THE UNIVERSITY OF QUEENSLAND

AUSTRALIA

Examining how an Australian Rules Football Coach makes Decisions in the Coaches' Box on Match Day

Bradley Vanderwert

Master of Sports Coaching

A thesis submitted for the degree of Master of Philosophy at

The University of Queensland in 2016

School of Human Movement and Nutrition

Abstract

The Australian Football League (AFL) is the premier competition for the sport of Australian Rules football. The game has historic significance, financial importance, and is a cultural institution in Australia. Unfortunately, there has been limited empirical research related to coaching within the sport. The little research that has been completed highlights the coaches' box as the most challenging environment for an AFL coach; in particular, decision-making and the ability to facilitate this when emotions are running high during the match. The purpose of this research study was to examine coaches' decision-making on match day using the Naturalistic Decision Making (NDM) framework. In doing so, this study included the use of semi-structured interviews and stimulated recall interviews to collect data. Semi-structured interviews were conducted one-on-one with a male head coach who had a coaching history spanning over 16 years and 11 years coaching either semi-professionally or professionally as a head coach. In addition semi-structured interviews were conducted with nine male players, seven of which were currently contracted by an AFL club and two other players had previously been contracted. The players were split into three focus groups and two male runners who were used on match day to pass messages from the coach to the players formed one focus group. The interviews were completed to determine the perceptions of the head coach, players, and runners regarding the influence a head coach's decisions had on match day. In addition, three stimulated recall interviews were conducted with the head coach across the span of three games. The purpose of these stimulated recall interviews, was to describe and understand the critical or important decisions made. The data was qualitatively analysed using a deductive-inductive approach creating 'meaning units', which were categorised and organised hierarchically. Two key themes emerged from the data analysis, First, the data revealed head coach decisions were perceived to influence the game in the context of retaining or regaining control of the match, particularly when the game was not going to plan. Second, the data revealed a two-part assessment process when assessing a situational problem to describe and understand head coach decision making. The two parts of assessing a

situational problem were: Situational Story and Player Knowledge. Situational Story is about scanning the situation, framing the problem, and understanding the trend of the game, allowing the coach to build up a 'story' to understand the situational problem. Player Knowledge represents knowing the history of an individual player's role, position, and footballing capabilities, which was key to making the decision as it helped the coach to finalise or complete the slow interactive script and form the appropriate mental model for subsequent decision making. The information, gathered from continuously scanning the situation, combined with the knowledge the coach had on individual players, strengthened the assessment, and allowed for the decision to be made. This research contributes to the literature by providing an understanding of a coach's decision making process throughout a match and potentially adding to the description that there are two levels of semi-deliberative decision making on matchday. Furthermore this is the first study to investigate decision making within a professional Australian Rules Football match. There are several implications for coach development from this study. Coach developers can potentially break up the formal learning process into two sections: (i) Describing and Understanding how a story is built; and (ii) Understanding the importance and the type of player knowledge needed to help take the decision. Formal learning can consist of discussions with coaches, designing mock scenarios and helping to identify and match player capabilities to situational problems. Coach developers can use experiential learning and reflection, to intentionally build on player's historicity and deliberately add depth of knowledge. The findings of this study indicated that the coach's decisions could influence the game when trying to regain control of situational problems. By understanding the two part assessment process based around these situational problems, coach educators might develop learning programs based on scanning and/or player knowledge. Knowing what information is scanned helps understand what forms a situational problem and can help the coach to recognise situational problems sooner. By understanding the role historicity plays in allowing a coach to make decisions, learning programs can focus on improving a coach's deeper understanding of player's role, position and footballing capabilities.

This knowledge can finalise the coach's script and make the decision quicker, increasing the chance of influencing the game. The findings support existing literature in relation to how the coach cognitively operates within the Naturalistic Decision Making paradigm. In particular, describing coach's decision making as semi-deliberative, coming to the most appropriate decision on an ongoing basis, the use of a slow interactive script, story building and feature matching. The limitations of the study included: (i) the number of players per focus groups, due to availability of players the numbers were unable to be organised to optimise discussions between players: (ii) the immediacy of the recall, which occurred two days after the game due to logistical reasons, where ideally this would have occurred sooner: and (iii) not taking notes when reviewing the transcriptions, limited the ability to get a sense of scope and identify occurring topics. Future research might consider additional case studies within the sport and across different sports to provide a stronger evidence base for understanding how coaches make decisions within a match. In particular whether or not there is merit to different levels of semi-deliberative decision making and what factors make decisions more and less deliberative.

<u>Declaration by author</u>

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my research higher degree candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

I acknowledge that an electronic copy of my thesis must be lodged with the University Library and, subject to the policy and procedures of The University of Queensland, the thesis be made available for research and study in accordance with the Copyright Act 1968 unless a period of embargo has been approved by the Dean of the Graduate School.

I acknowledge that copyright of all material contained in my thesis resides with the copyright holder(s) of that material. Where appropriate I have obtained copyright permission from the copyright holder to reproduce material in this thesis.

<u>Publications during candidature</u>

There were no publications at time of submission throughout candidature.

<u>Publications included in this thesis</u>

No publications included.

<u>Contributions by others to the thesis</u>

Dr. Steven Rynne (Editorial feedback; Research design 10%)

Prof. Cliff Mallett (Editorial feedback; Research design 5%)

Prof. John Lyle (Research design 5%)

<u>Statement of parts of the thesis submitted to qualify for the award of another degree</u>

None.

Acknowledgements

Academically and professionally, I would like to acknowledge and thank Dr. Steven Rynne for being first point of contact throughout my candidature; and Professor Cliff Mallett who has always given his time when asked. Particularly in his travels to Melbourne for other ventures, Cliff has always made time for me and more importantly initiated contact, which for an external student who has no face-to-face contact with anyone, is a massive consideration. Steven and Cliff have showed empathy, patience, direction and unequivocal support throughout my candidature, which has undoubtedly been one of the most challenging commitments to follow through with and complete.

Professionally, I would like to thank the AFL Club and the participants involved regarding their openness and willingness in allowing me to follow this path. This was an opportunity that could not be taken for granted and I thank them for the opportunity. Their professionalism and patience throughout this process has been second to none.

Personally, I would like to acknowledge and thank my wife (Belinda) whose patience, selflessness and support have been unequivocally limitless throughout the duration of candidature. No words can put into perspective the support she has provided. Her support did not question intent or necessarily understand reasoning, but her support respected and trusted me as husband, father and friend.

Keywords

coaching, situational problem, scanning, historicity, AFL, bench coaching, elite, high performance, sport

Australian and New Zealand Standard Research Classifications (ANZSRC)

ANZSRC code: 170202 Decision Making 100%

Fields of Research (FoR) Classification

FoR code: 1702, Cognitive Sciences 100%

Table of Contents

Figures & Tables

Abbreviations used in the thesis

- SR – Stimulated Recall
- CDM – Classical Decision Making
- NDM – Naturalistic Decision Making
- RPD – Recognition Primed Decision
- AFL – Australian Football League
- VFL – Victorian Football League
- AFLCA – Australian Football League Coaches Association

Chapter 1: Introduction

 The Australian Football League (AFL) is the pinnacle and premier competition of the sport of Australian Rules football. The game is played with a leather oval ball on an oval field. There are 36 players on the field at any one time (18 players per team) and each team has an additional 4 interchange players on the bench. Players can move to any point on the field, with no zones or off side rules. The game is broken up into 4 quarters lasting 20 minutes of playing time; meaning every time the ball stops or goes out of play, the time stops. Players score between 4 posts located down each end of the field, two tall central posts and two smaller posts, one either side of the taller ones (As seen in Appendix A). Teams aim to score by kicking the football in between the taller middle posts for a goal that earns 6 points. If they miss to the side, but in between the big and small posts one point is scored. If the ball hits the big post 1 point is given. If the ball hits the small posts the ball is out of play. Presiding over play, there are three field umpires, four boundary umpires and two goal umpires. Each team is also allowed two runners who can run on to the field and pass on messages and instructions from the coaching team to the players. The coaching team sits in a "box" located in the stands, allowing for a bird's eye view of game. The coaches' box is a small confined space that generally fits 4-5 assistant coaches and technical support staff who provide statistical data and cut live footage for the coaches to give immediate feedback in the three breaks during the match. With the collection of bodies in a small space, and the mix of opinions all directed at the head coach, the most effective decision is needed to influence and direct the outcome of the game.

 Winning the game and ultimately the AFL Grand Final is the pinnacle of Australian Rules football. Losing games and limited growth or success often correlates with the sacking of a head coach, along with negative financial, cultural and commercial decline (e.g., loss of sponsors and/or members). The head coach plays a large role within the AFL, which as an organisation is historically significant, financially important and socially relevant.

The coach has been central to Australian Football since 1858 when the first game was recorded in Victoria (Australian Football League [AFL], n.d.). The game continued to grow and in 1986 the Victorian Football League (VFL) was formed (Australian Football League [AFL], n.d.). In 1990, due to the expansion of the league too other states of Australia, the league changed its name from the VFL to the AFL (Australian Football League [AFL], n.d.). As the game grew, so did the stature and importance of the coach and the amount of assistant coaches and support staff. The increased number of physical bodies has had a concurrent effect on the number of opinions within the football department, specifically in the coaches' box on match day. Taking the best decision from the mix of valuable opinions, in short time-frames, within the confines of a coaches' box can influence the outcome of the game.

In 2002 the AFL created its own independent association devoted to coaches called the Australian Football League Coaches Association (AFLCA), which provides support for all coaches within the AFL on various levels ("Who we are," 2009). Currently the ALF has 18 clubs within its competition with each club consisting of a head coach and an estimated 150 assistant coaches ("Who we are," 2009) in addition to a variety of other professionals such as physiologists, psychologists, managers and statisticians. All of these professionals add to the mix of opinions and data that potentially influence the decision making of a head coach.

The AFL's annual report for the 2014 season highlights how financially important and socially relevant the competition is with the total attendance for its home and away season being 6,402,010 people with an average attendance of 32,333 (Australian Football League [AFL], 2014). In 2010, the attendance figures were the third highest in the world for a professional sports competition, with only the American NFL competition and Germany's Bundesliga ahead (Australian Football League [AFL], 2010). These attendance figures highlight the demand for AFL by the Australian public that, in turn, promotes revenue through sponsorship and broadcast deals. In 2010, the AFL reported a record revenue of $335.8 million and in 2011 announced a new media broadcast deal worth $1.25 billion each year for 5 years from the 2012 premiership season onwards (Witham, 2011). Total head coach were

estimated at $9 million in 2014, which averages out to be about $525,000 per head coach, with assistant coaches averaging $125,000 (Sheahan, 2011).

The head coach is the face of the club and they have a responsibility to represent the club to the public and commercial partners through press conferences, newspaper articles, events and functions. With the paying public listening to what is said and millions of dollars invested in the game, the coach is constantly under the microscope; accountable when not performing and hailed when successful.

With the status and pressure of an AFL head coach being so high, Mallett, Rossi, and Tinning (2007) have examined coaching knowledge, learning and mentoring in the AFL. They found that the head coach was open and passionate to developing their coaching practice, by using respected and trusted mentors, peers and other professionals to assist in their learning including a "personal dynamic social network that continued to evolve" (Mallett et al., 2007, pp. 6-7). The landscape of coach learning in the AFL is "serendipitous and opportunistic" rather than being "structured and systematic" (p.7) and AFL coaches are not being challenged. Their coaching practice is only affirmed by their own observations and then only over a period of time do coaches refine their own coaching behaviours. In relation to coaches' decision making, this poses the question: are coaches refining their own decision-making behaviours? And if not, what learning is taking place to improve coach decision making on match day?

Although coach learning in the AFL is limited, coaches are still passionate about developing their practice, however the biggest concern and "undoubtedly, the most challenging task for coaches was the coaching box on match day" (Mallett et al., 2007, p. 6). Suggesting it may not be performing optimally with the "lack of clarity of roles and constructive feedback are barriers to effective functioning" (p. 6). Furthermore, the "ability to control emotions in the box was thought important in facilitating effective decision making" (p. 6). It is precisely these decisions, made under pressure by the head coach in the box on match day, that this study is concerned with. The aim is to describe and understand how an AFL head coach makes decisions in the coaches' box on match day.

Aim and Significance

In this study, I will use the naturalistic decision-making (NDM) framework (Lipshitz, Klein, Orasanu, & Salas, 2001; Lyle, 2010) to examine the decision making of an Australian Rules football head coach on match day. To achieve this aim an attempt will be made to establish whether or not head coach's decisions influence the game or at least are perceived to impact the game and; second, by examining the coach the aim is to describe and understand how an Australian Rules football head coach makes decisions in the coaches' box throughout a live match within a regular season. This line of research has the potential to inform coach education and professional development opportunities for understanding and improving the decision-making capabilities of Australian Rules coaches on match day.

These aims are significant because they might potentially provide coach educators the ability to know what to teach novice (high performance) coaches in order to advance their development and education, to improve their ability to make decisions under pressure. These advancements aim to improve the quality of coaching and better inform the decisions made by the coach in a semi-deliberative environment. Improving the quality of coaching and decisions made on match day could help make for more competitive games and potentially improve player performance hopefully strengthening the game financially and socially, and ultimately grow the game.

Chapter 2: Literature Review

Match Day Coaching

There have been various projects conducted for match day coaching (e.g., Boutmans & Swillen, 1989; Debanne & Fontayne, 2009; Gilbert, Trudel, & Haughian, 1999; Smith & Cushion, 2006; Trudel, Côté, & Bernard, 1996), with a focus on coach behaviours at youth level (Smith & Cushion, 2006; Trudel et al., 1996), cognitive management (Debanne & Fontayne, 2009), Interactive Decision Making with youth coaches (Gilbert et al., 1999) and recently Naturalistic Decision Making (NDM) in high performance team sport coaching (Harvey, Lyle, & Muir, 2015). Magazine and newsletter articles briefly cover various sports talking about coaching on the sideline, during the match and at half time (Anderson, 2007; Armour, 1986; Gordon, 1994; Heil & Soter, 2009; Launder & Piltz, 1999; Oxenham, 1998; American Sport Education Program [ASEP], 2002). With regard to AFL coaches, there have been newspaper articles on AFL head coaches (e.g., Roos, 2011) and empirical research reports (e.g., Mallett et al., 2007) highlighting the need for research to be conducted into the coaches' box on match day. Television features provide insights on match day highlighting how the coach communicates to other coaches within the box and other staff on the bench, and provides a small glimpse of decision-making behavior under pressure. These insightful but token examples reinforce performance coaching being a cognitive activity (Mallett et al., 2007). Overall, there is plenty of interest in and growing acceptance of match day coaching as a cognitive (decision making) activity but there has been limited research to date.

Coach Decision-Making.

Coaches' decision making focuses on three types of decision making categories and understanding where they fit into coaching practice, if at all. The three category types are deliberative, non-deliberative, and semi-deliberative decision making. Deliberative decision making is related to time being available, where the coach can evaluate his/her options, therefore deliberating on the decision to be made. Non-deliberative decision making, is the coach having no time to

evaluate the options, needing to make a split decision. Semi-deliberative decision making still requires a quick decision to be made, however there is time available to deliberate (Lyle, 2010).

Deliberative and semi-deliberative decision making are the most appropriate categories to describe coaches' decision making (Lyle, 2010). Non-deliberative, however, is justified as not fitting into this category because although decision making has an element of time pressure, there is "no suggestion that the coach's behavior is (or should be!) completely without conscious deliberation" (Lyle, 2010, p. 28). Decisions concerning what to plan, schedule, and who to allocate resources to is an example of deliberative decision making (Lyle, 2002). Deliberative decision making can also be termed as Classical Decision Making (CDM) which is "typically applied during planning, implementation and review stages of practice to progress their athletes (or clients) toward set goals" (Abraham & Collins, 2011, p. 374). Although there is a school of thought suggesting that CDM is not the preferred paradigm to best describe coaches' decision making (Harvey et al., 2015; Lyle, 2010), it can be argued that it does have a place within coaching practice (deliberation) as it plays a key role with the implementation and initial development of mental models (Abraham & Collins, 2011).

Semi-deliberative decision making is specific to Naturalistic Decision Making (NDM) (Lyle, 2010) and coaching practice in terms of "coming to the most appropriate decision on an ongoing basis" (p. 29). Which is argued to be "crucial at key moments in training and games" (Abraham & Collins, 2011, p. 377). Coming to the most appropriate decision is achieved through the hierarchical organisation of mental models, which for coaches is "nested in nature" (p. 558). In other words, existing mental models are used as a starting point in finding a solution to a problem and further ideas of how to solve the problem stem from this nested mental model (Abraham et al., 2006). This cognitive process links directly to the role CDM plays in strengthening those mental models. For example, continuing with the story, the coach made the change to play Fred with Bob and he perceived the decision to work. Now the coach has a model of when it is raining. Bob and Fred can work

together to create scoring opportunities. Decision making plays an important part in everyday coaching practice and both CDM and NDM have a place within the coaching domain (Abraham & Collins, 2011). In the next section, I will discuss both NDM and CDM theories and explain there appropriateness to the coaching domain and how they impact on coaching practice.

Naturalistic Decision Making

This section on Naturalistic Decision Making (NDM) defines and describes NDM, including its history and explaining its appropriateness to sports coaching. The related theme of intuition will be explained and how this forms the basis of the most recognised NDM model, Recognition Primed Decision-Making (RPD). The RPD model will be explained and explored to understand how it relates if at all to sports coaching.

Naturalistic Decision Making (NDM) focuses on the experienced decision maker (Lyle, 2010; Ross, Shafer, & Klein, 2006) or the proficient decision maker (Lipshitz et al., 2001), and aims to describe and understand how experts use their experience or expertise to take decisions within their specific domain that is meaningful and familiar to them (Lipshitz et al., 2001; Lyle, 2010; Zsambok, 2009). Experienced people work as individuals or in groups and operate in dynamic, uncertain and often fast-paced environments trying to identify and assess their situation (Zsambok, 2009). Coaching in the box on match day might be considered to meet these criteria in that it operates with a group of people, by the head coach. The coaches' box is a confined space, where pressure and uncertainty of assessing situations and making decisions can be high. This is due to the limited time available within the game and the affect the three points (awarded to the wining team) has on the team from a historical, financial and social perspective.

Naturalistic Decision Making (NDM) emerged in 1989 (Klein, 2008) at a conference in Dayton (Ohio), which was sponsored by the Army Research Institute (Lipshitz et al., 2001). The Army and the Navy showed an interest in decisions made under extreme time pressure and uncertain conditions after mistakenly confusing a

commercial airliner with a hostile attacker (Klein, 2008). Since then NDM studies have expanded throughout different domains and various field settings, e.g., navy commanders, jurors, nuclear power plant operators, army small unit leaders, anaesthesiologists, airline pilots, nurses and highway engineers (Klein, 2008, p. 457).

The appropriateness of NDM to sports coaching has been reported in the literature that examines and illustrates how the findings of NDM resonates with semi-deliberative decision making in coaching practice (Lyle, 2010). The benefits of applying NDM methodologies and themes within the coaching context are substantial (Lyle, 2010) not to mention that the "circumstances under which the NDM paradigm was most useful mirrored the emerging consensus on coaching practice" (p. 39), such as continuously assessing situations and the cognitive organisation of an expert coach throughout coaching practice. To add more depth to the standing of the NDM paradigm within coaching practice, recent findings situated within training sessions and games suggest that "concepts from the NDM paradigm provide a suitable framework for analysing and describing the coaches' decision making behavior and a useful tool for interrogating the semi-deliberative decision making within a coach's practice" (Harvey et al., 2015, p. 165).

An NDM-related theme, by way of expertise, is intuition (Lyle, 2010). Klein (2003) and Lyle (2010) both dismiss the notion that intuition is 'magical' or 'creative', instead discussing how intuition develops and is built from our experiences. Experience allows the cognitive knowledge structures (also referred to earlier as schemata) to link between events and appropriate actions (Lyle, 2010) and intuitive actions which Lyle (2002) calls 'cognitive short cuts'. Recent research (e.g., Harvey et al., 2015) has added weight to the cognitive understanding of coach decision making within the NDM paradigm. This has been achieved by understanding coaches' use of key attractors (certain events coaches focus on) throughout a situation, to recognise (pattern recognition) or frame a problem. Key attractors act as catalysts that trigger a decision action once the coach's threshold is breached. Although this plays down intuition in coaches decision making, "intuitive decision

making is the basis of Klein's Recognition Primed Decision (RPD) model" (Bossard, Kermarrec, Benard, De Loor, & Tisseau, 2009, p. 1) and it is this model that is most suited within the NDM perspective (Pliske & Klein, 2003).

Recognition primed decision-making. The RPD model was established by Klein and colleagues (Klein, Calderwood, & Clinton-Cirocco, 1986) to describe what people do when they are under time pressure, receive ambiguous information, have ill-defined goals, and when conditions are constantly changing (Klein, 2009). The model explains how someone uses their expertise to come to good decisions without having to weigh up, analyse and compare the options in a deliberate fashion (Klein, 2008, 2009; Lipshitz, 1993).

The RPD model is based on experts cognitively moving through three levels when making a decision under pressure. Level 1 is labelled 'simple match', level 2 'diagnose the situation' and level 3 'evaluate course of action' (Klein, 2009). Simple match is concerned with a situation that is recognised and deemed as typical, where a straightforward decision is made (Klein, 2009; Macquet, 2009). For example, Bob has a game ending injury so the coach replaces Bob with another tall player, as he has done many times in his coaching past.

Level two, diagnosing the situation, means the situation is not a straightforward match to a decision and there is uncertainty about the situation being experienced. For example, the coach only has one other tall player and he needs that particular player to stay in the ruck position (centre of the ground rather than near the goals). How will the coach set up his forward line? Does he have a new model of what may work? Due to the uncertainty of the decision, the situation needs to be diagnosed, and is conducted in two ways; 1) to build a story (story building) or 2) to identify 'the relevant features of a situation' (feature matching) (Klein, 2009). The story involves the coach tacitly piecing the events together to make sense of the situation. Feature matching frames how the coach understands what has occurred (injury, time left in the game etc). It is this 'diagnosis' level where links to the cognitive management of a sports coach can be made and is discussed below.

The third level of evaluating a course of action involves assessing the situation through a 'mental simulation', to know whether the decision you are going to make comes across any problems and whether these problems can be dealt with or a new 'course of action' is required (Klein, 2009). For example, the coach is thinking about playing all small players in the forward line. How will the game play out? Will they get out marked? How do they deliver the ball into the forward line?

According to Lipshitz and Shaul (2009), an expert recognises a situation and then by a mental process (involving schemata and mental models), matches the specific situations with an appropriate action or patterns that they have previously learned (Klein, 2008). This is known as 'situational awareness' (Klein et al., 1986). Situational awareness is the "skill in making a quick assessment of its situation and requirements" (Klein et al., 1986, p. 580) and is conducted through feature matching and story building (mentioned above in the 'diagnosis' section of the RPD model). Lyle (2010) links the building of stories to coaching by stating its importance in novel and complex situations. He states "coaching often involves a serial or unfolding set of circumstances in training, in competition or in interpersonal interactions. Part of the coach's expertise is to build up a picture, to scenario build" (Lyle, 2010, p. 33).

Although the cognitive management of a sports coach has been linked to the RPD model through its diagnosis level, Lyle (2010) argues that the RPD model is not specific to sports coaching due to the complexity of the coaching environment. He states that pattern recognition within the RPD is one of 'typicality' which leads to easier 'matching' and that 'recognition–response is a 'mechanism' for coping with complexity and limited information, which is not consistent and does not reflect coaches decision making (Lyle, 2010). Not dismissing the RPD model altogether, Lyle (2010) believes the non-deliberative and semi-deliberative contexts of coaches decision making match up the 'demands' of the situation with the most appropriate action. He believes that it is rare for a coach to have an existing script unless the problem at hand is an exact replica calls for a similar response. He argues that the complex environment of sports coaching leads to uncertainty, whereby coaches are

able to handle this through management (Lyle, 2002) and NDM can help coaches cope with the uncertainty.

Although the RPD model may not fit perfectly into the coaching landscape, NDM is still the best paradigm to describe and understand the decisions of a coach within coaching practice. The NDM paradigm helps understand the cognitive management of a coach when making semi-deliberative decisions, under pressure, within time limitations, surrounded by uncertainty in a moment-by-moment basis. Decisions are able to be made on an on-going basis due to the hierarchical organisation of mental models, which are 'nested in nature' (Abraham & Collins, 2011). While the mental models are nesting they are able to be strengthened by the role Classical Decision Making (CDM) plays throughout the coaching process.

Classical Decision Making

In this section, I will explain the role Classical Decision Making (CDM) plays within the cognitive mechanism of a coach using the Abraham and Collins (2011) nested model and where CDM fits in relation to sports coaching. Throughout this explanation I will link CDM to NDM. As mentioned earlier, CDM can be directly linked with deliberative decision making, meaning the coach can deliberate on decisions, because he/she has time to plan implement and review components of their practice (Abraham & Collins, 2011). This ability to deliberate allows CDM to play an integral part in strengthening the mental models, which improves decision making under pressure in a naturalistic environment.

Classical Decision Making and Naturalistic Decision Making combine under the Professional Judgement Decision Making banner to form the nested model. This came about from Abraham and Collins (2011) raising concerns of coaching literature becoming too broad, covering too many fields and not impacting coach education. The nested model is a practical model, where the two paradigms (CDM & NDM) operate within separate parts of coaching practice however, are just as important as each other and are linked through the principles of expertise.

Classical Decision Making (CDM), recently, had been dismissed in favour of NDM (Lyle, 2010) when it came to describing and understanding coach decision making. However, CDM is relevant to coaching practice as it matches up with coaching practice specifically "during planning, implementation and review stages of practice" (Abraham & Collins, 2011, p. 374). Abraham and Collins (2011) argue that, NDM cannot be the sole focus of coaches decision making; "... a sole focus on NDM completely obviates the complexity inherent in the coaching environment" (p. 374).

The importance of CDM is strengthened through Abraham and Collins (2011) 'Nested Model', where NDM and CDM are intricately linked, to the point where NDM needs CDM to flourish. Consistent with cognitive psychology theory, NDM flourishes through strong mental models and for these to be strengthened a high level of cognitive engagement, thought and critical analysis is needed. In relation to the nested model, strengthening of mental models occurs within the Macro and Meso levels which are predominately a CDM process focusing on long term and medium term goals, planning and agendas.

In somewhat of a chain reaction, each level of the nested model is linked to the other through nesting. Abraham and Collins (2011) explain that when the decisions are taken at the coalface (NDM) they are then "embedded (nested) within medium term agendas which themselves are linked to (nested within) longer term aims" (p. 380). Longer-term aims (Macro level) are predominately a CDM process focusing on long term sociopolitical goals that for the performance coach are about "managing upwards on performance expectations" (p. 380). Within the Macro level there is some element of NDM occurring, which according to Abraham and Collins (2011) is "inevitable in any form of planning process" (p. 380), meaning intervention can occur at any time.

Medium term agendas (Meso level) are, predominantly a CDM process concerned with "goal setting and planning for the socio-motivational and tactical environment" (p. 380). Goal setting and planning are required for the macro goals to be achieved. On a socio-motivational level the aim is to develop self-determination and ownership for the athlete and represents a good opportunity to create the right

environment to get assistant coach buy in. Tactically, planning is about approaches to game play and hitting important performance and development markers (that act as evidence of progress). NDM is relevant in the Meso level and occurs within the tweaking of goals as progress is reviewed.

The taking of decisions is called the Micro level and is an NDM process, which is concerned with planning and delivery. This level is where the coach needs to respond to situations as they arise. However, Abraham and Collins (2011) explain that due to "taking a nested approach and premortem-ing possible challenges, the coach is better prepared to both make naturalistic decisions and more able to recognise when a decision is heuristic based or biased and needs externally referenced critique" (p. 381). This nested approach is the link between CDM and NDM and explains why CDM is important to improving decisions under pressure.

If we take Abraham and Collins (2011) nested model as appropriate, then NDM is still the best way to describe coaches decision making under pressure, however CDM is needed to be able to improve coaches decisions under pressure. With understanding the current coach decision-making landscape it can be argued that this current study is best described in the NDM paradigm and can fit into the nested model within the Micro level.

Taking into account the research, arguments and opinions mentioned above, decision-making is important to study within the domain of coaching due to decision making playing an important part in coaching practice. More specifically, the NDM paradigm is appropriate to understand how head coaches make decisions in the box on match day and the basic concepts (from NDM) are suitable for analysing and understanding coach cognitions.

Cognitive Psychology

In this section, I will explain cognitive psychology theory, its history, including mental models and the role these play with coaches' practice. The cognitive mechanism of a coach will be explored throughout practice including understanding coaches' knowledge structures. In particular, understanding how knowledge is

organised and how a coach deals with new information throughout practice will be discussed.

Cognitive psychology is the study of how humans think (Regeher & Norman, 1996). Specifically, cognitive psychology aims to understand "human mental processes" (p. 4) and the role these processes play in "thinking, feeling and behaving" (Kellogg, 2007, p. 4). Cognitive psychology emerged from behaviourism, and respectfully George A. Miller considered the brain as analogous to a computer (Crowther-Heyck, 1999). However, this computer metaphor did not capture the complexities of the brain because it was not as simple as having each individual bit of information travelling through separate stages of memory. Specific properties of information were components in all stages of memory (i.e. perceptual, short and long term) and were distinguished by the developed notion of working and active memory, which characteristically are the processes in the act of thinking (Regeher & Norman, 1996). Therefore, human information processing assumes that the brain has the "ability to perceive, comprehend, learn, decide and act," and these abilities are dependent on mental representations (Kellogg, 2007, p. 7). These mental representations are concerned with how information is stored and used in the mind (Kosslyn, 1984). Johnson-Laird (1983) takes it a step further by saying that if you have an understanding of a certain domain then you have a 'mental representation that serves as a model of an entity', which is classified as a mental model. For example, within Australian Rules football, the head coach may have a mental representation of a player (let's call him 'Bob') within his team who is physically tall and big, he has strong hands to be able to mark (AFL term for catch the football on the full whereby the player is awarded an uncontested kick). Bob is a player who is technically very good at kicking for goal. With this representation, the coach goes into the game with a model to play him 1:1 in the forward line to dominate his opponent. This next section focuses on understanding mental models, specifically how the coach cognitively manages information and structures knowledge within a naturalistic setting and the role this cognitive management plays in decision making throughout coaching practice.

Mental models. Constructed through a process called schemata (Lipshitz & Shaul, 2009), mental models are best described as a cluster of knowledge or knowledge structures that are based on past experiences and represent specific situations or events (Brewer & Treyens, 1981). Another interpretive description describes schemata as "frameworks through which we represent the world to ourselves" (Lyle, 2010, p. 32). In other words, we build a perception of a specific situation (meaning) through our experiences and our ability to visually "identify incoming information, referred to as the stimulus" (Schmidt & Wrisberg, 2000, p. 28). The new information or "visual stimuli" (Schmidt 1975), interacts with the old and current perceptions of the situation, by providing expectations for and constraints on the set of related properties associated with that concept (Brewer & Treyens, 1981; Thorndike, 1984; Schmidt, 1975). It is this process, which re-shapes the schemata, for example, to continue our story with Bob; the coach plays Bob in the forward line 1:1 with his opponent. The coach makes this decision because he perceives Bob as physically superior due to his height. The coach too has previously seen Bob take good overhead marks in 1-on-1 situations, in training sessions and matches. However, it starts to rain and the coach visually observes Bob isn't very good at marking a wet ball overhead in the rain. Over a period of a few minutes the coach has seen Bob drop three overhead marks. Therefore, the coach now has to combine this new information (i.e., stimulus) with the old and his perception of what Bob is capable of and change his expectations of Bob's performance in the rain. Functionally, schemata can organise various types of knowledge, which 'supports' and 'streamlines' cognitive processing by providing a) structures for acquiring new knowledge, b) representations for problem solving strategies, and c) multi-dimensional data structures that support situation assessment (Thorndike, 1984). These functions are consistent with Lipshitz and Shaul's (2009) more contemporary account of schemata in that people organise and construct the knowledge into mental models that psychologically represent a specified environment and the behaviour, which is expected (Holyoak, 1984). Continuing our story, the coach has a new mental model regarding Bob's performance in the rain that changes the coach's

expectations of Bob within this situation. This decision-making behavior within the NDM paradigm is predicated on accessing organised knowledge (Lyle, 2010), especially within coaching practice such as matches and training sessions.

Coach cognitions. Within coaching literature, it is suggested that if the coach who is constructing a mental model has a wealth of knowledge, then the representation will be more accurate (Côté, Salmela, Trudel, Baria, & Russell, 1995). For example, if the coach knew Bob was not good in the rain he would have had a stronger and more accurate representation of Bob's capabilities. When it comes time to make a decision under pressure the coach manages mental models by organising them hierarchically (Abraham, Collins, & Martindale, 2006; Debanne & Fontayne, 2009). The coach takes action according to priorities and moves to the next level of the hierarchy once lower level problems are resolved (Debanne & Fontayne, 2009). This process enables the coach to rapidly assess each specific situation. While assessing the situation quickly, if the assessment does not fit the coach's mental model, a change can be made allowing the next mental model in the line to be accessed (Côté et al., 1995). Returning to Bob, because it started raining and he was not good at marking the ball in the rain, the situation did not fit the expected model; therefore, the coach accesses the next mental model, which is based on his previous experiences. The next model in the line could be to put a smaller, fast player in the forward line with Bob to pick up the ball from any marks that Bob drops.

Evidence of this hierarchical organisation for coaches' cognitive management has been illustrated through the empirical work of Debanne and Fontaynne (2009) who describe the types of task the coach faces through a competitive match. Other in-game research on coaches has focused on behavior (e.g., Smith & Cushion, 2006) and interactive decision making (e.g., Gilbert et al., 1999).

Lyle (2010) describes a type of knowledge structure specific to Naturalistic Decision Making (NDM) known as 'scripts', which are shaped into mental models. Scripts can be deemed as "images or models of the situation, it's determinants and likely future outcomes" (p. 32) and they play the role of predicting "sequences of events, including like solutions to a problem" (p. 32) to recognize or understand what

is happening. He explains that via scripts experts are able to recognise cases that are similar to previous examples and apply indifferent methodology for solutions. Returning to the vignette the coach has decided to put a smaller player into the forward line, because his perception might be that this type of player will be able to retrieve any ball Bob drops. However, the coach is scanning all the small players trying to find the right player for the job. When he sees Fred, the coach remembers Fred has done this role twice before, both times in the rain. Bob makes the decision to send Fred in the forward line to help Bob. The cognitive mechanism of an expert coach throughout coaching practice, including matches and training sessions, is a slow interactive script (Harvey et al., 2015; Lyle, 2010). Throughout a match where serial or unfolding situations occur, Harvey et al. (2015) and Lyle (2010) describe the coach as someone who continually refines mental models through a slow interactive script, trying to control or maintain what was initially planned, what has emerged throughout the duration of the match, and how the situation matches up to previous experiences. For example, the coach wanted to use Bob's physical and technical capabilities, however what was initially planned was not working. The coach framed the problem through performance of the player within the wet conditions. Therefore, the coach had to find an alternative, which allowed him to control or maintain the match close to what was initially planned. The nature of the script "evolves through a process of pattern recognition and/or problem framing (Harvey et al., 2015, p. 166). Recognising patterns is the ability to identify incoming information, (which as mentioned previously is known as stimulus; Schmidt & Wrisberg, 2000). The pattern recognition in relation to Bob was highlighted previously, where the coach through visual stimuli identified a pattern of Bob dropping overhead marks. Recognising this pattern informed the coach the initial plan was not working and contributed the process of problem framing.

Problem framing is a way for the coach to make sense of a situational problem by understanding the reasons and/or circumstances of how the situation arose (Lyle, 2010). One way the coach can deal with these serial or unfolding situations (to understand what is happening throughout a match) is to use part of

their expertise to build up a scenario. This tacit process of scenario building is a form of schemata in which the coach builds stories as a mechanism to deal with serial or unfolding situations that are occurring. Once the coach has an understanding of the situation and a mental model formed, the next step is for the coach to make a decision.

Matchday Coaching Conclusions.

The aim of this section is to revisit and summarise bringing to conclusion what is known about match day coaching. This includes a) decision making (Gilbert et al., 1999; Harvey et al., 2015) and the attempt to describe and understand what triggers a decision; b) cognitive management (Debanne & Fontayne, 2009), understanding the cognitive mechanism of a coach throughout a game; and c) coach behaviours and communication (Smith & Cushion, 2006; Trudel et al., 1999), where recommendations are provided to improve coach effectiveness. In relation to AFL coaching in the box on match day we know it is the biggest concern and "undoubtedly, the most challenging task for coaches" (Mallett et al., 2007, p. 6).

On match day, coaches can use the deliberate strategy of being silent to monitor the game and reflect on appropriate interventions (Smith & Cushion, 2006). This behaviour of being silent and observing the game in detail allows a combination of sub conscious and conscious information processing and allows the coach to conduct insightful analysis, which is vital for coaching success (Smith & Cushion, 2006). Knowing when to intervene with a decision is based on certain events coaches may focus on within a match. As mentioned earlier, these events are known as 'key attractors' which act as a catalyst and could potentially trigger the coach to make a decision once the coaches 'threshold' is breached (Harvey et al., 2015). Some of these key attractors and catalysts can be factors based around contextual cues (field information) and performance (Gilbert et al., 1999), relating to the context of the match. Specifically, some of the key attractors and catalysts Harvey et al., (2015) identified were, the teams or coaches goals being threatened, weaknesses identified, and the game plan not working. We also know throughout a match, coaches consider player knowledge (player characteristics), habits, and history

(Gilbert et al., 1999), when making decisions, which could delay the threshold being breached when actually making a decision.

Intervention from the coach does not necessarily need to be a decision, it can take the form of communication, instructing, and providing feedback. Smith and Cushion (2006) provide suggestions for effective communication on match day, including all interactions should be personalised and feedback should be measured, specifically regarding amount, content, timing, and specified with the information given. The advice is short selective comments from the coach to ovoid cognitive overload. Regarding youth coaches, Smith and Cushion (2006) encourage insightful correctional instruction following mistakes, combined with support and encouragement. Advising to reduce the amount of negative feedback given to youth players and be specific with praise regarding performance, outcome, effort, improvement and skill execution.

In relation to the cognitive mechanism of the coach, Harvey et al., (2015) advises that coaches' decision making is intuitive, tacit, and semi-deliberative in nature. Throughout practice, coaches use a slow interactive script that evolves with pattern recognition and/or problem framing (Harvey et al., 2015; Lyle, 2010). Other key concepts the coach might use throughout practice are mental simulations, situational analysis, and emergent decisions. In relation to cognitive organisation, Debanne and Fontayne (2009) explain coaches prioritise tasks (e.g., technical and tactical instructions) in a hierarchical order. Once lower levels are resolved the coach will likely move to the next level of the hierarchy or priority.

In light of the information above, there has been very little research conducted within the NDM paradigm to describe and understand how expert coaches take decisions in a live match situation. Harvey et al., (2015) describe the triggers to a decision, which help us understand what makes the coach take the decision, and Gilbert et al. (1999) tells us what the coach considers throughout a game, which could potentially affect decisions the coach makes. These two papers, more so Harvey et al., (2015), are directly related to the aims of this paper, in describing and understanding coaches' decision making on matchday. However, not only does this

need to be explored in more depth, to either back up and expand on what has been discovered, but also to challenge the current findings to understanding coach decision making throughout a match. In regards to coaching on matchday as an AFL coach the only solid evidence we have is coaching in the coaches box is of concern and a challenging task (Mallett et al., 2007). In this paper, I aim to alleviate these concerns and the overwhelming tasks by informing coach education and professional development opportunities for improving the decision making capabilities of Australian Football League coaches on match day. Specifically, understanding the situational assessment processes, including what components inform assessments and will assist the coach in understanding what forms an assessment. Recognising situations quickly and therefore making more effective or better decisions can enable a coach to reduce and cope with the uncertainty of each decision.

Chapter 3: Method

Methods describe and explain the purpose and aims of the research and how the process was conducted; including details about the participants and what ethical concerns needed to be addressed before the research commenced. Additionally, I have explained the procedures used, such as stimulated recall, and semi-structured interviews, and the data analytic processes used to make sense of the data.

Data were collected to examine a head coach coaching in the coaches' box on match day. The aim of the data collection was to describe and understand how a head coach takes decisions throughout the match. Prior to this, the aim was to establish whether or not head coach decisions were perceived to have an influence on the match. The purpose of establishing this perception was due to the centrality of decision making; if decision making did not influence, then there was little point to describe and understand decisions at all.

Examining the head coach on match day to describe and understand how decisions were taken was achieved by conducting stimulated recall interviews. Establishing the perception of whether or not decisions influenced a match was achieved by conducting semi-structured interviews. Semi-structured interviews were conducted first and were used to establish the perceptions of influence decisions had on the game. Interviews with the players and runners were conducted in focus groups to maximise involvement and allow participants to generate conversation amongst each other and build upon the responses of others. Stimulated recall interviews commenced at the completion of the semi-structured interviews. There were three games in which the researcher sat inside the coaches' box and conducted three separate stimulated recall interviews with the head coach two days after each game.

Participants

The participants were one male head coach aged 40, nine male players aged 18-30 and two male runners aged 30-45, all whom were a part of the same team. The researcher had a pre-existing professional relationship with the coach, having

worked together in coach development capacities over a number of years. The coaching history of the participating coach spanned over 16 years, including coaching three football clubs and being Director of Sport at a high school for four years. He has spent 11 years coaching either semi-professionally or professionally as a head coach and at the time of the study was employed as a coach at a club in the Australian Football League (AFL) where one of his roles at the time of data collection was to be head coach of the development team. The participating head coach has previously won premierships as a head coach at TAC Cup (Under 18 representative competition for Australian Rules football) level, Victorian Football League (VFL) level, and as a part of a coaching team at Australian Football League (AFL) level.

The researcher received the participation of current or previous AFL listed players (those on official rosters), who at some stage, played under the head coach. These players were interviewed because they could potentially provide deeper insights and add more depth to the data. Players added value through their playing experiences, their own perception of pressure at the highest level and familiarity with the decision making behaviour of the participating head coach, which assisted in recognising decisions made. There were nine players, who were split into three focus groups of two, two and five players. Each focus group was organised according to player availability. The head coach facilitated access to these participants. All but two of the players were AFL listed professional footballers, meaning all but two players were on a contract with an AFL club and were eligible to play AFL games at the time of the research. The other two players had previously been on AFL lists, with one player having played 119 and the other 33 AFL games.

There were two runners who came together to form a focus group. Their employment positions can be classified as casual/part time roles, in which they were predominately required on match day and for training sessions. Operationally, the head coach used both runners together throughout a match. The runners would receive instruction from the coach via a phone, which was connected to the coaches box and would proceed to deliver the message to the player/s. The runners were a

team, who had to communicate with each other to make sure all the messages were delivered correctly.

Ethics

A university ethics committee gave ethical clearance for this research project. Information sheets and consent forms were approved for use with the Head Coach, Players, and Runners. All of the information sheets and consent forms were read and signed by the participants. Please see Appendix B: Ethical Clearance Letter for further information.

The key ethical dimensions to this project related to the difficulty of anonymity regarding the Head Coach. With few total participants involved in the study and only one coach, there were identified issues related to the distribution of results and submission for publication. Therefore, in order to achieve ethical approval, finding in this thesis are to be presented based on consensual agreement and through the use of overall themes used. In addition, all identifiers are removed. For the purposes of maintaining anonymity, pseudonyms are also used. The coach will have the pseudonym of 'Geoff', while any player or runner will be referred to as 'player/s' and 'runner/s'.

Procedures

There were two phases to the data collection, semi-structured interviews and stimulated recall. Semi-structured interviews involved the head coach, players and runners, with the aim of establishing whether or not coaches' decisions influence the match. Stimulated recall interviews were conducted solely with the head coach over three games to describe and understand how a head coach makes decisions in the coaches' box on match day.

Semi-structured interviews. The total duration of interviews was 178 minutes and resulted in 79 pages of transcriptions. In total, there were five semi-structured interviews conducted. This included three player focus groups, one runner focus group and a head coach interview. Each focus group had their own time restrictions (meaning participants were only available for a certain period of time),

and this ranged from 15 minutes to 45 minutes, with the head coach's having a time restriction of 1 hour and 15 minutes. The semi-structured interviews were either video or audio recorded and conducted using the critical decision method, due to its favouritism within the NDM paradigm (Lyle & Vergeer, 2013).

The critical decision method is appropriate because it shares similar characteristics with naturalistic settings, time-pressured environments, non-routine decision making and situational assessment. It allows the use of "cognitive probes to determine the bases for situational assessment and decision making during non-routine decisions" (Klein, Calderwood, & MacGregor, 1989, p. 462). This method provides flexibility in studying the cognitive bases of decision making in naturalistic settings with people at different levels (Klein et al., 1989). Therefore, suiting the participants of the semi-structured interviews who ranged from experienced AFL players to players yet to get their first AFL game, to runners, and the Head Coach. The critical decision method for eliciting knowledge adapted from Klein et al. (1989) and used by the researcher throughout the duration of the semi-structured interviews was as follows: (1) The players and runners had to select an incident (a non-routine incident – critical decision); (2) give an unstructured incident account from start to finish; and (3) whilst this was occurring the researcher constructed an incident timeline; and (4) located within the timeline a decision point; once it was located the (5) decision point was probed.

There were two objectives regarding the head coach when conducting the semi-structured interviews; First, was to establish whether or not he perceived his own decisions to influence the game and; second, to describe and understand how he makes decisions in the coaches box on match day. Some examples of the questions asked throughout the semi-structured interviews were: "The information you needed to make that decision, where did you draw that from?" and "How important was that decision?" and "Did that decision affect the result of the match?" and "Did that decision influence the game?"

The objective of the semi-structured interviews of the players and runners was to establish whether or not the decisions made by the head coach influenced the

game. For the runners and the players, the critical decision method was used to pin-point a critical decision they received from the head coach and understand how they interpreted and viewed the decision. For example, some of the questions asked to the players were; "With the instructions that come down from the box on match day, in what way do you think it influences the way you play?" and "What were your initial thoughts when you heard the message?" and "What did you do when you heard the instruction?" Likewise questions asked to the runners were: "With the instructions that come down from the box on match day, in what way do you think it influences the way the team or the players play?"; "And then when you were told the instructions, what was the players response?" and "Do you think that that instruction or that instruction influenced the game at all?"

      Stimulated recall. There were three Stimulated Recall (SR) interviews conducted with a total duration of 156 minutes, resulting in 55 pages of transcriptions. The SR procedure (Lyle, 2003) followed strict guidelines to direct the identification of the critical decisions and to ensure the SR interviews were conducted efficiently and effectively. There were three SR interviews conducted throughout the home and away season. All three recorded games were played on a Saturday at the club's home ground. Each entire game (a minimum of 100 minutes, not including extra time) was recorded in the coaches' box via a GoPro [Hero3, Silver Series] camera, recording a front facing shot of the coach within the box. The GoPro camera was attached to the window of the coaches' box by a suction cup. This process of using video footage is a "vehicle for accessing cognitive processes" (Lyle, 2003, p. 875) and the GoPro was the most appropriate device to use, due to its small size and its ability to be attached to the glass window of the coaches' box facing the coach. The GoPro's inconspicuous size and location meant that it did not interfere with the head coach and his staff throughout the match. Throughout the game the researcher was able to see what the GoPro camera was recording through the GoPro application on the mobile phone as well as hear the quality of audio being recorded through headphones connected to the mobile phone. The GoPro was able to provide an ultra wide field of view, allowing the researcher to see the head coach

and a select number of assistant coaches and support staff within the box. The audio was on a 5 second delay to help conduct the ongoing timeline. This delay aided the creation of the timeline in that if a decision was missed, the researcher could re-hear it on the delay. Post game, official match footage was obtained from the club who had been recording it for analytical purposes (at this level of competition, every match is recorded in an official capacity).

As mentioned earlier, while observing the game, a dot point timeline was conducted by the researcher. This timeline recorded every interaction the head coach had with other coaches in the box or communications with players, staff or coaches using the phone (there is a phone relay from the coaches' box down to the bench). As this occurred, the researcher made a side note of any decisions that he determined to be a critical decision. Critical decisions were defined as decisions made to try and influence the game, because control of the game was perceived to be declining, lost, or potentially lost in reaction to the opposition, the own team's ineffectiveness or the ineffectiveness of an individual player within the coach's team. A decision was judged critical, if an individual player was moved into another position and the player's role had changed, the structure of the team was changed or a decision was made to try and control the tempo of the game, such as in relation to ball movement. At the end of each quarter the researcher went back through the timeline and reviewed the points to determine if there were any critical decisions that were missed and to review the ones that were highlighted to make sure they were critical decisions.

The following morning (Sunday) the researcher spoke with the head coach on the phone to see if the coach could remember any critical decisions he thought he had made throughout the game. The critical decisions the head coach mentioned were matched up with critical decisions the researcher had noted down. On the odd occasion a critical decision in which the head coach mentioned did not match with the critical decisions noted down by the researcher, the researcher would ascertain when this occurred and locate the decisions on the dot point timeline and seek to locate the incident on the recorded footage. This process was important due to the

minimal time the researcher had with the head coach on the day of recall and showed care to reduce memory decay (Lyle, 2003). Once all of the technical logistics (mentioned below) were accounted for, the critical decisions were located on the split screen (see Appendix C for a visual on the split screen used for stimulated recall) movie file in preparation for the SR procedure on the Monday. The questions and probes to the head coach were typed up on a running sheet as well as a time list of the critical decisions in preparation for the interview. When asking the questions, the process used was similar to the one advocated by Lyle (2003), whereby the coach was asked to review the situation and decision made on the split screen footage. If the head coach recalled the situation, he was asked to describe the decision, why it was made, and to "elaborate on any element of the decision" (Lyle, 2003, p. 870). Before the start of each of the SR sessions, the coach was asked to be honest and if he did not remember the situation not make up what he might have thought or what he thinks now while watching the footage. To make sure this was the case, if there was any doubt the researcher asked the question "is that what you thought at the time or is that what you are thinking now?"

It is important to note that the time from when the game finished (Saturday afternoon) to the stimulated recall interview (Monday morning), time was spent uploading the files (head coach footage and game footage) into a movie editing software package (iMovie), syncing theses files into a split screen movie, and exporting the footage as a movie file in preparation for the stimulated recall interview. The stimulated recall interviews occurred on the Monday mornings, two days after the game.

Data Analysis

This section describes and explains the overall data analytic procedures used in this study. These procedures included the use of a deductive-inductive analysis and the use of a hierarchical content analysis that involved a long, back and forth process. The use of triangular consensus was used to promote trustworthiness of the analysis. Probing and in-depth interviews were conducted and all interviews

transcribed verbatim with a total of 134 pages collated. Data analysis began with all transcriptions uploaded into NVIVO (v.10) and included thorough reading of the transcriptions (consistent with inductive analysis procedures; Tesch, 1990), with the researcher reading all transcriptions a minimum of three times. Throughout the analysis, process specific observations were made relating to the decisions the head coach made under pressure on match day and building toward general patterns that may occur when trying to describe and understand the decisions made. This direction makes the analysis process partially inductive because the study had already established what the important dimensions would be (decision making). To understand the direction of partial analysis taken by the researcher a more in depth explanation of inductive analysis is required.

Inductive analysis allows the true dimensions of the research to emerge from patterns found in the cases under study. This occurs by taking away the assumption of what the important dimensions of the analysis will be (Patton, 1990), which Thomas (2006) supports by mentioning that the "findings arise directly from the analysis of the raw data, not from a priori expectations or models" (p. 239). However, going into the analysis, the aim of the researcher was to answer specific research questions regarding coach decisions. This was to be achieved by evaluating decision making under pressure in the coaches' box on match day which gives us a focus of relevance when conducting the analysis, not however a set of expectations about specific findings (Thomas, 2006). However, consistent with inductive analysis "the units of analysis or data segments were not predetermined but were carved out from the data according to their meaning" (Tesch, 1990, p. 90). The other common characteristic applied from inductive analysis theory was a hierarchical content analysis, which is explained next.

While analysing the data, transcriptions were read and divided into segments with meaning (Meaningful Units (MU)) to create tags. Tesch (1990) defines a segment of text as "comprehensible by itself and contains one idea, episode, or piece of information" (p. 116). Once all the segments were categorised, the aim was to establish common features of the categorised text segments and find a

relationship between them (Côté, Salmela, Baria, & Russell, 1993). This process of finding a relationship between the tags was continued throughout all the data; as tags are matched, they are given a category. If the tags do not match up to previously formed categories, a new category is created. Once there is depth to the categories, each category was linked to other categories and a hierarchy was established (Thomas, 2006). All MU, were coded and those tags and categories not related to decisions were placed in a separate folder within NVIVO called 'Non Decision Related Nodes'.

Analysis was a long, back and forth process, involving constant reviewing of the quality of segments within the tags. This occurred pre-triangular consensus where the researcher was wrestling with the data. During and post the triangular consensus process, the researcher was challenged to look at the analysis from a different perspective. Specifically, the triangular consensus process challenged the researcher to treat the subjects (players, runners and head coach) individually as opposed to as one collective unit. This perspective of analysis and the results this produced not only challenged the researcher but had a domino effect. This meant the researcher would go back into the transcriptions from where the MU came from to check the context and validity of the MU and at times change and edit the segments and review titles of the tags and categories. This analytical behaviour is considered to be normal and part of the process as Côté et al. (1993) explain the "tag can be changed in the analysis process" (p. 131) and the category "can be modified and refined until a satisfactory system is established" (p. 132).

Trustworthiness. According to Barzansky, Berner and Beckman (1983) credibility, transferability, dependability, confirmability are the four characteristics that "must be satisfied for a naturalistic inquiry to be considered trustworthy" (p. 194). Credibility was achieved through member checks of the head coach transcriptions (semi-structured and stimulated recall interviews). Throughout the member check process, the only head coach correction related to a clarification of the years of coaching experience that he had previously mentioned within the interview. This adjustment was made to the transcriptions and was the only change made.

Confirmability was achieved via triangular consensus, which occurred throughout the data analysis process. Triangular consensus was used so the researcher could regard their material critically and to test whether to take the analysis in a different approach or direction (Fielding & Fielding, 1986). This was achieved through discussions with research supervisors, where the researcher presented raw findings in the form of a schematic. Using the schematic as basis, the researcher was questioned and had to justify the reasoning behind why the research was heading in the direction it was, including why categories were titled as they were. Research supervisors suggested changes regarding the titles of categories, to better understand what the group of meaning units represented and made suggestions for the reconstruction of categories. Post triangular consensus, an exhaustive back and forth process was conducted where the researcher had to delve deeper into the raw data and was challenged by research supervisors to think critically about the analysis process.

Dependability was achieved via an audit trail reviewing timelines throughout data collection, confirming critical decisions made post data collection and pre interview, and by having all interviews recorded, provided a database to perform an audit if necessary. Transferability was achieved via a "thick description" (Barzansky, Berner, & Beckman, 1983, p. 204) of thorough timelines throughout data collection on every comment made throughout each quarter of each of the games.

Chapter 4: Results

In this section, results are presented from a thorough and exhaustive analytical process producing 668 Meaning Units (MU), comprising three higher order themes; Situational Assessment, Certainty v Uncertainty and Decisions Made. These higher order themes were followed by nine categories and 16 sub categories. As illustrated in Figure 1, the higher order theme of Certainty v Uncertainty is linked to the first research question concerning whether or not coach decisions are perceived to influence the game. The other two higher order themes, Situational Assessment and Decisions Made, are linked with the second research question, describing and understanding decision-making under pressure.

The results are broken up into two sections reporting the findings in relation to the key research questions. The first section is focused on the perceptions of a coach's influence, from the runners' and players' perspectives, followed by how the head coach perceives the influence of his own decisions. The first section concludes with a consideration of the uncertainty of a decision and its influence, including when it occurs and how the coach manages it. The second section is focused on describing and understanding coaches' decision making by reporting the findings of a two part assessment process, based around a situational problem: (i) Situational Story, which is about the coach understanding the problem; and (ii) Player Knowledge, which is about the depth of knowledge the coach has of his players' qualities.
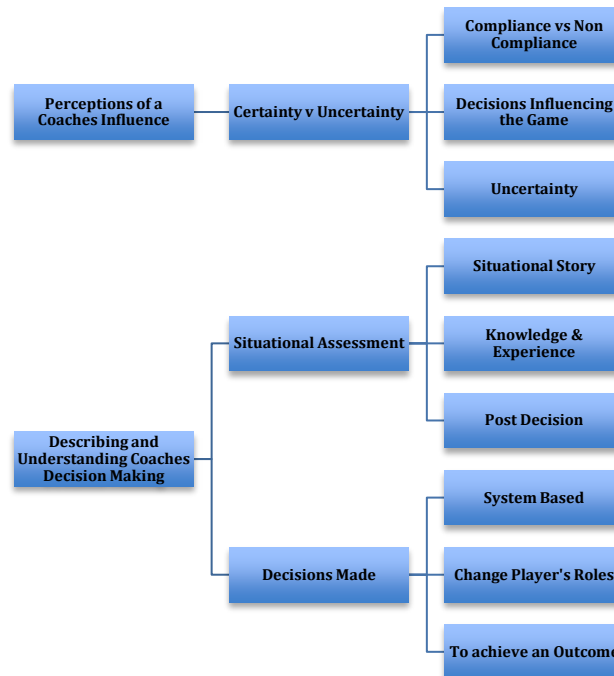
*Figure 1.*Overview of results showing the higher order themes, categories, and the aggregated tags.

Perceptions of a Coach's Influence

The perception of whether or not coach decisions influence the game was examined and the analysis conducted resulted in the creation of the higher order theme Certainty v Uncertainty (as seen in Figure 1). This theme had an aggregated 176 references, three categories and five sub categories. The theme Certainty v Uncertainty means there was no one straight forward answer to the question of, 'are coaches' decisions perceived to influence the game?' This is highlighted in the three categories underpinning the higher order theme. They were Compliance v Non-Compliance, Decisions Influencing the Game, and Uncertainty. The category of Compliance versus Non Compliance was concerned with players complying with the coach or choosing to ignore the coach and conduct their own action. In other words, if the players do not comply with the coach's decision there will be minimal influence on the game. The category of Decisions Influencing the Game consisted of 69

references and represented examples of decisions influencing the game. Decisions Influencing the Game represents the Certainty components of the higher order them Certainty v Uncertainty. The category titled Uncertainty represents the uncertainty component of the higher order theme of Certainty v Uncertainty. Indeed, there was uncertainty relating to whether or not the coach's decision influenced the game. The category of Uncertainty included four sub categories: Decision did not Influence the Game, Uncertainty Pre Decision, Uncertainty of a Decision's Influence, Uncertainty if the Decision was not Made.

The perception of how frequent decisions were and the level of impact a decision's influence had on the game differed depending on the participant (i.e. coach, runner or player). The coach was reserved on the level of influence a decision had due to a number of uncertainties associated with making the decisions, whereas runners and players perceived the coach's decisions to impact the game. Due to the varying perceptions of whether or not coaches' decisions influence the game, this next section will look at what component of the game the players and runners perceived decisions to have influenced. Followed by the head coach's perceptions of his own decisions, understanding the uncertainty the head coach has on the decisions influence.

Runner and player perceptions. The runners' and players' understandings of how coach's decisions influence the game differed, due to the different roles they each play on match day. However, generally speaking runners and players believed a coach's decisions can; 1. Influence the game flow by controlling ball movement; and 2. Help the team to get back on track by changing the structure of the team. The runners recalled an instruction they passed onto a player to try and get the ball moving forward. This example highlights the runner's understanding of a decision and how it can influence the game:

> …but that did come out from the coach that he [player] needed to push forward and to kick the ball or punch the ball back towards our goals prior to the actual incident happening. We verbalized that to the player, the player actually did that and it resulted in a positive towards our team, that we could influence the game… (Runner)

Similarly, the players perceived that system (based) decisions influenced game flow through ball movement to control the game. In the example below, the players provide an example of where a decision was taken to slow the play down and control the tempo via the use of a key word, which was delivered to all players, the key word is 'SZ'. All players had a clear understanding of what 'SZ' meant and therefore were all 'on the same page'. The players collectively trusted that the systematic decision would help them win the game:

One player explained:

> Just control the game. We were up and just needed to control the game, run the clock down and keep it in our favour; just hold onto the ball, just manage the time and make sure we have possession [player describing the SZ decision]

Player's perceptions of a decision's influence were specific in terms of their own understanding of the game. The players believed structural decisions had an influence on the game, especially if the game wasn't going to expectation. In particular, defensive structural decisions achieved the outcome of realigning and getting the team back on track. One player explained:

> I think it definitely does make a massive difference in getting the message to – to get yourself, and also the team, back on the right track, so that you – you know, you might be three goals down, so then you don't turn that around and be 10 goals down within another 5 minutes.

The results and examples provided offer insights into how runners and players perceive a coach's decisions influence the game and in what context this occurs. The next section focuses on Geoff's own perceptions of decisions influence throughout a game and the uncertainties faced.

Coach perceptions. Geoff perceived his decisions influenced the game when he felt the decision he made led to his team retaining or regaining control of the situation and/or the game. Controlling the situation can be related to countering the opposition (as a whole or an individual player) or solving the poor performance of his own team and players. In the example below, Geoff recognised his team structure was ineffective and it was not controlling the flow of the game. Geoff framed a problem within his own forward line, identifying that he had too many tall players. Through his knowledge of the tall players within his team, he was able to make a

decision related to one player, to impact the team as a whole and influence the game, so that the flow of the game was regained. Geoff explained that after he made the decision to remove one of the taller players: *"I was really happy with the benefit of starting to get the clearances back in our favour, generating more ball through into – into our forward 50"(Geoff).* He continued to explain that although they did not win the game, the decision helped his team to regain control, therefore still influencing the game: *"Well, we – we didn't win the game and – but the fact that we got it back on our terms," (Geoff).*

The above example highlights the point that although decisions may influence the game, it does not mean the outcome will guarantee a win. However, in certain instances, if the decision was not made, there would be a lesser chance of winning (larger margin of loss, smaller margin of win). Geoff explains: *"So I – I can't say it definitely won us the game, but I think that – I think we would have been under more pressure if we hadn't of done that decision and…"(Geoff).*

In the following situational story, the scores were close and Geoff's team was holding onto a slender lead with only a few minutes left. The opposition had momentum and Geoff's team was tired. With little time to regain full control of the game, the team and the coach were trying to just hold on and hope to remain in front until the final siren rung. In this highly intense situation, Geoff perceived his decision influenced the situation, and as a result his team was able to hold on and win the game. Geoff made the decision to put a spare (meaning to out number the opposition players, so the head coach always had a spare player) player in the back line, and it was this same player who took the match-winning mark, moments before the siren went. Reflecting on the decision, Geoff believed the decision influenced the match: *"But – but I think it did influence – it definitely influenced the last five minutes of the game when we only had a narrow margin to hang on to win; it definitely influenced that period, yeah."* However there is reservation in concluding the decision won them the game, Geoff explains in more detail:

> And – and I think – I think it was a critical decision to get seven back, you know, do I think that it won us the game, well, I'll never be certain of that, but I do know that we – we didn't lose the game because of it which was – which was obviously important.

When probed further, Geoff said that he knew he had to make a decision, otherwise there was a higher chance of his team losing the game. Earlier the analysis highlighted that decisions are made to gain, retain or regain control of the situation throughout a match. However, in this high-pressured environment, where time was running out, the score was close, players were tired, Geoff felt he had only one option, one decision to make, that would hopefully help his team hold on to the small lead they had. Geoff explains:

> …but certainly I feel – I feel that if we had of kept going with what we did in that last four or five minutes, that the – the overwhelming pressure of the – the dam wall would have collapsed, like, it was just – it was just – the only control that I felt I had over – over the game was to manipulate the numbers behind the ball.

The above examples highlight the perception that coach decisions do influence the game, although, it is unrealistic to say the decisions will win you the game. One can hope decisions influence the game enough to provide the team with an opportunity to win the game; however, there will always be uncertainty, especially from a head coach point of view throughout the decision making process as further discussed below.

Uncertainty. Uncertainty was present throughout the process of the head coach making decisions. There was found to be uncertainty pre- and post-decision and uncertainty related to whether or not the player's will in fact do as they are asked to do. Uncertainty pre-decision was specifically concerned with scanning personnel and individual players, how to use certain players, when to use a particular player, and which player to use. Geoff explains the potential uncertainty he faced pre-decision regarding how to use one of his best players:

> Well, where – where – will Jessie Jones play inside mid or will he play outside mid? Do you think that they're going to run with him and, if they are, does playing him on the outside give – take away from his game but give us an advantage, or does playing him on the inside going head-to-head with that player, give us an advantage, or does playing him inside, and him playing on one of their players, give us an advantage two-to-one? (Geoff)

Another type of uncertainty related specifically to individual players was deciding which player to use, to achieve the required outcome. The below example, highlights how Geoff knew the solution to the problem, but he explains the second part to making the decision was about which player is chosen to outwork the required role.

> I think the first six minutes is evaluating obviously how to stop their ball movement quick and inside kicks. So, like as we rang down to the bench to the players we wanted, and yeah – so that's the other side, and then the other discussion and main talking point is obviously what we do with their spare and who it is who equalizes. *(Geoff)*

When is the right time to move a particular player into a new position? The timing of when to move a player can cause the head coach uncertainty. Geoff remembered a time of uncertainty in deciding when to direct a particular player to position himself as a spare in the backline. The situational problem caused by the opposition, was that in a short period of time Geoff's team had given up a 4-goal lead. After the second goal scored by the opposition, Geoff new a decision needed to made but he was uncertain of when to make it, Geoff recalled: *"I remember talking about it and I remember – as much as talking about it, I remember in my mind, just wrestling with it and when to do it"* (Geoff).

There was also uncertainty post-decision, in relation to how moving or changing an individual's role would affect the game and whether or not the decision would achieve the desired outcome. Continuing with the last example, once Geoff made the decision, he was uncertain if the decision would get the outcome required and influence the game. Geoff recalls:

> Gee I hope it works! [I thought after the decision] Because it's still giving them a little bit more chance of getting the ball inside 50, when you've taken a player from your attacking half into your defensive half. It's sort of – you know, an also, you know, can we still score?

Geoff's team went onto win the game, however, he was uncertain as to whether or not the decision won them the game. He felt the decision did have an impact on the situation though, recalling: *"Whether it won us the game, I'm not sure down the track, but I definitely think it was a decision that stopped the dam wall at that stage"* (Geoff). With this example, it was perceived the decision influenced the

match, even though there was uncertainty before and after the decision was made. Evidence suggests uncertainty of a decision's influence can co-exist with the perception that a decision can influence the match. However, decisions could not influence a match if the players choose not to do as they are asked.

Compliance v non compliance. Players reported that they chose to comply or not comply with the coach's decisions. The power of choice can bring uncertainty to whether or not decisions influence the game, because players can choose not to follow instructions. This type of uncertainty was extracted out of the data via the players' own admissions. There were examples where players specifically noted times where they did not agree with the coach and chose to do what they thought was best, ignoring the coach's directions. An example of this was:

> We started, like, hitting to, like, the open side in the centre bounce, to the side with no players and running onto it because we thought that – we kept doing the same thing and they were reading it pretty easy and it was quite obvious. We probably didn't have our, like, best midfield in there, so I think coaches were trying to just kind keep it predictable for everyone. But I know that we sort of said, you know, sneakily, 'Let's just try doing this because…' (Player)

Uncertainty was evident and occurred at a variety of stages throughout the decision making process. However, the results reveal decisions were perceived to influence the game, especially when it came to control. Whether changing the defensive structure to regain control of the game or making a system decision to improve ball movement and retain control, decisions were perceived to influence the game. A decision influencing the game was found to have the potential to co-exist with uncertainty, however, emerging from the results were three potential ways to manage uncertainty.

Managing uncertainty. The results suggested three ways the coach was able to potentially manage uncertainty 1. Building a team system based on rules; 2. Fostering trust and respect between players and coach; 3. Drawing on experience gained from coaching the game and the knowledge the coach had of the players within the team. The results provided evidence of a system, based on rules. One such example was every time the opposition put an extra player in defence, the team

would always 'equalise' (meaning the opposition did not have an extra player in their forward line; Geoff would equalise the number of players in the defence). Geoff mentioned: *"We always equalise and we've had success with it"* This component of the system was entrenched into the team, the players enforced the decision themselves.

Geoff explains:

> So yeah – our first game plan thing is to equalise, so our players equalize and then we act on whether we want to change that decision and keep one back. So our players did the equalizing of players forward of centre for us to make it a 7 on 7.

Trust and respect between players and coach was another theme and ties into the example mentioned about a team system with everyone being on the same page. This could be in regard to a team rule or perhaps an isolated instruction. One player explained an instruction that came down from the coach: *"we might want to ice* [run down] *the clock a bit and the message will come out "Let's ice the clock", and we'll make sure we play in that manner, so as a team that's what we do"*(Player). Trust and respect also directly helps manage the uncertainty of non-compliance of the player (as mentioned previously).

Experience and Knowledge was the third theme related to ways in which the coach sought to manage uncertainty. Specifically this related to having intimate and detailed knowledge about the history of the players. Using the knowledge he had about individual players, Geoff's description below was a good example of the coach recalling knowledge on an individual's capabilities to change a previous decision. When probed to offer specific detail about why he changed a decision during a match, Geoff said: *"he's so creative with his feet and really sets up well. So that's why I changed that decision".*

Describing and Understanding Decisions

Two higher order themes emerged from the data analysis to describe and understand how the head coach makes decisions in the coaches box on match day; Situational Assessment and Decisions Made (as seen in Figure 2). The higher order theme of Situational Assessment consists of two key categories: 1. Situational Story

and 2. Experience and Knowledge. The higher order theme of Decisions Made consisted of three categories: 1. Decision to Change a Player's Role; 2. System Based Decisions; and 3. Decisions to Achieve an Outcome. The next section will report these findings starting with the higher order theme of Situational Assessment.
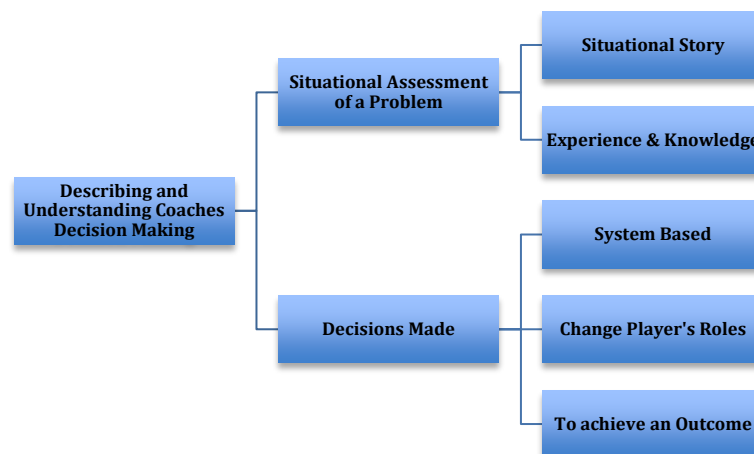

*Figure 2.*A schematic of the higher order themes of 'Situational Assessment' and 'Decisions Made'.

Situational assessment. The higher order theme of situational assessment relates to an appraisal the head coach undertakes of situational problems throughout a match. This means the coach is assessing the situational problem to understand what is occurring on the field of play. The problem itself was predominantly related to either the actions of the opposition or the ineffectiveness of the coach's own team (which could include the whole team, individual players, or a positional grouping of players) to respond to the opposition's play. The two categories that underpin the assessment act as two individual steps or two parts, which form the assessment and hence the understanding of a situation (as seen in Figure 3). The category, Situational Story can be considered the first part of the assessment process, which is achieved by the coach scanning the game trying to understand the problem. The second part of the assessment process is related to the experience and knowledge of the coach, particularly the knowledge he has of his own players to help complete the assessment and take a decision. Below, an explanation of the two-part

assessment process (Figure 3) is reported starting with the part one: situational story, followed by part two: player knowledge.
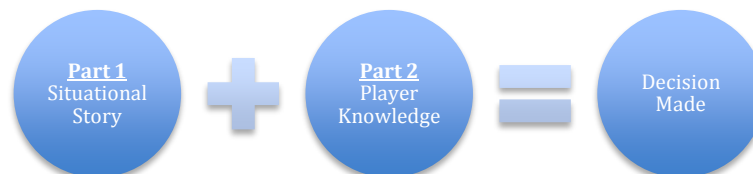
Figure 3. A model of the two-part situational assessment process of a problem which leads to a decision.

Part one: situational story. When assessing the situational problem, the head coach gathers information from different sources to understand the trend of the game and build a story (interpretation) of the situation. Part one of the assessment process gathers and combines information sourced from people (i.e., assistant coaches), the current score, time (minutes played in a quarter), the weather, statistics, injury and fatigue, players and personnel. For example, Geoff provides an account of how he framed the problem and used a combination of different information sources to understand the trend of the game:

> Well, we drew it from the trend of the game – the clearances, we were getting well beaten. We also, as I said before, we – we realised that in the wet conditions that we were too top heavy in our forward line, so it was a means to helping both areas of the ground, but primarily to get the ball inside our half was the first aim because they'd had a lot of the play in that quarter, our backs were against the wall in terms of possession inside our forward half, and we just wanted to try and – try and win the ball out of congestion against probably a bigger bodied side, get it going our way and play with the smaller forward line. (Geoff)

In the story example below, Geoff assesses a situational problem using the information sources of time, score, fatigue and injury. Story example one:

> …[Geoff's team was] Under pressure against an opposition in the last quarter after we got, you know, four or five goals up…the last five or six minutes of the game, our players seemed to – seemed to have no run, we had two guys off injured, we were basically hanging onto the game. …We brought up a forward to play less in our forward line and play around the ball to try and help us get – get the footy and get it into our half…(Geoff)

After Geoff made the initial decision, he continued to assess the situation. Because the decision did not influence the game as intended, he continued to understand the problem, drawing upon the sources of information available to him. He realised the initial outcome was not achieved, the opposition had momentum, the score was close, his team was ineffective due to injury and fatigue. Geoff explains:

> …we were unable to find enough of the ball and hang on – hang on to the ball for long enough, so we – we couldn't – we couldn't get enough marks and just control the tempo. The ball was – was continuously in motion, you know, using too much handball, all those sorts of things which affected our ability to actually take time off the clock… so when they got those couple of goals and the – the wave was moving in their direction, to obviously stop that, what we had to do – it wasn't anything about stats on the game, it was just about visual and understanding that we did have two players off so we had little rotations… we had another guy who was on limited minutes… I could see after they got to within two goals that probably 10 of our guys went into cramp stretch, so I knew we were struggling physically at the time, and that was – that was also used as – as – as cues to –that we had to do something. The trend of the game was that they'd kicked the last two goals, had it inside 50 repeatedly, and we had nothing left in the tank…"

Geoff decided to move the same player from around the ball to play as seventh defender:

> …but then after the next couple of goals we abandoned that to move that player to just purely play a seventh defender behind the ball because we knew that there wasn't long to go and we just couldn't afford to give them any more – any more goals. (Geoff)

The coach creates a story of the situational problem by continuously scanning the game to gather enough information from different sources. Once an understanding of the situation has been established the same information can become influential enough to act as a catalyst for a decision. Upon understanding the situation, the assessment process moved to part two. Part two was specifically concerned with the knowledge the coach had of each individual player. This knowledge helped the coach to take a decision and complete the story of the situational problem being assessed.

  Part two: player knowledge. The knowledge the coach had on individual players within his team was based on the history of their positional, role and

footballing capabilities. Players' positional and role capabilities was concerned with the coach knowing what positions each player could or could not play, or what positions they had played in the past. Knowing the players' footballing capabilities was concerned with knowing the strength and weaknesses of individual players with regard to technique, physical attributes and decision-making qualities.

Once the situational problem was understood (part 1) the nature of the decision making process proceeded to the head coach going through two different levels of deliberation, regarding the use of his player/s`. First, the coach immediately knew which player/s to use to solve the situational problem; therefore, minimal to no deliberation was used and; second, the coach was uncertain, therefore having to scan the field and bench to identify the personnel available, meaning some deliberation was used. The following example provided demonstrates the coach immediately knowing which player to use, therefore minimal deliberation was needed;

Story example two: Geoff's team had a slender lead and there was only 10 minutes to go in the game, with a win resulting in a home final. Geoff's his main ruckman (player who contests the ball when it is thrown or bounced into the air by the umpire after stoppages) (Bill) got injured and he needed to be replaced. The coach replaced Bill with the other two tall players (Simon and Grant), who were to share the ruck responsibilities until the conclusion of the game. However, it was the performance of Simon that made the coach uncomfortable: *"…he [Simon] went in and got his two to three minutes and I thought he's being a bit uncompetitive here."* Geoff continued: *"The un-competitiveness – the lack of strength around the contest and the vulnerability I felt from our side when Simon was in the ruck, it was evident"*. Within the assessment process, the information gathered from continuously scanning the performance of an individual (post-decision) combined with the coach's knowledge on individual players and personnel to inform a situational assessment. The knowledge the coach had of Simon was: *"that player [Simon] hasn't got credits in the bank with me in this area of the game" (Geoff).* Geoff decided to replace Simon with Grant after 3 minutes of game time. Using the knowledge Geoff had

about Grant, Geoff believed Grant could do a superior job to what Simon could do. Geoff explained: *"the competitiveness, the strengths around the ball, the ability to compete and one of them is superior at that, or I believe is superior at that."* Geoff ended up making the decision and Grant stayed in the ruck position for the last 7 minutes of the game and his team held onto their lead and won the game.

The above example highlights how the coach was able to immediately access the knowledge he had of the player and match the knowledge with the situational problem, to complete the situational story and take the decision. The second way the coach accesses knowledge of individual players once the situation was understood was to scan the personnel (e.g. tall players or defensive players) and/or individual players available. Scanning the players can help trigger the knowledge the coach already has regarding the history of their positional, role and football capabilities to make the decision. An example of scanning the personnel and individual players can be found in the following story;

Story example three: It was quarter time and Geoff's team was down by nine points, the opposition were on top and his side was getting beaten at stoppages. The team could not get the ball into their attacking half, the opposition had bigger bodies around the ball, and with the wet conditions they were probably too tall in the forward line. Going into quarter time, Geoff started thinking about moving a tall player from the forward line. When the second quarter started Geoff was continuously scanning his tall players assessing their performance and matching this to the knowledge he had on them, Geoff explains:

> I was looking at every tall we had up in the forward line, probably three plus another one off the bench, rolling through that ruck work as well. Whether one of them could play in the back line, which I didn't feel they had the – I suppose, the experience and the – the footy – footy DNA to – to play the role on the day.

Geoff made the decision to use one of his tall players who can play in the ruck, to go on the wing and act as a second jumper (ruck man), to achieve the outcome of trying and get the ball moving forward.

> So we made a decision to move a player, one of our taller players, and move him up onto a wing and get him to be the second jumper – jumper for ruck contests with our ruckman as

well, and just try and get the ball going forward and out of congestion with some – some ball movement our way from the stoppage. (Geoff)

To do this he used the knowledge he had regarding the history of their positional, role and football capabilities to come to a decision of which player could outwork the job. However, it was not until the information came in from one of the sources that the decision triggered and a particular player was thought of. Geoff recalled:

But once the – the clearances came in the second quarter in their favour and I thought how – how do we get something going around the ball, it probably – probably came to me that this guy, because he's athletic – and look, he has played wing last year…

Knowledge of individual players is an important component when it comes to completing the situational story. Whether the coach needs to scan the personnel and/or individual players or he feature matches the situational problem with a player straight away, knowledge of the player is important. Once the player is chosen the decision can be made.

Decision made. Predominately a decision made includes changing an individual/s role to achieve an outcome that solves the situational problem. The decision to change a player's role can affect the team as a whole (e.g., team structure) and on an individual level can influence a player's performance (positively or negatively). The following is an example of Geoff changing an individual's role and how it affected the whole team structurally: *"Well the player – the forward line player moves to the backline, takes a player and frees up one of the defenders … Yeah, in simple terms, yeah. Because if that – if he doesn't play ruck, then everything else changes around the ground."(Geoff)*

The other consideration is the effect the decision has on the individual and how the individual player responds in a different role, especially if they have not played their before or are not expecting to play there. One of the runners explains his views from the experience he's had delivering messages from the head coach to the players:

I think players have varying abilities to do that. Some players can adjust really well and even though something's been drilled into them, if they get a different structure they weren't

expecting, they're able to alter and then refocus and do it that way. Whereas I think other players struggle with that. They've been so, you know, throughout the week, programmed, yeah exactly right to do this, and then if something's – a bit of a curve ball's thrown at them, some of them have trouble, you know, reprogramming what their role is. (Runner)

Either way, once the decision has been made, constant assessment of the decision is carried out by the coach because of the effect it can have on individuals, the team and the game. Moreover, decisions made are predominately based around moving individual/s positions, therefore knowledge of individual/s is vital and understanding the effect this can have on individual/s, the team and the game needs to be considered.

In summarising the results, the first consideration was that the head coach's decisions were perceived to influence the game. Specifically, relating to gaining, retaining or regaining control of the game. The head coach did face uncertainty pre and post decisions and there was the added uncertainty of whether or not the players would comply or not with the decisions the coach made. In addition, making decisions from the coaches' box on match day is best described as a two-part assessment process based around a situational problem. The two parts combine together to help the coach complete the assessment process and take the decision. Part one was building a story of the situational problem using a variety of information sources, which involved continual assessment of the situation post, the initial decision. Part two is concerned with the depth of player knowledge the coach holds and how this affects the taking of the decision to solve the situational problem. The more depth of knowledge, the more likely the decision will be taken quickly. The next section will discuss the findings and what the results mean and how it is situated within current literature.

Chapter 5: Discussion

The research set out to examine how an Australian Rules Football Head Coach makes decisions in the coaches' box on match day. Two main questions guided this research study, 1. Are head coach decisions perceived to influence the game on match day? and; 2. How does a head coach make decisions on match day? It was important to establish whether or not coach decisions are perceived to influence the match, because if they did not influence the match, there would be little imperative to examine the decisions a coach makes. Examining a coach making decisions in the box on match day occurs in an environment in which the head coach operates with a group of people in a confined space, where uncertainty of assessing situations and making decisions is high. This environment is high-pressured due to the limited time available (time-pressured), and is often further compounded by the relative score and the consequences a win or loss can have from historical, financial and social perspectives.

The head coach makes decisions on match day by completing a two-part assessment process based around a situational problem, which allows a decision to be taken. The situational problem was predominately caused by the opposition or the coach's own teams' ineffectiveness in responding to the oppositional play. Part one of the assessment process is the coach building a story of the situation using information sources (i.e., statistics, weather, score, time, assistant coaches) to understand the problem. Once the problem has been framed, the coach moves into part two of the process to complete the assessment and take the decision. Taking the decision is achieved by using the knowledge the coach has of individual players and personnel within the team to complete the story and potentially solve the problem. Players' and runners' perceptions are that coach decisions to solve football problems do influence the game. The coach too believes decisions can influence the game; however, there was more uncertainty of the influence of this decision on the game.

The next section will discuss three main themes in relation to the results. First, the notion of control is explored as is the scope of the coach's influence on situations

through decisions made. The discussion will seek to link the notion of a slow interactive script with semi-deliberative decision making, as well as questioning and explaining what happens on a cognitive level when the pressure in the game is at its highest level, and how the decisions made do not guarantee a win, even if the decision influences the situation in a positive manner. The second main area of the discussion relates to the two-part assessment process of story building and player knowledge. In part one there will be an emphasis on story building including an understanding of how a situational story is built, by describing what information can be used to build a story and linking the information sources with existing literature, including key attractors (Harvey, Lyle, & Muir, 2015). In part two, player knowledge is considered with an emphasis on the role this knowledge plays in the completion of the coach's mental model and how player knowledge links with existing terminology used in current literature. The third area of the discussion relates to the proposal of two levels of semi-deliberative decision-making existing throughout a game, depending on the situation being faced.

Assessment Process

The head coach made decisions throughout a game by engaging in a two-part assessment process. It is this decision-making process there are two parts: (i) Situational story; and (ii) Player Knowledge combine or "interact" (p.14), allowing the coach to form a mental model, that represents an understanding (Côté et al., 1995) of a situation the s/he would like to achieve from their decision. The researcher's aim of splitting the assessment process into two parts is to provide simplicity to a complex assessment process. Both parts of the assessment process are important, however, part two of the process regarding understanding the amount and accuracy of knowledge a coach holds of each individual player is what allows the decision to be taken. Personnel and player knowledge is used to change an individual/s position or role that, in turn, can influence the situation to gain or regain control of the game. The two-part assessment process is discussed below, including the complexity of

building the situational story and the role player knowledge plays in taking the decision.

Building a situational story. Although part two of the process allows the decision to be taken, the coach still needs an accurate understanding of the situational problem; otherwise the quality of the decision made might have minimal impact and therefore not influence the outcome of the situation. To understand the situational problem, the coach frames the problem by building a story. The story is built by continuously scanning the game, which allows the coach to collect the appropriate information to frame the situational problem. The use and terminology of problem framing and story building to describe coach cognitions is consistent with existing coaching literature (e.g., Harvey et al., 2015; Lyle, 2010). Problem framing and story building are formed by the coach to make sense of a particular situation as is occurring in part one of the decision making process. The head coach gathers information and constructs the knowledge via a slow interactive script, allowing the coach to build up a scenario to deal with either serial or unfolding situations (Harvey et al., 2015; Lyle, 2010).

Building a scenario with a slow interactive script is a complex process; knowing and understanding what information to look for, how different information relates and matches up with each other, the affect information has on the situation, and the influence information has on the coach. The complexity of part one in the two-part assessment process is the amount of potential information available to the coach. Specifically the numerous equations of information combining together and the cognitive organisation required building a story to understand the situation. By the coach understanding the situational problem it is safe to say s/he knows what information to look for. Additionally the coach must know and understand if and how the information relates and affects to each other to be able to build an accurate story of the situation. If the coach does not know what information to look for, the representation of the situation will not be accurate (Côté et al., 1995) and the decision is unlikely to influence the game. Knowing what information to look for and

how different information relates to each other comes down to knowledge and experience of the coach.

Knowledge and previous experience allows the expert coach to feature match (Klein, 2009) the information gathered with previous experiences (Lyle, 2010) to recognise situations. "Feature matching" (Klein, 2009, p. 290) allows the coach to build the situational story. In other words, the expert coach gathers and combines the information presented by the situation to understand the situational problem. In story example one under the heading part one: situational story, Geoff used his vast coaching experience to match features. With his initial decision Geoff wanted to control the tempo and take time off the clock, by continually scanning, Geoff matched the features to conclude the outcome was not being achieved, for example Geoff explains the features: 1. *"…we were unable to find enough of the ball and hang on – hang on to the ball for long enough,"* 2. *"…we couldn't get enough marks"* 3. *"The ball was – was continuously in motion",* 4. *"…using too much handball"*. These features were matched and Geoff concluded his team was not controlling the tempo of the game and therefore not taking time off the clock. To further highlight the complexity of the assessment process, Geoff was then able to match the conclusion of the outcome not being achieved with other relevant information and conclusions (i.e, oppositions momentum, score, own players cramping) to build an overall story. If Geoff did not have the experience and knowledge to match features and form conclusions, there is the potential of the head coach to miss or not understand the situation, let alone an accurate representation of the entire situation. As Côté et al. (1995) explains: "when coaches activated several properties of knowledge simultaneously, they mentally formed a complex and possibly unique problem situation" (p. 14), as is in the example provided with Geoff. Côté et al. (1995) continues to explain: "the nature of this organisation determined the quality, completeness and coherence of the mental model used that, in turn, determined the efficiency of the knowledge applied" (p. 14). In other words, the quality of knowledge and how it is organised determines the depth of understanding regarding the story. This evidence from existing literature and the data reinforces the importance of

knowledge and experience a head coach needs to feature match incidents and conclusions, organise the information accurately to understand the situation and have a mental model which is complete, coherent and of a high quality.

While the coach is gathering and organising information to understand the situational problem, an event might occur to complete the story or be strong enough to enforce a decision straight away. These specific events are known as "key attractors" (Lyle, 2010, p. 31) and occur throughout a situation, helping the coach to recognise or frame a problem (Harvey et al., 2015). This means a key attractor can be an event sourced from the categories (e.g., statistics, weather etc.), which provide the information to form the situational story. If the information sourced is strong enough, irrelevant of whether there are multiple pieces of information coming together or just one or two strong pieces of information (for example, an individual's poor performance as found in story example two under the heading of part two: player knowledge of the results section) the information can act as a "catalyst" (Harvey et al., 2015, p. 160). A catalyst can be deemed as an attractor strong enough to trigger a decision. For example, the key attractors acting, as catalysts for a decision in the example above (story example one), were the score and the fatigue of Geoff's players:

> I could see after they got to within two goals that probably 10 of our guys went into cramp stretch, so I knew we were struggling physically at the time, and that was – that was also used as – as – as cues to –that we had to do something. (Geoff)

In the same example, there were other attractors gathered from continuously scanning the situation which were Geoff's team's inability *"to actually take time off the clock…" (Geoff).* This attractor helped form the story but did not act as a catalyst for the decision. Meaning the head coach can continuously scan, until key attractor/s become strong enough to act as a catalyst for a decision and not all key attractors become catalysts.

In summary, the coach builds a story of a situational problem by feature matching information. The quality of information gathered and matched together determines the quality and accuracy of the story. While building these stories an

event may occur known as key attractors (Lyle, 2010). A key attractor can either add to the story to help make the understanding of the situational problem stronger, or be strong enough as an isolated event, to act as a catalyst for an immediate decision. Once the coach understands the situational problem or there's a catalyst resulting in an immediate decision, attention turns to what decision needs to be made to gain or regain control of the situation and therefore the game.

Player knowledge. Once the coach has an understanding of the situational problem or there is a catalyst for an immediate decision, the coach's decision turns to choosing which player/s are going to be used to help complete the assessment, take the decision and bring the modelled situation to life. Not only choosing which player/s to use can bring uncertainty for the coach pre-decision but, how and when to use them are important considerations. If the coach has knowledge on his/her players this could potentially affect the amount of uncertainty pre- and post-decision. Prior to making the decision the coach should have as much knowledge regarding the history or "historicity" (Harvey et al., 2015, p. 158) of each player's positional and role capabilities including knowing their footballing capabilities (i.e., technique, physical attribute, decision making). Harvey et al. (2015) relates historicity to the knowledge the coach carries of personnel or players within the team on game day. The coach uses historicity and footballing capabilities of each individual player to complete the story and take the decision. In story example two, the last 5 minutes of the game Geoff was not happy with the performance of Simon (position: ruckman), therefore, he decided to change Simon with Grant. Geoff chose Grant because he knew the history of Grant's positional (i.e.: ruckman) and role capabilities including his footballing capabilities, Geoff explains: *"the competitiveness, the strengths around the ball, the ability to compete."* Geoff was able to take the decision relatively quickly, resulting in Grant helping to control the situation, influence the game accordingly and in this case the team happened to win the game. The level of knowledge Geoff had affected the accuracy of his representation of what the player could produce. As explained by Côté et al. (1995), "The accuracy of the representation depends on the level of knowledge of the coach who constructs the

model" (p. 14). If the coach does not have this knowledge, it is safe to presume there will be greater uncertainty of whether the player chosen can bring the coach's model of the situation to life.

However, uncertainty regarding players is not just related to the outcome of the decision. The coach faces uncertainty pre-decision deciding how, when and which player/s to use. This means there is uncertainty in making the actual decision itself and whether or not the modelled situation, the coach wants to achieve would be able to come to life. Therefore, managing the uncertainty related to the use of players, comes back to the level and accuracy of knowledge a coach has. The more detailed knowledge a coach has (i.e. historicity, players footballing capabilities), the less uncertainty s/he faces. One of the techniques of coping with uncertainty is to reduce uncertainty by gathering more information (Lipshitz & Strauss, 1997). Additional information can be gathered by the coach while scanning the game; for example, observing an injured player (as mentioned in story example two), or observing a player showing signs of fatigue (as mentioned in story example one) or identifying a player playing poorly. This additional information can combine with historicity and individual footballing capabilities to enable the coach to cope with some uncertainty. Apart from adding the additional information through scanning, the coach needs to use the information s/he already has to decide on a course of action. But, how is this achieved? The coach decides by using the existing mental model of that particular player, which is "nested" (Abraham and Collins, 2011, p. 380). This means the experience and knowledge a coach has of each individual player has been built, into a mental model, representing the capabilities a player can offer. Through decision experiences involving players, a coach strengthens the nested mental model. Decisions made throughout coaching practice are "embedded" (p. 380) "or become nested for the coach's medium term agendas which themselves are linked to (nested within) longer term aims" (Abraham & Collins, 2011, p. 380). This means the coach's representation of each individual player strengthens with more experiences and can be used to solve future situational problems. The stronger the mental model of each player, the more depth of knowledge the coach has, meaning

less time might be needed to deliberate on the decision. If the coach does not have depth of knowledge s/he may take longer to decide which player to use, therefore deliberating on the decision for a longer period of time. Therefore, in the context of deciding how, when, and which player/s to use to solve the situational problem, it could be argued there are two levels of deliberation.

Two Levels of Deliberation.

There are potentially two levels of deliberation relating to the decision of using personnel and individuals within the team to solve a football problem. These can be deemed as 'Less Deliberative' and 'More Deliberative' decision making. Within the NDM paradigm, Lyle (2010) explains that semi-deliberative decision making is the most appropriate way to describe a coach's decision making throughout practice. Therefore, if there is less and more deliberation throughout a game and coaching throughout a game is best described as semi-deliberative, it is safe to conclude there are two levels of semi-deliberative decision making. Any suggestion less deliberative decision making should be classified as non deliberative decision making can be quickly ruled out as there is "no suggestion that the coach's behaviour is (or should be!) completely without conscious deliberation" (Lyle, 2010, p. 28). Therefore, the head coach who makes decisions while coaching a match, depending on the situation, either makes decisions with more time to deliberate or takes decisions with less time to deliberate and this all occurs throughout semi-deliberative decision making. Determining the level of deliberation is not necessarily subjected to a single parameter such as how much time is left in the game, but can be determined by the nature or complexity of the problem, or historicity, in relation to personnel and this relationship with the current game situation. Below the two levels of deliberation within a live match situation are discussed. More deliberative decision making throughout a game can be linked back to the second example of part two: player knowledge in the results section, where there is more time to deliberate on which player to choose. The more time to deliberate suits the understanding that a coach's cognition is a slow interactive script. This is because Geoff had time to scan the game, build the story to understand the situation and scan the personnel and players

to complete the model. On the other hand the head coach maybe forced into deliberation due to the lack of historicity or uncertainty of how to best use a player in which his/her historicity is strong. For example as mentioned under the heading of uncertainty within the results section, Geoff was deliberating on how and where to use his best player, the coach wanted to use the player effectively for the benefit of his team and thwart the opposition at the same time. This situation highlights the two levels of deliberation is not only determined by the concept of time vs no time, but by the nature of the situation and historicity, additionally adding weight to the complexity of the assessment process and the importance of historicity and the role it plays within the decision making process.

Less deliberative decision making occurs in a high pressured environment, caused by minimal time left in the game and/or the score as mentioned in story example one under the heading of part one: situational story, and example story two, under the heading of part two: player knowledge. Less deliberative can also occur within a system based on rules, as mentioned in the first example related to equalising, under the heading managing uncertainty. Historicity too, can cause less deliberation, meaning the coach can feature match a player with the situation, irrelevant of the score or time. As illustrated in the last example under the heading, managing uncertainty, where the head coach's knowledge of a particular player means the decision needs little deliberation. In any of these scenarios, the head coach can either feel in complete control or have very little control; either way because the deliberation is less, the cognitive script used by the coach can be perceived as not being slow. This perception comes down to the nature and complexity of the situation i.e. pressure of the situation score, time left, players fatiguing, historicity, regarding which player to choose. To complete the assessment process, the coach needs to quickly understand the situation and match the player to the situation through the hierarchical organisation of the mental models and take the decision.

In summary, a coach making decisions throughout a game is best described as semi-deliberative and the discussion suggests breaking semi-deliberative

decision making up into two levels, less and more deliberative decision making. The level of deliberation can be determined by the nature or complexity of the problem and/or historicity, in relation to personnel and the relationship with the current game situation. Throughout the two levels of semi-deliberation the coach continues with a two-part assessment process to take a decision, aiming to influence the game by retaining, or regaining control of the situation.

The Influence of a Decision

      Control. The intent to control a situation (and the game) comes about from match day being a contested activity between two head coaches and their teams. The two head coaches are wrestling for control in an attempt to have the game most representative of their plans (i.e., working to the strengths of their own players or team, or seeking to exploit a weakness in opposition players or team). This relates to situations where they are seeking to regain control or retaining control of the situation (or game). For example, Geoff talked about getting the game *"back on our terms" (Geoff).* In effect, he is referring to the need to make decisions in an attempt to retain control of a situation and in turn the game. In another example, a player explains his understanding of a decision to retain control of the game:

> Just control the game. We were up and just needed to control the game, run the clock down and keep it in our favour; just hold onto the ball, just manage the time and make sure we have possession [Player]

The whole notion of a coach making decisions based on control, supports existing literature (e.g., Harvey et al., 2015; Lyle, 2010), where the coach tries to control a situation to match what was initially planned or what has emerged throughout the duration of the match. Above, when Geoff talks about getting the game 'back on our terms', the implication is that the situation or the game is not being played out in ways that were originally planned or envisaged. Depending on the information available, the coach may have to refine or re-evaluate his mental model, and change what control represents and how it is achieved within that particular situation. For example, in the results under the heading of coach perceptions, Geoff reported that he was losing control of the flow of the game and

identified he had too many tall players in the forward line. He still wanted to control the flow of the ball, however, the way in which this was represented on the field of play was different to what was originally planned. Therefore the mental representation of what control or in this case 'back on our terms' looked like was different to when the match first started.

Control can be classified as an outcome a coach is trying to achieve, through a process of re-evaluation (Côté et al., 1995) and refining mental models via a slow interactive script (Harvey et al., 2015; Lyle, 2010). For example, one particular situational story reported in the results explained the scores were close with Geoff's team leading, but they were fatigued and had no momentum. Geoff had already made a decision a few minutes prior to put an extra player into the midfield. Upon reassessment, it was adjudged that that particular decision was not working and Geoff decided: "*to manipulate the numbers behind the ball*" *(Geoff).* He made this decision because as he said it was *"the only control that I felt I had" (Geoff).* Although this can be interpreted as a desperate decision, it is not. Geoff's experience allows one option to be available to him. This is consistent with NDM literature where experts do not compare options and "making a decision means committing oneself to a course of action" (Klein, 2008, p. 457). The coach is able to commit without comparing due to the hierarchical organisation of mental models (Abraham & Collins, 2011). Therefore, Geoff committed to manipulate the numbers behind the ball, he did not compare options because it was the only control he felt he had.

In regards to Geoff's initial decision of the above situation, the decision did not influence the situation as he was expecting. Therefore, Geoff had to re-evaluate and refine the model, make a new decision, so the situation occurring on the field would be influenced and represent his new model. This cognitive theory is consistent with existing literature where "changes to a mental model could occur until the relationship between the model and the environment is adequate for achieving the goal" (Côté et al., 1995, p. 14). This process highlights continuous scanning and assessment of the situation after an initial decision and an element of deliberation, to allow the head coach to reconsider potential outcomes. The element of deliberation

mentioned ties well into the previously mentioned descriptor of coaches' decision making being semi-deliberative, coming to the most appropriate decision on an ongoing basis (Lyle, 2010). There was time after the first decision was made, to continue to scan, assess and engage in some sort of deliberation to make a new and appropriate decision. Although there was an element of deliberation, due to the nature of the situation, the deliberation level can be perceived as 'less deliberative'.

Implications for Coach Development

Coach development is based on ongoing learning and viewing the coach, as a learner will "develop an understanding of their working knowledge" (Cushion et al., 2010). This working knowledge will help improve coaches' decision making, which "plays an important part in coaches' everyday practice" (Lyle, 2010, p. 27) including match day coaching. Decision making is an important area of ongoing empirical enquiry and necessary to guide coach development, whether informal, formal or experiential. This section provides some ideas for the coach as learner and developers to improve the process of decision taking by the coach on match day.

Conceptualising the model as two parts was an attempt by the researcher to try and provide simplicity to a complex assessment process and in turn may help coach developers to break up the formal learning process into two sections: (i) Describing and Understanding how a story is built; and (ii) Understanding the importance and the type of player knowledge needed to help take the decision. In relation to describing and understanding how a story is built coach educators can discuss with coaches, how to understand and recognise problem situations throughout a game. Coach educators can use the information identified (statistics, weather, score, time, injury and fatigue, opposition and performance) to build and add depth of knowledge to a story of a specific situation. Coach educators and developers can put together various mock scenarios teaching coaches what features to look for within a particular situation and understanding the effects information would have on that situation. In terms of player knowledge, coach educators can

assist and help the coach to identify and match player capabilities to the situational problem, increasing the chance of the decision influencing the game.

Through the use of "experiential learning" (Cushion et al., 2010, p. 27) with mediation (from coach developers or mentors) or without, coaches can be encouraged to intentionally improve their historicity. Meaning, deliberately adding depth of knowledge regarding each individual players team, positional and footballing capabilities built from previous experiences. Improving historicity can be achieved in several ways including: playing players in different position, assigning different roles, and putting players in challenging circumstances. The coach educator can encourage the coach to reflect by using two of Gilbert and Trudel (2001) reflection techniques, "reflection-in-action and reflection-on-action" (p. 30) to "support the experiential learning" (Cushion et al., 2010, p. ii). Reflection-on-action occurs while the game is being played out and reflection-on-action should occur in between games (Gilbert & Trudel, 2001). Overall, experiential learning will provide coaches with the knowledge of their own players' capabilities and build historicity. Developing coaches' expertise regarding, story building, historicity and footballing capabilities "requires the relevant knowledge" (Cushion et al., 2010, p. iv), which has been provided throughout the explanation of the decision taking process by a coach on match day.

Coach educators and developers can use formal learning to create awareness regarding the importance of having sound historicity. Specifically, (and as mentioned above) historicity regarding understanding player positional, role and footballing capabilities including but not limited to: technical, decision making and physical characteristics, in all situations, guiding coaches' learning about what these characteristics might look like in certain players and in what specific situations these skill sets can be used in, will help to improve coaches' working knowledge and therefore decision making capabilities.

Chapter 6: Conclusion

Australian Rules football is an original game, which is historically significant, financially important and socially relevant. From a coach education and development perspective, professional learning within the AFL is limited and the coaches' box deemed the most challenging task for coaches (Mallett et al., 2007). Using the NDM framework (Lipshitz et al., 2001; Lyle, 2010) the decision making of an AFL head coach in the box on match day was examined. The purpose of the study was to describe and understand how an AFL head coach made decisions in the coaches' box throughout live matches. Foundational to this examination was the aim of establishing whether or not a head coach's decision influenced the game. If the decisions did not influence the game there would be little reason to continue.

Decisions made by the head coach were perceived to influence the game, by the players, runners and head coach. The perception of influence was measured by whether or not the team could control the situations the decision was aimed at impacting. This task of controlling situations and the game more broadly was made harder due to the game being a contested activity between two teams led by two opposing coaches. Both coaches make decisions to control situations and therefore the game. Control is classified as retaining or regaining the situation.

The notion of control supported existing literature that described coach decision making as semi-deliberative, coming to the most appropriate decision on an on going basis with the use of a slow interactive script (Harvey et al., 2015; Lyle, 2010). Throughout all parts of a match the coach can attempt to control a changing situation if the coach can understand what control looks like within that particular situation. This involves the coach continuously scanning and assessing situations, with an element of deliberation allowing the coach to reconsider potential outcomes to the changing situation.

Decisions on match day were described and understood as a complex assessment process, which to simplify, the researcher broke up into two parts. Part one: situational story and, part two: player knowledge. As a complete process the complexity is related to the head coach accurately knowing what information or key

attractors to look for, organising the information accurately by feature matching key attractors to form a conclusion, and understanding the potentially numerous combinations of features to form a conclusion and in turn the potential number of conclusions to form a story. The key attractors were gathered from continuously scanning the game gathering information (i.e. weather, statistics, score, time, game trends etc.) and accessing pre-existing knowledge (i.e. historicity and individual's footballing capabilities). Key attractors could too act as a catalyst for a decision, if deemed strong enough, such as the ones mentioned in the discussion, poor player performance, fatigue of numerous players combined with the score however, not all key attractors become catalysts (i.e. the teams inability to try and take time off the clock).

Overall, these findings support existing coaching literature regarding describing and understanding how the coach cognitively operates within the NDM paradigm, for example describing a coach's decision making as semi-deliberative, coming to the most appropriate decision on an on going basis, the use of a slow interactive script, story building (Harvey et al., 2015; Lyle, 2010) and feature matching (Klein, 2009). Including the importance of accuracy, efficiency and organisation of knowledge and the role this plays in understanding a complex and unique football problem (Côté et al., 1995). However, the identification, of the types of information which forms key attractors and the importance the role historicity and pre-exisiting knowledge plays has added depth to understanding the process of coach's decision taking.

An underlying theme throughout the discussion was the existence of less and more deliberation within semi-deliberative decision making. As mentioned earlier, describing coach's decision making as semi-deliberative is consistent with existing coaching literature (Lyle, 2010). Less and more deliberative decision making can be used throughout the entire decision taking process and can be determined by either/or time available, the nature or complexity of the problem, historicity (or lack there of) and its relationship with current game situation. More deliberative decision making throughout the decision taking process is consistent with existing literature in

describing the coaches' cognitive structure as a slow interactive script. However, when there is less time to deliberate, there was still an element of deliberation, however this may not be perceived as being slow. This concept does not challenge current research but opens the door to a deeper understanding of the taking of decisions by the coach on match day throughout different situations.

Further Research

Further research should look into coach's decision making throughout a game and unpack whether or not there is merit to there being multiple levels of semi-deliberation. Identify decisions throughout a live match in various team sports, (whether bench coaching or in a box) understanding the situation and the environment the decision has taken place and including whether or not the coach has used differing levels of deliberation. Once this has been achieved, research should continue exploring why the coach has needed more or less time to deliberate on a decision and how deliberation type has impacted on the game. The result to this research will help to explain the difference between the levels of deliberation, regarding when they occur throughout a game and what are the information sources or key attractors which make a decision more or less deliberative. Achieving this would guide coach developers into potentially targeting the different deliberative levels of semi-deliberative decision making to improve coaches' decisions on match day throughout all types of situations.

Due to the perception of a coach's decisions influencing the game, further research might examine the impact of the decision made. Understanding what it is the coach is trying to achieve and what effect did the decision have on the players' thoughts, feelings, and behaviours, as well as the opposition and game as a whole? Was the desired outcome based on controlling the situation achieved? One potential way of contributing to understanding the impact of coach decisions might be to quantify the situation through statistics, did the match data support the outcome achieved? Additionally, research could look at whether or not match data supported the situational scenario built by the coach, potentially assessing the quality and

accuracy of the story. However, a reliance only on quantitative data will limit the richness of understanding this complex topic.

Limitations

A limitation of the study related to the player focus groups. The logistics of assembling the focus groups meant that there were difficulties in securing appropriate times and the number of participants in each was unbalanced. A better situation would have been three groups of three or a group of four and a group of five. This would have provided more opportunities for discussion between the players (a key advantage of focus groups).

A potential limitation related to the immediacy of the recall. The stimulated recall interviews were conducted two days after each match. This presented the potential for the coach to leave the cognitive process involved with decision, opening up to the coach reflection instead of recall (Lyle, 2003). Unfortunately, due to availability (e.g., coach commitments post-game) and other logistics (e.g., accessing match footage, compiling split-screen footage) this situation could not be helped. With limited other options, a phone call was made the next day to the participant to probe his recall on the critical decisions he had made. This technique was used to show care in the process and reduce memory decay (Lyle, 2003).

Another aspect that should be incorporated in future research designs in similar projects is the use of note taking whilst pre reading transcriptions. This has the potential to help the researcher to get a sense of scope and to check for topics that occur and re-occur, for emerging themes where hunches and ideas are captured and is the first step in the development of categories (Tesch, 1990).

References

Abraham, A., & Collins, D. (2011). Taking the next step: Ways forward for coaching science. *Quest, 63*, 366-384.

Abraham, A., Collins, D., & Martindale, R. (2006). The coaching schematic: Validation through expert coach consensus. *Journal of Sport Sciences, 24*(6), 549-564. doi: 10.1080/02640410500189173

American Sport Education Program. (2002). *Match-Day Coaching* (3rd ed.). USA: Human Kinetics.

Anderson, J. I. (2007). Game-day coaching in team sports. *Coaching Update, 22*(3).

Armour, R. (1986). Sideline coaching. *Polo, 12*(4).

Australian Football League. (2010). *Highlights of 2010*. Retrieved from http://s.afl.com.au/staticfile/AFL%20Tenant/AFL/Files/afl_annual_report_2010 .pdf

Australian Football League. (2014). *Annual report (Report No.* 118). Retrieved from http://www.afl.com.au/afl-hq/annual-reports

Australian Football League. (n.d.). *AFL history*. Retrieved from http://www.afl.com.au/development/aflexplained/history/tabid/10296/default.as px

Australian Football League Coaches Association. (2009). *Who we are*. Retrieved from http://aflca.com.au/index.php?id=11

Australian Football League Coaches Association. (2011). *State of play: AFL Coaches Association Annual Report 2011.*

Barzansky, B., Berner, E., & Beckman, R. R. C. (1983). Evaluation of a clinical program. *Evaluation & Health Professions, 8*(2), 193-208. doi: 10.1177/016327878500800205

Bossard, C., Kermarrec, G., Benard, R., De Loor, P., & Tisseau, J. (2009, June). *Investigate naturalistic decision making of football players to design virtual environment.* Paper presented at the Proceedings of NDM9, the Ninth International Conference on Naturalistic Decision Making, London, UK.

Boutmans, J., & Swillen, J. (1989). *Time-Out: Key to successful coaching.* Paper presented at the Proceedings of the Maccabiah-Wngate International Congress, Israel.

Brewer, F. W., & Treyens, C. J. (1981). Role of schemata in memory for places. *Cognitive Psychology, 13*, 207-230. doi: 10.1016/0010-0285(81)90008-6

Côté, J., Salmela, J., Baria, A., & Russell, S. (1993). Organizing and interpreting unstructured qualitative data. *The Sport Psychologist, 7*, 127-137.

Côté, J., Salmela, J., Trudel, P., Baria, A., & Russell, S. (1995). The coaching model: A grounded assessment of expert gymnastic coaches' knowledge. *Journal of Sport and Exercise Psychology, 17*(1), 1-17. Retrieved from http://journals.humankinetics.com.ezproxy.library.uq.edu.au/AcuCustom/Sitename/Documents/DocumentItem/8925.pdf

Crowther-Heyck, H. (1999). George A.Miller, language, and the computer metaphor of mind. *History of Psychology, 2*(1), 37-64.

Cushion, C., Nelson, L., Armour, K., Lyle, J., Jones, R., Sandford, R., & O'Callaghan, C. (2010). *Coach Learning and Development: A Review of Literature.* Sports Coach UK: The National Coaching Foundation. Retrieved from https://www.sportscoachuk.org/sites/default/files/Coach-Learning-and-Dev-Review.pdf

Debanne, T., & Fontayne, P. (2009). A study of a successful experienced elite handball coach's cognitive processes in competition situations. *International Journal of Sports Science & Coaching, 4*(1), 1-16. doi: 10.1260/1747-9541.4.1.1

Fielding, G. N., & Fielding, L. J. (1986). *Linking data.* Thousand Oaks, CA: Sage Publications, Inc.

Gilbert, D. W., Trudel, P., & Haughian, P. L. (1999). Interactive decision making factors considered by coaches of youth ice hockey during games. *Journal of Teaching in Physical Education, 18*, 290-311. Retrieved from http://journals.humankinetics.com.ezproxy.library.uq.edu.au/jtpe-back-

issues/JTPEVolume18Issue3April/InteractiveDecisionMakingFactorsConsider
edbyCoachesofYouthIceHockeyDuringGames

Gilbert, D. W., & Trudel, P. (2001). Learning to coach through experience: Reflection in model youth sport coaches. *Journal of Teaching in Physical Education, 21*(1), 16-34. Retrieved from http://journals.humankinetics.com.ezproxy.library.uq.edu.au/AcuCustom/Siten ame/Documents/DocumentItem/4219.pdf

Gordon, J. (1994, July-August). Some thoughts on sideline coaching. *Soccer Journal, 39*(4), 33.

Harvey, S., Lyle, J., & Muir, B. (2015). Naturalistic decision making in high performance team sport coaching. *International Sport Coaching Journal, 2*(2), 152-168. Retrieved from http://dx.doi.org.ezproxy.library.uq.edu.au/10.1123/iscj.2014-0118

Heil, J., & Soter, P. (2009). Sports science: Stripside coaching. *American Fencing Magazine,* 22.

Holyoak, J. K. (1984). Mental models in problem solving. In R. J. Anderson & M. S. Kosslyn (Ed.), *Tutorials in Learning and Memory*. San Francisco: W. H. Freeman and Company.

Johnson-Laird, N. P. (1983). *Mental models: Towards a cognitive science of language, inference and consciousness*. Great Britain: Cambridge University Press.

Kellogg, T. R. (2007). *Fundamentals of cognitive psychology*. USA: Sage Publications.

Klein, G. (2003). *Intuition at work*. New York: Doubleday.

Klein, G. (2008). Naturalistic decision making. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 50*(3), 456-460.

Klein, G. (2009). The recognition-primed decision (RPD) model: Looking back, looking forward. In E. C. Zsambok & G. Klein (Ed.), *Naturalistic decision making* (pp. 285-292). New York: Routledge.

Klein, G., Calderwood, R., & Clinton-Cirocco, A. (1986). *Rapid Decision Making on the Fire Ground.* Paper presented at the Proceedings of the Human Factors Society - 30th Annual Meeting, Ohio.

Klein, G., Calderwood, R., & MacGregor, D. (1989). Critical decision method for eliciting knowledge. *IEEE Transactions on Systems. Man and Cybernetics, 19*(3), 462-472. doi: 10.1109/21.31053

Kosslyn, M., Stephen. (1984). Mental representation. In K. M. Stephen & J. R. Anderson, (Ed.), *Tutorials in learning and memory* (pp. 91-117). San Fancisco: W.H. Freeman and Company.

Launder, A., & Piltz, W. (1999). *Becoming a better bench coach: part 2: coaching in the game*. Paper presented at the Sports Coach Conference.

Lipshitz, R. (1993). Converging themes in the study of decision making in realistic settings. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsambok (Eds.), *Decision making in action: Models and methods* (pp. 103-137). Norwood, NJ: Ablex.

Lipshitz, R., Klein, G., Orasanu, J., & Salas, E. (2001). Focus article: Taking stock of naturalistic decision making. *Journal of Behavioural Decision Making, 14*, 331-352.

Lipshitz, R., & Shaul, O. B. (2009). Schemata and mental models in recognition-primed decision making. In C. E. Zsambok & G. Klein (Eds.), *Naturalistic Decision Making* (pp. 293-303). New York: Routledge.

Lyle, J. (2002). *Sports coaching concepts: A framework for coaches' behaviour*. New York: Routledge.

Lyle, J. (2003). Stimulated recall: A report on its use in naturalistic research. *British Educational Research Journal, 29*(6), 861-878. Retrieved from http://www.jstor.org.ezproxy.library.uq.edu.au/stable/1502138?pq-origsite=summon&seq=1#page_scan_tab_contents

Lyle, J. (2010). Coaches' decision making: A naturalistic decision making analysis. In J. Lyle & C. Cushion (Eds.), *Sports Coaching: Professionalisation and Practice* (pp. 27-41). London: Elsevier.

Lyle, J., & Vergeer, I. (2013). Recommendations on the methods used to investigate coaches' decision making. In P. Potrac, D. W. Gilbert, & J. Denison (Eds.), *Routledge Handbook of Sports Coaching* (pp. 141-152). New York: Routledge.

Macquet, A. C. (2009). Recognition within the decision-making process: A case study of expert volleyball players. *Journal of Applied Sport Psychology, 21*, 64-79. doi: 10.1080/10413200802575759

Mallett, J. C., Rossi, T., & Tinning, R. (2007). *Coaching knowledge, learning and mentoring in the AFL* (Australian Football League). The University of Queensland: School of Human Movement Studies.

Oxenham, D. (1998). Match Day. *Rugby league coaching magazine, 6,* 4-5.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). London: Sage Publications.

Pliske, R., & Klein, G. (2003). The naturalistic decision making perspective. In L. S. Schneider (Ed.), *Emerging perspectives on judgment and decision research* (pp. 559-585). Cambridge: Cambridge University Press.

Regehr, G., & Norman, R. G. (1996). Issues in cognitive psychology: Implications for professional education. *Academic Medicine, 71*(9). doi: 10.1097/00001888-199609000-0

Roos, P. (2011, March 26). The golden rules of afl coaching. *Herald Sun.* Retrieved from http://www.heraldsun.com.au/sport/afl/the-golden-rules-of-afl-coaching

Ross, G. K., Shafer, L. J., & Klein, G. (2006). Professional judgements and naturalistic decision making. In K. A. Ericsson, N. Charness, J. P. Feltovich, & R. R. Hoffman (Ed.), *The Cambridge Handbook of Expertise and Expert Performance* (pp. 403-420)*.* New York: Cambridge University Press.

Schmidt, A. R. (1975), A schema theory of discrete motor skill learning. *Psychological Review, 82*(4), 225-260

Schmidt, A. R., & Wrisberg, A. C. (2000). *Motor learning and performance: A situation-based learning approach* (4th ed.). United States: Human Kinetics

Sheahan, M. (2011, August 12). AFL coach wages top $25 million. *Herald Sun.* Retrieved from http://www.heraldsun.com.au/sport/afl/afl-coaching-wages-top-25-million/story-e6frf9jf-1226113441359

Smith, M., & Cushion, C. J. (2006). An investigation of the in-game behaviours of professional, top-level youth soccer coaches. *Journal of Sports Sciences, 24*(4), 355-366. doi: 10.1080/02640410500131944

Tesch, R. (1990). *Qualitative Reserach: Analysis Types and Software Tools.* New York: The Falmer Press.

Thomas, D. R. (2006). A general inductive approach for analysing qualitative evaluation data. *American Journal of Evaluation, 27*(2), 237-246. doi: 10.1177/1098214005283748

Thorndike, W. P. (1984). Applications of schema theory in cognitive research. In R. J. Anderson & M. Kosslyn, Stephen (Ed.), *Tutorials in learning and memory.* San Francisco: W.H. Freeman and Company.

Trudel, P., Côté, J., & Bernard, D. (1996). Systematic observation of youth ice hockey coaches during games. *Journal of Sport Behaviour, 19*(1), 355-366. doi: 10.1080/02640410500131944

Witham, J. (2011). *AFL's $1.25 billion broadcast deal.* Retrieved from http://www.afl.com.au/news/newsarticle/tabid/208/newsid/112560/default.aspx

Zsambok, E. C. (2009). Naturalistic decision making: Where are we now? In E. C. Zsambok & G. Klein (Ed.), *Naturalistic decision making* (pp. 3-16). New York: Routledge.

Appendix A

Appendix B

**THE UNIVERSITY
OF QUEENSLAND**
AUSTRALIA

School of Human Movement Studies

HEAD OF SCHOOL
Professor Doune Macdonald

The University of Queensland
Brisbane Qld 4072 Australia
Telephone (07) 3365 6241
International +61 7 3365 6241
Facsimile (07) 3365 6877
Email secretary@hms.uq.edu.au
Internet www.hms.uq.edu.au
CRICOS PROVIDER NUMBER 00025B

September 13, 2013

Mr Bradley Vanderwert
School of Human Movement Studies,
Connell Building
The University of Queensland
St Lucia QLD 4072

Dear Mr Vanderwert

Re: ethical review of the following project:

**Naturalistic Decision Making: Describing and explaining how an Australian Rules Football
Head Coach makes decisions in the box on match day.**

Thank you for the opportunity to review your proposal. I am pleased to let you know that
your project has been cleared in accordance with the ethical review guidelines at The
University of Queensland. Your approval number is: HMS13/0913.

Please note that:

(i)   Amendments to any part of the approved protocol (however minor)
        should be submitted to me for consideration.
(ii)   Signed statements of informed consent should be kept secure in case we
        need to access them in the future.

We wish you well with your research.

Yours sincerely,

Assoc Professor Judith Bauer
School of Human Movement Studies Ethics Committee

Appendix C