and 2. At this point, two different knowledge elicitation methods have been used to explore *what* and *how* coaches think. Given the emergence and speculated influence of these wider contextual factors on cognitions (Smith & Conrey, 2009), it was necessary to consider a research approach that would allow the focus on cognitions to be maintained, yet also explicitly describe the surrounding socio-cultural settings in which coaches operate, in order to

demonstrate the value of situated cognitions to sport coaching practitioners and academics alike.

When considering how my research could be more-profitably be extended, I sought to address two concerns: (a) how to incorporate and reflect situated cognition more explicitly in the study design, and (b) the potential to situate my assumptions about coaching practice in an understanding of sport coaching that had evident links to the pillars of situated cognition that I have already described. Fortuitously, I was introduced to the Embedded, Relational and Emergent (ERE) model of sport coaching by one of my supervisors, who was also its author (North, 2017). The similarities between situated cognition and the ERE model made it an obvious vehicle for a subsequent study. Before elaborating on these similarities, I will now describe the key features of the model.

5.4. A new approach to research informed by an ERE approach: The key concepts of an Embedded, Relational and Emergent approach

The Embedded, Relational and Emergent (ERE) model (North, 2017) was developed as an alternative integrative approach to existing disciplinary aligned positions in sport coaching research. The ERE model is both a theoretical model and a framework to be used by researchers when conducting empirical research. It is explained as an inter-disciplinary methodology that incorporates and builds upon existing theoretical positions such as sociological (d'Arripe-Longueville et al., 1998; Jones, Armour & Potrac, 2002, 2004; Jones, Bailey & Thompson, 2013; Jones & Wallace, 2005, 2006; Saury & Fournier, 2001) and cognitive approaches (Abraham & Collins, 1998, 2011; Abraham, Collins & Martindale 2006; Jones, Housner & Kornspan, 1997; Lyle & Vergeer, 2013; Nash et al, 2012; Vergeer & Lyle, 2007, 2009).

North (2017) summarises the central themes that were prevalent throughout the sport coaching literature, specifically: sports coaching has depth; coaching is embedded, complex and contextual; coaching is goal orientated; coaching is resource dependent; coaching requires reasoning, reflecting and strategising; and coaching produces actions or outcomes. This constitutes a conceptual framework within which to situate any enquiry into sport coaching practice. Whilst there have been calls for a shift towards a disciplinary focus within the sport coaching literature by behaviourists, cognitivists, complexity theorists and

sociologists alike, the ERE model does not seek to discard any of these positions. An ERE approach stipulates that each of the aforementioned disciplinary approaches has merit and is worthy of consideration and influential in moving forward the development of sport coaching. Significantly, the ERE model was proposed as a way to reorganise and expand on the existing disciplinary positions throughout the academic literature through developing an integrative position. Below, a diagrammatic representation of the ERE model outlines how the various components are situated against a spatio-temporal backdrop (North, 2017).

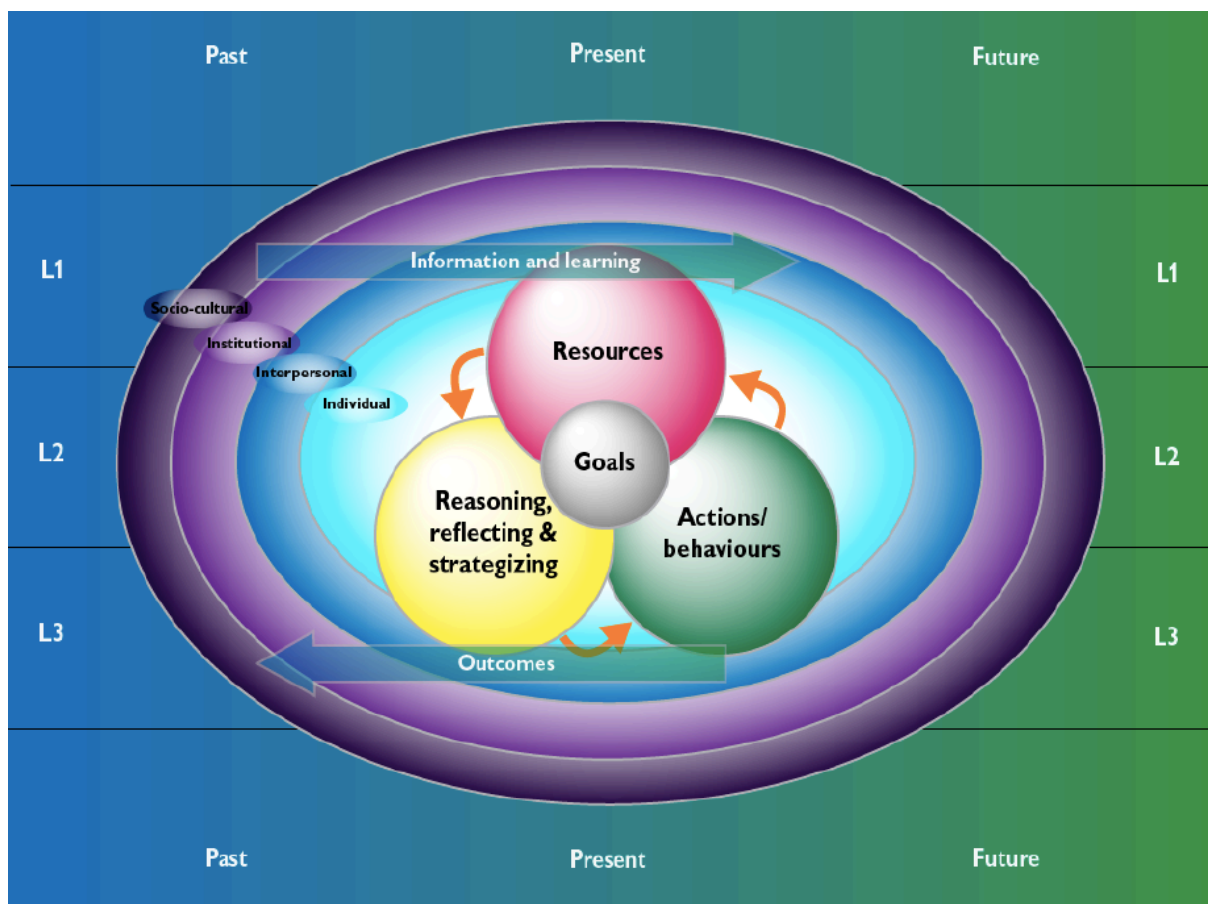


Figure 5.1: A critical realist informed sport coaching ontology for interdisciplinary thinking and research – the ERE model (North, 2017, p. 174)

5.5 Critical realism to inform and underpin the ERE model.

The ERE model is underpinned by a critical realist approach (Bhaskar, 1975) with a focus on ontology (the formal articulation of fundamental – non empirically verifiable - features of the

world and a set of concepts that are considered to best explain it). This is in contrast to other meta-theories that maintain an epistemological focus (North, 2013a). Crucially, critical realism is concerned with causal powers (Bhaskar, 2008, 2011; Collier, 1994; Kaidesoja, 2007) through a layered system which helps to provide an explanatory (mechanistic) account of particular social outcomes.

Previous approaches to understanding situated cognition have used contrasting perspectives, including the sociological, psychological, ecological and anthropological. This suggests that there is scope for critical realism to be a useful approach to understand and investigate situated cognition. As Kirshner and Whitson (1997) conclude, “the turn to...critical social disciplines has been necessary for recognition of the essentially social and situated nature of human cognition” (p. 3).

Cognitions are situated – but little or no work has used the situated cognition paradigm in the sport coaching literature to explore coaches’ thinking, behaviour and practice. Engeström and Cole (1997) remark that:

“‘situatedness’ is a challenging concept and which aspects 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).

Contributing to the problem of these rich contexts and where best to concentrate the research focus, situating cognitions cannot be a single event, rather, cognitions are embedded within practice. Hutchins (1995) suggests that a more ‘concrete analysis’ of situatedness should have a collective and individual perspective. This is in keeping with a critical realist approach which supports the idea that much of what is important about complex social phenomena is hidden beneath the surface and requires researcher investigation of several layers of influence (individual, group, institutional, and socio-cultural). The acknowledgement of falsifiable stakeholder narratives, which is common to both situated cognition and critical realism, requires researchers to gather more than one perspective to address the shortcomings of biased accounts or inaccuracies. In the case of

the ERE model, this is performed using an embedded approach that employs both ethnography and case study as research tools.

Critical realism, the ERE model and situated cognition, share the common concept of layers. Cognition takes place (i.e., it is situated) within these social layers and is often distributed amongst them. The ERE model offers clearly identifiable layers of social order, that is, the individual, group, institutional and socio-cultural, but it also directs the researcher's focus towards components of sport coaching that are embedded within these societal layers, that is, goals, actions, cognitions and resources. These components are of significant help in the context of this research. Moreover, they 'signpost' the researcher to clear ontological reference points. This is important as it helps to maintain the research direction and maintain a 'pathway', which may also be repeated by other researchers in the future.

Critical realism, and as an extension, the ERE model, accepts and acknowledges that how we make sense of the world is indeed fallible and therefore subject to both theoretical and empirical challenge (North, 2017). It is explicitly understood that by using this approach the researcher is central and active in the research process. However, it is argued that this is overcome by a theoretically informed and guided embedded research approach with the researcher in a continual adaptive process of theory and concept development and testing moving beyond immediate observational and narrative data. Instead, initial theories *can* and *should* be revised. It is the engagement in an active research cycle (Pawson & Tilley, 1997) that provides a clearer image of the emergent causal mechanisms at play.

At this point, it is important to note that critical realism, as a meta-theory, does not point to specific methods (Fletcher, 2017). Hoddy (2019) notes that the challenge with this type of approach is the lack of a critical realist informed method, which in turn, has made the approach less attractive to researchers. This issue has been addressed, to some extent, by Nichol (2020) who used participant observation, semi-structured interviews and stimulated recall interviews as part of a critical realist ethnographic study of various influences on, and of, coaching practice.

The ERE framework offers a navigational framework to explore the various psycho-social components of sport coaching situated in an embedded context. Ryba et al. (2020) supports the notion of a critical realist perspective and contends that, using a range of methods as

part of this approach provides a stronger position by which to explore the psycho-social system features and layered ontology. It is argued that the ERE model can be used as a navigational framework to guide the research process. Moreover, it is important to draw upon existing sport coaching concepts and theories to describe and explain the phenomenon under study. This conclusion is supported by Fletcher (2017) who suggests that “the best methods for each individual CR study should be determined by its guiding theoretical and conceptual framework” (p. 26).

Reflecting on the previous two studies within this submission, the ERE model appears to provide a broad, sophisticated and flexible navigational framework through which to: 1) maintain and engage a critical realist perspective throughout the study; 2) explore and describe a range of situated coaching cognitions as part of a complex socio-cultural setting; 3) apply the framework of higher psychological functions in coaching environments to describe situated cognitions; and 4) elaborate on the ‘reasoning, reflecting and strategising’ component of the ERE model.

5.6 The relationship between the situated cognition paradigm and the ERE model

The purpose of this section is to unpack and present the connection between the situated cognition paradigm and the ERE model. This is best illustrated in a tabular/visual format. The table below illustrates how the five hypothesis that have been explained above are conceptualised and represented within the ERE model.

The 5-interlocking hypothesis of the situated cognition paradigm (Roth & Jornet, 2013, p. 464)	The link between the situated cognition paradigm and the ERE model
“Cognition arises from, and is connected to, the interactions that the material body of an agent entertains with its physical environment; cognition is embodied and situated.”	The individual layer is situated within the interpersonal, institutional and socio-cultural, suggesting that the agent (coach) is connected to the environment. Coaching practice takes place in physical contexts and the ERE model outlines actions and behaviours, which are positioned in various contexts. These actions arise in response to what the coach sees, feels, and interprets within their physical environment. Therefore, coaches are physically connected to their surrounding environment and thus situated. ERE also recognises the

	physical, biological embodiment of reasoning/cognition.
“Cognition arises from, and is connected to, the interactions that an agent entertains with its social environment: cognition is situated in its social context. This context may be immediate, when typical behavior arises in relation to other agents, or mediate, such as when typical behavior arises within larger social contexts (communities, social networks, society).”	Different layers of social context are represented by the nested concentric circles. The ERE model represents these coaching contexts in a clear and situated framework. Furthermore, it is possible to identify which environments are more immediate to the coach (i.e., the interpersonal context) in comparison to those that are larger and distal to the coach (i.e., the socio-cultural context).
“Cognition arises in, and for the purpose of, action: cognition is enacted. Relations of reference to the surrounding world and purposes (intentions) characterize human behavior and tool-use: in-order-to, what-for, what-in, and for- the-sake-of-which.”	Cognition, action, and resources are central features of the model and are viewed as cyclical components. Goals closely reflect the notion of purpose or intention and are the central feature of the model.
“Cognition is distributed across material and social settings because of features (1)–(3). Language-use and material practices are relevant categories that capture such features.”	This hypothesis is less explicitly represented in the ERE model. The term ‘resources’ includes use of language and coaching tools. Cognition is shared, or distributed, within activities (or the actions/behaviours). Language is an important feature of the Critical Realism social ontology and epistemology. Language itself is a causal social structure, for example linguistically mediated reasons are seen as casual. The world is largely although not exclusively understood through language, discussion and text. If there is a reticence around language it is the idea that the world and indeed knowledge is not exclusively linguistic.
“A lot of intelligent behavior does not require explicit internal (mental) representation. What is important instead is how the world presents itself to the agent.”	It is acknowledged that coaching does indeed, at times, involve tacit knowledge under the general umbrella of resources. There are links between the term ‘intelligent behaviour’ and higher psychological functions, in that they are deliberate and intentional. It is acknowledged that both the world and agent are important. Crucially, the ERE model is underpinned by a Critical Realist philosophy which embraces and emphasises ontology, which contains both agent and structure (the world).

Table 5.1 An illustration of the similarity between the situated cognition paradigm and North’s (2017) ERE model.

The table above is intended to make explicit the connections between the situated cognition paradigm and the ERE model. Whilst it is evident that the language and concepts are indeed similar between the paradigm and model, it is the model that provides a framework, or map, which can usefully be drawn upon to focus the research enquiry. What follows in the subsequent chapter is how the ERE model has been used to inform the research approach and the resultant design of the final empirical study.

5.7 Summary

This chapter has mapped out the development and significant change of direction of the research. It has demonstrated that the realisation of material and socio-cultural context shaping cognition has resulted in a more sophisticated lens through which to view coaching cognitions and to interpret the results and limitations of the initial two studies. The identification and elaboration of the situated cognition paradigm has conveyed the complexity of undertaking research in the area (i.e., social context, intentions, language, and actions). The chapter also introduces the ERE model of sport coaching as a complementary framework. The complementary relationship between situated cognition and the ERE model is arguably the most significant step forward in addressing coaches' cognitions. Moreover, whilst situated cognition provides a rich and deep conceptual underpinning lens that is highly influential in the context of this research, it is the ERE model that provides the (practical) framework, and direct relevance to sport coaching practice, that informs the final study.

Study 3: An ethnographic study of situated coaching cognitions in Ice Hockey using an Embedded, Relational and Emergent informed approach

Chapter 6

Context, methodology and results

6.1 Introduction

At this point in the research, the link between situated cognition and the ERE model has been established. In the previous chapter the model was examined as a relevant and insightful framework with which to examine situated cognition in sport coaching. It was, therefore, appropriate to use the ERE model to inform this final ethnographic study, which explores the situated cognitions of one ice hockey coach across a 7-month period. The chapter begins with an overview of the methodological procedures, which details the ethical considerations, research setting and other stakeholders who were involved as part of the research process. A glossary of ice hockey-specific terms is presented to help the reader make sense of the language used by the coach in this study. This is followed by an overall summary of the ten vignettes that were created and a rationale for the selected vignettes that are presented within this chapter. This is intended to help and direct the reader to the key findings within this work. Afterwards, four composite, non-fictional vignettes are presented that vividly illustrate the historical context, coach-relationships, stakeholders, goals and *in situ* coaching practice. These have been intentionally selected to demonstrate the situational detail and complexity that surrounds coaching cognitions. The structure of this chapter is purposely designed to firstly explore and elaborate on the wider context first, before finally focusing on the coach's cognitions in practice. The vignettes are written and presented in a style that blends the academic nature of the work with the real-life practical examples that the findings represent.

6.2 Methodology

6.2.1 Ethics

Ethical approval was sought and subsequently approved by the University ethics committee and written consent was provided by all participants. All data were treated as confidential

and secured in line with the University's ethical procedures. All data that were generated and captured, including video and audio files, were stored on a password protected laptop and external hard drive in line with the University ethical procedures.

The nature of this study required several stakeholders to be formally interviewed using semi-structured interviews. In addition, the researcher spoke with these stakeholders many times in informal settings, allowing the participant more scope to lead the discussion. Therefore, all participants were informed of the purpose of the study and pseudonyms have been used to protect the identity of the club, coach, players, and management. Extending this premise further, there was a need to ensure that when conversations contained sensitive or confidential information, these conversations remained private. In the case where interactions revealed events that were known to others, these incidents were discussed with relevant stakeholders in the study as means of triangulation.

As part of the data collection, filming of coaching practices took place. The coach and researcher spoke with the team during the first meeting to explain the rationale behind the filming and to reassure them that it would only be shared with the coach, if requested, to analyse coaching practices.

The adoption of an embedded researcher approach within this study meant that the researcher was both 'part of' and 'removed from' the research setting. Team meetings, time before practices and games presented opportunities to become immersed in the coach's world and better understand the surrounding contextual factors that were impacting upon his cognitions. However, researcher-stakeholder interactions were often associated with finding out information, asking for accounts of events and adapting theories. Accordingly, this required the researcher to be both an 'insider' and 'outsider' to allow data to be gathered, but to also make sense of, and connect, data that were generated.

6.2.2 Participants and settings

The coach was purposively selected for this study as he was a practicing full-time Head Coach. Additionally, the coach held the highest level of Ice Hockey coaching qualification that could be achieved in the UK. The setting in which the research took place could be considered as high-performance as the team consisted of professional and semi-professional players. Drawing on the findings of the two previous studies in this submission,

it was found that performance coaches were more able (than participation coaches) to provide rich data and verbalise various facets of the coaching process. This coach and research setting were chosen to generate rich insights into situated cognitions and uncover an array of contextual factors.

The study took place over seven months in the 2019-2020 season, with a final follow up interview 14 months after commencement of the study. It involved one male ice hockey head coach (Chris, aged 36-38 years) two male players (George and Russ, aged 28-35 years), and female CEO (Carol, aged 40-45 years) at The Storm Ice Hockey Club (Pseudonyms have been used to protect the club and stakeholders' identities). The Storm played in the UK National Ice Hockey League which is the second highest tier of Ice Hockey in the UK. Games took place at the club's home ice rink and in a variety of opposition ice rinks around the UK. A number of informal conversations with assistant coaches, multiple players, fans and volunteers also took place during the research, which, in turn contributed to the researcher's immersion within the study.

Coaching sessions took place on Tuesday (9.00 pm – 10.30 pm) and Thursday (8.30 pm – 10.00 pm) evenings, typically with very few people around, meaning that the team often had the facility to itself. This allowed the coach and players to be honest and open with one another without being concerned about other people watching practices or overhearing conversations. Time was spent with both the coach and team before, during and after practices, before and after games, as well as away from the ice rink to discuss his perceptions on effective coaching, reasons for wanting to coach, and wider contextual factors as they emerged.

6.2.3 Procedures

Throughout the research process a critical realist underpinning was adopted. This meta-theoretical stance, together with an ethnographic approach, provided the rationale to become embedded within the research setting and facilitated an understanding of the psychological, sociological and cultural contexts at a range of different levels. The researcher's initial limited familiarity with ice hockey provided a blank canvas to explore situated cognitions using the ERE framework.

Data were collected through a range of methods in line with North's (2017) study on Kayak Slalom. The data generation procedures included: semi-structured interviews, document reviews, observations, and 'drop-ins'. Semi-structured interviews were conducted with the coach, two players and the CEO of the club. The purpose of these semi-structured interviews was to uncover goals (of various stakeholders and at different levels) and reveal resources, biographies, and motivations for involvement in the club. A framework of interview questions was carefully considered and devised for the appropriate stakeholders. As an example of semi-structured interview topics the head coach was asked about his: personal and seasonal goals, family, educational background, playing and coaching career achievements, coaching philosophy, conceptualisation of effective coaching, coaching challenges, sources of knowledge and future/ambitions. Similarly, players were asked about their personal and seasonal goals, reasons for playing, sporting background and views on effective coaching. A template interview framework is included in the appendices.

Document reviews included examining the coach's session plans prior to practices and written analysis of games. Coaching plans were reviewed before most practice sessions to gain insight into the purpose of the session, the structure (which always followed a predetermined format) and how the drills would work in practice. The coach used a specific online ice hockey coaching programme to construct the session plans. An example of these plans is included in vignette 6.

Observations included team practices, team meetings involving the coach and players, and competitive league games. From these data collection procedures, theoretical memos were written throughout the research journey as reminders of key events to be explored, concepts to be examined, and allow theories to be postulated, and connections to be made. Working as a researcher in this fashion requires a retroductive approach i.e., a consideration of what must have happened for the event in question to have occurred (Danermark et al., 1997). During the collection of data and immersion within the research setting it was necessary continually to consider how, or what, had taken place in order to explain the underpinning reasons for situations that arose, or decisions that were taken. As an example of this in action, a young player was released from the roster, which resulted in the formulation of a research theory involving what the coach valued most in his players. This theory was tested and refined through subsequent informal conversations with the coach, players, and support staff, as well as through a series of observations in different coaching settings.

'Drop-ins' were opportunities to access both formal and informal interactions between the coach and players around the facilities. This way of working was agreed with the coach at the beginning of the study and the actual specific arrangements for any given drop-in were finalised with the coach several hours' in advance. These less-formal interactions provided opportunities to become embedded in the research.

To establish researcher familiarity with the environment, build a relationship with the coach, and to present the scope of the study, several initial early interviews took place with the coach. This presented an opportunity to identify further key stakeholders and, importantly, to establish a relationship underpinned by trust, honesty, and integrity. These interviews were essential for key stories, mechanisms, and themes to emerge from the research. After reading ethnographic studies and relevant ice hockey literature (e.g., Allain, Bloom & Gilbert, 2018; Floersch, Longhofer & Suskewicz, 2014; Gibson & Atkinson, 2018; Gretzky & Reilly, 1990; Krane & Baird, 2005; Lee, 2011), the initial interviews with the coach were conducted. It was possible early in the process to gain an understanding of the specific nuances of ice hockey (e.g., the pace of the sport and fighting that regularly occurs in games) that might influence the coach's cognitions and to test the emergent findings over time.

As a result of the initial interviews with the coach, three additional key stakeholders were identified and approached. Interviews took place with two of the team's key players and the CEO of the club. The purpose of these interviews was to understand how the stakeholders operated at different levels in the club's system and gain an insight into their perspectives, the social relationships, and range of goals.

In total, 12 coaching sessions and 2 games were observed and video recorded, with the coach wearing a microphone to capture audio whilst on the ice and in the changing rooms. In addition, a further 8 coaching sessions and 4 games were observed, thus allowing deep immersion within the context. In keeping with his usual practice, the coach agreed to share his coaching plan before each session, and these were reviewed with the coach after practice when time allowed. In conjunction with the coaching observations, time was spent with players before and after practice. Furthermore, the coach was often visited whilst he was making mid-week preparations. The latter visits provided a different type of insight to the weekend. The less structured and intense coach-participant interactions were more informal, thus providing a further level of researcher embeddedness within the study.

Finally, a series of wrap up interviews with the coach and the players took place to explore the emerging themes and to explore the degree of consensus about what had materialised throughout the seven months. In total, more than 20 days (70-80 hours) were spent with various stakeholders at the ice rink discussing all matters regarding ice hockey, coaching and the wider psychological, sociological, and cultural characteristics and backdrop. The coach-researcher interaction took place on average once a week throughout the seven months in both a formal and informal capacity to ensure that there was continuity of engagement. This approach led to a true sense of embeddedness within both the club and team and, ultimately, provided unprecedented opportunities to capture stories and moments that may not have been prioritised by the other explored methodological approaches e.g., ACTA and Think Aloud Protocol. As might be expected, this led to such a wealth of data and researcher insight that it is impossible to represent fully all the data that were collected. However, as time progressed, it was possible to explore and test the causal mechanisms and influences that underpinned and acted upon the coach's cognitions.

6.2.4 Apparatus

Throughout the study, interviews and discussions were recorded using a Dictaphone. Coaching sessions were recorded using a video camera and wireless microphone receiver that was placed on an elevated platform by the side of the ice rink. The positioning of the camera meant that it was possible to capture the position of the coach and players in the same frame. The coach wore a wireless microphone attached to his coaching jacket and the transmitter was positioned in his pocket. The use of the radio-microphone solved the issue of the difficulty of capturing the audio whilst the coach and players were on the ice.

6.2.5 Data analysis

The data is presented through an extended series of non-fictional and in some cases, composite, vignettes (North, 2017; Potts, Didymus & Kaiseler, 2021; Sparkes, 2002) that depict a range of coaching environments, stakeholders, contextual factors and cognitions (coach, player and CEO). These factors were important and central to the development of theories that were formed and tested throughout the study. Skilling and Stylianides (2020) capture well the character of vignettes, "vignette construction appears to be an intricate and iterative process, simultaneously looking outwards to conceptualize the research aims and

inwards at the details of construction” (p. 543). In this instance, the initial purpose of vignettes is to present the research findings. The data analysis was an iterative ongoing process throughout the study and was part of the adaptive research cycle. Three examples of the adaptive research cycle are now presented below.

First, goals were identified with individual stakeholders through semi-structured interviews. Goals were examined at the personal (coach), interpersonal (player), and institutional level (CEO) in the early stages of the study. Initially goals were viewed as fixed, similar in weighting and belonging to an individual. For example, the coach set the goal of winning more than 50% of games. However, as the research journey progressed and the team experienced several losses early in the season, it became evident that the coach began setting monthly goals for the team as short-term targets, thereby maintaining a sharper focus for the players. An example of a conversation is provided below that illustrates the coaches’ thinking and actions on goal setting after the team had begun to win more matches.

Researcher: Can you talk me through the scoreboard on the wall?

Coach: I introduced this at the start of September. I put the games into sets, so there are 16 points on these sheets. So, we wanted 12 points out of 16.

Researcher: So, you group those games into sets?

Coach: Yes, so you can see all of the writing is different, you’ve got the guy who gets the man of the match... [he] gets the given the pen and he gets to come up here and put the 2 [points] up on the wall after a win. If we lose, we don’t do that. So this was December and we got 14 out of 16, which then allows us to carry 2 over... I wanted 4 out of 6 at Christmas, because that’s a tough time of year because guys are not travelling.

Researcher: And that looks like a tough schedule...

Coach: This was something I introduced where I felt we needed something visual and I know putting a ‘2’ up on the board is not exciting, but the boys all cheer and get excited... and so this is only taking is back to the start of December, if I’d had the ones up from one I used to meet you in September and October, they would be embarrassing, they would have 0s drawn all over them. But it just proves that since the start of December, we are, we would be top of the league...

Additionally, through observations and informal conversations with the coach and players during the season, it was necessary for me to reconceptualise goals as being dynamic, interactive, and aligned with one another. This is illustrated by the interaction and connected nature of goals such as 'being the club of choice for players' (a goal from the CEO) and 'to have players wanting to return to the Storm at the end of the season' (a goal from the coach). The explicit identification and 'testing' of the goals throughout the season revealed the importance of goal alignment. In one sense, the coach is being flexible/adaptive in reacting to changing situations, but the researcher is also reflecting this through a changing understanding of the coach's goals.

Second, it was unclear how coaching cognitions changed dependent upon context. In the early stages of the research, the coach revealed an array of social factors that he considered when constructing the team roster. I had initially assumed that these social factors would impact on all coaching decisions and influence the coach's thinking. As an example, the coach spoke about the need for players to have social connections off the ice and the need for 'team chemistry' as the season was long, and players would undoubtedly get tired in the later stages. However, through a series of informal conversations and document reviews, it was evident that when planning practices, the coach was operating with performance and simulation models. In essence, the 'social' factors that were prevalent in constructing the roster were seemingly less significant when designing and constructing drills. It was revealed through these document reviews that the coach expected players to make in-game or in-practice decisions that were in the best interest of the team. Therefore, this assumption allowed the coach to focus his attention on devising drills that facilitated practices designed to maximise (interpersonal/team/technical) effectiveness and help the team to perform against the next opponent. Additionally, during competitive league games the coach was operating with limited information due to the dynamic fast-paced nature of ice hockey. This resulted in him engaging in a reactive mode of thinking. Through these observations, a deeper understanding of cognition in context emerged and demonstrated a complex relationship between cognitions and the coaching setting.

Third, it was unclear to what extent biography impacted on *what* and *how* the coach thought. Initially, it was hypothesised that the coach would respond to events as they emerged, and the surrounding context/environment would influence significantly the cognitions that emerged. However, through semi-structured interviews, informal conversations and observations, biography began to emerge as a prominent and underpinning factor that

shaped many of the coach's decisions and actions. For example, the team rules about not being late, respecting hierarchy, and being unselfish, were shaped by the coach's upbringing and values that had been instilled in him by his parents and coaches. Over the course of the study, these emergent influences changed the focus of enquiry and revealed deeper layers of underpinning reasons. The emerging theoretical idea here is the importance of biography on coaching practice and outcomes.

6.2.5.1 The use of vignettes

In terms of presentation, vignettes offer two distinctive advantages over alternative formats. They allow emotion and feelings to be conveyed which, it is claimed, are essential in gaining a deeper understanding and framing of situated cognitions. Additionally, they also have the capacity to remove boundaries between participants and the researcher, which enhances the important concept of embeddedness. Extending this further, vignettes offer an "effective way to preserve and reveal the intimacy we develop with a participant that is usually obscured in research findings" (Douglas & Carless, 2016, p. 7). In this instance, vignettes served as a way to present the findings and analysed data. This was done in conjunction with the researcher's analysis and commentary, contributing to a fuller account of the emergent stories. However, using vignettes in this fashion requires a detailed discussion in order to allow the reader to make sense and become immersed in the story. Furthermore, vignettes offer a presentational format that is more succinct than interview transcripts and reflect the emergent story throughout the research (Callary, Werthner & Trudel, 2012). By using this format it enables the constructed and appropriate vignettes to be referred to directly within the discussion section.

There were 10 vignettes in total and most were based on a particular transcript that derived from the coach's narratives around his practice in discussion with, and promptings, from the researcher. However, in some cases, such as vignette 1, which tells the story of the coach's background, it was necessary to reflect on and include information from other incidents throughout the study. This approach is supported by Skilling and Stylianides (2020) who suggest that story building, in this case through vignettes, is important in complex situations and provides a platform for emergent solutions to reveal themselves. This demonstrates the importance of collecting rich data over a period of time using a variety of tools as part of an embedded approach.

As part of the analysis, it was necessary to consider how the vignettes would be constructed in order demonstrate the representative findings (Callary, Werthner & Trudel, 2012) that emerged as part of the data collection and adaptive research cycle (Layder, 1998; North, 2017; Pawson & Tilley, 1997). General, or rudimentary, theories were formed about the coach's cognitions and what factors might be influencing his thinking. Throughout the study, cognitions and processes emerged and were then explored (using various methods and with different stakeholders) and elaborated upon using wider contextual information to understand further their situation and to reveal the underpinning reasoning and causes.

In total, approximately 70% - 90% of the non-fictional vignettes are direct quotations from the participants. The remaining content was written by the researcher. This additional layer of analysis conveys the subtle nature of the environment that cannot be captured by quotations and transcripts alone. Moreover, the trustworthiness of the transcripts was maintained as participants were asked to read and confirm what they had said. Finally, the vignettes were shared with the participants to ensure that there was an agreement with the sentiment and theoretical components of the vignettes (Spalding & Phillips, 2007).

As might be expected, the interwoven nature of some of the vignettes demonstrates the interdependence and interconnected nature of the mechanisms that connect the coach's cognitions and the coaching context. As a simple but important example, it became evident that stakeholder goals influenced other aspects of coaching practice such as decisions taken during practice sessions, game management and player recruitment.

6.3 Results

For the purposes of the following sections, four vignettes were selected for inclusion (whilst an additional one can be viewed in the appendices for readers to become further immersed at their discretion in the research context) to situate cognitions in contrasting coaching environments. Additionally, the vignettes that are included reveal stakeholder accounts, goals, coaching practice in different environments, the temporal dimension of sport coaching and the significance of relationships in providing cognitive space, due to their distribution over the course of the research. To provide a succinct overview of the study, a summary of

each vignette is included in a 'summary document' within Chapter 8 outlining the key findings from each vignette.

6.3.1 Glossary of Ice Hockey terms

D – Defence in this study is often referred to as either a single player, unit of two players or as part of a tactical strategy.

F (1,2,3) – Forward. An attacking player. A team will typically have two forwards (and one centre) on the ice at any one time.

Face off – When the game (re)starts, the puck is dropped between two players who compete for possession.

Imports – The term used by the club to signify the player was not British. The rules of the league meant that each club could have a maximum of two non-British players playing in a game.

Neutral zone – the middle third of the ice.

'Off the glass' – hitting the puck into the wall for tactical purposes.

Penalty Kill or PK – When one team is trying to defend with one less player than the opposition because they have lost a player on the ice due to a penalty being committed.

Period – An ice hockey game is divided into three 20-minute periods.

Power Play or PP – When one team is attacking with an extra player because the defence has lost a player on the ice due to a penalty being committed.

Threw it – Passed it

Zone – A particular third of the ice. The rink is split into three zones.

Zone entry – When players enter the attacking third of the ice (within ice hockey, the puck must enter the attacking zone before any attacking players)

6.4 Summary of vignettes

6.4.1 Summary of Vignette 1: Chris' background and goals for the season

Vignette 1 illustrates how Chris' upbringing and experiences as a player – notably someone who was not the most skilled but worked very hard - shaped his belief that both coaches and players must work hard. His subsequent work ethic and the projection of this onto the players are evident throughout this study. Vignette 1 explains the reasons for Chris' personal attachment to and affection for the club, that derived from his days playing as a junior. In turn, this allowed Chris to make inter-personal connections that he developed whilst playing and coaching at the same club for more than 20 years. Vignette 1 demonstrates what Chris learned from other coaches by working alongside them. Chris' wide-ranging network of contacts including players and coaches within UK ice hockey is evident. Chris' goals for the session summarised as follows:

Summary of Chris' season goals

To finish the season with more wins than losses

To field a competitive team

To get players to create individual goals

To get players to agree whole team goals

To have players wanting to return to the Storm at the end of the season

Summary of session goals

Improve young players to make better hockey players

Motivate older players

Table 6.1: Summary of Chris' goals for the season and individual sessions

6.4.2 Summary of Vignette 2: The institutional history, goals, and Carol's background

Vignette 2 demonstrates the difficulties that Carol and The Board of Directors faced when creating the club and team. It describes the timeline of events and Carol's business

knowledge that facilitated the creation of the club. Establishing a team culture and ensuring that players always put the team first was a prominent theme. It demonstrates the club's need to regain the trust of the fans, and this would be achieved by stakeholder actions away from the ice rink, as well as team performances on game nights. This vignette shows how the influence of previous events and experiences in a social context have shaped Chris' thinking, coaching purpose, and goals. Emergent goals for The Board of Directors, team, and Chris (from Carol's perspective) are summarised as follows:

Summary of The Board of Director's goals

For the club to be sustainable

To regain trust of the fans

For the team to be competitive when playing games (longer term goal)

To be the club of choice (for players)

Summary of the team's goals

To develop strong team ethos (team before individuals, 'no d***s')

To retain 80% of the players

Summary of Chris' goals (from Carol's (CEO) perspective)

To foster strong team ethos

To become leader of club

To focus more on hockey and less on tasks that can be delegated (e.g. washing team kit)

Table 6.2: Summary of goals for The Board of Directors, team and Chris.

6.4.3 Summary of Vignette 3: Player backgrounds, understanding of effective coaching and goals

Vignette 3 describes the goals and backgrounds of two players. It explores the player's perceptions of Chris as a coach and what makes an effective coach in general. Both players

voiced their respect for Chris as a young coach and appreciated his interpersonal relationship skills with players. They shared their innate desire to win games as part of the reason that they chose to play for Chris. It was noted by both players that ice hockey gave them meaningful and fulfilling relationships with both teammates and fans. George's experience as a young player shaped his view of what good coaching is and how he expects his coach to behave towards him and other players. In contrast, Russ had a more traditional junior career, rising through the club ranks in a steady fashion, and as such, he felt obligated to give back to his local community. Both George's and Russ' goals are summarised as follows:

Summary of George's goals

To win trophies/league

To play for another two seasons

Not concede goals when playing

Summary of Russ's goals

To win trophies/league

Ensure contribution is net positive (i.e. his line scores more than they concede)

Play over 500 career games for The Storm

Table 6.3: Summary of George's and Ross' goals.

6.4.4 Summary of Vignette 4: Constructing the roster

Vignette 4 demonstrates the importance of player character to Chris. Moreover, it reveals his reasoning, strategizing, and reflection behind the recruitment process. Specifically, he was intent on signing players who would work hard and be team players. It revealed Chris' knowledge of his own players, team, and the wider competitive landscape of UK ice hockey. His connections and network of contacts are identified as a primary reason for him to being able to construct a competitive roster. Interestingly, Chris alluded to the need to maintain a certain amount of distance from the team during the season due to his position as a coach.

Finally, Chris believed that effective recruitment would be one of the cornerstones for the team to be successful.

6.4.5 Summary of Vignette 5: Coaching session 1, September 12th 2019

This coaching session demonstrates Chris' planning, knowledge of upcoming opponents, ability to recall situations and contextualise drills to his players so that they understood how and why their actions would help in game situations. Planning was specifically focused on preparing the team for the upcoming match and Chris used a variety of performance models when coaching. The interjection of a senior player within the session highlighted Chris' support strategy of ensuring that more experienced players were also leaders of the team. Wider contextual factors such as the team's place in the league standing and the injury to the junior player immediately prior to the session influenced Chris's thinking and behaviours. Vignette 5 is an example of how wider events impact upon the micro-management of a session.

6.4.6 Summary of Vignette 6: The game, September 21st 2019

Vignette 7 reveals Chris' knowledge of teams in the league. It demonstrates his understanding, based on his prior experiences, of the opponent's playing style which subsequently influenced his team's tactics and strategies, for example, dumping the puck. During the game, Chris' interactions with players were deliberately short and he aimed to make small tactical adjustments and check that his recall of events (or incidents) within the game were aligned with the players' memories. This vignette demonstrates the speed at which ice hockey is played and the problems that it creates in terms of affording time for coaches to engage in types of higher psychological functions, cognitions and take action. The intermission periods revealed Chris' strategy of 'buying time' during which he would cognitively prioritise the most pressing issues that he had identified in the playing period before feeding them back to the team. It also outlines how Chris' use of intermissions were entirely context/game specific. As an example, the first intermission was used to highlight the lack of players' effort after the first period of the game. Whereas, the second intermission was used as an opportunity to make tactical interventions because Chris was satisfied with the effort that the players had made. Both intermissions had positive effects on the team's

performance, suggesting that both effort-based and tactical interventions had the capacity to be equally effective dependent upon the game situation.

6.4.7 Summary of Vignette 7: Coaching session 2, October 17th 2019

Vignette 6 demonstrates Chris' use of planning and embedded routines as part of his coaching practice. Prior to the session starting, he was not overly talkative and was unhappy with the team's performance the weekend before. However, he attributed the reasons to injuries which were outside of his control. The use of ice hockey language was apparent throughout vignette 6, as well as the application of performance models. The emergence of humour within the training session by way of the players tampering with Chris' gloves was, to some extent, influential on his mood and the atmosphere within the session. Interestingly, Chris candidly took responsibility for a drill not working and this provided confirmation of contingency planning and his leadership skills. It is suggested that Chris' supportive coaching style during vignette 6 was due to the fact that so many players were injured, and he was of the opinion that a sympathetic approach would prove to be more effective.

6.4.8 Summary of Vignette 8: Feeding back to the players using video analysis

Throughout vignette 8, Chris' tactical and technical knowledge emerged. In addition, it illustrated his use of a performance mental model. His explanations whilst using the video allowed him to convey the team's strengths and weaknesses based on what he had noticed, questioned and confirmed. Chris was able to problem solve and offer solutions that were appropriate to his team to remedy the threats he had identified. His feedback was a blend of tactical information, along with examples of players not working as hard as he expected. By using video analysis as a tool, it is suggested that Chris was attempting to meet the needs of his players as both Russ and George voiced their desire for video analysis in their background interviews. Overall, this vignette provides an insight into how video analysis can be used to share the mental models of players and coaches.

6.4.9 Summary of Vignette 9: Observations of coaching after finding mid-season form, December 14th 2019

Vignette 9 illustrates how the Storm's coaching and playing environment changed over time. With the improvement in results (helped by players returning from injury and two new signings), the atmosphere within the session was much more light-hearted. Vignette 9 demonstrates the change in the coach-athlete relationship over time, evidenced by the players playing small games in the warmup, humour at a player falling over and the drawing of the '2' on the board. Furthermore, vignette 9 illustrates how winning and losing matches (which were also player goals) impacted upon the coaching environment and micro-management of sessions. Finally, the subtle yet important change of researcher position provides an interesting point concerning methodology. It clearly demonstrates how rich data are more accessible over time and within a longitudinal study.

6.4.10 Summary of Vignette 10: Reflections on the season

Vignette 10 examined emergent theories over the course of the study. Chris reflected on the influence of his former coaches when they had worked together and how this transferred to his own current coaching practice. He evaluated various aspects and applied them to his own situation. Chris was asked about different coaching environments and discussed at length a range of contexts and strategies that he had developed in order to combat the lack of time to think and make decisions. Chris mentioned the importance of video feedback, particularly after games when the speed of the game was such that it became almost impossible to recollect accurately what had taken place. The influence of wider contextual factors such as goals, stakeholders and sport-specific environment was considered, and Chris was aware of how these might influence his coaching. However, he was adamant that due to his clarity of position with The Board of Directors and clearly defined roles, he felt that senior management did not influence his coaching. Finally, Chris spoke about the importance of creating a team environment and it was agreed that this was a contributing factor in the recruitment of players and achieving one of his original goals.

6.5 Rationale for selected vignettes

The purpose of this section is to elaborate on the reasoning for selecting the four following vignettes. In total 10 were written that contain rich detail about cognitions, coaching processes, and emergent findings. Therefore, there is a need to consider which vignettes contain the most applicable, appropriate, and useful stories in the context of this research

(i.e., situating cognition). The construction of the vignettes was a vital part of the interpretation and sense making phase as they spanned the duration of the 7 months. The researcher was immersed in the coaching setting. The vignettes contain a degree of researcher-interpretation which, partially reflects the sense making and analysis.

As part of the rationale for inclusion and presentation of the vignettes, there is a need to illustrate the components of the ERE model and facets of 'situatedness', thus foregrounding the aims of the research. In addition, it is imperative to represent the contrasting coaching environments that coaches operate within as these illustrate different constraints and considerations of social aspects. Goals, or purpose, have been demonstrated to be an essential part of situatedness, evidenced by the 5 hypotheses presented earlier in Chapter 6, as well as the central component in the ERE model. Therefore, detailing the goals of the various stakeholders at the different societal layers illustrates the purpose behind the cognition and action. Thus, vignette 2 has been selected to meet the above requirements.

The spatio-temporal element of situated cognition has been acknowledged as being important. Although the study commenced in August 2019, there is a need to understand better what happened prior to the researcher entering the setting. In essence, there is a need to understand the coach's frame of reference to the surrounding world, intentions, and position within the broader social context. Vignette 4 has been selected as it fulfils the above criteria and provides insight into the coach's cognitions regarding the social aspect of coaching. There is a high degree of forecasting about what will most likely happen because of the coach drawing on his own experiences and social connections. Regarding the spatio-temporal element of situatedness, this vignette represents the coaches thinking in August 2019 (before formal coaching sessions had begun) as well as without the constraint of time. Finally, vignette 4 has been selected as it illustrates the influence of biography in forming rules and expectations and demonstrates how 'what has happened before' shapes 'what comes to be'.

Competition and matches are essential parts of sport coaching. However, these situations can be considered 'high pressure' and reflect decisions and actions that are taken with little time. Matches typify how cognition arises from the result of the immediate situation and is formed for the purpose of action (i.e., implementation or changing of the coaching strategy/tactics). Vignette 6 importantly illustrates how the coach attempted to work within

the environmental constraints and rely on organisational routines to aid his cognitive processes.

There is a need to portray what happens on a session-by-session basis to illustrate the embedded coaching routines that help to frame cognition. As part of coaching sessions, both ice hockey jargon (better expressed as language use) and relationships (i.e., the social context) were abundant. Two vignettes were written that shared the nature of coaching practices and were similar in nature. However, vignette 7 was selected for inclusion as it comprises an element of humour, thus more strongly demonstrating social connections. Finally, to assist the reader in making sense of the vignettes, a 'context' box is included at the beginning each vignette to highlight the important historical and contextual factors.

6.6 Vignette 2: The institutional history, goals and CEO background.

Context

This vignette was constructed with the intention of unravelling the goals at the institutional level. This story is constructed from a semi-structured interview with the CEO and took place early in the study. At this point in the research, it was understood that the team was newly formed, but it was unclear why the club was new and what had happened previously. Subsequently, this provided a blank canvas through which to explore the broader institutional and social-cultural context. This was the first face-to-face meeting with the CEO and the coach had not revealed any of the Board of Directors' goals for him and the team.

Carol kindly agreed to talk about the genesis of the team and how it had come to be despite the difficulties that the team had faced in terms of the roster being constructed close to the season beginning (Vignette 4). The meeting took place an hour before the Storm were due to play their local rivals, The Wolves. As well as being CEO, Carol was a season ticket holder and attended every home game. Her family had regular seats in a VIP box, and it was in that box that this conversation took place.

After some formal introductions and the purchasing of coffees, Carol was asked “how have you ended up in this role?”. She laughed briefly, suggesting that there was a long story to be told and replied, “the story begins about this time last year actually [February 2018], it was the end of The Storm’s second elite season, it had become apparent that management were failing and there was a point where the fans were only there because of the players, and the players were only there because of the fans”.

She paused for a moment and thought, continuing to say, “that’s not awful, it’s not an unfulfilling relationship between players and fans, but over the subsequent months it became apparent that players had not been paid, that suppliers had not been paid, that it was all going spectacularly pear shaped. I was a ticket season holder in block 14 as I am now. My fingers were getting itchy because from a business point of view, I was looking at this and going, this isn’t rocket science! What was happening was that they had taken their eye off the product, in terms of what was happening on the ice, and they had taken their eye off the main customers, i.e., the fans, so from a business point of view [there are] primary business groups, your staff and your products and the customers. It got to a point at the end of March [2018] ... I went over to the [REDACTED] and said, ‘I have money to invest, I would like to

help, I think I can add value, I think I can help you where you are right now', and nothing happened, they didn't engage".

Carol was surprisingly honest about the position that the club had found itself in last year. She was pressed on this issue further, "did they not appreciate the state of the club?". She carried on, "I don't know whether it was incompetence, or ego, or quite what was going on, it's just that everything was going so badly wrong they couldn't see the wood for the trees. At this point, it was clear to see that Carol had been hugely influential in creating the team. Her comments reflected someone with a strong moral compass and who felt passionate enough about the team to take action when it was failing as a business. Her business background would later be revealed in this interview and through other interactions throughout the season to show her to have a wealth of experience and business acumen.

Carol continued to explain the journey of The Storm, "on the 1st April [2019], I incorporated The Storm Ice Hockey Club Limited. At that point in time, I was doing it because this was a vehicle for whatever might come out of this [discussion], and if it goes nowhere, it goes nowhere, but I wanted to have a structure of a limited organisation". From the outset, it was clear that Carol had devised a plan of action last year and understood what corporate tasks needed to be fulfilled. She elaborated a little more, "I ran my own business for 11 years; I am very familiar with the responsibilities of directors of organisations and all that kind of stuff". Later on, Carol would go on to explain that "I have an MBA and prior to that I have a degree in mathematics, so I am not typical in terms of either events management or sports management, and happily so, I'm very proud of my academic creds". From this it is clear to see that Carol had developed her own individual resources upon which she could draw. Her business knowledge placed her in an excellent position to navigate and construct organisational structures upon which The Storm would be built. Furthermore, Carol's credentials outweighed that of other owners in the league and would provide an advantage in helping her achieve one of the goals regarding economic sustainability.

Carol continued, "On 10th April we had our first meeting of people who were interested. From that we had a board of directors and so it was [registered] on Companies House, and so it immediately changed to, at that point, 7 directors, we are now down to 5 because two people were lost in the process of writing the bid, which was to be expected. We got the initial parts of the funding in terms of people wanting to buy shares, we continued that share offer and delivered a crowd funder, by that point I had already started conversations with planet ice and with the elite league". This demonstrated Carol's business knowledge, but

also her willingness to act when necessary and draw upon her resources that she had developed.

She took a moment and reflected, “yes it was incredibly late in the season for us to be doing that looking at a 19/20 season. So yeah, we were finishing the 18/19 season and then going... right, we are going to start from scratch after 6 weeks of faffing about and we raised £200k in capital. We got the ice contract by the end of April 2019. In the middle of May we went to the elite [league] Board meeting and I had been told it was a done deal and then we were told no [by the elite league] we weren’t allowed to enter a team, so we weren’t going to be in the elite league this year”. This was a considerable set back given what actions had been taken to begin the process of getting the team into the elite league. For some people, this might have been a deterrent enough, yet it was possible to see from what Carol had revealed so far, she was used to overcoming difficulties and obstacles.

Carol began to draw the story to a close, “so there were a few things that were happening in parallel to each other. The day after we got the national contract and we said yes, we are going for this, we lost a couple of shareholders in that process, which was fine, it was entirely the agreement that we had with shareholders. which was, you are taking a risk and giving us your money, the risk in this is £1000s in what is a dream and an idea... as an organisation, we turn over roughly £600,000. It’s not a small undertaking, it’s not just let’s have a go, this isn’t a hobby business as much as we are all on the board, we are all volunteers”. This reveals Carol’s inner-workings of how she viewed the venture. The sums of money that she was talking about were significant and therefore, failure to achieve the goal of financial stability would have resulted in serious consequences. Moreover, Carol’s story reveals the institutional and socio-cultural settings in which the club was embedded.

She concluded her explanation of how the team was formed, “so in the middle of May we have the company structure in place, we have directors on the board, we have a wider team of volunteers, who are undertaking all the broad tasks that we need, we appoint Chris from the previous organisation to us, and then we go about recruiting players”. Her description of the journey in getting a team to be entered into the national league highlighted how complicated the process had been whilst having to navigate several complications and overcome various setbacks.

Carol started to talk about Chris and the team briefly, “so, Chris [was] is in a really difficult position because he [had] to recruit when everyone else [had] already done their recruitment. And whilst we were very fortunate in how that eventually unfolded in terms of

being able to pick up some really brilliant players like Tom, and a couple of great imports, although [REDACTED] wasn't a great fit for us in the long term, but that was to be expected. From that he has managed to build a team that are absolutely in it for each other, that work together really well, who have a really lovely mind-set and attitude, so that yes, it is all focussed on the win but not at the cost of anyone else on the team, they are absolutely there for each other, the bench clearance last weekend shows that too. But that's another story again. So, by the end of May, we have the season tickets on sale, we have our team coming together, we have our social media which we needed to start from scratch, so our ice contract was done, we have all the good building blocks and we have loads of experience on the table. So that's how I ended up being CEO". Carol would talk later on about her vision and expectation of the players and the coach, but it was an early insight into what she valued. This passage reflected her high opinion of Chris and his value to the team in terms of leadership and his inter-personal resources. Significantly, it is clear to see that both Chris and Carol brought very different sets of skills and resources to The Storm and this is evidenced by interactive with and observing both stakeholders in diverse setting. These differences reflect the contrast in skills (cognitions and actions) that are needed by the various stakeholders to situate The Storm against the wider socio-cultural backdrop.

She was asked about the management structure of the club and quickly outlined its setup, "[There are 3 people on the strategy group and 5 on the management group], in the management group there is Chris, and we have a call every Tuesday around lunch time to review what's going on with the team and what's happened the previous weekend, what we have coming up, the big conversations or challenges or stuff we need to talk about. Any kind of other business that might come up, ideas or other things or suggestions from other people. And we go through that on a weekly basis". This revealed how important it was for Carol to have a good relationship with Chris. Although there was a sense of 'structured formality' in how their meetings took place each week, their regular and informal conversations allowed an honest and open dialogue to be maintained. As a researcher embedded within the environment, it was reasonable to assume that this relationship was a positive aspect, and this is reflected in a number of vignettes (from both Chris' and the players' perspectives).

The conversation turned to The Storm's place in the wider community and the challenges that this posed. She began, "last season it was really difficult, [both] as a fan and a season ticket holder to go knowing that the money I am paying for a ticket is not going to those guys. I like that we are changing how things work here in that it is about the whole team, not different pockets, so what we are trying to do is break down some of the barriers that have

happened over a period of time, so that actually the supporters club, the management and the players are part of the jigsaw puzzle that makes up The Storm Leadership (TSL), and we all have our pieces in that and everybody is equally vital in making that work... Like any business it is about heart and soul, a sports club is never just about the component parts, it's always about the bigger emotional commitment. In terms of investment, it stretches me; it gives me great satisfaction and a sense of belonging as well. You know I am creating something that I started and know we have created something that is about us being a big team. It was possible to see that Carol was thinking about the club in a wider context that involved a variety of different stakeholders. Moreover, from listening to the content of the interview, as well as the tone in her voice, she appeared to have a personal connection with the club, suggesting it was more than just a business opportunity. Instead, several interpersonal relationships and a sense of giving back to the community were reasons behind her actions.

Carol was asked about specific goals for The Board of Directors, the team and for Chris. "[The] Board's goal is about sustainability. We have a three year business plan, we have the figures to back that up, which is great and every week we refine those figures a little bit further because we know more and we have another game with more tickets, so we think 'oh this is interesting, what is the pattern of sales?', we do all of that analysis, but the goal is to become a stable club and this year we are looking at working on a 'break even' so all the capital investment that we invested collectively is still there. We haven't had to dip into that cap so even though we have spent £20k on resurfacing the ice and even though we have spent £8k on filming equipment, we now have a bit of stock if you like, and that is an amazing outcome because most of the time hockey clubs lose money, so the fact that we are doing as well as that is fantastic". Her response was fast and concise, it was clear to see that as a businesswoman, the club's economic viability was her top priority. This provides an interesting layer of insight into the institutional context and specifically, the goals that are situated within the institutional layer.

She carried on, "so sustainability is important, but regaining the trust and that's a long-term goal because we recognise that lots of people have put their trust in us right from the beginning, which is great, but others take a bit longer. Others have been challenged by the process of it, and others are still very reticent, and again, each to their own, that's fine. Our goal is about proving our worth really as a whole club". This illustrated Carol's awareness of the wider community and her strong desire to show the local area that they were a club that could be trusted. It is suggested that her desire to prove the club's worth to the local community was, in part, due to the goal of economic sustainability. For example, without the

support from the local community, achieving the sales ticket targets would prove to be extremely challenging.

She went on to talk about the performance side of the team, but caveated it with a cautionary note about roles and responsibilities, “the slightly bigger picture is about taking our place at the league table, going for the best possible outcomes on the ice...matched with that, our focus is about the whole club...bearing in mind none of us are hockey coaches, so we don’t dabble and meddle with stuff we actually know nothing about, what we do know about is business and hockey in the whole club sense of it”. Carol went on to explain the interdependence between the various stakeholders, “there is a reciprocity between the team on the ice, the management and ownership of the club and then the supporters and the supporters club. They have to work together to make it work, and the boys on the ice can’t do their job if I haven’t done mine. If [REDACTED] hasn’t done his, [REDACTED] hasn’t done hers and the supporters club haven’t done their bit for fundraising. They can’t step foot on the ice without all of us doing our bit. Similarly, we have no bit to do if they can’t step on their ice, if we don’t have a player to play, so the moment you start to understand that these [two] things are in balance, that’s what we are going for. That makes it much less ego driven, and the environment is much more about what is in the best interests of the club”. This reflected Carol’s awareness of why each stakeholder was important and their contribution to the organisation. Additionally, this clearly demonstrates Carol’s awareness of ‘layers’ in which the club was situated. These layers are thought of as dependent upon one another and Carol’s description partially brings these to life.

The discussion turned to what Chris’ goals were and where he fitted into the organisation. She began, “I love working with Chris, he is brilliant. This season has been about setting up and what he has created in the locker room is extraordinary and that’s the reason why [REDACTED] has signed again for next season, it’s because of what Chris has created in the locker room and that’s really valuable and that’s about becoming the club of choice...for sponsors, for players, for partners, for fans, we want to be the club of choice.... [Chris] is a vital part of doing that in terms of how the players are supported, how they are trained, how they are played on the rink in the game, how we deal with injuries and stuff, he has been right in the thick on leading on all of that... we need to get on top of his workload management because he lives and breathes hockey, and he needs to take a bit of a break every so often. We will make him take time off in the summer, to be fair once recruitment is done that’s a good [time] for him to take time off”. From this it was evident that Carol was appreciative of what Chris had done and was doing, yet she had a desire for him to focus on leading and coaching and move away from some of the tasks that could perhaps be

delegated. This suggests that Carol had some preconceptions (expectations) of what Chris, as a Head Coach, ought to be doing with this his time and what tasks he should be completing. However, what is unclear is where Carol's preconceptions originated from and, whether or not, these were fair or accurate. From this interview, the many other interactions that took place between the research and Carol, and her use of language, it is reasonable to assume that Carol's perspectives on leadership were, in part, derived from her business experiences and these had been conceptually transferred into this performance ice hockey domain.

Carol started to talk about the team goals, "talking about the team, it's not about the silverware, at least for me it is not, don't get me wrong, yes we want to see trophies etc. etc., yes we want wins, of course we do, everybody wants wins, but that's not what I want from the team, what I want from the team is the ethos, the mind-set, so it is about a winning mind-set, it's about how they work together, it's about the trust that they have between them. This season that we are in at the moment, we started with a brand-new roster and this coming season, into 2021, we will be starting with at least, I would go so far as 80% of the same boys...through choice... they want to stay with us, and because we want them, and actually that gives us the same kind of head start that the other teams in the league had last season. We are in a much better place for that". Carol's omission of wins and trophies as targets was particularly notable. From the in-depth interview, it was possible to conclude that Carol had an awareness of the difficulties and unknown factors that might arise throughout the season. However, it is reasonable to suppose that Carol was aware that winning and losing were by products of coaching processes, but importantly, not in her direct control and her expertise (she commented later that she was aware of each stakeholder brought different skills to the organisation). Hence, the team's chances of winning were likely to improve with a solid and cohesive team culture and led by a respected coach.

Carol began to talk about the team environment and linked it to the goals, "the locker room is great, it is really positive, hugely supportive and that's the reason why some people want to stay. So, for me it's about the team goals, keep building on that. We can see it on the ice, we do. We see it in the play, we see it on the bench, we see it off the bench. We see it with the players, we see it in the bar afterwards. We see it in how they respond to a loss and to a win. I have contact with pretty much all of them in various forms whether it is Facebook, or WhatsApp, or text, or emails, I will have contact with most of them. I find it really interesting because not one of them is there for their own ego". She admitted that the goals that had been set, at least at this stage in the journey, were more of a holistic nature with the team, which directly linked to the goal of rebuilding the trust between various stakeholders.

She was asked how she felt Chris managed the changing room environment and facilitated leadership. Carol replied, "Chris manages that fairly well, and Russ to be fair. The leadership team on the ice, our three captains behave like that. We have one rule which applies to everyone which sums up every policy which we have, every issue we face, we don't have issues with players that we shouldn't, generally, because the rule is - don't be a d**k. That's what they have been told in their induction, it's what we were talking about in Board meetings, in wider team meetings, there's one rule don't be a d**k [a reference to a book called 'Legacy' which had been given to all players a few weeks ago]. When people do behave contrary to that rule, then we find issues. So, the biggest challenge has been about moving away from individuals to the whole team ethos, a much more holistic view of what we are doing, and we are not there yet and we won't be for a long time, but the challenge is about that. That's the risk - the stability of the club is our primary goal and is contingent upon people not being d**ks". From this passage, it is clear to see that Carol was concerned about player behaviour. She had a certain level of expectation from Chris and the players, and they were required to operate within these parameters. However, it is interesting to note that she expected Chris to be the one to set the tone and manage the behaviours of players.

6.7 Vignette 4: Constructing the roster

Context

This vignette elaborates on the coach's thinking as he was coming to the end of constructing the roster for the upcoming season. The roster was approximately 90% complete and the coach had been working in a full-time capacity for the club for the last two months. Despite this, he had begun the task of recruiting players four months ago and had been busy drawing upon his social resources to gain a better understanding of certain players who would fit into his team. At this point, the coach had not shared his biography as this became more apparent later in the research as the researcher-coach relationship grew.

The story begins in the café at the ice rink. This was a common place for Chris to spend his time when working and he had a friendly understanding with the staff, given the sheer volume of tea and coffee that he drank throughout the day. The particular focus within this vignette details the decisions Chris was having to make in order to construct the roster for his team.

Despite the quiet environment of the café, a number of people passed by the table offering a nod of acknowledgement to Chris and some would stop for a quick chat. From these interactions, it was apparent that Chris was well known to the people in the building and some of the local community. When asked how he had got to this point, Chris began to talk, “[I] started playing when I was about ten. This place opened in 1990 so I would have been turning eight that year, but at first, they didn’t have a junior programme set up – it was a brand-new thing to the town of [REDACTED] as well, new facilities going up all over the place and the ice rink being one of them. I was lucky enough that my grandparents were hockey players from when they used to live in London years ago, before they moved, so they took me, my cousins, my sister, and I was the only one who really fell in love with it [ice hockey] to the extent that I did. [I] started playing, went through all my skating levels, and as I started playing, I started dropping all the other sports that I did because it’s just impossible, you can’t be in two places at one time. So, I used to play football at school, I used to play rugby and when I started getting a bit more serious about hockey, one of them would drop off, and then another would drop off to the point that in my middle teens, I was just playing hockey and I’ve been here ever since”.

The conversation soon turned to how his team was shaping up for the upcoming season. In particular, Chris reflected on his knowledge and own beliefs, “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] and pull together and drive together”. From this passage, as well as the numerous observations of coaching sessions and games within the study, it is reasonable to deduce that Chris was intent on ensuring that his team were cohesive and willing to work for and with each other, and this in turn would provide them with the best opportunity to win. This demonstrates Chris’ knowledge of the competitive environment and league from the perspective of when he was a player. However, it is a telling passage about how his experiences as a player have shaped his thinking and expectations. As a player, Chris had experienced success when playing in a team with strong social connections (which emerged in Vignette 1). Triangulating the data of vignette 1, Chris’ goals and the observation of coaching practices, it was reasonable to conclude that the motive behind his intention to recreate similar social connections between his players was because it would facilitate the best possible conditions for success. When pressed further on this matter, Chris was asked, “[that’s what] you need then in this league?”. He replied, “Yes and that’s exactly what I’m already trying to instil; I said this earlier, it’s not like a catchphrase but something I’ve said to people, that everyone that I signed this year, I got a character reference for. It would be a character reference from somebody that I trust”. This provides a telling insight into Chris’ personal resources that extended far beyond his league and city. He had a number of interpersonal connections, and it was obvious that he was well respected by a large number of people. Chris’ beliefs about character linked closely with his upbringing and his parents’ emphasis on hard work and resilience. This was something that Chris sought to instil in his team and was an integral part of his coaching philosophy and influenced his relationships with players.

Chris was quizzed on the world of UK ice hockey and its interconnected nature, “so you’ve got a loose link to every single person?” He replied, “British Ice Hockey is a very small world, and you’re never more than one phone call away from someone that knows someone. Some of the guys I’ve brought in, I’ve coached before, or they’ve played around The Storm before, some have come from other British clubs where I know someone who’s played on the same team as them or coached them in the past”. Chris continued to explain his

selection of players based on personal qualities, “my thing is always, I’d rather sign a guy that’s like a ten out of ten guy who’s like an 8 out of 10 player, than a 10 out of 10 player who’s a 5 out of 10 human. Because eventually over the course of a fifty whatever game season it ends up being, fifty-two league games, four preseason games, that’s fifty-six before we even make the playoffs, in a year it’s going to be sixty plus, the guy that’s not the good guy at some point in that season is going to cause a whole bunch of [problems]. So, I’m very careful to make sure I’ve signed guys that are good guys. Chris’ comments reflect his priority towards player character and how highly he valued those that could be considered team players. The ice hockey season runs through from August to March and the team spend a great deal of time together, therefore ensuring that there was continual cohesion, especially when late on in the season people would become tired. This demonstrates Chris’ awareness and forecasting of potential problems that would arise unless he was able to gather players with certain personalities who would gel together. Furthermore, as the season progresses and the research become more immersed in the setting, it was evident that Chris’ need to consider ‘team chemistry’ was necessary and important, especially as the results were not favourable for the first few weeks of the season.

Chris went onto elaborate about how he might gather information on players, “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 and go ‘oh what’s Joe Bloggs like that 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 demonstrates the interconnectedness of the British Ice Hockey world and how easy it was for Chris to gather information on players. In return, he also offered his thoughts on players to coaches. This allowed coaches to work together, yet it also emphasises the importance of coaching connections and how imperative it was for a coach to be able to call people who were trustworthy. These social connections facilitated cognitions such as contextualising, reasoning and problem solving.

After a short while, Chris began to think about the building process in terms of assembling his team, “yeah, whereas I’ve started from scratch, so I’ve brought in some players. Two players played for The Storm in the Elite League last year, a couple of players from the past that have been here and gone elsewhere when the team went to the Elite League, some players I coached in the lower league, and then players from elsewhere”. Chris’ knowledge of players, experience of the surrounding leagues and environments, as well as personal

connections or resources that he had developed was revealed (this is also evident later in the season when Chris drew upon his interpersonal resources to sign a player). It was clear that he was having to draw upon his network of ice hockey-contacts and that this was a deep and rich resource. Thinking ahead over the next four weeks he remarked, “we’re not going to get on the ice for the first pre-season game and everything meshes beautifully and we’re good to go – it’s just not going to happen, it’s going to take time but by having good people in those positions, it will hopefully speed that process up”.

Chris reflected on the makeup of his team and commented specifically on how he was aware of the team dynamics, “I’ve got very much a mixture, I’ve got three, maybe four teenagers on the team, and then another two or three twenty to twenty two year olds, and then I’ve got four guys in their thirties, and everyone else is in their middle-to-late twenties 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’ consideration of the team dynamics showed he wasn’t willing to sign just anyone and yet, he was clearly pushed for time as all but one of the teams in the league had filled their rosters. Chris acknowledged that it was going to be a steep learning curve for him, more so than anyone else.

The notion of team cohesion that was mentioned above required further examination and Chris was asked for his thoughts on the social dynamics, social catalysts and leaders within the team and if he had already identified them. “I’m putting [the] onus on the older guys who live locally in [REDACTED], to look after the guys who are either coming here for the first time to live here or are travelling in from outside, to make sure that they get what they need. I’ve got guys moving here from abroad. I don’t want them sat in their house every night of the week by themselves. I need guys on my team to say ‘let’s go out for a game of pool’ or a game of darts or go and watch Monday night football down the pub, because it’s easy for a guy to sit there by himself and hate his season, hate the whole experience and can’t wait to get back to the airport at the end of the season and go home. I don’t want anyone to feel like that.” Chris’ comments reflect his awareness, consideration and thought process surrounding his players off the ice. Moreover, they illustrate Chris’ intent on fostering inter-player relationships away from the ice, so that they might be drawn upon as a resource

when the team played together over the course of the season. This suggests that the facilitation of inter-player relationships would ultimately assist Chris when he needed to deliver difficult messages to his team. In turn, this would create cognitive space for him to think in sessions and during reflection away from the ice especially when things did not go to plan. As a researcher embedded within the environment, it was possible to see first-hand how Chris' relationships facilitated opportunities and time to address problems (i.e., even though there was a period of losing in the early stages of the season, Chris was afforded time to sign more skilled players mid-way through the season and the team remained motivated throughout all stages of the season).

He was pressed further on his team's social side, "what can you do to make sure that socialising happens?", he replied "I'm the middleman so it's not my money, I'm an employee of this business just like the players are, so for example, next Saturday it will be the first time that all of the players are in one place at one time, on the 31st. So, I've already gone right, this is what we need. Players are going to train, 6.30 pm until 8.00 pm, and I've told the older guys to go and organise a night out. So, I've then gone back to the owners and said, 'can we have some money?'. They said 'yes'. So, then I'm able to go to the boys and make it easy for them by saying right, you're all going out, whether you like it or not, straight after practice, I've got you some money to chip in towards your meal – or maybe they'll sack the meal off and go straight to the pub – [that's] fine!". This reveals Chris' perspective about his role to facilitate social interactions away from the ice rink. His reference to being a 'middleman' illustrates his awareness of pressures from management and the players, and that he had a task of trying to mediate, in some cases to find compromises between the two stakeholders.

Chris reflected briefly on how his players might feel during the season. By drawing on his own experiences as a player he was able to demonstrate a level of empathy as he spoke, "because it's not easy if you're moving here from abroad. The fact is, there's one guy who's going to be living by himself and the other guys are living with a teammate anyway, and in fact, further on from that, those four that are living with a teammate are all living in the same block. So, I expect at some point they will form a friendship and share cars to the rink and back and to the gym and back without me having to force anything, it's common sense. You go from the same front door to the same work and the same back again, well, wouldn't you? I'm pretty sure guys will be up and down the stairs all the time to see each other". This example suggested that Chris was able to recall life as a player and it influenced how he treated his players both on and off the ice. Moreover, he displayed an awareness and

sensitivity to how his players might be feeling, especially those who did not have the social connections that he had when he was a player. From the above passage, it is possible to see how Chris' cognitions were populated not only with his players, but his thinking about how they would interact with one another. Chris was aware of the social context that his players were situated within and although he was not directly part of that societal layer, he was aware of its capacity to influence his team's performance.

This topic provided an opportunity to explore what had changed for Chris as a player and how he thought about his role now as a coach. Chris explained that the social aspect of the sport was a big part of why he played for so many years, yet this had changed to some degree, as he was in a coaching role. He went on to explain, "so for example what I would probably do, what I probably will do next Saturday is, I'll probably go for the meal and then I'll go, 'see you later boys, have a good night' and I'll get in my car and go. As much as I'd like to also have a night out, there's a time and a place. If we go and win a trophy I'll be out, for sure, you're not keeping me in! No-one, including my wife is keeping me in that night! But I don't think that's a good way to get started - to be out till 4 am drinking with my team. I have to, in certain situations, be a part of it, and certain times I shouldn't". This demonstrates Chris' perception of his situation in regard to the team and that he needed to remove himself from certain settings, most likely because this would either interfere with decisions that he might have to make later on in the season in a professional capacity or limit his position of authority as the coach. He went on to elaborate, "I don't think they [players] should feel that I'm there watching them to see what they're up to; some that don't know me would probably think that they should behave in a certain way because I'm there, and others that do know me wouldn't care that I was stood there. But I'm a firm believer in working hard and playing hard; there's seven nights in a week and we only play twice a week. So, if we play Saturday Sunday every week and every Sunday, we go for a team night out on Sunday when we get back from our away game, I'd say great, off you go, you've got Monday, Tuesday, Wednesday, Thursday and Friday to recover so that no-one's expecting anyone to be teetotal. If I then found out the guys were going out on Friday night and doing that, well then that's where I would have to intervene".

At this point in the interview, Chris had painted a picture of a coach who was aware of the importance of maintaining a distance from his team at certain times. Moreover, he was content to keep this distance and trust the team because of his interpersonal resources that he had developed as a player. Furthermore, his appointment of captains to positions of

seniority and leadership with this team also meant that he had a certain level of trust that he placed in key individuals - if there was a serious enough problem he would be notified, or if it was minor, then he believed the leaders within the team were equipped to deal with it. Chris was quizzed further on this topic about how he might keep checks on the team, he replied, "I actually met last night with, you probably know in hockey you have a C and two As, a captain and two alternative captains, and I met them last night to tell them that's what I wanted them to do. Actually, I think the words I used were 'if something's going on that I need to know about, you need to tell me, but at the same time, I don't want you to be a snitch', because that also doesn't do anything for the team".

From what was revealed about team dynamics, it was necessary to examine how leadership was situated within this construct. Chris was asked about how he selected leaders within the team and he explained, "I said to the captains last night, there's certain things they can deal with which is why I've put them in place, and if they think they need to talk to me, come and talk to me. But a player can come and talk to me too. An 18 year old can come to me and say 'can we talk?' and I'll say 'yeah, sit down, what's the problem?'. He might ask, 'why am I not playing so much?', why am I not on the powerplay?, why this and that and the other?'. That's where I have to justify to myself why that player's not playing as much or whatever, and it's not just about 'oh you're 18, you'll get your turn when you're 25', it's 'these are the things I need you to be doing on a regular basis without constant prompting or constant instructions. When you're doing this, this, and this, then you'll probably be the next guy that I think about putting on the powerplay when the powerplay's not functioning. But you're young, you've got things to learn, etc'. It could be anything, it could be that I've got two goalies, one of them comes to me and says, 'I'm not playing as much' and it could be that it's absolutely nothing [they've] done wrong but the other guy has played 8 games in a row and he's sitting at 91%. I'm not going to stop him playing when he's playing like that!" This demonstrated how Chris considered his players but also how he intended to interact with players. It is reasonable to assume that Chris was able to have these difficult conversations because of how he had situated himself from his team. He was clear that he was not 'part' of the team. Instead, he was on the peripheral fringe, sometime entering the circle of players, but mostly retaining a degree of separation and distance. This allowed Chris to think clearly and make decisions without the influence of emotion driven by his player-relationships. Interestingly, he spoke about the ages of players, highlighting his awareness of how his players might feel, or act, dependent upon seniority, or, their playing experience. His reference about 'prompting or constant instruction' suggested that he was aware of how younger players might need more instruction or direct feedback and guidance than those

who were more established. One of the telling remarks made by Chris was his unwillingness to change a player who was performing at a high level. Chris was unwilling to bench his netminder [goal keeper] if they had a series of successful performances. From this vignette as well as several observations during games and practices, it was possible to interpret this as player-performances being more important than potentially hurting a player's feelings. Additionally, this exemplifies the significance of putting the team goals ahead of any individual goals.

Chris was asked about how he dealt with players soon after recruiting, "some guys, and you don't know until you really meet them all and get to know them, some guys are vocal when things are wrong, some guys keep it to themselves and let it bug [them], and that can be anything. It doesn't have to be related to what happens on the ice, that could be like I said about the accommodation, they don't like the flat they're in. They don't like the fact that I've given them a Toyota Aygo as their company car, because they're six foot two. But they can come and sit with me and I could tell them 'I could get you a Range Rover if you want one, but I'll have to send back all the sticks I've just paid for, all the skates, and you'll have to live in a cardboard box, because a budget's a budget'. Some guys keep that inside and they just stew over it, never tell you and then you'll find out at the end of the season some guy will say to you 'oh yes, so and so, he was never happy because the neighbours said his apartment was noisy'. Well why didn't you tell me in September? I could have gone to the landlord and said 'is there anything we can do? Can we move them to a similar property elsewhere?'. If I'm doing my job right, I would like to think I'm empowering people to come and speak to me. If it's something I can solve, I'll try and solve it, if it's something I can't solve I'll have to explain why I can't solve it, [sometimes] it's just them being a bit precious, which happens with athletes". This passage reflected that Chris had dealt with several players before. Moreover, he was willing to try and change a player's environment if they came and spoke to him. Chris was clearly aware of the financial constraints of the club, and these clearly impacted what actions he could take. However, he was also happy to highlight these limitations to his players so that they could also understand the financial constraints within the organisation.

Finally, the conversation turned to how Chris viewed goals and recruitment, "to me, if my team's successful, I'd say a large part of it is because I've recruited well...when I say recruited well, I mean talent on the ice but also personalities and all that other stuff...I think that my coaching ability is most called upon when we're playing a team of a very similar

standard to ourselves. If we're playing a team where my players are just fundamentally better than the other team's players, we'll beat them more times than we lose to them, with minimal input from me. If we're playing against a team where they're just much better than us, we'll lose to them more times than we beat them. When we're playing against a team, which I believe this season will be quite a level playing field, then I think that's where that little extra five or ten percent I can get out of each individual and collectively that makes a lot of percent - that's where I come in". This passage outlines how and why Chris viewed the recruitment process as important and this was an important feature of the study as it played out over time. Furthermore, it illustrates how Chris perceived his role and value as a coach, for example, his most notable contribution would be in similarly matched games.

6.8 Vignette 6: The game, September 21st 2019

Context

This vignette details the seventh game of the season for The Storm. The team had won 2 of the 7 games and was in 8th (out of 10) position in the league. There were few injuries at this point in the season, but this would quickly change in the next month. In terms of performances, the team has been highly competitive, and the losses been close (not exceeding a margin of two goals). In addition, the losses had come against historically strong teams in the league and there was a growing sense of frustration within the coach and team.

The story begins with a prearranged meeting one hour before The Storm were due to play and takes place in the venue's coffee shop with Chris (Head Coach) and Rob (Assistant Coach), who had dedicated time to discuss their pre-match routine. The match was against The Buccaneers, who were historically one of the strongest teams in the league, and one that would be a good indicator of performance for Chris and the Storm to compare themselves against.

Amongst the growing number of spectators who had arrived to watch the game, Chris and Rob sat down at a table in the middle of the café to answer some questions, "so what sort of things are you doing in the build-up? what are you looking for?" they were asked by the researcher. Chris replied, "so we have a meeting at 5:15 pm. We try and keep that routine whether we are away or at home. 15 minutes after arrival we will have a good meeting where I will go over everything that I need to go over. Then this now is part of the day where I don't have to do anything... 6:10 pm then the warmup starts, we will be out there watching the warmup. Then we are starting to watch them (the opposition) and their line-up". Rob chipped in, "we are starting to look at the other team's line up to see what it is going to be, but it is not always the case". To clarify, he was asked, "so you are not watching your guys during the warmup?". He responded, "no, because we know what we are going to do". Chris continued to elaborate on this idea, "we never watch our guys, because you can tell by the [opponent's] drills what their lines are going to be... I know who [the players] are". This is an example of a routine that facilitates cognitive engagement and noticing – albeit from a game management and tactical perspective.

The conversation soon turned to the mood of the players in the changing room. Chris was asked how the players were feeling. He answered, “it felt alright, I spoke to the lads, [I] said it was a good week in training... talk is cheap”. Chris appeared not to dwell on things that he couldn’t control and from the researcher’s knowledge of Chris throughout the study, it is suggested that he was trying to maintain his focus on the upcoming game, rather than the mood of the changing room.

To encourage Chris to talk a little more, the topic of conversation changed to last week, “are you going to be playing the same as you did last week?”, he was asked. Chris briefly reflected and offered, “we were away last week at their place, it’s a smaller rink and we were playing defensively. And we need to carry on with that and reinforce that, but we also need to work on the neutral zone, how we carry the puck, how we take away time and space on the ice and stop them getting into our end as well which is impossible, they are going to get into our end at some point, but we want to try and make it more difficult for them to get into our end. We are going to focus on dumping the puck in which means it is going to become a contest. If we can take away time and space in the neutral zone it means that they don’t get clean entry. Clean zone entries mean that [the puck is slow to enter the offensive zone, so the defence can get back into position?]. We are going to go for dump the puck so that we can get after it. I am not against us getting pucks in behind their D to give our forwards something to go onto...not all the time but if you get time and space taken away. [The team hasn’t] quite yet learned that when you get that time and space taken away, the only play is to dump the puck in and go”.

Chris continued to explain his rationale behind dumping the puck, “every time you dump the puck the D has got to turn himself around, go back to the corner, find the net, pick up the puck, if every time you are faced with a player he puts the puck behind you, you got to turn round go and get it and then he hits you, yeah you get tired by the end of it”. He began to reflect on what had happened last weekend against a different team, “adding on to what we did much better on Sunday last week, our defence is way better, now we need to build on that to try and take away the zone entries in the first place”. There is an interesting mix of reflection and forward projection. Chris is able to rationalise what has happened previously – generally a ‘what ... if ... then’ chain of thinking. This also incorporates an element of application to his team in the future. Again, this suggests that Chris’ performance model is very sophisticated (Vignette 8 confirms this point and provides an in-depth illustration of

Chris' performance model by way of feedback to his players) but can also be 'particularised' to specific instances and future planning.

Chris was pressed further on his strategic changes for last week's game. He explained, "so basically, I was hitting on making sure our net front was never left unguarded blah blah blah, so we always have D in front of the net, but then I watched the video [afterwards] and the guys had taken it quite literally. There was always mainly a D man in front of the net who was doing f***ing nothing". Needing further clarification of what he meant he was asked, "so you have a D man in front of the net, but he wasn't moving?". Chris quickly replied, "it's not that he wasn't moving, he was like he might be there and someone would come to him in which case he has got to tie up, but other times the guy might be 6 foot out from the left hand post and the D in front of him is just letting him stand there. Well, that's why I have a net front D man to address anything in or around the net. Not just to stand there...sometimes I expect people to know what I am talking about. Even the very experienced players on our team, I didn't coach them well enough because I said get to the net front, don't leave the net front to go to the other side until the other D gets back to the net front. And guess what... they stood at the net front and waited for the other D to get back there, and they did that really well, but I didn't actually say, 'by the way when you are there you are supposed to be doing this'. So, the unspoken [bit] for me hurt me. So, I will take that, so on Sunday, I told them and they did much better but then other situations started arising which I think we coped quite well with because we were sort of adjusting things".

Now that the previous experiences and lessons to be learned had been elaborated upon, the topic of conversation briefly focused now on the team that the Storm were playing this evening. Chris began, "[The Buccaneers are] very skilful technically". Rob added, "they will score more goals than anyone else in the league this year". Chris continued, "and they find different ways. So, if you take that away, they will try that, take that away they will pop up over here, you know so they are not s**t. They won the play offs [last year]". This passage, as well as the coaching sessions, plans and games, reflect not only the dynamic and unpredictable nature of the sport, it also demonstrates the range of tactics (both offensively and defensively) that Chris and the Storm had to contend with.

For the last few minutes, Chris and Rob began to think about other teams in the league and they commented on how their ice rink compared to the Storm's. They explained how different qualities of ice meant that players could pass the puck with more efficiency and led

to higher quality ice hockey. They also spent time discussing the tactical and playing style of other teams and how some were considerably less entertaining and perhaps not worthy of asking the spectators to pay their entry fee. The quality of ice presents a physical ice-hockey specific coaching constraint. The quality of ice has the capability to impact what coaching strategies Chris is able to implement effectively. After approximately 20 minutes, Chris and Rob finished their cups of coffee and started to stroll back to the changing rooms.

Approximately half an hour later, The Storm's arena was full of home and away fans and the players were out on the centre ice singing the national anthem. The first period began with Chris watching and observing, whilst also making comments to the players when they returned to the bench after a line change. "Here we go boys, solid tonight, solid tonight", said Chris as the players were in position for the first face off of the game. Chris firmly believed that he had little control over the players on the ice once the whistle blew and the game began. However, he was still highly attentive as he watched the game and he did notice, question, feedback and instruct, as much as he was able, as the game was underway. "Good start there, good f***ing start. Good job Stoney, well done boys", Chris began early on in the game. Spotting a mismatch within the first two minutes, Chris turned to a player and shouted "alright Steve, I'm going to get you out against that line all night, you shut those fu***rs down alright, they got nothing over there. Harry, you got to be sure there, don't throw it across the middle, you've just got to chip it, let them come across from this side so you can get on the end of it". This is an excellent example of Chris noticing something early on in the game and making a strategic intervention. It also demonstrates that his solutions to perceived problems involves his knowledge of the players and their capacity to carry out his instructions.

Within five minutes, the Buccaneers scored the first goal of the game. Whilst the goal was scored, Chris turned to his assistant coach, Rob, "I don't know [what happened], I was talking, I think the guy just f***ing skated in because they had all the guys down low, I think he just arrived late". Keen to find out what happened, Chris asked a player on the bench, "Mike what happened there?". Mike and another player started discussing what happened and Chris quickly interjected with a sharp question, "so whose guy was he?". The player answered with a question, "the winger's guy?". This, as well as vignette 10, demonstrates how the fast-paced nature of ice hockey meant that Chris struggled at times to observe what had happened. In this instance, his strategy to overcome this was to ask his players what they noticed. However, this requires players to accurately recall events and share their

recollection with Chris. This suggests that coaches often operate with a partial understanding, and subsequent rationalisation, of events as they unfold.

Ten minutes into the first period a fight broke out which involved George, one of The Storm's captains. It was a short fight, with neither player initially appearing to come off too badly or injured. However, the full extent of the injury would be revealed a few days later when George found out he had fractured his carpals in his hand and he would be unable to play for a number of weeks.

As the game progressed, the Buccaneers were starting to have more possession, "I tell you what, you f***ing better get desperate around that net", Chris shouted to his players on the ice. Within a few seconds, the Storm conceded a second goal. As the players returned to the bench, Chris spoke to one of his key defenders, presumably because he identified that he had made the mistake, "Stoney that goes f***ing deep, that's where that guy comes from, come on, and then we're f***ing soft on sticks in front, f***ing 3 and a half minutes in soft on sticks, twice, two goals [lost]". Chris continued talking to his other players, "we're not helping ourselves here boys, are we? Theo, Benny, are you tired?". A player quickly replied, "no, I feel alright". As the clock counted down to the last few seconds of the first period, Chris spoke to one of his key defensive players on the bench, "James, you don't need to drag that puck all the way back behind our goal line, if they don't come for it, put it off the f***ing glass, because all you are doing is getting closer and closer to our end". The buzzer went signalling the end of the period. Chris and his team started walking to the changing room for the first intermission.

As Chris walked with Rob across the ice towards the changing rooms he remarked, "right, so we are going to decide what we need to address, I'm going go in there [to the changing rooms] and go f***ing mental and walk back out and you are going to do the bit that we need to do, alright? But do you know what, first two goals, soft as anything". Through previous discussion and conversations between Chris and the researcher, it was reasonable to conclude that this was not an unusual ploy for Chris; he was comfortable using his assistant coach to get messages across to players and he considered this to be a more effective strategy than delivering the information himself.

Chris entered the changing room and was keen to find out what had happened to his player during the fight. His first question was to George, “what’s up G?”, he asked. George replied (unaware of the extent of the damage at the time) “my hand is f***ed”. “Did you go leftie?”, Chris asked, referring to the style of fight. George responded, “no, it’s right at the start that it popped”. “Get some ice on it”, Chris quickly replied, hopeful that one of his best players was still healthy enough to play in the rest of the match. “I don’t know if it’s just the ligament though, I just felt it pop”, George continued. As George submerged his hand in a bucket of cold water, Chris asked, “is it the metatarsals? Can you move it?”. George replied, “yeah, yeah I’ll be alright”.

As was usual in the intermissions, Chris did not speak to his players for the first five minutes because, as revealed in Vignette 10, Chris felt that because of his experience as a player, his players needed time to decompress, get drinks and take their pads off. As a coach, Chris used this time was dedicated to thinking about what had happened, solving any problems, and then considering how best to present the key messages to the team. Rob voiced his opinion to Chris, “do you know what, we are tracking, we are getting numbers back, that last one there was scored from f***ing here, Benny had his guy, and then I think he went here, and James had someone in the middle, but that should never go in”. Chris reflected briefly and said “so we are working quite hard to try and get back, but its collapsing and its exactly what we were doing last Saturday but we got better at it, were using momentum like the fight, the goal, and then we go and concede a soft one straight after on the same f***ing 4 on 4, like when we get pucks behind their D, especially when Ryan is on they can’t f***ing live with us, yet its open for the puck carrier, the puck carrier is going like this ‘I don’t know who to pass to...’ and not popping up into areas like here, popping out into areas being a late option, just mindlessly allowing them to cover us, we have got to f***ing stem the flow. I am going to say don’t worry about that, got to close them down. Got to go defence first, they get nothing more and we just go one at a time, if we win this next period 1-0 that’s fine, but that’s the thing we need to do, I don’t want to go too f***ing mental at them”. Chris was aware that he could be too harsh at times and despite the fact that emotions were high, he was still aware that he needed to motivate rather than demotivate his players. By analysing Chris’ conversation, it was evident that he was attempting to breakdown the match and establish smaller more achievable goals. Additionally, he was cognisant of the fact that throughout the match, events occurred that were likely to change the momentum or flow of the game. In this instance, he had hoped that the fight would be the catalyst to improve the team’s performance. This, in conjunction with vignette 9 whereby Chris illustrated monthly goal

setting, illustrates how Chris was required to set goals at different levels based on the situational need.

As Chris walked into the players' part of the changing room, he started loudly, "right I'm telling you something right now, I'm getting sick of the sound of my own f***ing voice already. This is f***ing game 1 of 52. You know what, I hate losing, I f***ing hate it more than anything. I f***ing hate losing a board game with my 7 year old son. But you know what, I will take it if you lose in a certain f***ing way - that was f***ing piss poor. That's f***ing four games and we turn in a performance like that on the first f***ing real one, soft at the f***ing net front, unacceptable, not picking up on the back check, unacceptable, it doesn't require any talent those things, not being soft and picking up requires zero f***ing talent. F***ing bullshit. G steps up, has a f***ing fight, reaction f***ing zero. Ari steps up scores a f***ing sweet goal with a 4 on 4, reaction nothing. F***ing push!". Chris was always happy to admit that he was competitive, but he could only take losing as long as his team had given their full effort. In this instance, he was dissatisfied and was keen to let his players know how he felt.

He carried on, "it's s**t... but we're not f***ing shit and that's when I'm pissed off. Letting guys skate past us and we're not even laying a f***ing finger on them, f***ing soft. And there's a lot of people who would have loved to have played for this team in the summer and I picked up a team and unit of guys who I thought would get the f***ing job done for me and guess what, right now, soft. Top to bottom, line one to line three, back to front, f***ing soft. You guys need to f***ing figure it out. Two, three, four rebounds around our net is f***ing unacceptable, when you get that through your f***ing mind the first two goals don't go in. Pussies. F***ing sort it out, have some f***ing balls".

As Chris left the changing rooms, he looked at his phone to see the results of other teams in the league who were also playing at the same time. The medic approached Chris and offered "I think [G] has done his metacarpal, because when he does this [mimics a fist] I can hear it popping, it's as if there is sort of play in it, it could be ligament, it could just be the swelling popping up at the bottom, but either way I think he is going to try and be an idiot and play. Its popping but when going down the bone it doesn't feel anything obvious, but the only thing I can feel is when I am trying to play with it and see if there is any play in the actual joint, it is moving and it is popping, I don't know if that is fluid, I mean it's your call, I don't know if it's going to do it any good [to continue to play]." George did not go on for the rest of the game, it was decided that it was too early in the season and there was a very long

way to go. Furthermore, it was unclear how much he would be able to contribute to the game. Still dissatisfied and angry as he walked out on to the ice, Chris shouted towards the referees who were on centre ice, “what’s up with the clock? is it fixed now? It doesn’t help with all these f***ing times written down”. As a result of being a part of the research setting, it was concluded that Chris’ feedback had been diluted due to the tone and sentiment in which it had been delivered. Clearly, he felt that what the players needed was to make more effort, rather than any tactical adjustments.

The players soon came out of the changing room and lined up to begin the second period. As the whistle blew, Chris began to focus on the game that was unfolding in front of him. “Shoot. How are they not going in? Charlie, your line, you two go!”, he remarked to himself. This style of comment continued with Chris giving short and sharp comments to his players in an instructive style. Occasionally, Chris would offer something a little extra to a player, for example, as a player came off the ice from a line change, he said “that’s one of them ones, where I know for a fact as soon as you went by there, you thought, ahhh f**k. It’s not that you weren’t working hard enough, I think it’s because you went high and it didn’t really do anything. So you are better off just not going”. In contrast to other previous examples within this vignette, this is an illustration of a non-emotionally charged intervention, as detected by the tone and volume of voice, which allowed the player to make an adjustment next time that situation arose.

As the game progressed, Chris offered a range of short comments, mostly positive to his players. Interestingly, one of his youngest players, who had recently made a significant improvement came towards the bench from a line change. Unhappy with his performance, Chris, spoke to him and said, “you know what, Ryan, you’ve been playing so well lately, I don’t think I’ve said one bad f***ing thing to you, but that there was a f***ing nothing play and I don’t know where you expected that to end up. And you don’t need to pass that to someone who’s not there. Either keep hold of it and keep walking until something opens up, just keep your head up, come on man, you’ve been one of my best players so far this year. How many bad things have I said to you this year? One maybe?”. All of a sudden the arena erupted with cheers as the Storm scored a goal.



Figure 6.1: The moment The Storm score a goal

Unaware of what had happened, Chris asked Rob, “who was that, who scored? What happened there, I was talking to Ryan”. Rob responded, “unreal. It was touched up to Charlie on the turn, cannon from the blue line”. This is a further example of how difficult it is to follow the game in real time and how easy it is for coaches to miss what happens.

As the game continued, the score line remained the same and there were no major incidents. The Storm went back to the changing room for the second intermission. As Chris and Rob spoke privately in the changing room, they discussed a player, “do you know what, every time we had a game, he should have been in the gym”, Rob said. Wanting to talk about the current game, Chris tried to change the subject, “the problem is to get that, I have to go in there and do what I do. That [effort] should be baseline”.

Chris seized the initiative and carried on, “Let’s talk about how this game is actually going for a minute here. The most joy that they are getting is this right, puck carrier gets support. D, this guy is doing a better job, so F1 is here right? This guy is f***ing here, and they are not afraid to throw the f***ing thing over there or across here, every f***ing time they go up the ice, right? So now what I’m thinking here, it’s not because it’s how they get most of their joy. So like now, so, if they are coming like that, right... I need to get this straight in my head, so he’s going to have the puck, he’s going to be the support 1, right? So, he’s going to be the puck carrier, he’s going to be in the D... but it’s not always the D, sometimes it’s the forward.

But he can't come over here, so what I think needs to be [fixed] is the sort out, the high guy is going to become that guy right? I think the wing, whoever is the weakside winger needs to basically skate straight up here with his stick on the ice, because they throw that a lot without looking for it. And I think we'll end up with the puck a couple of times this period if we do". This is an example of Chris analysing and problem solving out loud. In a somewhat negative and arguably unhelpful fashion, Rob replied, "the biggest f***ing problem is that this weakside winger can't f***ing remember what to do, so I don't know how we expect him to do this". Wanting to move on as this negativity was not conducive to being effective, Chris simply stated "Yeah, ok". It does illustrate, however, the very technical nature of the coach's role and understanding of (particularly tactical) performance. Much of Chris' thinking involves an interaction between the performance model, his expectations of players to fulfil this, and the flow of the game. Depending on the nature of the momentum swings and player match ups, Chris is constantly verbalising his analysis of the performance and conjuring up either something that has worked before, what might or should happen if his intended tactics are put into play. It is interesting to note the abrupt comments of the assistant coach in comparison with Chris' more holistic view of players. This is reinforced by Chris' comments later in his reflection on the season interview (c.f. Vignette 10).

One of Chris' captains and key defencemen wandered over to talk to him and Chris began to speak, "come here and try and stay with the forwards, because Bobby's just doing nothing here, he's just waiting to get the puck and hold it for Matty Davis. But they are just throwing one pass, Matty's getting it every time and he's just coming in, just giving it to him, he's just delaying it and holding it. So, they swing, come back and reattach and make it that guy trying to carry the puck, so they are staying with the two forwards. But then if another guy comes down here, it's fine because it's me. Just take away his options so that he has to carry it". This interaction was important to Chris, he needed to know what his players were seeing on the ice in order to inform what key messages he would send to his players.

After his usual five minutes of deliberation, Chris walked in to deliver his key messages to the team. He began, "right here we go, boys, quiet. Guys, that was a much better period, we have probably gone there from our f***ing worst period of the season to probably our best. But you know what, I had to come in here and f***ing snap and you know what, that's not exceptional that second period, that's baseline. Yeah, so I come in here and snap and we get to baseline. That can't continue, I shouldn't have to do that. Ok, so good job, good effort, good second period. Right, now we've got to f***ing go out there, we're two goals down, we

don't rush, we don't panic, but we f***ing don't concede anymore goals, we chip, chip, chip away. OK, we can f***ing shrink the game. We're going to have a period of 10 and another period of 10, ok? Or we can have 4 periods of 5 and we need to win two of them, alright, whatever we want to do boys, but either way, we chip, chip, chip away and we defend properly, ok? It's way better".

Chris began to deliver his tactical messages, "on the scraps around the net guys, I'm getting a little bit nervous because I'm never really sure what the f***ing guy who ends up with puck on his stick is going to do. Like, just f**k the thing away from the net, whether that's into the corner, up to the half wall, f***ing ice it for all I care, stop open playing it around the net when there are f***ing sticks all over the place. Just get rid of the thing, we'll sort it out once it ends up, ok?". It was interesting that Chris used a number of ploys to 'buy time' for decision-making. He would deliberate before speaking to the players at a break.

Reflecting on his conversation a few minutes earlier with Rob, Chris began to relay his final message, "what they are getting loads of joy from, guys, is this right, so say this guy is the puck carrier here right and this D has got him covered, this guy is the closest support and the F3 is getting back, ok, so we've got a defensive forward here, he's got the guy. They send a guy to here, all the f***ing time, has anyone else noticed this, right? So, this D is here and he knows that he is here, he can't f***ing go up there and take that guy, that would be insanity, right? So, what they do and they do it a lot without looking, right. I'm telling you we can get on the end of something here. Because they do it, Robert does it a lot all the time, Hughey does it, they are programmed to have a really wide guy who spreads the ice, makes it massive and gives people tough decisions, right? So, the first forward back has to get this guy, ok, the D has got no one. I want him in the middle, he has to be there, so we are middle strong. So, this weakside winger who is going to be the guy who tucks into the high slot anyway, you've got to come straight back through this lane, with your stick on the ice, every single time. So, if you're not the first guy back and you know you're not the first guy back because there is someone further up the f***ing ice than you, you're going straight through here with your stick on the ice, because I'm telling you they throw it without looking a lot. And at least the first time they try and do it, we are going to get on the end of something. Ok, but we can't keep letting them throw pucks from here to here and then they get their zone entry here, these guys start running around, he's still not sure if he should go over here or not. There is no one in the middle, there is no one at the net. Ok, so we've got to f***ing cover that up and stop them from doing that". This is an example of Chris recognising a tactical

ploy from the other team and offering a solution to his team that he believed would yield success. Chris' explanation offers an insight into his ability to recall information in the form of a mental model that he had created. He was able to draw upon this mental model to explain how the game was manifesting and what needed to be done to overcome the difficulties that the team was experiencing. Although Rob's contribution was often terse and perhaps slightly negative, it is clear that Chris absorbed the message. The conversations between them may have been an opportunity for Chris to verbalise, and perhaps crystallise, his thoughts, rather than a two-way discussion.

Wanting to be positive, Chris explained, "guys, on the offence, there were a couple of lovely goals. Theo, f***ing got us going there on the PP [Power Play]. And then, Alan's goal, that's what they have been doing to us for the last two weekends boys, hitting trailers and f***ing ripping them. Look for that boys, in there, puck carriers, in there, second guy get to the net so f***ing pull that puck down, look for the trailers. You've got a guy at the net so the goalie can't see anyway, and he can't even stop them when he can see them. Boys, we had more chances in that period. We could be f***ing level, but we're not, so don't take this as me giving you a f***ing pat on the back, it's better than what you did in the first period. I'm telling you that period was baseline, now we can turn it up a notch. If we get the first one, we get the second one, we see what happens after that".

As time was running out, the players needed to get back out on the ice, Chris spoke to a key defender to ask for clarification about what was happening. Addressing the whole team, he said, "guys, just one thing for the forwards here. Harry just asked me a really good question here about what we are doing with dump pucks. Let's have one simple f***ing play for this period. So, if we are here, we are getting squeezed out, we know we've got to dump the puck, ok there are two options, one is a very soft placement for the closest support guy to get on to. That's option one, [second] is you are going to f***ing hammer it all the way around the weak side winger, you are going to come down and meet it, the guy that has just dumped it, well we will see who can get there first, this guy probably is going to get to the back of the net, the guy there is just going to pump it back to the net and that guy fills the high slot. Ok, so we're all on the same page, we can make it look pretty in practice, that's what we are going to do this f***ing period. Soft chip, or hard rim, weak side winger pushes it back down".

As the players got their pads on and tied their laces for the final period, Chris and Rob left the changing room and walked across the ice to their bench. Wanting to motivate his players, Chris' feedback throughout the period was overall positive. He began, "there you go, Benny and James. That will do, let's go. That's a good shift boy, that's good. That's good, simple, that's what we need". The Storm gained a number of power plays on the final period which created pressure. Each time, Chris would call for "Charlie's line" as this was his best line of most skilled players.



Figure 6.2: A few players from the Storm get physical around the net

Chris spoke to a group of players following a pushing incident in front of the Buccaneers' goal, "I like that from those f***ing forwards, push the c**t into the net. Alright, Stoney, take the shot. Just two D, Carri, Harry, come here, that's the kind of desperation I want to see from you guys, push the f***ing c**t into the net. Three goals on your shift, it's going in the right place, come on". Approximately halfway into the final period, The Storm scored to be one goal behind.



Figure 6.3: Pulling back to 4-5

As the time was running out, Chris called out a tactical time out. He got the players to come in tight and spoke, “right boys, we’re going with Charlie’s line here. Where’s Charlie? [turns to Charlie] win the draw, back to the line, Theo, James, sprint for it, get some f***ing air in your lungs, Theo, give it to James. James, you skate into the zone, as soon as you are in the zone, Ryan’s going, yeah? It’s outside, yeah, so D to D”. This was Chris’ last attempt at a tactical intervention. Unfortunately for The Storm, it did not provide the goal required to tie the game up. However, it did prove that the team were more than capable of competing with one of the best teams in the league and there was something positive that could be taken from that outcome.

6.9 Vignette 7: Coaching session 2, October 17th 2019

Context

This vignette is intended to convey a 'routine' coaching session. All sessions retained the same structure in terms of warmups, activities, and cool downs. The players appreciated the routine as they had come to know what to expect each week. The focus for this session was on types of 'zone entries' (a technical term which refers to a player skating with the puck into the attacking third whilst ensuring all his/her teammates are behind them). This aims of the session reflected the coach's thinking and planning about the need to improve team's offence. Within previous sessions, the coach had tended to focus on defensive strategies, in part, because of his playing experience.

The Storm had experienced a string of early season losses, resulting in being 8th place (out of 10) in the league, and it was clear from the research-coach interactions in the previous few weeks that Chris was frustrated and attributed the reasons for losing to factors outside of his control. Many of his key players; captain, vice-captain and goalie, were injured due to fights or collisions in the previous games (an example of a fight is contained within vignette 6). It was clear from speaking to Chris away from the ice and later in this vignette that injuries were beginning to limit Chris' coaching options. Despite his frustrations, it was evident that Chris' expectations and approach towards his team remained consistent, in the belief that (the process would work), his luck would change and bring about a set of favourable results.

Prior to the Thursday 8.00pm late-night session starting, Chris briefly answered some questions about how he considered the season to be going. "We lost" was his simple answer to when he was asked how the previous weekend's results had fallen, citing the performance to be "terrible" and confirming another blow as his "goalie [was now] injured". Suffice to say, he was not overly talkative about the weekend and in an effort to quickly change the topic of conversation, the discussion turned to new player signings. "Have you signed someone new?" he was asked. He replied, "we have signed a temporary goalie. Just to be back up. Because there is no way we can make do without one, even for one weekend". After being pressed on the matter further, Chris confirmed the signing of a new player "he is quite well known, his dad is... (confidential). His mum is... (confidential). He is a hockey guy; he is a good guy. We've had 9 games now, it's 7 more until he arrives. Our

captain is injured, everyone else is f***ing injured". Glancing at the clock he said, "yes, Ok I've got to go now" and ran off to start the session.

It seemed that Chris was expecting and waiting for the catalyst (player) that would result in a string of wins that the team felt they deserved and the more experienced players had come to expect. Various injuries meant that the players had been asked to play more minutes than was expected and in unfamiliar positions; Chris was exasperated about how the season was unfolding. He was counting down the games until his new signing arrived, bringing with him hope and a spark of new energy that could change the team's prospects; demonstrating to the team and the league in general that the season was not over for The Storm.

Chris was meticulous about planning his sessions, each session was always planned with help from a software programme that he subscribed to at his own personal cost. He felt that the time he and his players had on the ice was precious and he was aware that he needed to plan in advance if he was to maximise this time. Chris shared the plan below with the researcher and team the day before the session and clarified that he wanted to spend time on improving his team's zone entry (i.e., how the team would get the puck into the attacking third). The plan (see Figure 6.4) demonstrates Chris' intent on providing the team with three zone entry options, each with advantages and disadvantages that he alluded to throughout the session.

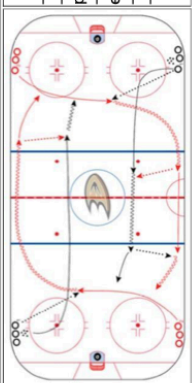
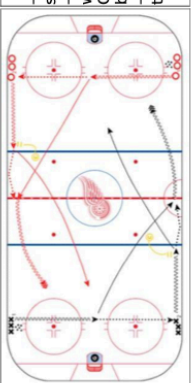
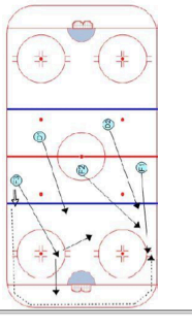
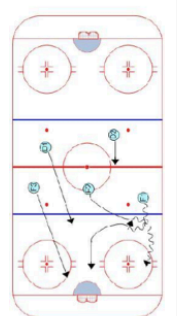
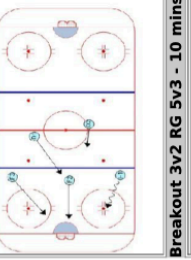
Thursday Night Practice - 10/17/19, 8:00pm - 90 mins MKL - Team Systems - ADULT 4 Corners 1 on 0 - 5 mins  - 2 vs 0 each side - O2 skates across ice and receives a pass from O1 - Skate hard through NZ and run through entry options - Kickout/Pass off Pads - Area Pass to middle of ice	
2 v 0 Chip - 5 mins  - Diagonal lines, X1 and O1 start at the same time - X1 leaves with puck and passes to X2, who gets off wall and chips puck pass back to X1 - X1 takes a wide shot with X2 driving to the net	Zone Entry - Hard Rim - 0 mins  F1 - gets down wall and tries to pump puck back to the back of the net to F3. F2 - stays above the puck and supports F1 and hunts for loose pucks, then goes to the net and STOPS. F3 - Hard rim on glass, ready to jump to the back of the net for return or get pass in slot. D1 - Into middle and react according to puck position. D2 - backs up on puck side if F1 doesn't win.
STRETCH - 5 mins Powerplay - 15 mins Breakout off DZ FO Into 3v2 - 15 mins Zone Entry - Cross and Drive - 0 mins  F1 - Crosses in front of D inside blue line and continues to the net with hard middle drive. F2 - Crosses behind F1 and picks up the puck with options *Shot *F1 *F3 or *D1 F3 - Wide lane drive. D1 - Second wave to high slot, keeping momentum. D2 - Follow up stay D side of their last attacker.	Zone Entry - Triple Drive - 0 mins  F1 - Takes puck wide and tries to get puck to the net or look for F2, F3 or D1 F2 - Mid lane drive STOP in front from F1, STOP in front D1 - Follow the play, come in second wave behind triple drive, time to keep momentum. D2 - Stay defensive side of their last forward.
Breakout 3v2 RG 5v3 - 10 mins Breakout 5v5 Rush - 10 mins OZ F/O Section - 10 mins Angle 3v3 - 10 mins  Offensive team tries to score, while defensive team pressures and tries to gain possession Once defending team gains possession, they must breakout from behind the net Attacking team now must tag up at the centre line and pressure/forecheck accordingly 30 to 40 second shifts	

Figure 6.4: Chris' coaching plan

The session began with the players warming up, skating around the rink, handling the puck, and taking some shots. Chris took time at the start of the session to talk to a player at the side of the rink. The player did not attend the previous session for personal reasons and, Chris spent a few minutes outlining what had been covered in the last coaching session. In rapid hockey speak he explained to the player that the "[the puck] goes bang to the net, to

the back post almost, then he just drifts out, drifts out, drifts out and almost comes into the space that the centre has left behind. For a pass out, for a one timer, or pass out and hit the centre out the back door. And then from the other side, win it, walk, give it to the D [Defence], we call this one from the wall, so he comes off the wall to the high slot, he walks, gives it back to him, he shoots, or exactly the same thing, but you just f**k off that pass and he just one-timers it. So, we went over that one and that one. We're doing that one tonight, I had to think of something else that could run from that side, so I've just come up with that one. Cals, the boys bought into it". It is interesting to note Chris' use of hockey terminology within the explanation. To the uninformed bystander the above is undecipherable, but it suggests that Chris and the players were comfortable with this language and that they understood what each other meant. From the many coaching observations throughout the study, it was possible to determine that this was a common theme in all of Chris' coaching sessions. The passage above demonstrates Chris' ability to recall what happened previously, his knowledge of the game, his clear mental model of how the play ought to unfold, the shared nature of this model with the players, and his ability to explain a complicated concept with seemingly relative ease.

Early in the session, it became apparent that an ongoing game was emerging between Chris and one of the well-established players. Chris noticed that his gloves were being repeatedly knocked off the side of the rink when he was not looking. It was a humorous act and Chris' mood seemed to have picked up from the pre-session chat, calling 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", Chris shouted over the ice. "It wasn't me", responded the accused player, "I know who it is though". 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".

Although brief, this humorous interaction highlighted Chris' ability to enjoy the coaching session without affecting his focus. The string of poor results and misfortune appeared to fade into the background as he coached and spent time with his players. Shortly after the warmup, Chris called the players in to explain the first drill. "Alright boys, we're going here, I'm going to give you 5 minutes tops in your end and then we're going to go full ice, we don't have enough killers to go into two ends, alright, so James, Cals, TK, Ryan, Steve, just play down low, pretend to be tank, yeah and then, Theo, Harry, Mike, Roger, and Cari are the other end, ok. Ok, go 5 minutes, bosh out a few things, come full ice, get some killers on

there and we'll go 3 or 4 times each, alright?" he paused to allow for questions before starting the drill "Let's go. Shoot the f***ing puck, James".

It is important to note this further example of the ice hockey-specific language that Chris used with his players, which was designed to allow his messages to be communicated with ease and efficiency. In turn, this specific ice hockey vocabulary reduced the cognitive load on the coach and contributed towards the establishment of team mental models. The length of Chris' explanation was deliberately short and sharp, reflecting his intent on maximising the players' time to practise on the ice. Chris has expressed to the researcher previously that he was aware that time on the ice was valuable and this observations confirmed what he said earlier.



Figure 6.5: Chris consulting his plan during the session

Throughout the session, Chris was observed consulted his plan. Players completed each drill and were called to come and speak with Chris at various times for feedback. Chris 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 each and every session that was observed. From time to time throughout the session, Chris spoke to individual players and small groups of players about what was unfolding.



Figure 6.6: Chris offering his thoughts to players

Midway through the session, Chris and two players were observing what was happening during a drill. Chris often watched his drills quietly from the centre of the ice. It was rare that he outwardly shared his immediate reflections during a session, but on this occasion Chris shared his thoughts with two senior players at the side of the rink, “that when we [the team] get into the zone, like on that first one when you got in, when you got in, it was messy over here for 5-10 seconds, I think the play there...should be to pump it to the back of the net for one of you two, probably you Carri, so you know when you got in, it was messy over there, Harry had it, threw it to you, you threw it back to play. Throw it to the back of the net and one of these two guys will grab it and everyone just busts to their spots and then we are set up.” He elaborated further confirming his strategy, “Yeah, because the longer we spend over there f***ing around with it, the more chance we are going to turn it over, but also we are wasting time, we’re not sitting in any way settled or any way ready”. This demonstrated Chris’ ability to notice, observe and recall what happened, whilst proposing ways to overcome the ‘messiness’ of what was occurring during the drill. It also demonstrates that, in making sense of what he saw, he was drawing on an extensive knowledge of prior experience of similar situations. Chris provided solutions to the problems that he identified, giving his players direct and clear instructions that would remedy the lack of time and space that his players experienced in the drill and likely in a competitive game.

After an hour into the session, Chris called the players in to provide feedback on the drill. Through this example of *in situ* reflection, it was apparent that Chris was dissatisfied with the fact that the players were struggling to grasp a concept in his planned drill, and it resulted in

the players making a number of errors. At this point, Chris made a decisive choice 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 whilst he “liked it on a piece of paper... [he doesn’t] always like it when [he] see[s] it on the ice.”

Chris voiced his feedback to the players, commenting that “the first two guys, they worked really well because you bought into it”. Appreciating that the initial plan was too complicated, he simplified it stating, “there is always a default play, because there is always a common thing that someone always ends up doing this right. So, the default play when we get in trouble is out here on the wall”. Chris then proceeded to launch into an array of hockey-specific terminology explaining that he wanted his player to “[enter] the zone and [try] to drive and shoot and the guy starts down and put the puck here, ok? Behind the net, put it to here, if this guy is always going here with a purpose and he can get to that puck first and we can set up offence from here. Right, it’s better than trying to throw it out in the middle, it’s better than trying to eat the puck when we’re in the f***ing offensive end.”

He went on to expand and contextualise 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?” Chris sent the players back onto the ice for the final drill.



Figure 6.7: Chris and the players laugh about his gloves

As the session drew to a conclusion, Chris called the players in to recap what happened and to discuss the final part of the session. However, one player who had been disturbing Chris' 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 carries on, he didn't snitch, but he was close to. I could have made him though!" the players erupted with laughter.

The humour quickly dissipated, and Chris focused his attention on ensuring that he delivered his final messages and key points for the session, "obviously guys there are going to be times when offensive zone or face offs don't go to plan because clearly the other team is trying to stop us implementing any f***ing play that we run. But we have got a few in our arsenal now, two from the left, two from the right, let's start f***ing using them".



Figure 6.8: Chris reinforces the key messages of the session

Interestingly, Chris attempted to take any blame for things that were not working, most likely because it would alleviate any pressure that the players would be feeling, "We should see and you know what, I take responsibility as well, because I haven't really given you any plays other than say get it to the D and go to the D and shoot, so it's on me as well but we should see certainly on every offensive zone draw every time the Centre Man should be

calling the f***ing draw.” Chris 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, 5pm Saturday don’t be late, two f***ing points lets go.” Chris skated back to the side of the rink with his gloves in his hand. The players remained on the ice for a final 15 minutes to play some fun games and practise some skills.

Chapter 7

Discussion and conclusion of situated cognitions in ice hockey

7.1 Overview of discussion

As part of the overall research findings to date, a framework of higher psychological functions (types of thinking in which specific cognitions can be grouped) has been established. This has been used to describe how and what coaches think in a micromanagement setting. At this point, it is important to reaffirm the parameters of this discussion and its focus on the findings from this third and final study. In contrast, what follows in Chapter 8 is a synthesis of the key findings and messages that have emerged as a result of all three empirical studies and research journey as a whole. The purpose of this section, therefore, is to explore and describe, using evidence from the vignettes, the relational influence of the environment on cognition. Therefore, as the cognitive processes have been scrutinized in the first two studies, it is the coaching environment itself, consisting of the intrication of agency and social structures, influenced but not determined by historical events, that is the focal point of this chapter. This embedded study is intended to paint a richer picture of cognitions in context, as they play out over time, and establish a basis and case for thinking about coaching cognitions through the situated cognition perspective.

The discussion begins with an elaboration of goals at the different levels (individual, interpersonal and institutional). This is designed to explicitly outline and illustrate how, in this instance, goals are developed, aligned, and weighted by the individuals and groups involved. Following on from this, coaching activities are examined in respect to the enabling and constraining influence of the environment and the time that is afforded for coaches to operate. As part of this, coaching sessions, roster construction, competitive games, and video feedback, are used as illustrative examples to draw upon. Subsequently, the influence of coaching biography, is explored as an influencing factor that shapes coaching cognitions and practice, which again illustrates the temporal aspect of coaching. Building on this, the institutional context is explored and illustrates how the club's culture, as part of the institutional context, has developed over time. Developing this further, the socio-cultural context is briefly elaborated on, which reveals how sport-specific factors, for example, injuries and wins/losses, shape both coach and player expectations and cognitions. What follows is a conceptual schema of coaching cognitions that acknowledges the influence of contextual factors on coaching practice within contrasting coaching environments. The

findings of this final study are then reflected upon with specific reference to the aims and research questions of the thesis. The chapter draws to a close by outlining the substantive and methodological conclusions that have emerged from this third and final study.

7.2 The influence of goals

The purpose of this section is to examine how individual and group goals have the capacity to shape the environment and exert influence on how coaches think. As discussed within Chapter 2, goals are a fundamental part of the wider coaching landscape (Cushion, 2007; Jones, Armour & Potrac, 2002; North, 2007; Potrac et al., 2000) and provide a sense of direction, or purpose, to the coaching process. This study has revealed three goal-related concepts, 1) the alignment of goals, 2) the weighting and proximity of goals to the coach and 3) the formation of goals due to historical events and personal beliefs, all of which are elaborated upon below.

7.2.1 Goal alignment

Goals are a fundamental feature of sport coaching (Horn, 2008; North, 2017). In this study the coach's (Chris, situated in the individual context), players' (Russ and George, situated in the interpersonal context) and CEO's (Carol, situated in the institutional context), goals were explored. Notably, it is possible to see how some goals were aligned and interdependent on one another. For example: 1) Carol's goal of 'becoming the club of choice', 2) Chris' goal of having his players want to return to the club at the end of the season and 3) Russ' goal of Play over 500 career games for The Storm. These three goals were expressed independently of each other but there was an important degree of mutuality. The term 'club of choice' concerned spectator numbers and local reputation but also addressed players wanting to return and play for the club. This goal could be seen as speaking to and observing players whose actions were integral to the club achieving its goals. Examples of the mutual alignment demonstrated by the stakeholders include the coach and players attending networking events, supporting charity initiatives, and engaging with the fans before and after games. These observations, or more specifically, 'alignment of goals, were more easily captured and accessed away from in situ coaching practice. As such, this illustrates that goals exist at different layers of the club 'system', yet, in this study, there was mutual alignment between them. The goals were complementary, rather than conflict inducing,

which, would most likely result in power struggles (Cushion & Jones, 2006; Lyle & Cushion, 2017; Townsend & Cushion, 2020). However, incidences where there is misalignment of goals, for example, between Chris and the young player who he asked to leave the team (Vignette10), are likely to be more noticeable and detectable to researchers.

7.2.2 Weighting and proximity of goals to the coach

Not all goals carried equal weight and in some cases were ill-defined (Saury & Durand, 1998), and therefore, impacted on coaching cognitions to differing degrees. Extending this premise, the source (individual/organisation) responsible for establishing the goal was also likely to have greater/lesser influence on the coach's cognitions, for example, an organisation may provide long term goals, whereas coaches will inevitably set week-to-week (or short-term) goals. These are now expanded upon below, using the notions of 'proximal' and 'distal' (North, 2017), with illustrations of how goals can be considered in respect to their relative proximity to the coach.

Chris' goals in vignette 1 were predominantly performance-based and included: fielding a competitive team and winning more games than he lost. The player's goals were to win trophies and make positive contributions to the team (when playing and evidenced by statistics such as goals, assists and number of playing minutes without the other team scoring). In contrast, Carol's goals were more diverse and focused on the club's sustainability, ensuring a positive reputation within the local community. Undoubtedly, Carol's goals can be viewed as interdependent, for example, one of the key features of the club being sustainable was high ticket sales. Therefore, without the team being successful, it is highly likely that ticket sales would have decreased, which in turn, would have negatively impacted upon the club's sustainability.

Considering the goals of the different stakeholders above, some goals are likely to be more influential than others on the coach's cognitions. The most influential goal for the coach was fielding a competitive team (which is also in keeping with the high-performance adult domain in which this study took place). This is evidenced by Chris' concerns early in the season about what the Board might do when the team was not winning, he said: "so say in, September, October, we're losing all the time. I don't know them well enough to know [that] they're not going to sack me... luckily, they were, they were willing to give me time. I mean, it

turned around. They could have made a snap decision in October and sacked me; I wouldn't have blamed them for it" (Vignette 10). With this goal driving his actions, Chris felt a degree of helplessness as a result of the nature of the sport and injuries (which are common in ice hockey and inevitable due to the high-speed collisions and the fact that fighting is part of the sport's culture) that had occurred. He explained, "but I'd get a text from Carol on Sunday, on the way back from the game - Why did we lose? Well, because the other team played better than us. And then she'd start pressing me. And I'd be like, we didn't play well enough. They played better than us. Leave me alone, almost like I have nothing else to tell you". It is reasonable to conclude from this that Chris' primary purpose was to ensure that the team were as prepared as possible to win games. As such, Chris' goal of wanting to field a competitive team was exerting the most influence on his thinking and decision-making in various aspects such as game management, coaching sessions, and roster construction.

In contrast to the above example which details Chris' cognitions during a period of team losses, it is important to consider how the influence of fielding a competitive team became less influential, or perhaps harder to detect from a research perspective, as the team began to win more games. This is exemplified in vignette 9 in which the coaching atmosphere was lighter, more jovial, and Chris appeared to be willing to let the sessions flow more, in comparison to sessions that were observed earlier in the season. Additionally, the players had become more familiar with Chris' principles, processes, and coaching strategies.

Summarising the above, it is evident that some goals that are distal to the coach are likely to exert less-direct influence over situated cognitions. For example, Chris' goal of 'having players wanting to return at the end of the season', is less likely than 'fielding a competitive ice hockey team' to immediately influence what and how he, as a coach, thinks. Therefore, it is important to appreciate that goals are dynamic regarding their perceived importance (weighting) and, can be categorised as either proximal or distal to the coach's immediate cognitions but in the knowledge that they vary over time.

7.2.3 The formation of goals due to historical events and personal beliefs

The results suggested that the goals at all levels (coach, players and CEO) were aligned as a result of, and reaction to, historical events. This alignment proved to be highly influential in guiding and orientating how and what the CEO, coach and players thought and behaved,

both on and off the ice. Carol was a former fan, and her emotional connection to the team was one of the primary reasons for her decision to take on the responsibility for managing the club, especially when it was not financially sound (Vignette 2). Her experience of seeing the club mismanaged and the widening disconnect between the fan base and the club itself, were underpinning reasons as to why the goals of 'establishing trust' and becoming the 'club of choice' were selected, by her, when the new club was formed (Vignette 2). In turn, Chris' cognitive processes and actions were very much aligned and focused upon achieving these goals. For example, Chris spoke passionately and frequently about what ice hockey had given him personally and as a player, stating that he wanted to 'give back' to his local community. He explained, "because we're a really good family, and they've [the fans] been through really tough times in the last two years, just like the players, but we're here". This historical backdrop and set of circumstances that led to the formation of the club and team meant that many of Chris' goals were formed and influenced by prior events. Several examples of actions, underpinned by Chris' desire to 'give back' to the community included 'skate with a player', 'charity fund raising nights' and his involvement with the junior coaching programme.

7.2.4 How goals as part of the wider context shape cognition.

The discussion above has demonstrated the significance and complexity of goals within sport coaching. Goals help to situate cognition by providing a purpose or direction of travel. By conceptualising goals as dynamic and interactive features of the wider sport coaching landscape, it is evident that they shape cognitions and higher psychological functions. The nature of goals can be performance based, whilst also being practically and socially constrained. In this third study, it is apparent that many of the goals at different levels involved social components (e.g., 'wanting players to return at the end of the season' (the coach's goal) and 'to foster a strong team ethos' (the CEO's goal)). In contrast, there were clearly identifiable performance-based goals set by all stakeholders.

Whilst the coach's individual goals are clearly important, it is now possible to see how different stakeholder goals are often intertwined with one another. This illustrates the complex nature of many individuals working together and all with potentially differing perspectives, needs and choices. Given that sport coaching requires setting and working towards goals, it is possible to view these goals as either social or performance-based, yet in

both cases, they have the capacity to strongly influence and shape cognitions within different coaching settings.

7.3 The impact of the coaching environment and time constraints on coaching cognitions

The following sub-sections highlight how different coaching environments were associated with differing time pressures and that this had an impact on cognition (Abraham and Collins, 2011).

7.3.1 Situating cognitions in non-time constrained environments

In the study particular environments were less constrained by time pressures. Player recruitment (Vignette 4) and feedback via video analysis (Vignette 8) are drawn upon as examples that offer insight into situated cognitions when coaches are afforded time to deliberate and draw upon their knowledge and wider resources.

7.3.1.1 Recruiting players and constructing the roster

First, the recruiting of players. It was evident that there was a significant number of factors that Chris needed to consider. When a player himself, Chris had competed against many of the players in the league and had a good knowledge of their characteristics. Within vignette 1, Chris was explicit about how important player 'character' was to him in his players and this suggests that he was forecasting how the team might function in certain situations and throughout the season. Part of Chris' forward-looking performance plan was an expectation of how his players would perform and these expectations were built into his recruitment strategy. Chris' approach to recruitment was underpinned by his biography which is discussed later in this chapter. However, the following quotation, stemming from his biography illustrates, in part, what he was prioritising in terms of player recruitment: "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] and pull together and drive together" (Vignette 4).

At the beginning of the study, Chris needed to construct a roster and was required to sign players late in the off-season (because the club had been entered into the league late in the year). Chris' use of the interpersonal resources he had accrued throughout his playing and coaching career meant that he was able to gather information and player references by asking questions of his ice hockey contacts. Using their recommendations, he made decisions based on reliable and informed data that extended well beyond statistical score sheets. This concept was explained by Chris: "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 and go 'oh what's Joe Bloggs like that played on your team last year?' and they'll be like [makes noise] 'di*****d – 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 standard" (Vignette 4). This might be described as a refinement process, during which initial impressions or potential actions are subsequently refined as a result of further information. However, the reasoning involved will include an ongoing process of accommodation to the various factors that Chris is considering – the team's specific needs, the trade-off between ability and character, the club's expectations, other stakeholder expectations, and Chris' own values. This is an interesting example of a situation in which the variables being 'juggled' are, nevertheless, far from easy to reconcile.

Interpersonal resources are vital for coaches to make good and informed decisions. However, what this study illustrates is that coaches require time to draw upon and utilise these resources. In this example, Chris would not have been able to obtain references about players' suitability and character if he had not developed strong working relationships with other coaches around the league. This resource, coupled with time, enabled Chris to gather important and relevant information to support his cognitions and actions in the construction of the team roster. This finding is supported by Elliott and Maguire (2008) who conclude that informal communication is the primary mechanism to facilitate the flow of information to coaches when recruiting foreign players in the British Ice Hockey league. Interpersonal resources act as enablers within the environment to facilitate sophisticated cognitive processes such as contextualising and reasoning.

7.3.1.2 The emergence of video feedback as a tool to share mental models.

Chris' use of video feedback is one of the most notable findings within this study, as it offered the opportunity for both players and coaches to share their mental models and memory recall without the constraint of time. Video feedback has been researched by several authors in the sport coaching literature (e.g., Debanne & Fontayne, 2009; Groom, Cushion & Nelson, 2011; Groom & Nelson, 2013; Nelson, Potrac & Groom, 2014) who suggest that video-based technology could be more effective with further engagement of how socio-pedagogical factors affect coaching practice and athlete learning.

Chris' video analysis was shared with players who, at their request, wanted to use it to improve their performance (Vignette 3). Chris noted that he struggled to see what was happening in games due to the speed of play and he needed to, at times, speak to players to provide feedback. He expressed that, "a lot happens in five seconds in a hockey game. Quite often, I'll think I've known exactly what happened on that goal, that we just scored or conceded. I'll go to Russ and go 'what happened' and he'll tell me, and it'll be a bit different to what I think happened, and then we'll watch the video - and we were both wrong. Because all of a sudden, the red light goes on and you look and you go, that guy's standing over there, but actually when the goal went in, he was in the right place, but he was still moving - in that split second that he's moved. So, the picture in your mind is different to what actually did happen" (Vignette 10).

In this study, Chris used video analysis as a tool to 1) check his understanding and recollection of what had happened, 2) analyse how effectively the team performed against the opposition, and 3) to share his mental models with the players. It is evident that Chris was aware that his memory was fallible and therefore video analysis was found to be a reliable tool for him to limit this potential negative impact. Echoing Chris' sentiment about the problem of keeping up with the speed of the game, the players also expressed trouble with accurately remembering or knowing what had happened, for example, George said, "sometimes you see things differently in your head when you are on the ice and then you are kind of thinking when you watch the video, that wasn't what happened" (Vignette 2). From these findings, connections can be made between Lee's (2011) earlier work who reported that video feedback was considered to be useful as a player development tool. From this, it is reasonable to suggest that the use of video feedback as a tool, was crucial in establishing a shared performance model (Gershgoren et al., 2013; Lyle, 2002) which assisted both the

coach and players in identifying what happened during the games. Within vignette 8, it was possible to see the level of detail in terms of technical and tactical knowledge that the coach verbalised when providing feedback (McMorris, 2015).

Overall, video feedback emerged as a highly effective tool to outline how the team performed and what needed to be done better in order to be more successful. The tool's 'objective nature' removed any potential for conflict between player and coach, but it was clear that the players were keen to be shown what was happening during games so that they could take responsibility and ownership over their own performances (Vignette 3). Finally, the most notable feature of video feedback was that it allowed Chris and the players time to reflect and come to conclusions.

7.3.2 Coaching environments that were more time pressured

Coaching sessions and intermission periods required the coach to act and make decisions with limited time. Both coaching session and intermission periods emerged as situations whereby Chris was afforded time to deliberate, but still experienced time pressures. The two examples below detail Chris' cognitions, routines, and strategies within these environments that he employed to facilitate more 'thinking time'.

7.3.2.1 Coaching sessions

In coaching sessions Chris had to manage coach-player interaction and micro-management of drills and interventions but, generally with limited time. To explore the details of this, an elaboration of the types of emergent higher psychological functions and specific cognitions within the study, using an embedded approach (in contrast with ACTA and Think Aloud Protocol) is now presented. Successively, the emergent coaching strategies that influenced and facilitated cognitions over the course of this study are expanded upon.

Within coaching sessions, Chris' behaviour and demeanour appeared calm and considered. This observation was noted and discussed in the coach's comments in vignette 10. Chris' planning negated some of the environmental complexity and facilitated the prioritisation of important information being noticed, which arguably contributed towards his calm

demeanour. Furthermore, a range of higher psychological functions such as forecasting, problem solving, and reasoning were more evident. It is suggested that they emerged due to the structure of the practice session, coaching style, and idiosyncratic nature of the coach (Lyle & Cushion, 2017), all of which afforded Chris the opportunity to observe quietly and focus his attention on activities within the session from a distance. An example of this is evident in vignette 7 and Figure 8.3 when Chris, positioned by the side of the rink, explains to two of his senior players what he has noticed and what he thinks should happen next.

Chris used strategies within coaching sessions to effectively manage limited time, such as prior planning and embedded routines - 'protecting' time for him to deliberate. Chris summarised his perspective on this: "you can't control everything because things go well, and things don't go [well] just like when you're teaching in a classroom, or teaching any sport, or teaching anything. But I control that with a whistle. So, if it's not going the way I want it, I can stop the thing with a whistle, call everyone in and then go again" (Vignette 10). This raises an interesting, and perhaps underexplored, issue of the point at which Chris' observations conclude that what is unfolding in front of him is not just 'reasonable variation' but a sufficient catalyst for further intervention and action to be taken.

During the observed coaching sessions, Chris rarely ever deviated from his planned practice structure of setting up the drill, observing the drill and providing feedback to the group. Players appreciated the routines and structure (Vignette 3) as they knew what to expect, were rarely surprised, and could focus on the objectives for the session. In some instances, Chris would talk to individual players and offer specific feedback. An example of this was witnessed when one of the foreign players was unclear of what was required of him because Chris had given his explanation with such fast-paced fluent UK based ice-hockey vernacular. In this instance, Chris made the time to reiterate his points and convey them in a slower fashion and with less ice hockey jargon. More generally, ice hockey is a game that relies on systems, 'playing on lines' and shared (especially tactical) mental models. Therefore, small group feedback is perhaps more important than individual feedback. Moreover, when players are skating at full speed with helmets that impact their ability to clearly hear others, providing live feedback during drills is extremely challenging and not overly effective. These findings support Lyle's (2010) work suggesting effective planning as an important tool in team sports to aid not only coaching cognitions during practice, but how these might be usefully shared amongst the team (Cole & Engeström, 1997; Debanne & Fontayne, 2009).

The findings from this study demonstrate how Chris was operating with a performance mental model in mind when coaching in sessions. This was evidenced in vignette 7 when Chris offered a lengthy explanation of his observations to two players: “that when we [the team] get into the zone, like on that first one when you got in, when you got in, it was messy over here for 5-10 seconds”. However, Chris followed this up by offering his perspective of what he thought should happen: “I think the play there...should be to pump it to the back of the net for one of you two, probably you Carri, so you know when you got in... Throw it to the back of the net and one of these two guys will grab it and everyone just busts to their spots and then we are set up.”

7.3.2.2 Intermission periods

Intermission periods within ice hockey games presented important challenges for Chris. In vignette 10, Chris explained his strategy and underpinning reasons for why he acted like he did, given the environmental constraints: “I tend to always, when we come into a locker room at the end of a period, they go that way, I go that way and I shut the door. And I'll just think, there's a thousand things I want to say to these guys right now. But really, firstly, how many points can I hit that they're going to listen to? Secondly, how long have I got to do it? So a roughly 15 minute break; I will only ever talk in the middle five because I know, I had a coach that I played for, for a long time - he used to get in there, I'd be taking my shirt off, about to take my shoulder pads off and he'd start...and then, he'd finish, and I'd just have to do it all back up, put my shirt back on, the buzzer would go and we'd be back out again and that never worked for me... so I'll categorise into five bullet points, probably. Probably maximum five. Then it might be a bit of a, like a 'raaah' at the end”.

Chris was aware of the need to process all the available information in such a short period of time. However, Chris' processes were also shaped by an understanding of what his players needed, which stemmed from his own playing experiences. This example illustrates how cognitive processes in this environment can be influenced by the coach's existing experiences and 'personal theories', i.e., what worked for him as a player will work for his players now that he is a coach. This has been exemplified here, but some further consideration might be given as to whether this reliance on personal experience is a constraining or enabling influence on effective practice.

7.3.3 Situating coaching cognitions in significantly time-constrained environments

Chris' tactical and managerial role, coupled with his close proximity to the game during matches, meant that he was typically forced to operate and think in a very reactive fashion. As an example of this, vignette 6 demonstrates the limited and constrained nature of the coach-player interaction during the game, as well as the understandable challenges of attempting to exert a measure of game management in such a dynamic sport. In contrast to the two previous environments discussed above, Chris spent most of the time during the match attempting to observe and notice tactical patterns so that he could feedback his observations to the players during substitutions and in the intermission. His comments in vignette 10 illustrate the difficulties that he experienced when trying to recall what happened in the lead up to a significant event, such as a goal being scored. There were also significant and not-uncommon events such as injuries and fights in ice hockey, that required either a response or remedy from the coach (these illustrate the sporting culture and particularity of ice hockey, and these are discussed as part of the socio-cultural context later in this chapter). As a result of the time constrained and dynamic nature of the sport, it is reasonable to conclude that a significant proportion of coaching cognitions can be described as 'fast' and reactive in this environment. This type of thinking has some similarities to that described in Klein's (1993) recognition primed decision-making model. In this instance, the coach is able to draw upon previously experienced similar patterns of play and will have developed a set of cues that will help him to direct his cognition to a relevant example. However, as Harvey, Lyle and Muir (2015) speculate, the serial, ongoing nature of game play and the number of variables involved, when linked to immediate and medium-term match goals, may make this cognitive process less effective. Similarly, this type of thinking could not be described as 'type 1' (Kahneman, 2017), as the coach was attempting to deliberate, albeit having to sort through a range of ideas and then offer a solution, which, in the context of the fluid environment, could not be tested against any other alternative.

There now follows a discussion on coaching strategies that aided Chris' cognitive processes and routines when he was practicing in severely time constrained environments. Several embedded practical routines resulted in a simplification of decisions that needed to be made. First, whilst the teams were warming on the ice before a competitive match, Chris and the assistant coach spent time observing the other team to identify their intended line pairings. In turn, this helped in strategising which line to send out on the ice and when to send them. Moreover, it provided time to forecast how the other team might play, anticipate their tactical

intentions, and formulate preconceived (even if tentative/fallible perceptions of) strategies. This demonstrates Chris' routines and thinking before the match began. As such, it was helpful for Chris as it allowed him to examine the opposition in isolation, without at that stage, having to solve any problems within his own team. In this instance, Chris was searching for cues in the environment which in turn impacted upon his strategic focus within his own team. This scenario reflects the high degree of uncertainty and unpredictability for the coach, given that opposing teams were likely to change tactical formations from game to game. However, it is acknowledged that there were identifiable formations and strategies that required Chris to diagnose, as speed, within this environment. Therefore, Chris' intention was simple – to observe and glean as much information as possible – without, at that stage, the distraction of thoughts about his own team interfering with his analysis.

Second, and as a further example, within the game (Vignette 6, Chris called for a time-out towards the end of the match in order to deliver information and implement a tactical intervention. This is an example of not only his intention to convey a message to his players and implement a strategy within the game, but also his forecasting and decision-making in a situation with very limited time. In this situation, Chris shared his simulation model of how he considered the subsequent play should unfold.

7.3.4 How specific coaching environments shape cognition

Coaches are presented with an array of challenges and levels of complexity dependent upon the task and setting. However, coaching environments are varied and either constrain or enable cognitions. Consequently, coaches are required to change physical, mental and social routines dependent on what the environment affords. In the discussion above, the notion of time has been used to demonstrate how coaches are forced to prioritise certain cognitions. Nevertheless, this prioritisation results in fewer factors being considered and, as a result, those 'put to one side' can be perceived as less important or less likely to contribute to goals being achieved – perhaps until further reflection.

In Figure 7.1, injuries, team success, team cohesiveness and goals emerged as examples of contextual factors that shape cognition. However, it is suggested that cognition is affected to differing degrees by these contextual factors because of enabling/constraining features afforded by the specific coaching environment. Below, the concepts of deliberative, semi-

deliberative and non-deliberative are offered to indicate how different coaching environments vary in the amount of time that they afford coaches. As time creates pressure on coaches to think in a particular way, in turn, they are required to prioritise key higher psychological functions and cognitions. Furthermore, these cognitive processes are closely aligned with what the coach wants, or needs, to achieve. In contrast, when coaches are not constricted by time, it is possible for wider factors, that might have less immediate impact on goal achievement, to be considered.

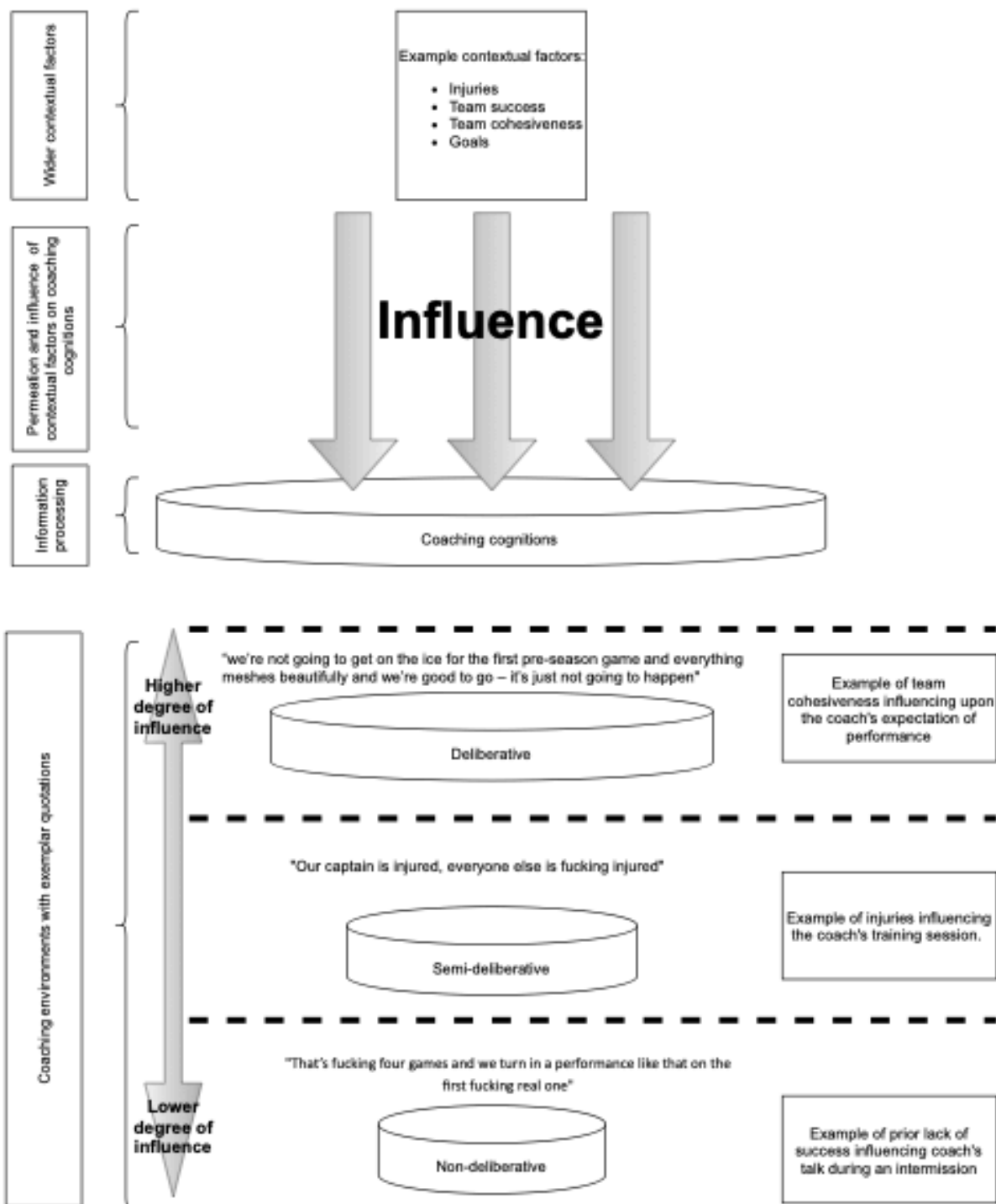


Figure 7.1: A conceptual schema of how the strength of contextual factors varies dependent upon the coaching environment.

7.4 The influence of biography

Chris' biography, including his upbringing and parents, were significant influences on his thinking and decision-making as a coach. Vignette 1 demonstrates how Chris' upbringing, and his playing experience, influenced the expectations he had of his players. In vignette 8, Chris explained the mindset, or playing attitude, that he desired from his players. In particular, he spoke about his perception of player battles around the net area: "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". In this instance, it is possible to see how Chris' thought processes and expectations of how he wanted his player to think and act, are framed in relation to his playing experiences and physical skill set (Vignettes 1 & 8). Building on this point further, the analysis of the vignettes demonstrates that Chris' upbringing, which required him to work hard to maximise his abilities, influenced what he expected of his own players. Chris, by his own admission, felt that he was not the most talented of players. However, he attributed his success to hard work. Chris understood that his playing success was due to his efforts and willingness to work harder than others around him (Vignette 1). Therefore, Chris' cognitions were being influenced by his own experiences and it is possible to see from his quotation above, that this translated into expectations of a similar level of dedication and commitment from his players.

A notable example of a historical influence was found in Chris' background and upbringing (Vignette 1). His biography was explored in several interviews, and he frequently referred to certain values that had been instilled within him by his parents. Through these interviews and observations, it was evident that he valued certain characteristics and traits in his players such as honesty, a diligent work-ethic, and the ability to listen and act on instructions (Vignette 1). Chris spoke at length about his experience as a young ice hockey player, the influence of his parents and the lessons he learnt by having to save up his pocket money in order to buy skates and sticks to play ice hockey. Chris explained that "if [he] wanted a new pair of skates which [he] needed, because [his] feet were growing, it's not like now, where it is dependent upon how hard [he is] on them, they might last [him] a couple of years... when [he] was a kid [his] feet were growing, so [he] needed a new pair of skates every year, but

[he] didn't get given a pair of skates, [he] needed to have them as a birthday or Christmas present". An example of how Chris' upbringing underpinned and influenced his cognitive processes and subsequent actions regarding an important decision into the season is now portrayed below.

After 6 weeks into the season, Chris made the decision to terminate a young player's contract. Chris had, to some extent, taken a risk with this young player as he could not obtain a character reference for him. Despite Chris' attempts to mitigate information gaps, he was still not operating in a sporting environment with perfect information, insight, or prediction with which to shape his decision-making. Chris' explanation of the incident provided his reasoning behind the decision to release the player from the roster, he stated: "I didn't have time to persevere with him any longer. Because effectively I could lose my job. I'm a sports coach, I could get sacked because my team keeps losing" (Vignette 10). In this instance, it became evident that the player was not upholding Chris' values and most importantly, acting on the feedback and instruction Chris was giving him. The same rationale for the decision was also echoed by the two players in the study.

The following builds further how Chris' values were formed and underpinned by his prior experiences. Several researcher-coach conversations within the study demonstrated Chris' beliefs and values, but equally importantly, how these were underpinned by his parental upbringing. Expanding this further, Chris' 'upbringing' influenced what he perceived as acceptable behaviours from his players. In this instance, the player's actions contravened the coach's beliefs, values, and goals, resulting in Chris having to take extreme action by removing the player from the roster. This highlights how individuals' prior experiences impact on triggers and thresholds of acceptable behaviours. Additionally, these experiences shape the construction of a coach's mental models and schemas (Cannon-Bowers, Salas & Converse, 1993; Gershgoren et al., 2013; James, Goodman & Reichelt, 2013).

7.4.1 The importance of biography and past experiences to situate cognition

In the context of this study, it has been found that prior experiences act as powerful resources that shape present-day thinking, decisions, and actions in coaches. 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 is an important aspect of situated cognition as it emphasises the significance of temporality. In addition, Sutton (2009) states that causal reasoning can be thought of as how *“conversations about past events elicit or jointly generate...a temporally constructed narrative that explains the influence of the past on the present”* (p.223). It is possible to see within this research how previous experiences shape cognition and social interaction. For instance, for Chris, rules on hierarchy and ensuring that respect was given to older players was non-negotiable and can be explained by his narrative and experiences when growing up. However, Barsalou (2009) extends the concept further 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 real or imagined). This provides a useful lens to examine sport coaching in terms of how situations are perceived according to the three criteria above. Within the context of this research, Chris drew upon his resources as a player to inform his coaching style and management approach. Many times throughout the season, he revealed key positive experiences that he himself had as a player and these shaped his present-day thinking. Finally, Barsalou (2009) suggests that the concepts listed above are unclear in terms of how they originate [i.e., it is not known why Chris placed so much emphasis on his childhood experiences in comparison to his negative experiences of working with a coach with a contrasting coaching philosophy]. This research does support Barsalou's (2009) contention, and the evidence suggests that autobiographical experiences should be considered according to their grain size, meaningfulness, and tangibility if we are to understand the strength of their influence. Future research could elaborate further on how autobiographical memory manifests within specific situations in sport coaching.

7.5 The institutional context

The previous circumstances, notably financial mismanagement that led to the disbandment of the old club, and formation of the current incarnation of the club, were vital in shaping how

it acted and what it prioritised. As CEO, Carol's vision, and articulation of what was expected of the players and indeed Chris highlights that coaching practice, and therefore coaching cognition, is situated and influenced in this broader context. For example, Carol emphasised that the club's primary goal was to be sustainable. This was achieved through careful financial management and rebuilding the club's reputation in the local community. Chris was acutely aware of the club's history, purpose, and vision moving forward. Additionally, he knew and understood how the club was perceived in the eyes of some fans due to his interpersonal connections (Vignette 1). As part of his role within the club, Chris was additionally required to assist in the junior section. In reality, the number of hours that he spent coaching in the junior programme far exceeded what he was contractually obligated to fulfil. Chris was conscious that, relative to other professional sports, there is not an abundance of adult British Ice Hockey players in the UK (demonstrating his awareness of the wider socio-cultural context). Consequently, he was aware that by working with the junior programme, he was in fact potentially contributing to the institution's growing player resources. His explicit reasoning for his extensive involvement in the club's junior section was that he wished to give back to the community in both a domain specific context (i.e., the ice hockey community) and in a wider general respect (i.e., his local town and people).

The influence of the institutional context on Chris' cognitions was also evident in several vignettes. As an example, in vignette 1, Chris referred to his personal affection to the club and more specifically what it had given him e.g., the opportunity to play ice hockey and an abundance of social connections, as well the wider community such as charity events and fan enjoyment. From this, it was possible to see how the institutional context shaped Chris' feelings and affection towards the club and his willingness to offer his time in the junior programme, as well as the additional planning and analysis he did in his own time at home.

The institutional context was also highly influential on the two players within this study. They were both highly appreciative of the support that the club received in the local community and acknowledged that the number of spectators during games were important for the financial sustainability of the club, as well as helping them individually to raise their levels of performance during matches. Vignette 3 details the players' wishes to "give back" to the community after the support that they received from the club as young players. In turn, the players' affections for the club offered Chris a wealth of personal resources upon which he relied during the season, for example, leadership of the wider group of players and indirectly gaining information on the views of other team members in the locker room. This suggests

that the institutional context has the capacity to generate personal resources, upon which coaches can draw to aid both cognition and action.

7.6 The socio-cultural context

This sub-section outlines two emergent themes, injuries and winning and losing, both of which are tied to and embedded within the socio-cultural context. These themes are considered to be not directly under the control of the coach, yet they still exert significant influence over coaching cognitions, actions, and practice, in either a conscious or sub-conscious fashion.

7.6.1 Injuries

It was apparent that a number of injuries in the early part of the season resulted in coaching practices having to be adapted, whilst players were also asked to play in different positions during matches. In vignette 7, Chris spoke about his frustrations with the number of player injuries and, in turn, how these limited his options in both practices and matches. At one point, his captain and two vice captains were injured, meaning that other players were asked to perform roles that they were not originally intended to fulfil. The impact of injuries on planning in team sports was elaborated upon earlier in the sport coaching literature by Lyle (2010b) who noted injuries as a contributing factor towards the complexity of planning in team sports. Furthermore, as part of a statistical investigation into the impact of injuries on player and team performance in basketball, Sarlis et al. (2021) reported that injuries have been found to have a negative impact overall on team performance. However, they stress that the impact of injuries is a complex issue and there are indeed many additional factors that impact upon the injury-performance relationship. The topic of injuries, which are very common in ice hockey and part of the sport's culture, demonstrates how the specific nature of the sport itself has the capacity to act as a constraint on cognitions during various facets of coaching practice.

In a different example, vignette 5 illustrates how an injury prior to the session (to one of the junior players) impacted on Chris' cognitive processes during a coaching session. The session was notably different from usual, for example the atmosphere was sombre, and

Chris was annoyed by the players' decision not to have the ice cut [this is done prior to a practice session or game as it makes the ice smooth for players to skate on and the puck to slide without bobbling]. It was noted that the players were more intent on maximising time on the ice, rather than ensuring that the ice was in a perfect condition in which to play upon. In this instance, the session was impacted due to an uncontrollable factor (injury to the junior player) immediately prior to the coaching session. At the end of the session and as part of his final message to the players, Chris acknowledged that he and the team were aware of what had happened, "alright, we had a distraction tonight before practice, that's no excuse". The two examples above demonstrate the high-risk nature of ice hockey. Player injuries, which are overwhelmingly prevalent in ice hockey, represent a significant challenge or threat to coaching processes and the implementation or accuracy of mental models. These two examples have demonstrated how injuries impacted cognitions during planning in the first example and separately during *in situ* coaching practice in the last example.

7.6.2 Winning and losing

Team results are linked to coaching processes, although the efforts of the opposition and other mitigating factors, mean that the coach does not have direct control over the outcomes. Importantly, good coaching processes contribute towards the chances of a team winning, but they offer no guarantees and are dependent upon a plethora of other elements. Two key instances of the team's success as an influence on the coach's cognitions are now presented below.

The first example takes place during the game (Vignette 6). With the Storm losing heavily after the first period, the team came into the changing room for the first intermission. Chris' first words to the players were, "that's f***ing four games and we turn in a performance like that on the first f***ing real one" (Vignette 6). From this, it can be inferred that the coach, whilst very conscious of his team's recent string of losses, wanted to remind the players of The Storm's league position, and to increase his players' motivation in strident terms. Other examples that were observed within coaching sessions during the early part of the season (e.g., the sombre atmosphere, reference to league position during feedback and tactical strategies based on available personnel) support the notion that the team's league position (which was lower than desirable) influenced how and what the coach was thinking.

In contrast, when Chris and the team were visited towards the end of the study, it was clear to see that there was a change in the atmosphere. This researcher observation was supported by Chris' statement in vignette 10: "There was a time when we were like bulletproof through that sort of mid-to-late part of the season where I was like, I know what I'm doing here. My team knows what they're doing. We're winning nearly every night". This demonstrates a distinctive change in Chris' mood and confirmed his belief about the quality of his coaching methods.

In conclusion, this sub-section has explored two emergent socio-cultural and domain specific factors, injuries, and position of the team within the league, which, it is contended are outside the coach's direct control, but which impact significantly on the coach's cognitions. The evidence from this study has revealed that injuries, which are commonplace in ice hockey (Hutchison, 2011) and the risk of which is exacerbated by the acceptance of fighting, impact on how coaches practice (Sarlis et al., 2021). Other sports might offer different versions of what can be deemed 'uncontrollable factors' (Lyle, 2010b). Furthermore, these findings demonstrate that the notion of 'effective coaching' is inherently complex as it is difficult to identify clearly which factors (or stressors) are within and which are beyond the coach's control (Côté & Gilbert, 2009; Thelwell et al., 2008).

7.6.3 Reflections on the significance of the socio-cultural context when situating cognitions

The socio-cultural context is complex, intricate, and inherently challenging as a site for research. As part of this, the notion of relationships has previously been presented as a significant component of the social context in which coaches operate; the cultural aspect does, to some extent, shape coaching practice and cognition. To date, the focus of academic literature on culture within the situated cognition paradigm has elected to take a 'cognition for culture' approach (Warneken & Tomasello, 1999). This line of enquiry has focused on how cognitive processes relate to evolution and biological adaptation. Therefore, it is both necessary and appropriate to draw briefly upon culture from critical realism-based literature and link these findings to the aims of this research.

Buch-Hansen and Nielsen (2020) state *"that the cultural system is understood to exist independently of how agents perceive the world serves to underscore that we are dealing here with a distinctly realist perspective on culture"* (p. 59). This is an important point as it

highlights that, from this realist perspective, culture exists without the individual (or coach) being explicitly aware of *what* it is, or *how* it may influence his/her cognitions and actions. In relation to emergent entities, Archer (2017) states that cultural systems have causal powers that influence the beliefs and theories of individual agents. Moreover, these cultural environments exist prior to an agent entering the system. Finally, these cultural systems can act as 'friendly or 'hostile' to ideational projects, or in coaching terms, act as constraints/enablers on cognition and action.

Reflecting on the findings in this research, it is clear to see that the coach and team both entered the league and system of UK ice hockey. Within this cultural system exist conventions and norms (perhaps better expressed as expectations and habits) held by agents. Therefore, it is reasonable to assert, and has been partially revealed within this study, that culture shapes how coaches think and act.

The theme of fighting or violence, which is accepted within the sport exemplifies how culture can shape cognition. For people unacquainted with the sport of ice hockey, the premise of fighting is surprising. Fighting was witnessed in most of the observed games and resulted in one player being unavailable for selection due to injuries. Players that enter the league accept that fighting is part of the sport and therefore, in their mind, it becomes normalised. Therefore, once cultural practices have been established, ways of thinking and expectations become fixed, thus shaping actions and behaviours.

7.7 A conceptual schema of coaching cognitions that acknowledges the influence of goals, biography, institutional context, and the socio-cultural context.

Thus far, the embedded approach adopted within this study has revealed how cognitions play out in a variety of contexts. Moreover, it has examined a range of influences on cognition and detailed how they act on how coaches think. The conceptual schema below in Figure 7.2 attempts to draw together the key findings as part of this discussion and theoretically represent how these components are situated in respect to one another.

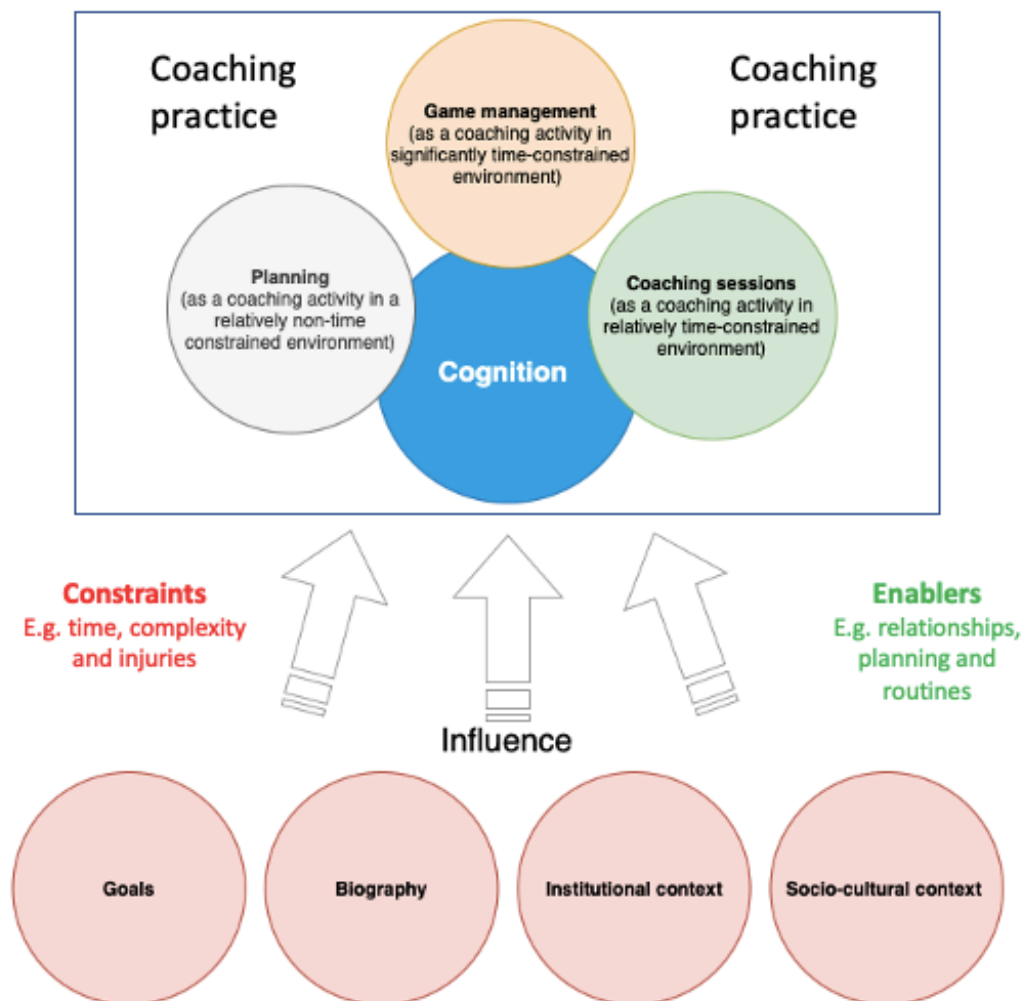


Figure 7.2: A conceptual schema of coaching cognitions that acknowledges the influence of goals, biography, institutional context, and the socio-cultural context

In Figure 7.2, cognition has been put at the centre of the schema and underpins the coaching practices (strategies and actions) of planning, game management and coaching sessions. It illustrates that cognition, which is engaged during coaching activities, is underpinned, and influenced by a range of factors such as: goals, biography, institutional context, and socio-cultural context, which have emerged within this study. The constraints and enablers are specific, identifiable features of the layers below and influence on cognitive processes during practice. However, it is acknowledged that there are undoubtedly many other factors, warranting further exploration, that help to situate better cognition.

Whilst this study has revealed several examples of environmental constraints in coaching activities such as game management, one of the tentative findings from the study hypothesises that when coaches are tasked with reacting to dynamic and new situations that require the engagement of cognitions of a more reactive nature (noticing, questioning and problem solving as evidenced in study 2), coaches are forced to 'block out' external contextual factors and are required to focus on dealing with the issue in front of them. However, this is not to say that they do not influence cognitions or mental processes, it is more likely that they have been shaped more broadly over time. As an example, injuries to players produces a mental constraint for the coach in terms of player selection, available mental models, and decision-making in each of the coaching environments. Nevertheless, coaches are required to work with the resources available, which in turn can act as enablers or constraints on cognition. This highlights, albeit from a widened cognitive researcher perspective, the complexity and need to understand both cognition and context. For example, whilst coaches might wish to consider wider contextual factors, it is reasonable to assume that coaches 'filter' those which are most prominent or influential, when coaching in complex or time-pressured environments, and it is these that directly influence cognition. Furthermore, as coaches have a finite cognitive capacity, there is likely to be an 'order' of what contextual factors are most influential. It is speculated that coaches are, consciously or unconsciously, prioritising what information is useful to them when operating in certain circumstances. In some cases, the coaching environment may present constraints (for example player selection) which in turn forces coaches to adapt their cognitive routines and mental models to the new situation that has arisen, albeit with different physical resources.

In contrast to the example above regarding cognition in time-constrained environments, it is proposed that coaches are likely to be able to engage in sophisticated cognitions (such as reasoning, problem solving and contextualising). This is because when coaches are afforded

more time to deliberate, they are given the opportunity to consider more factors. In turn, this facilitates complex and sophisticated higher psychological functions that are populated with social, technical, and tactical components. In contrast, when coaches are afforded almost no time at all, cognitive routines and strategies are established to deal with the emergent situation at hand. Consequently, it is necessary to recognise that coaches cognitively operate within what the environment affords them and therefore at appropriate times, focus almost exclusively, on what is unfolding before them.

7.8 Reflection of the study against the aims and research questions

The purpose of this section is to present an overview of the findings within this third study and to reflect on the results against the aims of the original research questions.

Undoubtedly, situating cognition within the realm of sport coaching is a challenging endeavour mostly because of the ambiguity of the notion of 'situatedness'. This third study has used the situated cognition paradigm and ERE to inform the research approach and in doing so, has revealed specific components that are instrumental in the consideration of 'situatedness'. The conceptual map offered below is intended to foreground prevalent and emergent themes throughout this final study and act as a broad, yet explicit, framework for future studies within the field of cognition in sport coaching.

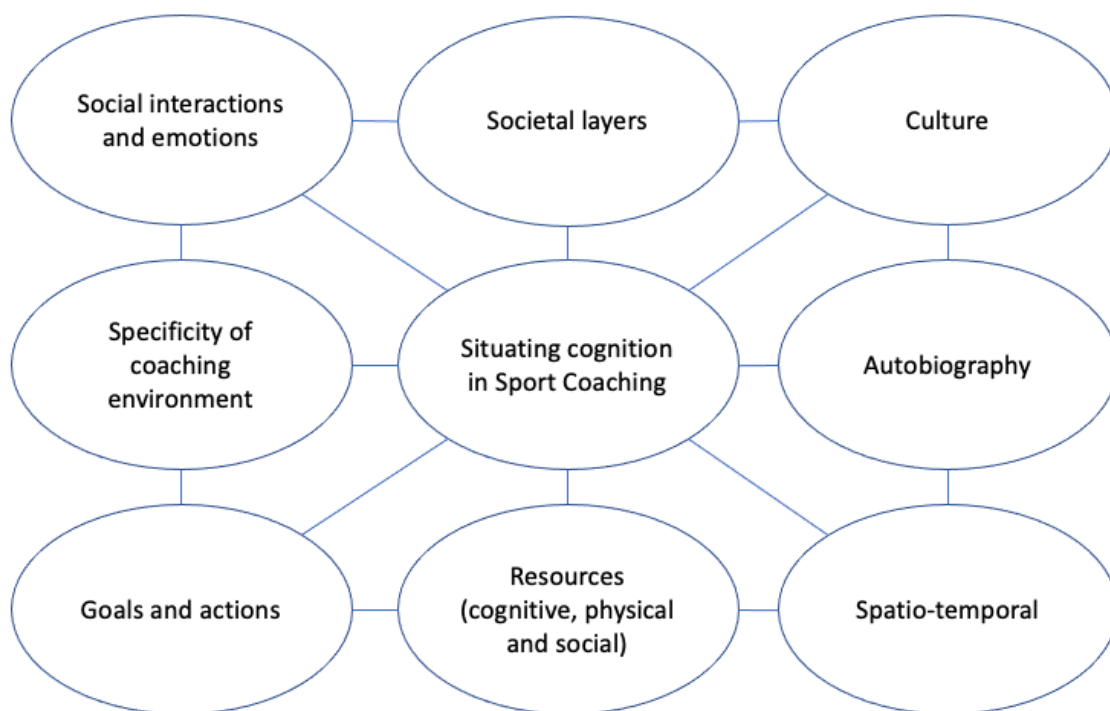


Figure 7.3: A conceptual map to illustrate how cognitions might be situated within sport coaching.

Figure 7.3 demonstrates the need to unpack features of the surrounding context when researching cognition. Whilst it is accepted that some of these features might exert higher degrees of influence than others, it is proposed that each are important and hence worthy of consideration. Furthermore, the reconceptualisation of cognition in sport coaching to a 'situated' perspective offers a more thought provoking, sophisticated, and intricate backdrop against which to understand cognition in a sport coaching context. Finally, the variety of contextual features above indicate the need for interdisciplinarity within future research of this nature. It is the confluence of research approaches that are likely to develop further knowledge in the field and capture the nuances of the sport coaching discipline.

7.9 Substantive conclusions

This study has presented cognition as a situated concept that is constrained, enabled, and influenced by various contextual factors. For example, during coaching practises, it is possible to see how the coach's cognitive processes are, in part, informed by the goals that have been explicitly uncovered at a variety of societal levels. Additionally, the coaching

cognitions during coaching practice were also informed and situated amongst the coach's individual resources (for example player relationships) that he had developed as a player and coach. In a different example, it was possible to see how the coach was thinking about the leadership structures within the team and used his interpersonal resources to ensure that his captain and vice captains would lead the team in his absence with the same underpinning values. This is a significant point as coaches are able to draw upon their interpersonal resources, i.e., relationships, to provide cognitive space for contingency. This was demonstrated at various layers within this study, for example, the coach's relationships with his players meant that although the team did not win many games in the first half of the season, the players were still intent on following the coach's game plans and 'buying in' to his strategies. Within sessions, coach-player relationships afford coaches the opportunity and freedom to think without having to consider factors, for example managing unwanted behaviours or concern about direct feedback might be perceived. Additionally, relationships at the Board of Directors level are essential for they act as enablers for coaches to think and act without being concerned about potential negative consequences which might constrain cognitive processes. These are important original findings as they highlight the importance of relationships from a cognitive perspective.

One of the most significant conclusions of this chapter is the value of situating cognitions in sport specific coaching contexts. For instance, ice hockey presents coaches with the challenge of devising tactics when they are unable to observe much of what has happened due to the speed of the game. Additionally, fighting, which has been demonstrated to be part of the socio-cultural context presents coaches with constraints in terms of player selection for games and tactical options. This study has demonstrated how the elaboration and telling of 'coaching stories' containing issues, background, and history, provide a rich and vibrant picture of cognition over time. Furthermore, this approach and study provides a useful elaboration of the cognitive sphere within the ERE model.

Throughout this third and final study, the ERE model (reasoning, reflecting, and strategising) was used to conceptually situate the coach's cognitions. However, the notion of 'purpose' which has clear links with that of goals was inescapable. It was evident that everything within coaching is directional, and each stakeholder was working towards achieving a goal or purpose. The ERE model was useful in helping to show that cognition is part of the wider coaching picture. The embedded approach and longitudinal research design made it possible to view cognitions (or more broadly, higher psychological functions), that are

shaped by history, layers of social-context and resources. This makes the case for a multi-layered perspective that requires an immersive research approach to examine to what extent do the surrounding factors impact on coach thinking. However, it is still acknowledged that this new insight only offers a partial-picture and as such, the strength and permanence of these situational influences that are located within the layered ontology warrant further investigation.

7.10 Methodological conclusions

The adoption of an embedded approach has demonstrated the rich interplay and dynamic relationship between cognition and context. Moreover, this study has revealed, through a range of stories and incidents, how cognitive processes are situated in context, formed by biography and resources (at all levels), continuously subject to environmental constraints and fluctuate over time.

In the early stages of the study, the coach was willing to share his philosophy and background, but there was not a great amount of detail that was revealed about his coaching practice and the players responses. As the research journey progressed, it was evident that the coach-researcher relationship evolved, and the coach became increasingly open about his players and team issues as they were arising. This highlights the importance of ethical research, as well as immersive approach to build trust so that complex and sensitive issues emerge and can be explored.

Methods such as observations, interviews, and document reviews as part of an ethnographic and case study approach, caused relatively minimal interference with the coaching processes notably as the coach and other stakeholders became more familiar with the researcher in the coaching environment. This meant that the coach was able to perform his typical coaching routines, without having to engage with the researcher during sessions. Although it was not explicitly discussed, it was clear that the coach became more trusting towards the researcher as the study developed and began to share information that was potentially sensitive. The language and richness of data that emerged as the study progressed supports the approach and this has been demonstrated in the selection of the three vignettes included in Chapter 8 that represent the study over a period of time. This was

a key methodological strength and was a significant determinant in preserving the ecological validity of the research setting.

As part of the data collection, the coach was asked to share his plans ahead of time in order for the researcher to understand the session goals and intentions. As the study developed, it was clear that the coach's language towards the researcher changed and there was a great deal more 'ice-hockey vocabulary' used in the latter part of the study. This was an initial courtesy extended to the researcher who did not have an ice-hockey background at the outset of the study, but rapidly developed a rapport and understanding of the coach's terminology and idiosyncrasies.

This embedded ethnographic approach required the researcher to be part of the coaching environment. It was not possible for the researcher to be on the ice (due to insurance restraints), but it was possible to capture and observe the conversations and subtle interactions by using the wireless microphone and video recorder during games and coaching sessions. With the researcher being immersed in the research environment and with the development of trust and familiarity over time, it facilitated the collection of data that was rich and nuanced. This made it possible to notice the complexity in the coach-athlete relationships and how they appeared to fluctuate at certain times (as the season progressed) and in particular settings (such as games and practice sessions).

The study required a significant amount of researcher time to collect data (between 70-80 hours) and become truly immersed in the research environment. In turn, this produced more data than was necessary for presentational and formal analysis purposes. However, each encounter, meeting, and interaction, contributed towards a deeper researcher understanding of the cognitions that are situated within the coaching processes and stories. Notably, towards the end of the study, the coach was covering 'old ground' which is a significant marker of theoretical saturation (Layder, 1998; North, 2017). Crucially, it was possible to engage in an adaptive research cycle (North, 2017; Pawson & Tilley, 1997) throughout the study which allowed the testing of emerging theories and the opportunity to explore and devise modified theories that could be further scrutinised.

By utilising the ERE model as a navigational compass for data collection and research (Muir, 2018), the incorporation of the different stakeholders was both intentional and essential. Two

players were selected for the purposes of this study, yet it is suggested that each member of the team would have had slightly different goals and a distinctive viewpoint on the coach, team, and Board of Directors. Therefore, it is recognised that each player could be considered a stakeholder and therefore may have a different outlook. Furthermore, it is acknowledged that this was an intensive study and the concepts and themes as part of these findings might be generalisable and transferable to other sports, domains, and coaches (Holloway, 1997).

Chapter 8

Summary discussion and conclusion

Summary discussion

The purpose of this chapter is to synthesise the three empirical studies and draw together the key findings that have emerged throughout the research journey. The chapter begins with a concise review of each empirical study. This is followed by a discussion of how types of environmental constraints, including types of practice, and the serial nature of coaching, have the capacity to influence cognitive processes. Following on, the concept of mental constraints is then presented which includes biases and cognitive capacity within coaching environments. Extending the notion of examining cognition from a situated perspective, a set of questions is presented as part of a section on fixed and flexible influences. The flow of discussion then turns to how cognition might usefully be reconsidered given the findings in all three studies. As part of this, the concepts of *purpose*, *context*, and *domain* are examined as cornerstones on which cognition might be better understood. The purpose of this is to act as a tool to encourage coaches to consider their surrounding influences and underpinning reasons for their cognitions. Building on this, a conceptual schema is offered as a tool for coaches to examine the formation, surrounding influences and underpinning reasons for their own cognitions. The chapter concludes with a summary of the theoretical and applied implications for the field, a review of the quality of the research and an acknowledgement of the methodological limitations. Finally, a succinct overview of the thesis' original contributions is presented.

8.1 Review of empirical chapters

In study 1, the constituent tasks, higher psychological functions, and cognitions of four tennis coaches were explored using semi-structured interviews and stimulated recall as part of a modified ACTA approach. This study made three contributions. First, it used the ICCE framework to operationalise the coaching tasks, resulting in a fine-grained understanding of the tasks that tennis coaches are required to undertake. It was found that coaching tasks are varied, largely cognitive in nature (at least in their genesis) and are reliant on and derived from sub-disciplines such as strength and conditioning, nutrition, management, and education. Second, it described the content of coaching cognitions during practice using

stimulated recall. It was established that during sessions, coaches undertake a plethora of cognitive tasks such as assessing their player's understanding of the purpose of the task, mental state, and progress. These findings support existing literature on how coaches cognitively operate with mental models, and, significantly, how they use performance models during practice (Debanne & Fontayne, 2009; Filho, Tenenbaum, & Yang, 2015; Lyle & Cushion, 2017). Furthermore, the content of cognitions revealed and demonstrated the social dimension, in that, coaches think about their players/athletes as people – 'in the round', rather than as simply performers - as well as the tactical and technical facets of sport coaching. Third, a cognitive framework was developed to understand better the nine emergent higher psychological functions. Using this framework, it was found that coaches spent considerable time *in situ* observing player behaviour and actions. In addition, the findings revealed that coaches draw upon their wider knowledge and understanding of players in order to contextualise and make sense of information during practice (Lyle, 2010a; Richards, Collins & Mascarenhas, 2016). Finally, methodological limitations were identified with the use of stimulated recall and were found to include memory decay and reflexive mindset when watching the video and therefore not describing cognitions during practice.

Study 2 employed Think Aloud Protocol with 6 rugby coaches to overcome the previously identified methodological shortcomings. The framework of higher psychological functions that had been devised in study 1 was used to inform the data analysis. An 'ordered' pattern of higher psychological functions and cognitions emerged from the analysis of coaching practice. Noticing, questioning, reasoning, and problem solving emerged as the predominant higher psychological functions. These functions were then populated with coaching content to produce relevant cognitions. In turn, it was found that these cognitions had the capacity to breach a 'threshold' which resulted in instruction or feedback (to be thought of as micro-managed intervention) within the session (Mason, 2002; McMorris, 2015). This finding supports the work of Lyle and Cushion (2017) who explain that "the 'triggering' stage involved evaluation of the threat to the intentions and expectations, and the degree of risk to be tolerated" (p. 170). During practice, the coaches spent most time observing player technique, player tactics, player decision-making and player positioning. In addition, coaches internally questioned player communication, what players were seeing, and player knowledge of goals and improvement strategies.

The findings from study 2 demonstrate the importance and interdependence of both instruction and feedback, as well as the prevalence of triggers and thresholds (Debanne &

Chauvin, 2014; Harvey, Lyle & Muir, 2015; McMorris, 2015). Furthermore, it was found that coaches continuously work with performance and goal-orientated mental models and, therefore, have developed cognitive patterns and strategies in order to function when practicing in a semi-deliberative micro-management setting. Finally, a conceptual model (Figure 6.1) was offered to illustrate the co-action between cognition, instruction and feedback.

Whilst Think Aloud Protocol captured vast quantities of data, coaches found it challenging to verbalise thoughts during practice as it interfered somewhat with the flow of the session. Moreover, some coaches felt uncomfortable when verbalising thoughts about players whilst the players were in earshot. Finally, although Think Aloud Protocol facilitated an important and necessary step towards a better understanding of situated coaching cognitions, its capacity to embrace the wider contextual factors that emerged was limited. The result was that Think Aloud Protocol provided only a partial picture of the coaching landscape in which the coaches were operating. Consequently, a more sophisticated and context-sensitive method that would offer a wider approach was required to provide more comprehensive answers to the original research questions and bridge some of the emergent tensions within the sport coaching literature.

Study 3 built on the first two studies in two ways. First, it employed an ERE-informed approach (North, 2017) that used an ethnographic case study to explore the wider contextual factors surrounding cognitions. Second, it captured situated coaching cognitions during a range of coaching activities over a longer period of seven months. This facilitated a better understanding of surrounding influences and forces that act upon *how* and *what* the coach was thinking (Robbins & Aydede, 2009). By focusing on coaching cognitions, using a cognitive perspective, against an interpersonal, institutional, and socio-cultural backdrop, the study elaborated on the cognitive sphere within the ERE model.

As a research approach, ethnographic case study, used in conjunction with the ERE model as a navigational roadmap, provided a means to achieve a detailed insight into the coaching processes and cognitions over a 7-month time period. A combination of interviews, participant observation, and document reviews provided a wealth of data and rich insights into *what* and *how* coaches think, dependent upon situation and context. During this study, the focus of the research was on the coach's cognitions during practice and, therefore, coaching activities were considered as situating the coach's cognitions. It is important to

reiterate that this study did not reveal new types of higher psychological functions, rather the intended focus was on the *how* the coach's practice emerged given the surrounding environmental enablers and constraints. This study revealed a host of supporting strategies that coaches could implement to 'buy time', thus allowing them time to deliberate and engage more sophisticated higher order functions. Particular examples of these strategies include session planning, structuring of 'intermission periods' (Allain, Bloom & Gilbert, 2018), and the use of video analysis in order to share mental models (Groom, Cushion & Nelson, 2011; Groom & Nelson, 2013; Partington et al., 2015). A conceptual schema (Figure 9.1) was proposed to illustrate how contextual factors influence on cognitions during coaching practice. Finally, the researcher immersion within the study was found to contribute significantly towards a deeper understanding of situated cognitions in respect of goals, biography, relationships, and the institutional and socio-cultural context.

Now that the empirical chapters have been revisited, the following section is presented as a discussion of the prevalent findings that have emerged over the course of the research journey. Importantly, and as part of the research design, this section draws on the cumulative findings of this work 'as a whole'.

8.2 Environmental constraints and enablers on cognition

This research has explored how contrasting sports can result in differing levels of cognitive demands placed on coaches and require such coaches to be strategic with *how* and *when* they think and act in sessions. This is, in part, due to the necessary practice structures for different sports (i.e., team vs individual). For example, tennis coaches were presented with opportunities to intervene at regular intervals due to the practice and competition nature of the sport. In contrast, rugby coaching sessions appeared to be 'flowing', with fewer natural pauses during which the coach had the opportunity to intervene. Within ice hockey, many types of coaching practices were observed, some of which were more dynamic and interactive than others. A discussion now follows on how sessions which are more interactive or deliberative in nature present coaches with both enablers and constraints on cognition. Finally, the serial nature of coaching is presented, which in turn impacts upon how coaches are required to think and act.

8.2.1 Interactive and deliberative coaching

The empirical studies within this research demonstrate how cognitions differ in terms of the coach's proximity to the immediacy of a situation (i.e., as incidents unfold in sessions, some sports require immediate action or intervention, whereas others sports present coaches with more time to deliberate and consider what to do next). The three sports (tennis, rugby and ice hockey) differed significantly in their practice structures and revealed that coaching sessions could be categorised by reference to the number of 'intervention opportunities', as well as provision of enablers for coaches to engage in sophisticated cognitions such as reasoning and contextualising. As an example of these enablers, tennis coaches were physically distanced from their players and tennis sessions contained natural and numerous pauses between drills, points, and games. In contrast, rugby sessions appeared to have a certain 'flow' (Light & Harvey, 2017; Swann et al., 2018), often without any predetermined or organic stoppages, which would have allowed coaches opportunities to contextualise and rationalise their thoughts. However, (and perhaps largely as a result of capturing a more complete picture of the coaching process) study 3 illustrated both interactive (for example, sessions that require high levels of direct engagement and concurrent feedback with players) and deliberative (for example, watching drills and then waiting for a natural pause before offering terminal feedback) practice. Therefore, the opportunities for coaches to engage in sophisticated and 'less reactive' cognitions, due to the type and structure of session, inevitably varies significantly between sports that require certain practice structures. Supporting this idea, Lyle and Cushion (2017) acknowledge sport-specific differences (for example, between athletics, volleyball and swimming) in the context of mental models of coaches, but they also note the idiosyncratic practices that vary between coaches and within sports (Johnston, 2018).

This thesis has explored situated cognitions in both team and individual sports. From the data and researcher observations, tennis coaching appeared to be less player-interactive and 'chaotic' in comparison to rugby and ice hockey. Although tennis coaching is indeed interactive in nature, sessions did not present as hectic or appear to place the tennis coaches in time-pressured situations. This finding is important as it demonstrates the need for initial sport-specific identification of the coaching environment in order to establish what constraints might be impacting upon cognition.

As part of 'interventional opportunities' in practice, it might reasonably be argued that sessions that are intentionally structured, or naturally predisposed to have pauses, enable

more opportunities for coaches to engage sophisticated cognitions. Additionally, this notion is tied to the structural planning of coaching sessions in that, coaches can plan and deliver sessions according to what needs to be achieved both in the session and over time. It is the structure of the session that should, to some degree, facilitate coaches engaging complex and sophisticated cognitive processes in conjunction with feedback and instruction. Study 2 has shown that rugby coaches were consistently interacting with their players, resulting in a dynamic cycle of noticing, questioning, problem solving, instructing, and feeding back. By not creating time, or living with restrictions to it, to process information in sessions, coaches were unable to demonstrate some of the higher psychological functions such as contextualising and reasoning, which require mental capacity and deliberate engagement. However, it is acknowledged that consideration should be given to the capabilities of coaches in that, experts are likely to be better than novices in engaging sophisticated cognitive processes when they are afforded little time.

Whilst a coaching session delivered by an interactive coach might appear busy, noisy, and dynamic, this research has demonstrated that it is not likely to offer any possibility for reflection-on-action (Cushion, 2018; Nelson, Cushion & Potrac, 2006; Stodter & Minto, 2020). Moreover, it is suggested that research methods are also limiting factors in being able to detect complex and sophisticated cognitions during highly interactive coaching practice. As a result, it is proposed that the nature of the sporting domain, the coaching purpose and the coach's priorities that surround the cognitions and mental processes are factors of paramount importance when researching and potentially evaluating situated cognitions.

The above suggests that there is a need for coaches to understand *how* they think, or at least how they are *allowed* to think, in their particular environment. The implications of encouraging coaches to attempt to manipulate their environment or alter their routines by pragmatic and epistemic actions (Kirsh, 2009; Kirsh & Maglio, 1994) to aid their thinking (or at least the quality of it) is a novel premise, but one that could lead to higher quality or more-refined mental processes, reflection in action, a deeper level of reflection-on-action, or even, perhaps, facilitate 'reflection on cognition' (Stephenson, Cronin & Whitehead, 2020; Whitehead & Richards, 2020). As a result, it is reasonable to consider a proposition that it is the social context which allows coaches time to contextualise, reason and reflect, that possesses the capability to exert greater and more-direct influence on *what* and *how* coaches think.

8.2.2 The serial nature of coaching practice

One of the main difficulties that coaches encounter in ‘managing’ their cognitions is the ‘serial’ nature of sport. In terms of structure, coaching practice is often considered to be episodic in nature (Callary, Werthner & Trudel, 2012) – implying that there is little connection between sessions. On the other hand, performance sport programmes and coaching during competitions is most certainly serial and cumulative (Lyle, 2018) – implying that the event moves forward without an opportunity for the impact of coaches’ interventions to be tested fully, and with a constant series of newly emerging data to be taken into consideration. As a result, coaches must sometimes manage the flow of their interventions without receiving immediate feedback and within a dynamic, constantly changing environment. The challenge for coaches, therefore, is to know *when* to interrupt the flow of a session and intervene in the absence of feedback. In turn, this poses challenges for coaches’ cognitive activities and routines as they require, in order to adapt, feedback from the environment. Study 2 found that coaching cognitions (in a micro-management setting) manifested in a serial pattern, but also that cognitions have the capability to trigger an action when a threshold is reached. For example, on several occasions during drills, the coaches watched players and verbalised to themselves “*what’s [he] seeing?*”. The cognitive processes in this instance were of a diagnostic nature, illustrating that coaches were seeking to identify problems or faults that needed to be remedied. However, in cases where coaching sessions are time-pressured, or perhaps teams are working towards important competitions, coaches may not have the luxury of being able to diagnose all problems. Instead, what happens is a prioritisation and reconciliation of *what* needs to be remedied against what *can* be remedied, without immediate feedback to the coach as to whether these strategies are likely to work or be successful.

As was found in Study 2, not all cognitions are associated with an action. Rather, cognitions can initially be ‘stored’ as short-term memories, thus allowing the coach to prioritise what they are seeing, rather than reacting immediately to the situation. This demonstrates the complexity of cognitions, not only in content, but also in an aggregative sense over a period of time. Moreover, this research has focused on the coach’s ability to make sense of the situation by piecing together bits of information, or contextualising, as cognitions emerge and contribute to coaches’ sense-making of the wider coaching picture (Lyle, 2010). Nevertheless, it is important to recognise that specific coaching constraints are significant in

terms of the extent to which wider contextual factors can directly impact on coaching cognitions.

8.3 Mental constraints and enablers on cognition

To understand coaches' cognitive limitations, it is necessary to explore cognitive capacities and biases. As has been established above, coaching environments are complex, yet coaches are required to operate, both practically and mentally in these settings. Importantly, this section illustrates how cognitions are fallible, but also that coaches devise ways to overcome their cognitive limitations and shortcomings.

8.3.1 Cognitions and their susceptibility to bias

Coaches inevitably have preferences (biases) in terms of delivery, style, and approach (Lyle, 2018). In turn, these preferences are likely to emerge in different ways dependent upon the domain, individual context, and purpose. Study 1 found that performance tennis coaches had preconceptions about how their player should be playing and questioned if the player had the mental fortitude to be successful as a professional player (a type of forward reasoning or forecasting). Undoubtedly, coaches' preconceptions or assumptions are an essential part in helping to make predictions and forecast future progress. However, these preconceptions influence how open minded a coach is likely to be and contribute towards fallible cognitive processes, for example, a confirmation bias (Kahneman, 1991).

A coach's disposition is likely to be, to some extent, influenced by her or his playing experiences. In this study 3, the coach's former playing position as a defender revealed that he devoted more cognitive attention to defence than offense. This point is further evidenced in Study 3 when the coach wanted to focus more of his attention and practice time on the team's defence early during the season, as he believed it was the top priority to allow the team to be successful. Reflecting this finding, Chi (2006) proposes that "greater domain knowledge can also be deleterious by creating mental set or functional fixedness" (p. 27). Future researchers may wish to explore the influence of coaches' previous playing positions on mental models and cognitive processes.

It is equally important to discuss the role of heuristics within the coach's cognitions. Lyle and Cushion (2017) explain heuristics as "preferred ways of acting that the coach has become comfortable with over a period of time" (p. 171). Whilst heuristics might initially be perceived as a negative phenomenon, Simon et al. (2017), in a study of heuristics in paddle sport coaches, remark that "Heuristics appear vital for the coaches studied to act in an effective way, given the time pressures" (p. 243). This research suggests that coaches often devise idiosyncratic routines to help them deal with the complexity of their environment. Due to the domain differences, individual purposes and context, coaches arrive at different and personalised solutions to their problems. This illustrates the importance of a researcher-understanding of the situational context surrounding the coach. As an example of this in study 3, it was found that the coach and assistant coach employed mental shortcuts when analysing the opponent whilst they were warming up prior to a game (for example, only focusing on the opposition's lines so that 'match ups' could be identified). This routine afforded the coaches a degree of space, an opportunity to provide capacity for other mental operations. The coaches in other studies were not afforded the same opportunity to manipulate their coaching environment as a result of sport-specific nuances or domain specificity. Future research might build on this finding by examining: 1) how self-aware are coaches of their idiosyncrasies or tendency to resort to preferred options (for example, biases and heuristics); and 2) if the underlying reasons for coaches employing heuristics are due to coping strategies or their perceived effectiveness.

8.3.2 Acknowledging that coaches have cognitive capacity and accompanying strategies to extend that capacity.

Coaches are unable to engage in sophisticated cognitions during practice on a continuous basis, nor would it be appropriate for them to do so. Both feedback and instruction are essential components of coaching within sessions, as evidenced in study 2. Whilst these actions do not offer cognitive 'breaks' for coaches, it is suggested that they provide a potential end point, or check point, which allows cognitions to be shared with players. This is an important idea because pre-designed sessional activities (i.e., drills) should be aligned to the coach's purpose, which in turn provides a platform to inform their cognitions and prioritisation.

Coaches may wish to carefully consider their goals (sessional/seasonal) and how they will be achieved through cognitive processes and subsequent actions. As a way to focus and

improve upon the cognitive aspect of coaching practice, it is suggested that coaches would benefit from verbalising what it is they intend to learn, or perhaps notice, from the activity, and how they intend to achieve this. For example, when observing a drill, an ice hockey coach might state *“I’m assessing how the forwards are using space on the breakaway”* or *“I am listening to hear where the communication is coming from on the ice”*. This formal verbalisation provides an explicit reference point to inform future cognitive efforts. Furthermore, this would offer coaches the opportunity to analyse subsequently the suitability and accuracy of their cognitive intentions (for example, did coaches focus on the ‘right thing’ and did they focus on what they planned to focus on?), but also to offer a platform for coaches to reflect on their thinking.

This research has demonstrated that coaches develop heuristics and routines that, either consciously or subconsciously, support their cognitive processes and activities. Note from earlier in the thesis that coaching routines are dependent upon the peculiarity of the sport, context, and coaches’ idiosyncrasies (informed by their knowledge and experiences). Moreover, the coaching routines are linked to other facets of coaching such as stakeholders, goals, resources, and actions. As an example of this, study 3 found evidence to support Allain, Bloom and Gilbert’s (2018) research on intermission routines and situational factors that guide coaching strategies within ice hockey. In their paper, coaches alluded to a number of situational and behavioural factors that underpinned the content of the message to be delivered in the intermission. Study 3 supported this finding and revealed that the coach chose to, and perceived that he needed to, collect his thoughts in order to prioritise his feedback strategically before delivering it to his players during an intermission. However, it has also been found that the situational factors have the capacity to prevent the original intention of feeding back on technical and tactical matters. For example, as described in vignette 6 in study 3, the coach felt that the players’ effort levels were insufficient (perhaps better expressed as ‘unacceptable’) and, therefore, he spent time addressing this feature of their performance, rather than providing sport-specific feedback. In this instance, the contingency element affecting the coach’s strategising highlights the situational importance surrounding cognition that can only be understood by an embedded approach.

Further examples of coaches attempting to strategise in order to maximise their time to deliberate include detailed planning of sessions, allowing players to engage in ‘banter’ while the coach composes his thoughts, awareness of nested goals (perhaps best expressed as ‘keeping the big picture in mind’), and the creation of practice structures that allow time to

deliberate and reflect. An example of this might be allowing practice drills to continue for a time whilst the coach reflects on information that has already been gleaned from the performance. These findings support research on naturalistic decision-making (Harvey, Lyle & Muir, 2015) and nested goals (Abraham & Collins, 2011). Currently, the identification of coaching strategies to support cognition is an under researched strand within sport coaching. Whilst a small number of empirical studies have contributed to an understanding of coaching cognitions in particular sports (Collins & Collins, 2020), there is a paucity of literature investigating *how* and *why* coaches devise their cognitive routines. Similarly, the findings from the studies in this research permit the speculation that routines are highly context-dependent and rely on coaches having forged strong relationships with players, or perhaps better understood as interpersonal resources.

The competition environment poses a particular set of challenges for coaches. Study 3 found that coaching strategies and cognitions were different under the stresses and time pressures of competition. The impact of stressors on cognition in sports coaching is, as yet, an under-researched field (Harvey, Lyle & Muir, 2015). Schwabe and Wolf (2013) discuss the impact of stress on cognitions and state that during times of stress, cognitive flexibility is reduced and instead a more rigid habitual cognitive style takes over. This research has demonstrated how types of cognition change within different coaching environments and are influenced by the context and rely upon resources, action, and goals. Future research may wish to extend this finding by exploring the particular stressors (social or psychological) that coaches experience and analyse the impact of these on coaching cognitions.

Finally, study 3 illustrated how video analysis was used to effectively share mental models between coaches and players given the constraints within ice hockey as a fast-paced sport. More broadly, this can be conceived as helping to ensure that expectations and tactics are explicitly and accurately shared. Video analysis has been explored in a variety of coaching settings (Groom, Cushion & Nelson, 2011; Groom & Nelson, 2013; Partington et al., 2015) and has been shown to improve the quality of learning in players. Furthermore, this study extends Nelson, Potrac and Groom's (2014) work on receiving video feedback in elite ice hockey from a player's perspective, or more broadly, using a more explicit socially aware/embedded lens. The examples that were observed in this research demonstrate that video feedback is a valuable mechanism for coaches and players to evaluate constructively what happened during a game and thus support cognitive engagement. However, it is acknowledged that the social dynamics and power inherent in the coach-player relationship

can partially, or completely, prevent constructive feedback via video analysis, as evidenced by the coach in study 3 removing a player from the team. From a methodological perspective, this embedded approach illustrates the value of immersion within the individual, interpersonal and institutional layers identified in the ERE-model and the need to triangulate findings from multiple stakeholder perspectives.

At this point, cognition has been examined in terms of the coaching environment, coaches' cognitive capacity and how coaches devise strategies to overcome complex situations. Drawing on the above sections, it is possible to see that these components, when viewed in this way, reveal the need to examine cognitions from a situated perspective and how traditional information-processing approaches are not likely to capture the level of detail or complexity that has been shared above. For example, these sophisticated cognitive processes included coaches prioritising information giving, targeting information/feedback, acknowledging player emotions, and 'controlling' their own emotional responses. This more immediate interaction also had to be situated within the broader set of goals, assessment of progress, game outcomes, and previous interactions that constituted another layer of thinking. More importantly perhaps, the third study reveals the need for coaches to engage in a constant process of adapting to the situation/environment based on what was unfolding, meaning that there is a need to adapt and respond (cognitively, socially and physically) to the coaching context.

8.4 Fixed and flexible influences on cognition

Some surrounding aspects of coaching practice such as institutional expectations and practice schedules, can be considered as 'fixed' or relatively permanent and, as a result, coaches must work within a set of parameters. Study 3 intentionally revealed the explicit goals that had been set by the CEO and the coach was expected to contribute towards these goals being achieved. Similarly, the tennis coaches in study 1 were required to operate within the policy and practice employment context of their club and this typically meant giving a certain number of hours to participate in the junior coaching programme, presumably as part of the club's goals of ensuring succession planning, growth, and retention of members. Both examples illustrate coaches working within a set of fixed parameters and consequently can be considered as types of environmental constraints (at the institutional level) that act upon coaches. [This should not imply that such policies or

requirements would never change, merely that continual change is unlikely, and coaches can be thought of as operating within a set of 'known' constraints.]

Given that coaches operate within organisational structures (North, 2017), these structures can be viewed as fixed (e.g., policies, rules, and regulations) or flexible, or, at least open to negotiation (practice structure, player relationships and match tactics). As an example of a fixed structure within study 3, the coach was given predetermined times when his practices were able to take place due to the contract between the ice rink and the club. Similarly, these restrictions were in place due to the historical contract between the leisure centre and the club, as well as the club's previous financial mismanagement, both of which were outside of the coach's control. In contrast to the above examples, team rosters and practice structures are directly within the coach's control, but they are also often fluid and highly influential, at least in the short term. In contrast, there may be other factors such as finances and culture that could be viewed as semi-permanent, highly influential, but also within the coach's control over a prolonged period of time (e.g., an entire season).

Whilst a case for needing to understand the types of constraints and subsequent influence that surround cognitions has been made, the implications of these findings extend to both coaches and coach education and these are discussed in more detail later in this chapter. Specifically, it is important for coaches not only to be sufficiently self-aware (Jones, Armour & Potrac, 2004), but also cognisant of how constraints might be fixed or flexible over time. Initially, coaches could consider the following questions so that they might be able to reflect more specifically on the layers of influence that impact upon their practice:

- a) *Why am I doing the things I am doing?*
- b) *What has led me to do these things in this way?*
- c) *What facets of my surroundings are flexible, semi-permanent and permanent?*
- d) *What goals exist around me? Whose goals are these? Which of these are proximal and distal to my thinking?*
- e) *What is preventing me from doing things in a different way?*
- f) *What informs my thinking?*
- g) *What and how do I think in my different surroundings? (sessions and planning)*
- h) *What can I change around me (at different levels) to help my cognitive processes?*
- i) *Is there a difference between what is expected of me and what I believe is the optimum way of doing things*

8.5 To accept or challenge the beliefs of coaches to help cognitive activity?

Critical thinking is a valuable tool to aid coach reflection, reasoning and problem solving (Nash, Sproule & Horton, 2017). The embedded approach in the final study captured coaching cognitions over a 7-month period and revealed how they changed at the beginning of the season compared to the end. Throughout the study, it was evident that the coach was, at times and especially during the early part of the season when the team were losing often, engaging in critical thinking. In other instances, the coach tended to revert back to well-established and predetermined methods, seemingly without critically evaluating the effectiveness of those methods. A succinct discussion of critical thinking as a cognitive enabler is offered below.

On one hand, it was evident that the coach in Study 3 was implementing practice methods and interventions because his former coaches had successfully used them in sessions when he was a player, and he was reproducing them. These ideas, or coaching tools, acted as a source of information, knowledge, and individual resource for him to draw upon during practice (Cushion, Armour & Jones, 2003). This is an important strategy for coaches, and it is recognised that for some coaches, much of what has been learned is experiential learning as a player (Gilbert & Trudel, 2005). However, it is by no means an indicator of effective coaching practice, rather, it could be perceived as a constraint on coaching cognitions practice without sufficient accompanying critical thinking.

Conversely, there were instances where the coach was more critical of existing cultures, practices and processes, and he wanted to ensure that he was doing things because *he* thought they were right, rather than because it was what he felt was *expected* of him (Vignette 10). One example of this includes a story about the coach who was on a bus ride back after losing at an away game. During this journey, he received a number of probing messages from other stakeholders asking why the team was losing and what needed to change. In this case, the coach was sufficiently aware that he was implementing his methods because he felt that they were right, and he was not going to change what he was doing. This leads to the question- “to what extent do coaches accept and no longer challenge their own beliefs?”. This view is supported by Brookfield (1995) who claims that critical thinking is context dependent. For example, simply because someone exhibits critical thinking in a particular situation there is no guarantee that they will employ it in the future. Streat et al.’s (1997) study on critical thinking to improve team strategy demonstrates the

need for coaches to be made aware of, and challenge, their assumptions. Therefore, this research suggests that coaches should be provided with the mental tools to be critically reflective, both in and of their environment over a period of time.

8.6 Conceptualising the situation of cognitions

This section will argue that the sporting *domain*, *context*, and *purpose* provide a framework to understand better situated coaching cognitions. Subsections 10.6.1 – 10.6.3 will discuss each component in turn, before presenting a diagrammatic illustration of how they might fit together.

8.6.1 Coaching domains

Lyle (2020) defines coaching domains as “discrete communities of coaching practice with distinctive participant populations, competition formats, levels of technical expertise, performance standards, and social arrangements” (p.3). Study 3 found that the establishment of a clearly defined and acknowledged coaching domain proved useful in understanding not only the coaching tasks, but also an ‘expectation’ of *how* the coach would be likely to think and act. In study 1 the identification of coaching tasks within the performance and participation domains contributed towards more of an, albeit partial, understanding of what was expected of the coaches. Within this study, some distinctions were made between performance coaches and participation coaches. Study 3, which was undertaken in the adult performance domain, clearly reinforced elements such as the coach’s technical ability, the standard of the athletes and the level of competition. Consequently, domain specificity offers a level of expected coach-proficiency within tasks as illustrated in study 3. On the basis of this research, an understanding of situated cognitions needs to recognise the particular pattern of coaching tasks within the coach’s domain and organisational context and is the first step in understanding the underlying reasoning behind coaching cognitions.

The concept of coaching domains includes the particularity of the sport itself. Within this research, three contrasting sports were chosen, which has highlighted the stark differences in what they afford coaches in terms of cognition, action, and feedback. Clearly, different

sports present a range of bespoke challenges for coaches and therefore, this requires consideration of *how* cognitions can be situated in respect to their constraints. Furthermore, the explicit identification of the sporting domain means that it is possible to assess the validity, suitability, and appropriateness of *what* and *how* coaches are thinking. For example, coaches may not have sufficient technical knowledge (performance mental model) to work at a more advanced level of competition. Within study 3 it was clear to note the coach's technical vocabulary and performance mental model (in Vignette 8), which demonstrated the depth and proficiency of his sport-specific knowledge.

Finally, it is important to understand and recognise the value of exploring the domain beyond the coach, for example, the consideration of the players' levels, ambitions, and goals as participants themselves. There is inherent value in including both the coach and players in the research – this body of work does both.

8.6.2 Coaching context

'Context' is a broad term and encapsulates social, cultural, historical, and economic elements. Together, these combine to add a depth and breadth of understanding of the coaching setting in order to more accurately appreciate situated cognition. Numerous examples of context are highlighted in all studies but are most explicitly captured in study 3. For instance, *how* the ice hockey coach used his personal resources in the inter-connected world of UK ice hockey to construct his roster demonstrates the emphasis on close-knit relationships between players and coaches at the institutional level in the sport.

Extending the premise of context, study 3 revealed the history of the club and uncovered the story behind its previous financial mismanagement. This provided an understanding as to *why* the club was choosing to prioritise certain goals, which revealed that it was to establish economic sustainability. The discovery of these emergent contextual factors and layers offered insight into a number of features or 'contextual characteristics' that possess the capability to influence, shape and inform cognitions. Moreover, this finding also reveals the temporal aspect of coaching as an underpinning factor in the emergence of cognition. Additionally, the strength of these contextual characteristics was assessed in vignette 10 and it was found that the coach was aware of factors that might influence his cognitive processes and subsequent actions. This research has found that the social context has the

capacity to be highly influential on cognition. Furthermore, this influence is more prominent when coaches are afforded time to engage in reflecting, reasoning, and contextualising. The reliance on routines and reactive responses within coaching practice suggests that the social context may be more evident, or detectable to researchers, in planning and strategising about resources. Nevertheless, it is acknowledged that it is evident, although only partially accessible, in inter-personal communication and *in situ* decisions and actions.

The findings highlight the importance of a socio-cultural 'backdrop' against which to situate and explore cognitions (Hatch & Gardner, 1993). This idea is supported by Mallet et al. (2009) who argue that it is essential to understand the power dynamics that coaches experience as part of their situational context. North's (2017) clearly identifiable layers of context (individual, interpersonal, institutional, and socio-cultural) provide a useful and practical 'roadmap' of how cognitions can be understood as situated. However, this requires an intensive research approach to become immersed within the layers and to triangulate findings to the extent that such influences become evident.

In summary, the absence of context provides a shallow and superficial viewpoint from which to explore coaching cognitions. As an example of this, study 2 was useful in determining cognitive patterns of coaching. However, a better understanding of these patterns was revealed by situating them against a socio-cultural backdrop. In essence, context provides the 'fine-grained' rich detail within the coaching picture and facilitates a researcher understanding of '*why things are as they are*' or '*how things have come to be*'.

8.6.3 Coaching purpose

Goals provide coaches with a sense of purpose as they operate – it is clear that goals provide a sense of direction and a means of evaluating progress and outcomes against those markers. The term purpose is intentionally wide ranging and includes goals, but also a more general direction of travel, rather than a focus on a specific objective to be achieved. As a result, 'purpose' provides a rationale as to '*why* a coach is thinking *what* they are thinking' and, offers researchers or coach developers the potential to evaluate whether or not the cognitions, and their subsequent decisions and events, contribute towards the achievement of a goal. Moreover, this emphasises the value of the framework of higher

psychological functions as a tool to devise common terminology and a lens through which coaches and coach developers can explore cognition.

In some cases, coaches did not make explicit the goals of the session, which would have provided players/athletes with an understanding of the session's purpose. It is reasonable to suppose from more general observations that coaches did have session goals. However, these often had to be inferred from the researcher's observation of the session. As an example, the ice hockey coach in study 3 was always able to articulate his sessional goals and they were written on his plans. However, he rarely read them out to his players at the beginning of the session as players were well versed with what was expected of them. A lack of clearly defined and stated goals implies that no evaluation or judgement of coaching effectiveness can be made. Rather, all that can be offered is insight into, and description of, the cognitions and mental processes. In contrast, some rugby coaches in study 2 explained the purpose of the overall session or drill. However, coaching purpose and goals exist at a variety of different levels (Abraham & Collins, 2011) and therefore, it is imperative to understand the hierarchy of goals, as they are interlinked and situated in time.

As previously discussed, distinctive and identifiable coaching domains exist and are essential for researchers and coach developers in recognising and appreciating different forms of coaching practice. Therefore, coaches working within these domains practise with a specific purpose or intention and are required to employ appropriate mental models (Côté et al., 1995; Cushion and Lyle, 2018; Lyle, 2002). For example, study 1 demonstrated that performance coaches were not only intent on improving player performance, but they also exhibited a holistic interest in the wellbeing of their players. Consequently, they spent a great deal of time contextualising and reasoning, which could only have been achieved with a more-developed inter-personal relationship between the coach and player (Jowett & Poczwardowski, 2007).

Extending the concept of purpose, it is suggested that coaches must often prioritise information in order to determine, in the context of established goals and awareness of organisational requirements, *what* is most important and *when* it is best to act and remedy any perceived problem. Prioritising was most evident in study 3 when the coach was reflecting on his team's performance. Coaches cannot act on everything that is noticed. Rather, expert coaches are able to prioritise and select issues to be attended to that will in turn yield the most significant increase in performance. There will, of course, be some

distinction between immediate responses to session goals and those decisions that will impact in the longer term. It is proposed that prioritising is most likely to be found within deliberative decision-making environments and within tasks such as planning. However, there was strong evidence from the research (and from personal experience) that coaches prioritise continuously. For example, coaches make tactical adjustments in games based on noticing events and prioritising remedies to be implemented. Future researchers may wish to explore coaches' processes of prioritising, which in turn could build upon existing research on catalysts and thresholds (Harvey, Lyle & Muir, 2015).

At this point, a case will now be made for a link between coaching purpose and cognitive prioritisation. In high-performance domains, the need (or priority) to improve a team or athlete's performance generates a sense of urgency – in the case of study 3, the coach was aware that he might get fired as a result of the team's many losses. Performance coaches are explicitly aware of their team's or athlete's goals and often this can be set by stakeholders in the wider context. This sense of urgency produces an environmental demand which, in turn, requires coaches to engage in particular cognitive processes and routines, often over a long period of time.

In contrast, domains that contain fewer explicit or pressurised goals place less cognitive demand on coaches. Examples of this in action were found in study 1 with participation coaches. These findings are supported by Turnbull et al. (2019) who conclude that "humans prioritise daydreaming when environmental demands decrease by aligning cognition with their personal goals using DLPFC [Dorsolateral prefrontal cortex]" (p. 1). This concept is further outlined by Gilchrist and Mallett (2017) who argue that "people may, at times, have to engage in activities that they do not find intrinsically motivating" (p. 41). This suggests that coaches who are not mentally stimulated by their environment are more likely to 'daydream', rather than be present in what they perceive as "less-compelling events in the here-and-now" (Turnbull, 2019, p. 6). The implications of this finding naturally lead to the question, 'what do coaches think about [during sessions] when they are not thinking about coaching, and how often does this happen?'. It is likely therefore, that it is the 'purpose' within coaching (generated by goals or an environmental demand) that informs the degree to which attention is focused and information and tasks are prioritised.

Finally, the concept of judging cognitions is closely linked with research on coaching effectiveness (Côté & Gilbert, 2009) and understanding the contribution of the cognition

towards its overall purpose or goal (Lyle, 2007). The dynamic and complex interaction of all of the contextual variables, when aligned with the many layers of goal-setting, suggest that the nature of cognitions and the absence of verifiable 'correct solutions' precludes more than a fairly general assessment of the appropriateness of decision-making, reasoning, and strategising. It may be easier to identify cognitions that appear to act against the 'direction of travel' than to establish a judgement of effectiveness that goes beyond 'appropriate'.

8.6.4 The value of combining domains, context, and purpose to situate cognitions.

Thus far, this section has explored how understanding the surrounding domains, context and purpose contribute towards a deeper researcher understanding of situated cognitions. Each component (domain, context and purpose) contains multiple facets, many of which have been explored above, as well as within the empirical chapters as part of this research. For example, 'context' includes the social, cultural, historical, and economic aspects impacting on the coach. In addition, the notion of domains includes the level at which the performer is competing, as well as the sport's specific characteristics. Therefore, in a similar vein to the ERE model, Figure 10.1 below offers an illustrative view of how these components fit together to provide a better conceptualisation of how cognition might reasonably and usefully be situated in sport coaching. The central component of the diagram shows the importance of recognising and 'triangulating' the sporting domain, context and purpose and outlines the advantages that situating cognitions offers coaches, coach developers and researchers.

The combination of these three components bestows researchers and coach developers with: 1) the ability to offer a judgement regarding the appropriateness and quality of coaching cognitions, 2) the opportunity to provide a more holistic evaluation of the situated cognitions, and 3) a more sophisticated understanding of the environmental constraints impacting on cognition. The intersections between only two of the three circles illustrate how the absence of the third circle (of content, purpose or domain) permits only a partial account of a coaches' cognitions. This research has explicitly explored all of these situational elements and their relative value in contributing to a richer and more nuanced understanding of situated cognition.

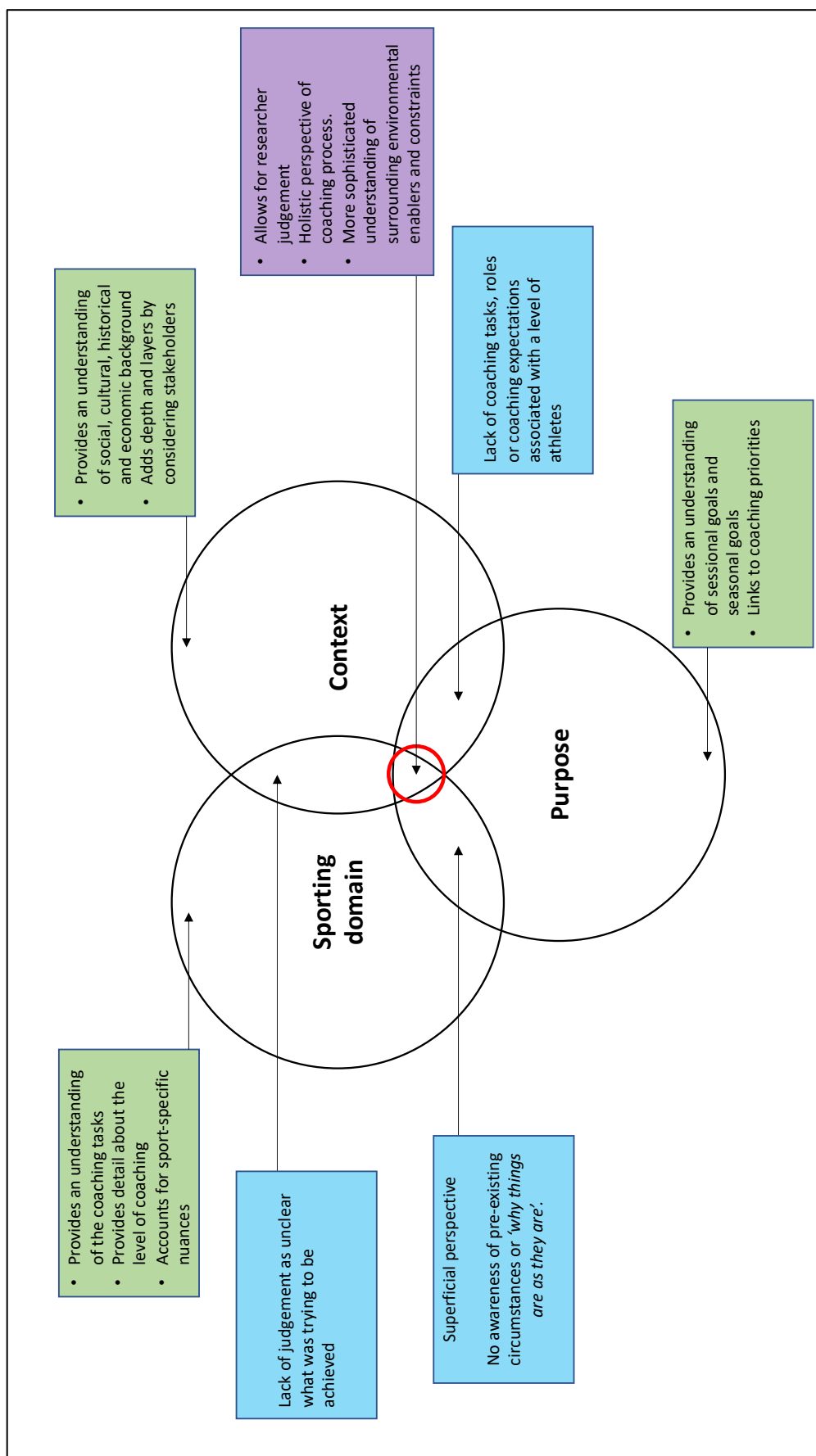


Figure 8.1: Situated cognitions amongst domains, context and purpose

8.7 The value of the situated cognition perspective to coach education

It is now appropriate to present a brief discussion of the above in terms of the implications for coach education. Mallet et al. (2009) discuss the merits of formal and informal coach education and suggest that formal coach education must be context dependent. This body of work involved coaches with a variety of formal coach education training and qualifications. From the coaches' perspectives, they were all keen to receive coach education that would help them in their roles. However, as this research has shown, domain, context and purpose all contribute towards a better understanding of how coaches think and subsequently act. In study 3, the coach had not received formal coach education from his National Governing Body in the five years prior to the study, as there was no level 3 ice hockey course delivered in the UK. Therefore, he sought to use peripheral sources of knowledge that enabled him to borrow ideas and concepts from neighbouring domains such as rugby. This was also evident in study 1 where one coach spoke about the extensive reading and mentoring that he received from knowledgeable individuals outside of the tennis world.

Nelson, Cushion and Potrac (2006) conclude that whilst formal coach education certainly has a place in helping to develop coaches' expertise, informal coach education tends to act as the prevalent mechanism through which coaches learn. Hence, it is suggested that coach education, at least in the performance domain, might wish to focus on providing coaches with the skills to develop an awareness of their own thinking, or perhaps provide a mechanism by which coaches can critically reflect on their situated cognitions. Consequently, a 'one size fits all' approach is unsuitable and inappropriate for educating coaches about situated cognitions and mental activities, particularly for coaches who work in academies and clubs in performance domains. Therefore, the onus lies with coach education to provide coaches with the tools to improve and reflect on their own thinking, or more accurately, situate and evaluate their cognitive processes against context, domain and purpose.

8.8 A conceptual schema to aid 'reflection on cognition'

Thus far, the discussion has explored a variety of emergent themes and demonstrated how cognition and various facets of the coaching environment are interlinked. In order to utilise these findings so that they translate to, and impact upon, coaching practice, it is necessary

to consider how these component parts fit together. With this in mind, a conceptual schema has been developed to illustrate the interaction of 1) coaching layers, 2) situational factors, 3) cognitive resources and 4) types of cognition. This conceptual schema (Figure 10.2) has been created from the body of evidence that has emerged throughout the research and provides an effective way of presenting and situating the findings as a whole. Moreover, it is intended to 'package' the findings in a useful and meaningful way for coaches, academics, and organisations.

Within Figure 10.2, the layers in the lower part of the diagram provide the basis for coaches to consider the surrounding societal layers of sport coaching that have the capacity to influence cognition. Additionally, these layers can be thought of in terms of 1) their facilitation of access to resources, 2) their level of permanence within the layers and 3) their strength of influence.

At the next level, coaches are encouraged to consider their situational purpose, paradigmatic expectations and goal management. Moreover, whilst goals exist at a range of contextual levels, coaches need to manage these goals and understand which are distal or proximal, as they undoubtedly influence coaches' cognitions to differing extents. As part of this conceptual schema, the notion of primary and secondary goals is suggested. Primary goals are fixed (non-negotiable) for coaches and most likely set by stakeholders within the institutional context. For example, in study 3 the CEO listed goals for the club and the team, one of which was 'to regain the trust of the fans'. Whilst this was clearly articulated by the CEO as a goal, it did not appear to be at the forefront of the coach's mind. In contrast, the coach set secondary goals which it is suggested helped to contribute towards the achievement of the primary goals. For example, as one of his goals, the coach articulated that he wanted 'to win more games than he lost'. Extending the idea of primary and secondary goals, it is suggested that primary goals are distal to the coach. For instance, whilst one of the primary goals was to regain the trust of the fans, it is not a goal that he was able to directly influence or achieve, at least in the immediate future. On the other hand, it is suggested that there are a number of secondary (contributory goals) that are proximal to the coach. These secondary proximal goals exert an immediate and short-term influence over *what* and *how* a coach thinks. Nonetheless, primary goals are consistent over a long period of time and contain a high degree of permanence, but also exert less immediate influence on the coach's practice.

Within the third level, knowledge and experience act as cognitive resources for coaches to draw upon for the purposes of their cognitive activities and routines. It is acknowledged that these are significant components of cognition and a wealth of research reflects their importance (Nash & Collins, 2006; Nash et al., 2012). At the fourth level, it is proposed that coaches undertake the information processing stage within different coaching environments. These environments provide mental constraints and affordances on the coaches' mental processing capacity and can be better thought of as *in situ* face-to-face coaching. Finally, at the fifth and highest level, the prominent types of higher psychological functions are identified to explain the types of cognitions that manifest in the context of the previous layers of the conceptual schema. As an important acknowledgement of, and consideration for, the conceptual schema, it is recognised that coaching has a cyclical aspect, including a continuous process of feedback and feedforward, which in turn, influences *what* and *how* coaches think. Therefore, whilst coaching actions, based on practice structures, may have a serial aspect, cognitions are more holistic and can be thought of as dynamic and fluid as a result of the continuous sensory input from the surrounding physical and social environment. With this in mind, the notion of feedback within the environment is demonstrated by the multi-dimensional arrows within the information processing layer.

The conceptual schema below is intended to identify and show a relationship between the components that impact upon situated cognitions and act as a tool to aid coaches to reflect on their own cognitions in terms of location, influences, content, and style. As a result, the conceptual schema encapsulates the key themes that have emerged throughout this body of work. It is acknowledged that there are countless other factors that contribute to sport coaching behaviour and practice. Consequently, it is not intended to be an all-embracing model of, or model for, coaching practice (Cushion, Armour & Jones, 2006).

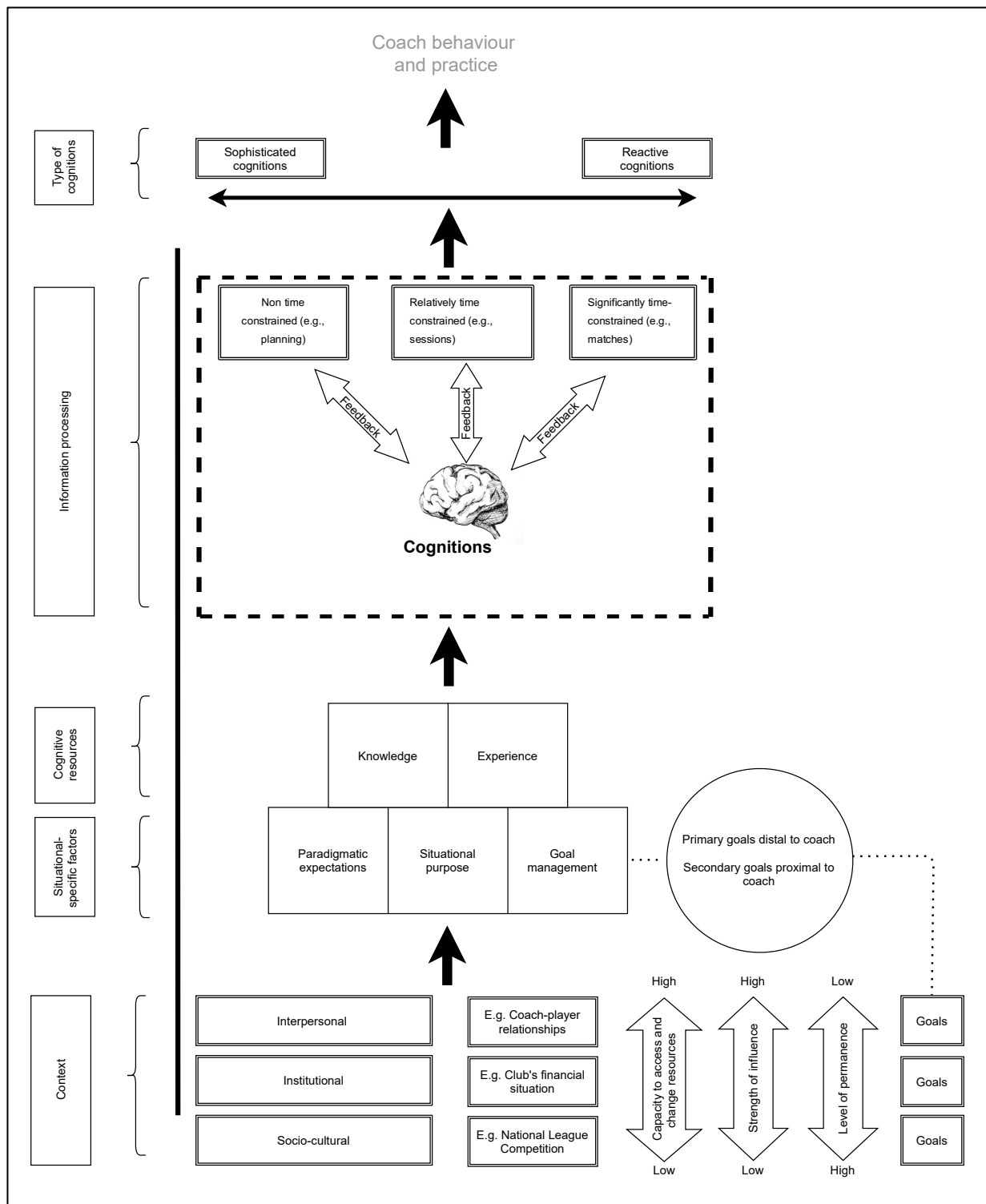


Figure 8.2: A conceptual schema to assist coach education and coaches with reflection on cognition.

Conclusion

This section will begin with a brief review of the original research aims. It will then explore both the theoretical and applied implications of the work before offering a number of recommendations for future research. Finally, there is an acknowledgement of the research limitations before a summary of the original contributions that this body work has made to the field of sport coaching is presented.

The research questions and aims of this work were:

Research questions:

RQ1) What is the nature of the relationship between coaching cognitions and the particularity of the coaching context?

RQ2) To what extent does an appreciation of situated cognition contribute to an understanding of how coaches think and what they think about?

Research aims:

1) To investigate coaching tasks, as a starting point, to understand more accurately the fine-grained detail of what coaches are required to do.

2) To investigate situated cognitions and explore the patterns of coach thinking in coaching practice.

3) To explore how coaches mentally operate and strategise under pressure.

4) To examine situated cognitions against a wider socio-cultural backdrop.

5) To analyse the strengths and weaknesses of different research methods and approaches when investigating situated cognitions.

8.9 Theoretical implications

At the beginning of the research journey, the initial intentions focused on *what* and *how* coaches thought during practice, in the hope that it would provide an insight into higher psychological functions and these could be populated with exemplars of content and practice. However, as this research has demonstrated, examining cognitions in isolation provides a partial picture of the complex interrelated processes and contextual influences that surround coaches. Significantly, coaches regularly draw on their knowledge, experiences, biography, relationships and resources, all of which influence (in a symbiotic fashion) *how* and *what* coaches think. Moreover, some of these factors have been shown to afford coaches time and space to engage cognitive processes such that they can overcome adversity and deal with contingency when outcomes are uncertain.

The findings in this study illustrate the usefulness and importance of two arguably more traditional knowledge elicitation methods. However, whilst studies 1 and 2 provided a critical step forward and valid insight into coaching cognitions, they did not offer a description or explanation of the underpinning reasons for the cognitions in any depth. The final study demonstrates the value of exploring cognitions over time and by using an embedded approach so that surrounding influences can be detected. Whilst it is acknowledged that traditional knowledge elicitation methods such as stimulated recall and Think Aloud Protocol provide a useful 'snapshot' in time, they do not capture any changes in cognition, which, it is suggested is an essential component of learning and effective coaching.

Importantly, studies 1 and 2 have highlighted some of the methodological issues and more specifically, the deployment of individual knowledge elicitation methods. The collection of data for cognitive activity is mostly obtained by indirect methods, with possible exceptions in fields such as neuroscience (McKay & Kemp, 2018). Therefore, this inevitably presents a variety of issues, many of which have been outlined in the individual chapters. However, this research has highlighted that whilst there may not be an ideal 'singular' method, the approaches within this submission provide valuable findings which build on one another and contribute towards an improved understanding of situated cognition.

Finally, the most significant theoretical implication of this body of work that cognitive processes underly all contexts however, it is how they are captured and play out that is significant - there is a rich, challenging and dynamic world in which coaches think and practice. Moreover, this research and subsequent findings demonstrates the value of critical realism as a meta-theoretical approach to guide researchers and unravel the underlying influences impacting on cognition. It is proposed that all coaching cognitions are susceptible to circumstantial forces and the prominent challenge for coaches and researchers alike, lies in the identification of these forces, so that their strength of influence can be described, examined, and potentially mitigated against.

8.10 Applied implications

This section will begin by firstly examining the applied implications of this work for coaches, before outlining some additional contributions for coach education. First, it is proposed that coaches can use these findings to evaluate critically their own cognitions and mental processes within different environments, namely, during planning, coaching sessions and within matches. Importantly, these findings are applicable to all coaches, regardless of domain and sport, as they provide a conceptual framework for coaches to use to reflect on their thinking.

This naturally presents coaches with an opportunity to examine *how* they are thinking, in terms of the type of higher psychological function, at various stages of coaching practice and reflect on their suitability given the environmental affordances. Importantly, this presupposes that coaches are able to engage in reflection of this nature (Cushion, 2018; Stodter & Minto, 2020; Vinson et al., 2020). This research contributes to existing literature on 'reflection on action', which it is contended, focuses more on coaching behaviours, rather than cognitions. Therefore, this work makes the case for coaches to engage in 'reflection-on-cognition', which precedes coaching actions. The development of a conceptual schema to aid coaches in this reflective process is a contribution to applied coaching practice.

Extending the idea of 'reflection-on-cognition', coaches need to consider what forces or influences are acting upon them and the wider context in which they operate. For example, coaches could consider which factors are permanent and which they might be able to

change, either immediately, or perhaps gradually over time. This is an important point for coaches as it encourages them to think about their sphere of influence and critically reflect on their situation within that sphere.

Building on the notion of spheres of influence, this research makes the case for coaches to consider and challenge their assumptions that govern and shape their cognitive processes. Whilst there are indeed social, organisational and environmental constraints, there are also cognitive constraints caused by assumptions and 'fixed mindedness'. This could be achieved by coach developers challenging coaches' conceptions, or by using the questions in section 9.5 accompanied by the conceptual schema at Figure 9.2, to reflect on *why* they think and practice in a certain way. For example, some of the coaches in this body of work coached in a particular fashion because of the institutional expectations surrounding them, whilst others stated that it was because it was how they were coached as a player. None of these, it is suggested, at least on their own, provide a sound foundation for effective coaching practice. Bertram, Culver and Gilbert (2016) advocate for 'communities of practice' as viable sources of knowledge to assist coaches in their development. Interestingly, it was found that whilst working within their community, coaches did seek out and find information in an informal capacity that was of value and specific to their unique setting (Mallet et al., 2009; Nelson, Cushion & Potrac, 2006). Communities of practice might also provide a platform or mechanism to encourage coaches to challenge their paradigmatic assumptions.

Thus far, the applied implications of this work have focused on reflection-on-cognition. However, this research has also demonstrated the importance and usefulness of some practical strategies that coaches utilise to overcome issues, such as lack of time or complexity, which are prevalent in their coaching practice. The synthesis of the three empirical studies has demonstrated the inherent differences within each sport-specific domain and, therefore, illustrated that coaches are challenged to find ways to operate effectively in time-pressured and complex situations. Within this research, notable examples were found of coaches devising strategies and routines as well as having developed interpersonal resources, and more specifically, relationships. Significantly, the case study and use of vignettes provide rich stories for coaches to examine, relate to, and learn from.

Finally, this research has identified different higher psychological functions, some of which, it is proposed, are more sophisticated and require greater cognitive capacity than others. These higher psychological functions offer a useful mechanism to examine the influence of

contextual factors. Coach education might consider how it can prepare coaches to effectively rationalise, contextualise and problem solve within their unique context, and how some of these cognitive processes are more susceptible to surrounding environmental influences than others. Some appropriate questions for coach education include, '*what information is needed for coaches to problem solve or contextualise?*' and '*how can contextualising, reasoning and problem solving be developed in coaches?*'. Additionally, cognitions of this nature require a high level of knowledge and experience; therefore, it is proposed that the challenge for coach education is to identify *if* coaches are ready to engage effectively in these sophisticated and more complex types of cognitions (Gilbert & Trudel, 2005; Nelson, Cushion & Potrac, 2006).

8.11 Measures of quality to assess this research

It is necessary to identify the criteria through which this research should most appropriately be evaluated, using qualities of connoisseurship (Sparkes & Smith, 2009). Tracy (2010) proposes eight 'big-tent' criteria against which qualitative research might be judged. Whilst all criteria are noteworthy, Sparkes and Smith (2014) argue that it is possible that not all criteria are equal in weighting and that some might shift in priority as a result of the context of the research. Furthermore, a simplistic approach looking merely to 'tick the box' might result in certain criteria being judged as 'not achieved'. Therefore, there is a need to be both explicit and selective about the criteria this work has intended to prioritise. Reflecting on Sparkes and Smith's (2014) point about the possibility of unequal significance of criteria based on the context of the research, it is important to emphasise that there has been an evolutionary shift in focus and methods throughout this entire body of research. Consequently, the three studies are likely to be weighted towards, or privilege, certain criteria and, therefore, require an examination of how they meet the selected and most relevant markers of quality.

In a similar fashion to other qualitative research studies in sport coaching that have stated the criteria against which they wish the quality of the research to be judged (Grant, Bloom & Lefebvre, 2020; Potts, Didymus & Kaiseler, 2021; Sarkar & Hilton, 2020; Townsend & Cushion, 2021; Tracey & Elcombe, 2015), I suggest that this research should be judged against the following measures of quality. The research: 1) has been conducted with sincerity, 2) is credible, 3) is meaningfully coherent, 4) has an evident ethical stance, 5) is rich in rigor, and 6) is resonant. These criteria are now briefly elaborated upon and are

largely derived from Tracey (2010). These descriptions are then followed by a study-by-study account of how each empirical chapter meets the criteria.

According to Tracey (2010), sincerity is characterised by the researcher's self-reflexivity about biases and inclinations, as well as transparency about the methods employed, and the challenges faced. Extending this further, Tracey and Hinrichs (2017) state that *"transparent research is marked by disclosure of the study's challenges, methods of funding, unexpected twists and turns, and revelation of the ways research foci transformed over time"* (p. 6).

Research that can be considered credible includes rich description, explication of tacit knowledge, triangulation, and member reflections (Cavallerio, Wadey & Wagstaff, 2020). The primary factor within credible qualitative research is that of confidence in the data, such that researchers can act on the findings to inform future studies. Meaningful coherence considers how, or if, the study uses methods and procedures that are aligned with the research question. In addition, this criterion necessitates a connection between literature, findings, interpretation, and the research questions.

Ethical research is a reflection of the procedural, situational and relational components, together with exiting the research setting and sharing the findings. These elements emphasise the need to consider a range of potential issues at various stages of the research process (i.e., before, during, and after the study). Undertaking ethical research is an on-going endeavour and requires constant foregrounding as and when situations arise. The notion of rigor is concerned with how the study uses a sufficient, abundant, appropriate, and complex set of theories, in addition to design factors such as the amount of time spent in the field, sample size, research context and analysis. Rigor is perhaps most evident in the methodology section of research and, whilst there is no specific number of hours collecting data, sample size, or methods of analysis that will guarantee rigor, the researcher has an obligation to consider whether or not these design and procedural features are sufficient to substantiate any claims made.

Finally, resonance considers how the research influences or moves the reader by evocative representation or transferable findings. Tracey and Hinrichs (2017) explain this further by suggesting that *"through his or her thick description, a researcher paints a picture of how life unfolds in a given context or how a concept can be better understood. However, it is eventually up to the reader to make connections between the researcher's findings and*

familiar contexts germane to his or her own life experience" (p. 7). The purpose of the next three sections is to examine the empirical research studies against the above criteria.

8.11.1 Study 1: An exploration of coaching tasks, cognitions and higher psychological functions in tennis using a modified Applied Cognitive Task Analysis including stimulated recall

Addressing the criterion of sincerity, study 1 offers a reflexive account of the research, explaining the problems that were encountered. Moreover, it is explicit in sharing how the findings from the study were useful in moving to a resolution of the research questions yet, offered only a partial account of cognition in context. The inclusion of the reflexive account is important as it shares the trials and tribulations (in terms of both method and substantive findings) that were faced when conducting the research.

Credibility was established throughout the data analysis phase. Braun and Clarke (2019) state that the process of conducting a thematic analysis should be *"creative, reflexive and subjective, with researcher subjectivity understood as a resource"* (p. 593). In the context of this study, the researcher's prior knowledge of the sport acted as a resource to draw upon when undertaking the thematic analysis (i.e., the interpretation of technical and tactical language). However, it is also acknowledged that this subjectivity also facilitates and acknowledges researcher-bias as part of the process. In terms of how the data were presented, the sharing of abundant quotations and contextualisation within the results and discussion sections was intentional and contributes credibility to the study. In addition, the credibility of the data was checked during the researcher-coach interrogation as part of the stimulated recall process. During this process, the video was paused, and the coach was given time to elaborate on what they were thinking (Côté et al., 1995). It is important to note that within a study of this nature, it is not possible to present the same 'rich description' as can be found in the final ethnographic study. Rather, the methodology provides a robust explanation of how the results were obtained, thus allowing researchers to act on the findings and therefore inform future studies.

The criterion of meaningful coherence is partially addressed. On one hand, connections are made between the research questions, methods, findings, and available literature. On the other hand, within the broader research journey described in this submission, the

contribution of study 1 towards understanding situated cognition is acknowledged as being limited. With this perspective, it is possible to conceptualise how the impact, or significance, of studies that are part of an aggregative approach might 'fade' over time as their contribution to research questions are overtaken by more recent studies that get 'closer' to answering the research questions.

This initial study details the many ethical considerations that had to be taken into account, notably the procedural elements, which include confidentiality and pseudonyms that were used in the presentation of the data. However, this study adopted a research design in which the researcher was not an active part of the coaching environment. Consequently, this type of study exhibited fewer ethical issues in comparison with those where the researcher is embedded within the research environment and uncovers (or is exposed to) information of a sensitive nature.

Concerning rigor, the modification of the Applied Cognitive Task Analysis added an additional layer of complexity that, on reflection, could be avoided in the future. Rather, it would be more beneficial to 'streamline' the study to focus solely on stimulated recall and rely on the procedural elements associated with this method alone. Extending the concept of rigor, this study intentionally used a small sample size because of its intensive nature, i.e., four coaches produced 514 meaning units. This in turn produced a significant amount of data with which to work and it is acknowledged that differences in quality and type of data occurred between performance and participation coaches.

Lastly, resonance is achieved through the development of the higher psychological functions, which provides a useful framework to conceptualise types of thinking. Furthermore, resonance is also reached by the thick description in the discussion section which unpacks some aspects of cognition and allows readers to make connections between this research and their own experiences.

8.11.2 Study 2: An exploration of cognitions, higher psychological functions and actions of *in situ* practising rugby coaches using Think Aloud Protocol

In relation to the principle of sincerity, study 2 presents a reflexive account of the methodological and procedural issues that were faced, such as, the problems that coaches encountered when attempting to verbalise cognition in the act of coaching. This study demonstrates credibility by the explicit sharing of quotations from the coaches and the elaboration of how the data link to aspects of the wider context. In terms of credibility, the extended discussion conveys a level of rich description, which helps to contextualise selected quotations. Moreover, this is important in bridging some of the more abstract concepts (e.g., higher psychological functions) with the real-world verbalisations. In evaluating the contribution of study 2, it is contended that this study has a higher degree of meaningful coherence than study 1, as it is more closely aligned with the research questions. Put simply, it gets closer to the act of cognition in context by virtue of the research method employed.

Within the methodology section, ethical considerations are extensively detailed, and the procedural aspects are also considered in detail. However, as was anticipated, the nature of the study meant that the collected data were more sensitive as they included coach-athlete and coach-coach conversations. This contrasts with much of the existing literature that uses Think Aloud Protocol (Whitehead, Taylor, Polman, 2015; Whitehead et al., 2016), most likely because the above authors applied the method in a different fashion in comparison with this study. The criterion of rigor is fulfilled in the methodology section which details the procedures, data generation methods and the thematic analysis. It is acknowledged that a larger sample size and, in particular, a more robust training programme for participants would further improve rigor in the study.

Finally, it is suggested that the study does demonstrate resonance as it illustrates, as part of the discussion section, how the higher psychological functions manifest within coaching situations. However, the scope of the overall contribution is limited, i.e., it reveals a small part of *in situ* coaching that is impacted by many wider contextual factors. Consequently, it is acknowledged that the degree of resonance could be improved by situating further the data that were collected, e.g., making the links between cognition and context more explicit.

8.11.3 Study 3: An ethnographic study of situated coaching cognitions in Ice Hockey using an Embedded, Relational and Emergent informed approach

Study 3 is both conceptually and methodologically different to the two earlier studies in this submission. The notion of 'situatedness' demanded an embedded ethnographic research approach, and the presentation of rich data and stories in the vignettes reflects the vibrancy of the research environment. In this instance, sincerity is most evident in the adaptive research cycle that is shared in the methodology. Within the context of this study, researcher fallibility is acknowledged and is mitigated, in so far as possible, through the adaptive research cycle which allows for the testing and refinement of theories (Layder, 1998; North, 2017). A reflexive account is also offered to further the sincerity of the study.

Credibility is established through the rich descriptions and vignettes that are presented. Contributing to this measure, as part of the member checking process, participants were asked to read the vignettes for accuracy and to confirm the sentiment of the story. Similarly, Cavallerio, Wadey and Wagstaff (2019), in a study of member reflections in elite coaches and gymnasts, acknowledge that member checking can be an uncomfortable process when participants disagree with the story when it is relayed to them. It is acknowledged that this type of research requires a degree of researcher interpretation and sense making, which could differ from the participants' perception of events. In this instance, the study did not reveal any disagreement between stakeholders' interpretations of events. However, the adaptive research cycles and iterative processes do, in part, overcome these issues.

Within the broader context of this thesis, there is a clear evolutionary shift towards a 'situated' perspective of coaching cognitions and this third study attempts to capture explicitly the important features of this 'situatedness'. It is claimed that within this final study, there is a clear connection between the (refined) research questions, data generation methods, and the interpretation of results and findings. Within ethnographic studies, questions can arise around which areas of focus are most important and therefore, worthy of presentation. This third study has foregrounded cognitive processes (as a reconfiguration of the ERE model), which are an essential component of the research questions. However, in making sense of the findings and constructing the vignettes, there is a need for researcher interpretation in conjunction with the adaptive research cycle. Consequently, the data presentation (in the form of vignettes) deliberately attempts to make links to cognitive processes to address the research questions in an explicit fashion.

In contrast to the first two empirical chapters, this ethnographic study required additional ethical considerations. The procedural ethical details are included in the methodology section. Situational and relational ethics require a researcher awareness of the potentially sensitive nature of the research setting (which is perhaps more likely in the high-performance domain). Situational and relational ethics are not explicitly mentioned within the study. However, the notion of relational ethics is implicit in the consideration of potentially sensitive research settings, which is elaborated upon in the methodology. In practical terms, this resulted in the need to 'choose' moments that were appropriate and did not overly intrude on the coach or players. This point is also echoed by Champ et al. (2020) who discuss the challenges and experiences of an early career-practitioner using ethnography in professional football. In a similar vein to Champ et al. (2020), the researcher-coach relationship changed over time as trust was built, illustrating the importance of relational ethics and how this fluctuates temporally.

Due to the number of hours spent in the research field and the quantity of data that were collected, it is claimed that this study demonstrates a high degree of rigor. Whilst the sample size consists of one coach, this is necessary and entirely apt for conducting an ethnographic study with an appropriate degree of intense engagement. Moreover, it has explicitly identified critical realism as the underpinning philosophical theory, the ERE model as the framework, and the study's intention to examine situated cognitions. The combination of these factors, illustrate the level of theoretical rigor that is interwoven within the study.

Finally, resonance is achieved through the rich description within the vignettes that are presented within the results. Potts, Didymus and Kaiseler (2021) used composite vignettes to share coaches' experiences of appraisals and wellbeing, and state that resonance (as well as rigor, sincerity, and significant contribution) is used as a criterion against which to judge the quality of the research. It is anticipated that both coaches and academics are likely to feel a sense of connection with the stories and emergent findings. However, the discussion that follows the vignettes aims to reconceptualise the vibrant stories using the situated cognition paradigm and demonstrates how the web of surrounding features provide a complex real-life backdrop against which cognitions can be viewed.

In conclusion, the above discussion elaborates on the proposed 6 criteria against which this research wishes to be considered. It has been demonstrated that different types of qualitative research require appropriate matching and weighting against certain criteria.

Clearly, studies 1 and 2 are inherently different to study 3 and, therefore, it has been vital to examine how each of the studies within this submission meet the six criteria, albeit using differing research methods, procedures, and presentation formats.

8.12 Future recommendations

Given the findings within this study, it is proposed that future research could focus on:

- a) Examining cognitive patterns within different coaching environments.
- b) Exploring the implementation of coaching strategies to facilitate more sophisticated cognitions during practice.
- c) Evaluating situated cognition against context, purpose and domain.

10.13 Research and methodological limitations

It is acknowledged that within each empirical study, there were a number of research limitations. In total, this research explored the cognitions of 11 coaches. Conducting research of this nature, in studies 1 and 2, could be carried out with larger sample sizes. However, there was a research strategy to particularise the research where possible and provide depth rather than breadth to the data collection and analysis.

One potential issue is that of domain specificity. Study 1 involved both performance and participation coaches and made some distinctions between the two groups in terms of task and cognition. Study 2 used coaches that were highly qualified and experienced. However, the players were at different levels of performance, ranging from junior beginners to advanced junior competition. Greater homogeneity in the players' standards could have improved the validity of the findings.

Within studies 1 and 2, it is recognised that richer data might have been obtained if a more-robust training programme for stimulated recall and Think Aloud Protocol had been devised prior to data collection. In study 2, coaches were given a training session prior to the data being collected; however, it is possible that further coach-familiarity with Think Aloud Protocol might have resulted in increased Level 2 verbalisation. Specific methodological issues and limitations have been noted in detail within each chapter. With this in mind, a broader reflection on stimulated recall and Think Aloud Protocol as knowledge elicitation methods is offered first, followed by a commentary of limitations of an ERE informed approach.

The issue with traditional knowledge elicitation methods, such as stimulated recall and Think Aloud Protocol, is that their attempt to capture cognitions *in situ* results in a lack of detection of wider socio-contextual factors (Lyle & Muir, 2020). Therefore, these approaches, whilst useful and necessary, only provide a partial picture of cognitions. It is now contended that coaching is a psycho-social process and therefore, study 3 clearly illustrates the value of attempting to embrace both of these disciplinary approaches and the adoption of both ethnography and case study as research approaches.

Retrospective knowledge elicitation methods such as stimulated recall, can be viewed as problematic because it is unclear if the participants are truly verbalising their thoughts during the action, or if they are verbalising their thoughts whilst watching the action. This point is confirmed by Ericsson who states, “for cognitive processes of longer duration (longer than 10 to 30 seconds), recall of past specific thought sequences becomes more difficult, and people are increasingly tempted to infer what they must have thought, thus creating inferential bias in the reported information” (p. 230). Hence, in study 1 it is acknowledged that coaches were more specifically reflecting on their coaching practice in general when watching themselves on the computer screen, rather than recalling and verbalising their cognitions during *insitu* coaching practice.

In contrast, knowledge elicitation methods that capture data at the time of the event present different problems and can be criticised for the level of detail that they provide (Whitehead, 2015). Therefore, some relevant coaching cognitions might not have emerged within the study (for example, reflection) as coaches were more focused on practising and interacting with players. In one instance, a coach felt that he could not verbalise his thoughts due to the risk of upsetting players. Therefore, it is conceded that coaches might have ‘held back’

information as a preventative measure, so as not to risk damaging their relationships with their players. Additionally, study 2 revealed the highly interactive aspect of rugby coaching. This led to difficulties with coaches being able to verbalise their thoughts at Level 2, as it interfered with the process of providing feedback and instruction to players. The interactive nature of rugby meant that participants found it difficult to verbalise their thoughts in parallel with multiple stimuli and other tasks were taking place. This meant that some thoughts were most likely not verbalised (Ball et al., 2015).

In contrast to the first two studies, study 3 offered an alternative and innovative approach in the quest to provide insight into coaching cognitions. The adoption of ethnographic case study approach was highly research-intensive. Nevertheless, this was essential in order to become immersed within the study and gather data at the different layers within the ERE model. In contrast with the two previous studies, study 3 did provide data that was vast and rich. Of course, despite the 70-80 hours of time that was spent with the team and stakeholders, there will always be more emergent and interesting themes that provide insight in the coach's cognitions and surrounding influential factors. It was felt that theoretical saturation was reached, and the adaptive research cycle validated these findings as the coach was starting to repeat his messages. However, it is acknowledged that more time spent in the research environment might unearth more stories and reveal more themes. Upon reflection, it is recognised that ethnography requires time for the researcher to become immersed so that 1) trust could be nurtured between the researcher and coach, 2) researcher familiarity with the research environment, including the different layers, could be established and 3) a tactical and technical understanding (as well as new vocabulary) of ice hockey could be developed by the researcher. As part of study 3, researcher theories were hypothesized, tested and refined throughout the data collection due to the engagement with the active research cycle (Pawson, 2002).

Finally, it is acknowledged that when data are collected, the presence of a researcher has the capacity to impact the validity of the ecological environment and might interfere with the originality of the cognitions. It is speculated and was notable from a researcher-perspective, that the impact of the 'observer influence' (and initial awkwardness in the researcher-participant relationship) became much less prevalent over time.

8.14 Contributions to the field

In summary, this research makes an original contribution to the field of sport coaching in the following ways:

- 1) Provides conceptual clarity of cognitions using higher psychological functions that are populated with content.
- 2) Demonstrates that cognitions are best understood when situated against domain, context, and purpose.
- 3) Demonstrates the influence of wider contextual factors on coaching cognitions over time.
- 4) Illustrates that relationships, planning and strategies provide cognitive space for coaches to deal with contingency.
- 5) Evaluates the effectiveness of three contrasting methodological approaches to explore situated cognitions.

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Appendices

Appendix A: Study 1 example of interview notes

Director of Tennis. SV & ST - Working with 45 members of the team - Confs, Outreach, club, play, conference, study - Oversees the different tier groups. - Brought all into one umbrella. - had manage each of the head of programs - Senior management of Sports Park, for male one HK, female, masters, openers - More involved with the academy - 70% of time with academy - 30% w/ others - Split into tech, tact, mental & physical. - 12, 14, 16, 18. - Live map all specialists - Once a week meet with Casare managers - " senior park coach - 2 hours on Monday for the academy. - Matt has done each of the jobs, so he can tell people how to do it - "I will do it, because Ben I understand it" - Uses the 19500 hour rule. - Programme is 10,000 hours over 10 yrs.	Shane the Enviro - Financial returns for the Sports Park - Play for the LTA. - Had a very clear vision who started. - 10 year plan: Physical plan. - 1 Player development plan. Helps player develop the plan. 7 part factor. - Recruitment. - Team Sport - Focus on your - Everyone is an individual 25000 hour rule "All you can do is your best" - Values, for 1 manager, competition - split & settle - If players want to do this but they - looking for players who work hard, smart & together.

- Mandy with H & S.
- "Coke can be so limiting as they are inspiring".
- Tennis is a fair sport.

- Focus on improvement every 6 weeks.

Physical profile
Coke's coach emphasized to win a match.
Coke's coach to feedback from other coaches.

After 1-8

- Give each player a player improvement plan.
- Manage the programme manager for each player.
- Each player has 3 things to be working on at any time.

Build Relationships.

- Manage all stakeholders - parents.
 - Sports park.
 - LTA
 - Coaches.

- Acts as a bridge for the coaches + players.
- Need to show interest in them + keep them happy.
- Look for a player to say "I want to work with that coach".
- "Coke needs to believe that they need to help them win".

- have to go with what the players want.
- "Me a my game sessions".
- ✓
- Big education for the coaches.

- Spent all time educating his performance coaches.

- Tennis is 'method' -
- ↳ Worked out what to do in each playing situation.

"in with rules" "in with it matters."

- Very scientific -> if plays are not hitting targets, they are not being successful.

Coaching Practice & Structure

- High levels don't need a much network.
- Rally pattern.
- And plays under together.
- Start with the facts -> what are we looking at?
- Really technical.
- Most of the DM mistakes.
- Offer a spectrum -> technical, tactical, individual, group.
- > phys.

Stimber competition:

- Make some preparation is perfect.
- Created a pack for all coaches before they go.

Read & Reflect.

- Always watching coaches' sessions.
- 6 week reviews for players & coaches.
- Coaches have their own improvement plan.
- Implemented a peer to peer.
- Didn't want to undermine.

MD's
@Ary

- Uses principles to guide → reminds values
- Agility, but will not compromise on belief, values & vision.

Read
to
understand

- Now indicate - No. of Grand slam medals we win!

Bottom line needs → RAVENHAWKS.
→ there.

Learn & Reflect.

- Evaluate numbers on programme
- Routes.
- Optimised.
- Coaches' rewards 'wood', ask players.
- Sit down with all wood, ask players how they would want to use the improved.
- Always chatting to coaches & players.
- Act on feedback ASAP.

Jeff reflect
& self notes

- Had a business mentor
- Had a coffee with Peter King.
- He kept coaching on a weekly basis.
- Reflects, thinks about things like agility, columns, self aware.

Engage ~
professional.

- Access to people! @ Air Woodland. Success.

Learn & Reflect.

- Provide an opportunity
- All about hands. → 20,000 hand
- Make sure all players in terms space
- Long term approach.

Appendix B: Study 2 coding

Rugby data analysis V2										C4-6 Sessions Coded											
Home Insert Draw Page Layout Formulas Data Review View Tell me										C1-3 Sessions Coded											
Calibri (Body) 12 A										Conceptual model											
B I U v f										Thematic analysis of cognitions											
S40										Thematic analysis of verbal act											
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AC										JW S1 MUS JW S2 MUS TR S1 MUS TR S2 MUS JW S1 MUS JW S2 MUS											
Higher psychological functions										AC											
3 Actions										Problem solving											
Thought content										Information to help problem solving											
4										SOLUTION BY											
Thinking										AC											
Intensity of emotion										AC											
Quality of the action										AC											
Interplayer communication										AC											
Technical evaluation										AC											
Predicting on field, space and tactical evaluation										AC											
Decision-making										AC											
Player's level of understanding										AC											
Questioning player communication										AC											
Questioning what players are doing										AC											
Questioning what players are understanding										AC											
Questioning what players are doing										AC											
Knowledge of game rules (rules, tactics (strategies), what to do to 'win' it).										AC											
Goal of the game										AC											
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Appendix C: Coach's background questionnaire

Intro

- This questionnaire explores your background as an athlete and coach.
- I would like to record your responses.
- The research is strictly confidential – no one will be able to identify you or your players.
- It should take between 1-2 hours.
- You can withdraw from the research at any time.

Questions

Please describe:

Q. What's your family and educational background?

Q. How did you get into ice hockey?

Q. Talk me through your ice hockey career including:

- Achievements
- Challenges
- Critical incidents
- Strengths/weaknesses
- Influences

Q. When did you start coaching?

Q. Why did you start coaching?

Who/what was involved in your decision to start coaching?

Q. How has your coaching career progressed? Can we now discuss your:

- Achievements
- Challenges
- Critical incidents
- Strengths/weaknesses

Q. What is your current job title and role?

Q. What types of participants do you work with?

- Age, level, gender etc.

Q. What is your current coaching philosophy? How has this evolved?

Q. What particular coaching challenges do you face in your coaching currently?

How have/do you resolve them?

Can you provide some examples?

Q. Who/what has had the most influence on your coaching?

Q. From what other sources have you learned to coach?

Q. What is your current coaching qualification and level?

Q. What are your plans/ambitions moving forward?

Q. In what ways would you change your coaching?

Q. Anything else to add about your coaching background?

Appendix D: Vignette 8: Feeding back to the players using video analysis

Vignette 8: Feeding back to the players using video analysis

It was late October and almost two months into Chris' first season as the head coach of The Storm. Despite the many observations he had made, and feedback he had provided, to his players, his team were not winning as much as he had expected or hoped. Given that The Storm were a newly-formed team, Chris expected that there would be a period of time for the players to gel and find a certain rhythm when playing. Ice hockey is a game built upon playing systems that require a high degree of precision in order to function effectively (Allain, Bloom & Gilbert, 2019). Therefore, it was important for Chris to implement systems that his players could understand and were suitable for their skill levels. After six games into the season, Chris spent many hours trawling through footage of games in an effort to make a video that he shared with the team, first via WhatsApp and then discussed in a wider team meeting. The video consisted of key themes that he had identified as either strengths or weaknesses. Video feedback was supported by the players. Both Russ and George had expressed in earlier interviews that they valued video feedback as it allowed them to see themselves on the ice and witness their own mistakes from a third person perspective (c.f. vignette 3).

This story reveals Chris' analysis of the Storm and his thinking behind the strengths and weaknesses. He shared the feedback in the changing rooms on the central monitor. Providing feedback to his players in this format allowed him to make his points with evidence, but also to identify the key areas of focus with little time pressure and within a deliberative environment. After Chris had shared the video analysis with the players, he received many positive comments thanking him and it was evident that the players were appreciative of being shown what was happening from a different point of view. Although the video was shared electronically, the team spoke about the video at the next practise session and it was viewed on the central screen.

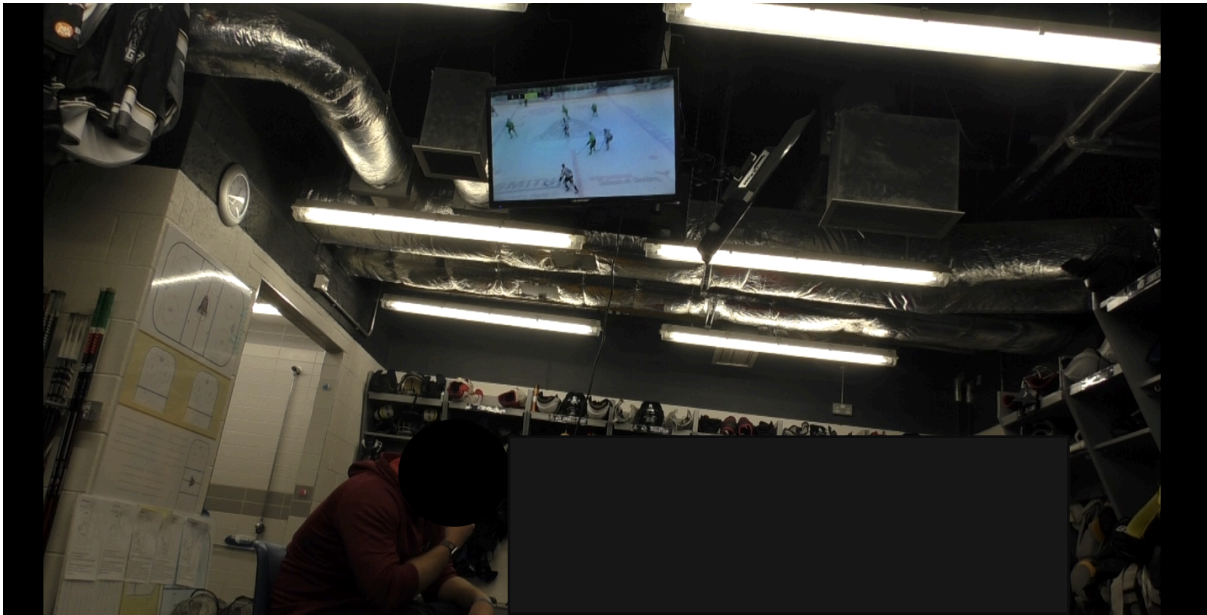


Figure 8.9: Chris sharing his video feedback

Chris began the video and explained his analysis and conclusions: “so the first bit here, I just went over a few situations with them where we have made dumb plays and given the puck away. So, turnovers, throws, the puck across the ice, to nobody, bang, they’ve got it in our end, like, in fact their guy throws it as well which is a bit unnecessary. Here, like comes back and he just flips the puck into... like what is that? What productive thing is going to happen from just flipping the puck to them like that?”. He paused briefly, and then shared a different clip to make his point “here, stick handling into traffic, there is only ever going to be one result there. If you are skating into three people, you ain’t coming out the other side of that with the puck. And he ends up with a shot on net. Here, he throws the puck across ice, turns the puck over. Goal scoring chance. Again, silly pass, you know what I think I probably stopped the video at the time and told them”.

uctive

Chris continued to share his thoughts about players trajectories and directions which is an important intricacy of ice hockey, “so when we get the puck here, the play is not to pass to this guy in the middle, it’s to put the puck, softly, here because his feet are moving that way and he is going to get there before him and him.” On this topic, he was asked, “because they are both facing forward?”. He replied, “Yeah, yeah, and he just tries to pass it to him as you can see. And this guy, he is starting to move this way, you can tell by his feet. Turnover, just a soft chip down the boards there, 20 could have skated on to that, we’ve got the puck with good possession in their end. It’s just a silly, thoughtless play”. The direction that players were facing appeared to be high on Chris’ list of factors to remedy. In this instance he was

firstly drawing on his knowledge of being a defender, which required a clear field of vision at all times, and, secondly, applying his knowledge to solve a problem that he had noticed on the video recording.

At the next stoppage in the video, Chris was asked a follow up question on the topic of the player's direction of vision, "so when you are an attacker going over the blue line, you are not only meant to be looking where your guys are going and their paths and the defence, but also the hip position as much as anything else to work out where they are going to be going?". Chris paused and thought for a few seconds, he replied "that's kind of an intricacy of the game. I probably wouldn't think of it whilst I was playing. The rules are hard and fast, if you can skate the puck into the blue line, you skate it, and if you can't it gets in there one way or another. So, if you are being squeezed out, you chip it. But if you can enter it with full control, enter it with full control, head to the blue with full control, it's not rocket science, why would you chuck it away if you can skate it in? But if you can't, you are being squeezed, you can pop it. I don't think you would look at their hip position and think he is coming and go (think) I'm being closed down. It was just a naïve, silly play". After he had given his answer, he pressed play and began to watch his video.

As the video came to a natural pause, Chris was pressed on how this information was delivered to his players, "so what are you saying to the players as you show this?". He responded, "when it's bits like that, I would just go, we are turning the puck over too much and just play it. But that one there where I stopped it and paused it, I said, what's the play then? Someone tell me, what is the play? And someone will have put their hand up, I can't remember if it was a forward who said, 'I should have chipped it'. And then I go, 'well there you go and look what happens, bang' [presses play]. Pucks to him, he turns it over, they go and have a shot down the other end." Although the emphasis in this study is on the coach's thinking processes, one advantage of the video replays is that it provides the players with 'specific instances' of more general principles and scrutinizes their decision making. This provides the players with a comparator for future play or evaluation.

Chris stopped the video recording and reflected briefly on the game in a wider sense, "Hockey is a game where, as you know because you come and watch the games, it can go from that end to that end in 3 seconds, 4 seconds, like every time you turn the puck over, every time you give possession away unnecessarily, you are giving that team a chance to be in your end and shooting at your goal in no time. So why would you give that (the puck

away) if you didn't have to? And every team does it, you know I always say it, mistakes happen, if no one ever made a mistake every game would probably finish 0-0. How many games of 0-0 ice hockey have you ever seen? None! I think I have been involved in one in my entire life which was a first leg of a cup final. It just doesn't happen, people make mistakes. It [the puck] moves at a hundred miles an hour, sometimes your brain doesn't move quickly enough to react to every situation that the game throws at you. I know that, I'm not an idiot, but [still]". This shows that Chris was able to view the game of ice-hockey in a wider context and understood the nature of the sport. By understanding the detailed technical aspects of ice-hockey, it is clear that Chris was aware of what he could and could not control. Therefore, due to the dynamic nature of the sport, he was attempting to implement strategies that acknowledged the variability of the game and in the players' performance, the likelihood that the opposition would impact the effectiveness of his tactical control. It seems clear that one of Chris' strengths was drawing upon established solutions but applying them to the specifics of the team's situation.

In mid-flow, Chris continued to the next section of the video, "so this next section, don't force and composure. So, this one is Ryan, going back to doing Ryan things that I spoke about earlier. What's that? He's gone up the ice by himself, he has actually got support... passed the puck to them [the opposition]! So those are the things he hasn't stopped doing". Aware of how he was delivering the information, he remarked, "so this one is a positive, so I am interspersing positives with negatives. So it's the power play, we are moving the puck, moving the puck into spaces, it's nothing overly complicated, it's nothing elaborate and then at the end of it we are rewarded with a goal. Bearing in mind that the player who passed the puck and the player who scored the goal are currently injured!". It was clear from this statement that Chris was still frustrated by the injuries that his team had acquired and implied that the good parts of the video recording were performed by those players who couldn't currently contribute.

He continued, "this one, good net presence, that's what we need. We always need a player up high, F3, he is always a high guy which stops you getting outnumbered when they get the puck and go back at you". To clarify what he meant, he was asked, "in that situation, it's number 19?". He quickly responded, "it's him [pointing to a player on the screen], he is the defender. So, it's him, if the player with the puck is up high, we need two players to the net. If the player with the puck is down low, at least one of the other players has to be above him and higher than him. So, this one is good because he brings the puck out high and the two

guys with him go to the net and nearly score a goal because of it". He was questioned further on what he meant, "and I'm guessing that you are hoping for a save and deflection or ricochet?". He replied, "or it goes to the goal and the goalie doesn't see it. So, you've provided a screen like that. The goalie had no idea where that puck was, it didn't go in, but he had no idea where it was. So net presence is something that costs nothing, takes no talent to establish, but it's very hard to get players to do it". To clarify, Chris was asked what he meant by 'net presence' and he simply replied, "Having bodies around their goal".

The video recording moved on to the next section and Chris carried on with his feedback, "and this bit is a positive, having desire and desperation, someone just wanting to make something happen, working hard and being desperate to do something. [The video plays] he's not getting caught there, he is desperate to score and guess what, he scores. Sometimes, that's not something I have told him to do, that's not something I have drawn on the board, that's just someone going out there, seeing there is a little bit of a gap in their back line. And again, here is another play with some good desperation. This time he just tried to stuff it in the net, I like that!". This passage demonstrates Chris' emphasis on hard work, resilience, and grit with his players. It is possible to speculate that this focal theme stemmed from his own playing style and his own admission of not being the most talented player, but one who was willing to make up for it with sheer hard work and learning.

Chris carried on explaining, "here are some more negative examples of where we don't want to shoot the puck. He takes it in, nothing comes of it. If he had thrown it on there like". To understand what he wanted his players to do, he was asked, "so what would you be coaching him to do there?". He responded in an animated fashion, "shoot the puck! When you are shooting the puck from here, you aren't necessarily thinking that you are going to score with it, if you throw the puck on net from there to here, unless you chuck it in his glove in which case you are going to get a face off in their end anyway, which is positive, then it's either going to hit him in the leg and pop out, either way, he is going to have to make a save." He paused briefly to reflect, "alright, so you're not always shooting to try and score, you might score... any time you put the puck at net there is a chance that it might go in because the goalie might have a mare. But if you are chucking the puck from there at the goal which is the play he should make, which he doesn't, he is there, he is going, there is a chance that something positive will come of that. If you just skate the puck in and someone takes it off you, nothing will come of that, and it doesn't because he just does that. Again, he hesitates, doesn't want to shoot". Chris was clear about the purpose behind wanting his

players to shoot. In this instance, he was aware that without shooting, nothing positive was likely to come of the play. The act of shooting yielded multiple possibilities, which indirectly, might result in a goal.

Chris was interested in other famous coaches and players (c.f. vignette 3) and sought to clarify his thought processes behind encouraging his players to shoot. He paused to think for a moment and then said, “there is a famous [Wayne] Gretzsky quote that actually goes across a lot of sports because a lot of people have said it to me – you miss 100% of the shots that you don’t take. Right, in any sport, you can’t score without shooting, in any sport... Goalies make mistakes, unless it is in their catching glove, it is going to come out somewhere, it’s going to come out because it’s the only piece of equipment that they can stop the puck with, so if it hits them in the blocker it’s coming out, if it hits them on the leg, it’s coming out, unless it hits them in the chest and then the can you know [Chris moves his hand towards his chest suggesting that the puck might be cradled] swallow it in, or it hits them in the catching glove and they can freeze it”. From the many conversations with Chris throughout the study, it was clear that he spent time educating himself in an informal capacity, often drawing lessons from what others in sport have written. The Wayne Gretzsky quote resonated with him, it was one that he had mentioned before, but it was another example of his intent to explain what he meant to players, coaches and researchers.

The video recording restarted, and Chris resumed his analysis: “so these ones here are good, what we call dumps. If you dump the puck, you put the puck in their end. I’ve said that they are good smart dumps and we are putting in their end where we know we are going to get to it first. That’s not good defensive play from them, they’ve got 4 guys, you could throw a blanket over them. And another one, good dump, you can see Ryan’s got speed, he gets to the puck first, scoring chance. Another one here, get there first. So, these ones here are goal situations. We have got way better at this since this game. This was our first league game of the season. So, I’m pausing this and going [Chris paused the screen to show a still image of the team all in one third], in that picture is every single player we have got on the ice right now. Right, so how many players in a green shirt (the opposition wore green shirts in the match) can you see on that screen?”. The reply from the researcher was “2”.

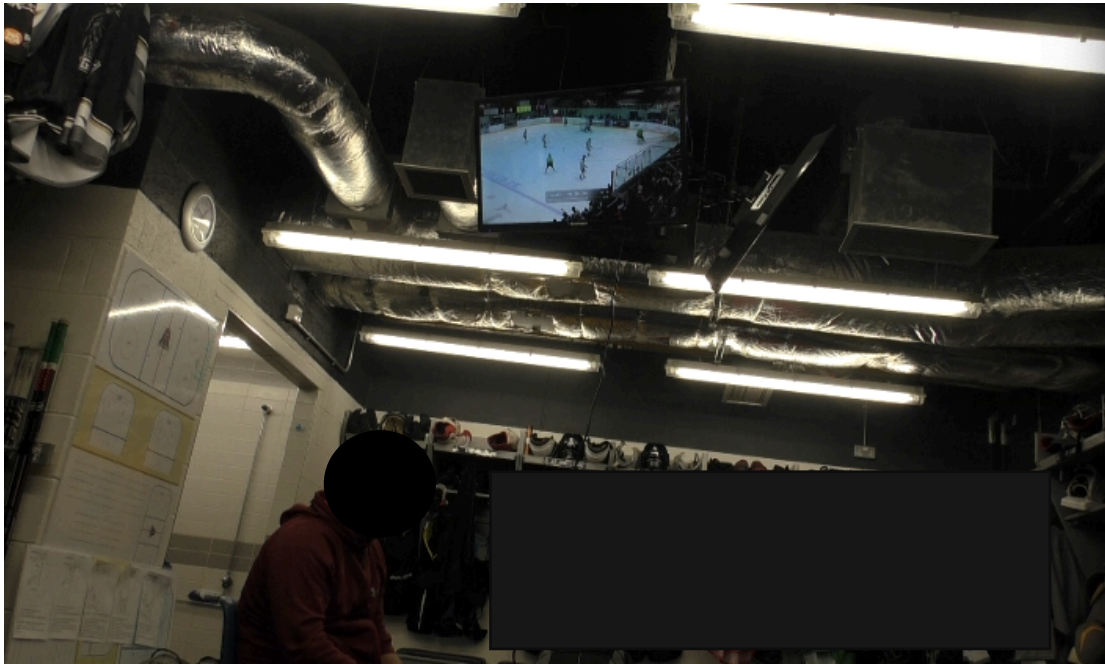


Figure 8.10: Chris pauses the video to make his point

Without much hesitation, Chris carried on with his explanation, “so that’s a two on five! Right, but look at this, head facing that way, head facing that way, head facing that way, he’s probably the only one in a decent position because he is off the back post and can probably see everything, but still, head facing that way. Right, the player here (in) contact, which you are sort of trying to do, but hard contact, force him to the wall, next nearest player, which is G, come in here, pick up the puck, we’re gone before any of the rest of their players arrive. But what we do is a half-hearted attempt at making contact. Does nothing, does nothing, does nothing, does nothing [Chris holds the cursor over four players] and then... well we’ll see, more [defenders] arrive, because we are looking down the way, players are coming in behind us and we have no idea what is going on. Because everyone’s head is turned the wrong way, facing the wrong way and we have no idea what’s going on anywhere else on the ice”. By using the video recording in this fashion, it allowed Chris to make observations that would otherwise have been impossible in a non-deliberative environment. His ability to notice the head position of each team provided a telling insight into what Chris was focused on.

Chris was questioned on the subject of player positioning, “so if you could physically move your players on that screen, how would you rotate them? You said the guy on the green at the moment should smash him to the boards. Number 9, that’s G is it?”. He replied, “yep”. In an effort to understand his thoughts, he was asked “where would you expect the other 3

guys to be?”. Chris paused and said, “He’s not in a bad position, but his feet are pointing the wrong way and therefore his head’s facing the wrong way so he can’t see what’s behind him”. “So should his back be to the boards?”, he was asked. At the point, Chris took out his clipboard to explain “He should probably be facing... his feet should be pointing that way [whilst signalling on his whiteboard]”.

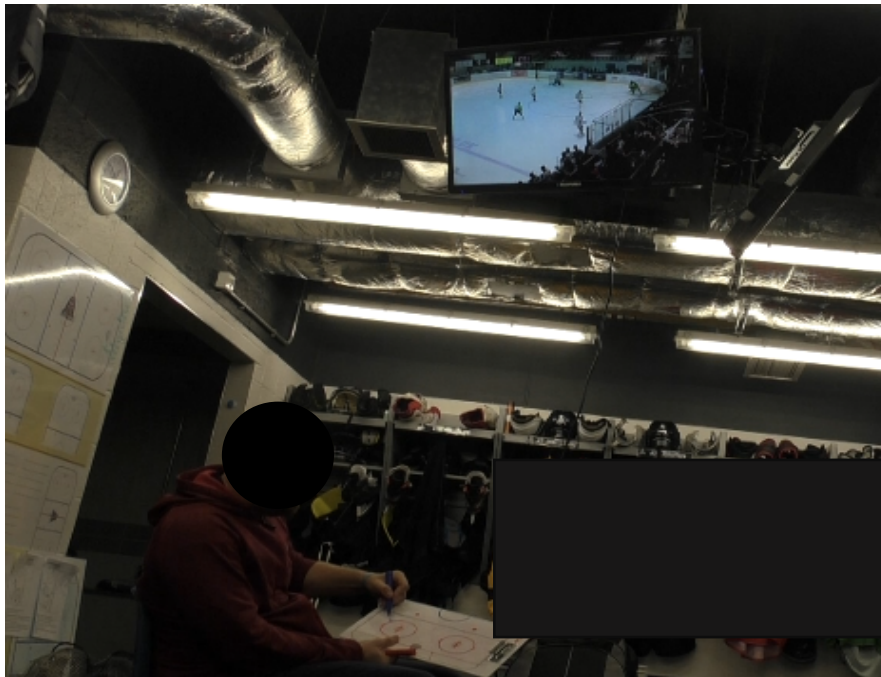


Figure 8.11: Chris takes out his clipboard to explain which way his players should have been facing

He continued, “He should be going that way, because if his feet are pointing that way, his line of vision is that, so he can see all of that, or probably that in fact. So what he has done, is he has pointed his feet that way, so all he can see is pretty much that. Does that make sense? But what really happened, I think the D man, Steve Rusk, should have made contact, pinned him, G should come and pick up the puck and we’re gone, before any of this happened. But no, we’re all looking at the puck, we’ve got much better at this. Doing nothing as it said in my little caption there, skates in, everyone facing the wrong way. So we’ve turned a 2 on 5 situation into a 5 on 5 situation”. This illustrates Chris’ understanding by way of a performance model of what should have happened. His ability to recall and explain what should have happened, whilst comparing it to what actually happened on the screen demonstrated his ability to recall and diagnose problems.

As the video continued, Chris watched it intently and then paused it and asked, “You see that one there, that’s a different situation, right. So we always say, before you step up, check the numbers around you. OK, so if the D thinks he is on a one-on-one, then he has to contain it. If the D think it’s a 2-on-2 he probably has to contain him. But, if at any point we have more numbers back than them, then I’m more than happy for my D, so long as he checked his numbers to take an attempt to try and step that guy up.” Chris plays the video, “What happens here is Jeremy steps up and misses him, but we’ve still got numbers back. So, I’m not going to tell Jeremy, what the f**k do you think you are doing stepping there? Because he’s got numbers, he’s well within his rights to step, but what happens is he steps and gets beaten and the numbers back don’t pick up.”

Chris rewound the clip and provided further analysis on the play, “so what’s happened here is that Benny, Ben here, this guy, Ben is more than capable of taking a one on one with this guy, but he is trying to get a stick on him as well. He doesn’t need to be there, he’s doing nothing! He’s double covering someone and this is the issue, he needs to be further up here in this passing lane so that this pass never happens and then that goal never happens. So by double covering that guy, Ben’s fronted up, he can see everything they are doing, he doesn’t need someone behind trying to hook him from behind the goal, that guy needs to get across there [Chris points with his hand]. Whilst getting across there, he needs to be going there via the passing lane, so they had [Chris picks up his clipboard again to illustrate] puck carrier, player, player. We had D who is recovering, tried to step up and he’s missed him. D who has locked on with that guy and then a forward trying to help this guy who doesn’t need to be there. What he needs to do is go, he’s got the puck, he’s going this way, there is a lane there, so I need to go here. So, if he comes in and tries to make this pass, I’ve got my stick on the ice and that pass never gets there”. This provides another example of Chris’ understanding of what each player should be doing at any one time on the ice. This is an interesting point as it demonstrates Chris’ coaching knowledge and his ability to focus on all positions, rather than simply drawing on his experience as a defensive player.

As he watched the video, he commentated as the play unfolded, “again, that one there, that one’s a good example of what we were doing a lot of early in the year, we have got better. So at the moment, everything is under control. So I think that’s Stoney there with the D, Harry’s got this guy. And then Harry, for some reason, has a rush of blood to the head. Now he’s open, you are working harder than you need to, for the sake of working hard, you are actually hurting the outcome for the team because you are going somewhere you don’t need

to be". By listening to Chris, it became apparent that no player was without fault and he was willing to tell any of his players if they were in the wrong position or not fulfilling their role. This underlines the importance of Chris' interpersonal relationships with the players and how these afforded him the opportunity to deliver the information with credibility and integrity.

The video turned to the final section and Chris explained, "and these one are just net battles, desperation around the net". He was asked, "What do you put the net battles down to?". He thought for a moment and replied, "Mindset, strength, aggression. Generally, 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. That's not Sydney Crosby battling against me stick on stick, it's guess what, we're in such a tight area now, it doesn't matter if it's Sydney Crosby or it's 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".

As the video played, Chris picked out another example to explain, "So this one is where we have committed too many bodies to the same puck. So what should happen here is... Charlie [one of the team's captains] here, centreman, he should stay with their centreman. But what he does is, there centre is quite smart, he stays still for a few seconds and waits for him to get bored and he goes and joins a battle that he has no business being in and leaves him wide open. And then Jeremy [another of the team's captains] here, also thinks he might have a bit and then like we end up with too many guys battling for the same puck. So he leaves him, look he is stood still, then go, bang, he's gone, two on one, should be a goal, but it isn't".

As the final seconds of the video came to a close, Chris remarked, "and this is a positive, so I'm finishing the video on a positive. S**t sandwich right, so I finished that off, tell them something positive right. When we play the right way, we get the puck out wide, make a triangle, someone goes to the net, that is what good can come of it. The things that not only I am preaching, but every coach has ever preached to you that you have ever played for since you started playing the game at ten years old". This final comment implies Chris' continual focus on the basics of ice hockey. He was not asking his players to perform something that they were not capable of, rather he was always looking to see what could be easily fixed yet, made the most impact.

Concept	Summary of Chris' observations
Turnovers (negative examples)	- "A series of examples where the puck is lost in a variety of situations". - "Specific example of stick handling into traffic (3 players). - "Giving a cross ice pass". - "Here the play is not to pass to this guy, put the puck here softly because his feet are moving this way and he's going to get there before him and him".
Don't force/composure (positive examples)	- "Going up the ice by himself, passing the puck to them". - "Positive example of the team scoring a powerplay goal". - "Good net presence, we always need a high player as it stops you getting outnumbered". - "If the player with the puck is high [away from the net], we need two players to get to the net". - "Net presence costs us nothing, but very hard for us to establish". - "Willpower is important, we have got to want 'it' more than the other team".
Don't turn a shot down (negative examples)	- "When you shoot from this position, you don't necessarily expect to score". - "The netminder might deflect it to the oncoming attackers and something positive might come of it".
Good smart dumps (positive examples)	- "Looking at the opposition, they don't have good defence. There are four players there and you could throw a blanket over them". - "A good dump to someone with speed, we get there first".

Numbers back/doing nothing/watching/not picking up (negative examples)	- "In this picture I can see every one of our players, this means it is a 2 v 5 not in our favour". - "Head position means we cannot see everything". - "We are looking one way and the opponent comes from behind and we don't know what is going on". - "Feet are pointing the wrong way, so his face is pointing the wrong way". - "The line of vision is wrong when we defend, so all we can see is the person with the puck". - "Our numbers do not pick up when the defence goes forward". - "It hurts the team when you go where you don't need to be".
Net front battles/strong stick/desperation. (negative examples)	- "This boils down to strength, aggression, bloody mindedness". - "Whack it until the puck moves in the direction you want it to". - "We have committed too many bodies to the same puck. In this example, two people who have gone into battle for the puck and we have lost it".

Table 8.1: Table of Chris' concepts and observations as outlined in his video feedback