

# **Defining and developing a theory of sport intelligence**

by

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## Summary

Much has been researched and written on the concept of intelligence in the last century and while much of it has been applied in educational settings and commercial organisations, little has been investigated and applied within a sports context. Early research in the 1970s identified sport intelligence as comprising primarily of reaction time and recall and it was only in 2002, some 30 years later, that it again appeared in the literature with sport intelligence being considered a psychological characteristic of Olympic champions. The research of Gould, Diffenbach and Moffet (2002) into sport intelligence hypothesised that sport intelligence included having “the ability to analyse, being innovative, being a student of the sport, making good decisions, understanding the nature of elite sport, and being a quick learner” (p. 5). Later research by Blue (2009) proposed a comprehensive model of sport intelligence as it applied to golf wherein he posited that sport intelligence – albeit in a golfing context – comprised a ‘competition’ and ‘developmental’ intelligence.

Other than the thematic assessment of Gould et al. (2002) and the golf-specific study of Blue (2009) no literature, data or research was available internationally, on the African continent nor in South Africa. The researcher responded to the call for further research and decided to complete a qualitative, exploratory study in South Africa.

The research commenced by covering what was available on sport intelligence literature and to build on it by reviewing and considering general intelligence theories. Both orthodox and unorthodox approaches were considered and the review suggested that sport intelligence would conceptually and theoretically consist of a number of dimensions and constructs including a series of cognitive processes like memory, reasoning, problem solving, decision making and other rational processes.

The third source of literature was a review of sport psychology and it emphasised the importance and significance of emotional, motivational and other psychological factors in addition to the influences of personality.

The literature review led to the researcher identifying 14 hypotheses which were explored with 15 credible sport participants, whereafter a thorough content analysis of the 14 hypotheses was performed. 13 of the 14 initial hypotheses were accepted with one included as a theme within another.

The thematic assessment resulted in the identification and development of a systems model of sport intelligence comprising six components as follows:

- A neurophysiological component;
- A cognitive/rational component;
- An emotional/affective component;
- A team/group component;
- A societal/ecological component; and
- A metaphysical component.

The investigation and analyses furthermore indicated that the components do not exist in isolation of one another and each dimension seems of equal significance. The data suggested a parallel process and dynamic interplay between these components and this led to a systemic perspective being adopted when synthesising the model into a logical and coherent framework. Each of the components were critically evaluated from a cognitive and systemic perspective.

The systemic perspective proposed challenges the view that performance is not only an individual endeavour but also a systemic endeavour.

**KEY TERMS:**

Sport intelligence

Competitive intelligence

Developmental intelligence

Neurophysiological sub-system

Cognitive/rational sub-system

Emotional/affective sub-system

Team component

Societal component

Metaphysical component

## Declaration

I, Garrath James Rosslee, declare that *Defining and developing a theory of sport intelligence* is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I have not previously submitted this work, or part of it, for examination at UNISA for another qualification or at any other higher education institution.

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G.J. Rosslee

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# Chapter 1

## INTRODUCTION

### 1.1 Background

The psychological characteristics of Olympic Champions were researched by Gould, Diffenbach and Moffet (2002) who found that Olympic athletes possessed, among other characteristics, 'sport intelligence'. The researchers noted that "sport intelligence was a new concept that emerged. It consisted of raw data responses such as the ability to analyse, being innovative, being a student of the sport, making good decisions, understanding the nature of elite sport, and being a quick learner" (2002, p.186).

The same researchers called for further investigation into the concept of sport intelligence. The current research project will endeavour to define the concept of sport intelligence through the identification of its constructs and the development of a theoretical model of sport intelligence in South Africa.

Tom Eaton, writing a cricket article in *Business Day Sport* (2012, November, p. 13) says: "... one sees a bowler at the height of his powers, using speed, skill and intelligence to prise batsmen off batting friendly wickets". Speed and skill are known concepts, but do we know what intelligence in a sporting context entails?

Elite athletes offer a clue: Ice hockey great Wayne Gretsky (University Northern Texas, 2012) said: "A good hockey player plays where the puck is. A great hockey player plays where the puck is going to be" . Tennis player Arthur Ashe (University Northern Texas, 2012) said, "The ideal attitude is to be physically loose and mentally tight," while Bruce Jenner (University Northern Texas, 2012), a gold medal decathlete said: "I always felt my greatest asset was not my physical ability, it was my mental ability".

The current research project aims to better understand how and why some athletes are able to know where the so called "puck" will be, and what processes constitute sport intelligence.

Sport intelligence seems to entail cognitive processes. However, little research and literature is available on the topic. In fact, extensive literature searches produced only two references relating to the concept.

Preliminary investigations yielded an article on game intelligence. According to the Karolinska Institutet (2012), “[G]ame intelligence ... is the ability to ‘read’ the play, to be always at the right place at the right time, and steal goals. Many people have regarded game intelligence to be almost a magical ability, something that is impossible to measure” (p. 1). The second relevant reference is the one by Gould et al. (2002) mentioned above.

Attempting to better understand and define sport intelligence will require an examination of theories and approaches to general intelligence. Mackintosh (2011) points out that “it would be difficult to start measuring intelligence without some implicit or intuitive theory of what intelligence is, and from the earliest Greek philosophers to the present day, many writers have enunciated their ideas about the nature of intelligence” (p. 3).

His review of the history of intelligence stretches back to Alfred Binet in the late nineteenth century, whose theory of intelligence “consisted in a multiplicity of different abilities and depended on a variety of ‘higher’ psychological faculties – attention, memory, imagination, common sense, judgment, abstraction. Even more importantly, it involved coping successfully in the world and would thus be best measured by tests that would ... show that ... (people) ... are capable of coping with everyday problems” (Mackintosh, 2011, p. 5). Binet’s tests would, however, result in “leaving the general factor to shine strongly through” (p. 7) while Charles Spearman later labelled ‘g’ for general intelligence .

Other academics and researchers, including Cattell and Thurstone, criticised the ‘g’ theory through factor analytic models. Thurstone (cited in Mackintosh, 2011, p. 10), for instance, argued in favour of a number of independent mental abilities and identified “seven including verbal comprehension, verbal fluency, number, spatial visualisation, inductive reasoning, memory and possibly perceptual speed”. Later, Guilford devised his multifactor three-dimensional model, which yielded a total of 120

possible intellectual factors, but he revised this model to include 180 types of intelligence (Mackintosh, 2011).

Theories on intelligence therefore range from the single factor 'g' on the one hand to Thurstone's 180-type model on the other. These are, however, silent on the nature and characteristics of sport intelligence.

The psychometric view of intelligence, according to Davidson and Kemp (2011, p. 59) focuses "on individual differences in performance on mental ability tests ... the main underlying assumption is that the resulting interrelationship of test scores reveals the overall structure of intelligence". The available literature on the relationship between psychometrics and sport performance is steadily growing, but does not yet have enough data to provide conclusive results (Cox, 2007).

These models of intelligence do, however, not adequately explain why some people perform well in sport and others do not – even if they have the same measured intelligence.

Other theorists have attempted to respond to this question. Howard Gardner (2006), for example, developed his theory of 'multiple intelligences' in the 1980s, while Sternberg (2011) has developed his theory of 'successful intelligence'. Emotional intelligence gained popularity in the mid-1990s and continues to receive attention in academic and related circles.

A review of the less orthodox views of intelligences has included interpersonal, intrapersonal, spatial, logical-mathematical, linguistic, analytical, creative, emotional and practical intelligences and these have intuitive appeal for an investigation of a sport intelligence. Elite athletes – certainly in the age of professional participation – are required to process information, make decisions, get on with others, understand themselves and their emotions, complete calculations, provide feedback to coaches and support staff while also engaging with stakeholders such as sponsors, broadcasters, journalists and the public (A. Capastagno, personal correspondence, September 2012).

The current research project will propose a theoretical model of sport intelligence.

## **1.2 Problem statement and research questions**

The interest in sport as a science, discipline, industry and a psychology is expected to continue for many years, while sport psychology is defined as “a science in which the principles of psychology are applied in a sport or exercise setting” (Cox, 2007, p. 5).

Current research findings relating to the mental aspects of sport participation are found mainly in sport psychology literature. This research project is, however, a new area of investigation, as little research seems to have previously been undertaken to explore and report on the nature and characteristics of sport intelligence. There also does not seem to be any research on this topic within the South African context.

An opportunity exists to develop a theory of sport intelligence, building on and using the available literature of sport psychology and theories of intelligence. It is hypothesised that this will allow for a two dimensional ‘rational-emotional’ model of sport intelligence to emerge.

The tasks to be investigated by the current research study include:

- a) To define the term sport intelligence – especially in a South African context;
- b) To identify the essential elements and constructs of sport intelligence;
- c) To develop a model/framework of sport intelligence indicating its dimensions; and
- d) To examine and better understand the relationship between the constructs.

## **1.3 Research aims**

The general aim of the research study is to define and develop a theory of sport intelligence. The research approach includes a review of the applicable literature and an empirical component.

The research aims in terms of the literature study include:

- 1) To review the theory and research into intelligence, along with its application to sport intelligence;

- 2) To review sport psychology theory and research and its application to sport intelligence; and,
- 3) To integrate sport psychology theory and intelligence theory towards developing a model and theory of sport intelligence in the South African context.

The specific empirical aims in this research project are as follows:

- 1) To define, examine and validate the proposed model of sport intelligence with recognised experts in South Africa; and,
- 2) To review the proposed theory and model of sport intelligence for application into the research, development and enhancement of sport expertise and performance in South Africa.

#### **1.4 Paradigm perspective**

Research has been referred to “as a systematic investigation or inquiry whereby data are collected, analysed and interpreted in some way” (Mackenzie & Knipe, 2006, p. 2) in order “to understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such contexts” (Mertens in Mackenzie & Knipe, 2006, p. 1).

The theoretical framework adopted by a researcher can also be referred to as “the research paradigm and influences the way knowledge is studied and interpreted” (Mackenzie & Knipe, 2006, p. 2). The same authors include the interpretive framework, epistemology/ontology or research methodologies when referring to paradigms (Denzin & Lincoln, 1994).

The current research study will be considered from two paradigms. The first is that of a post-positivist perspective. Post-positivism is the worldview which is adopted after positivism and post-positivism, according to Creswell (2009) “holds a deterministic philosophy in which causes probably determine effects or outcomes” (p. 7). Post-positivists argue in favour of considering the causes which influence or impact outcomes.

Post-positivists are reductionistic in that they identify a set or sets of ideas to examine and which may take the form of hypotheses or research questions which are carefully measured and observed in order to achieve an objective reality.

The post-positivist approach was initially adopted by Comte, Mill, Emile, Durkheim, Newton and Locke (Creswell, 2009; Haralamous, 1985). This perspective “works from the assumption that any piece of research is influenced by a number of well-developed theories apart from, and as well as, the one which is being tested” (Mackenzie & Knipe, 2006, p. 4). The research project will therefore commence with a review of current theories of sport psychology and of intelligence and how these may apply to a theory of sport intelligence. These will be used as the basis of a theory which will be developed through semi-structured interviews from a specialised sample. The research participants chosen are recognised as experts due to their credentials as elite athletes, commentators and/or journalists. The participants will elaborate on the proposed sport intelligence framework; 15 interviews will be conducted.

The second paradigm that will be applied in this research study is that of an interpretivist paradigm. The Interpretivist view comes from the initial work of Mannheim, Burger and Larkmann and Lincoln and Guba (Creswell, 2009, p. 8). They argued that

Individuals seek to understanding of the world in which they live and work... and that these meanings and varied and multiple, leading the researcher to look for the complexity of the views rather than narrowing meaning into a few categories or idea (Creswell, 2009, p. 8)

In a similar vein note Mackenzie and Knipe (2006, p. 4) that the “interpretivist researcher tends to rely upon the participants’ view of the situation being studied”. The interviews with the research participants and the content analysis of these interviews will provide the research data that will be used to construct the framework and theory of sport intelligence (Breakwell, Hammond & Fife-Shaw, 1995).

## **1.5 Literature review**

In reviewing the literature of this research project, the researcher will focus on the following aspects:

- Basic tenets and premises of sport intelligence.
- Theories of intelligence and their application to sport intelligence.
- Sport psychology theory and its application to sport intelligence.
- A theoretical integration of intelligence and sport psychology theory as it may apply to sport intelligence.

## **1.6 Research rationale**

### **1.6.1 Research problem**

Limited research has been done on the nature and dimensions of sport intelligence – especially in a South African context. Research done by Gould et al. (2002) provided a broad outline of sport intelligence, but called for more research in order to better understand the concept.

### **1.6.2 Research Approach**

The research project is a qualitative study. It will adopt an interpretivist based stance on a post-positivist epistemology. The post-positivist paradigm will be adopted in addition to an interpretivist perspective, which will be used for theory development and testing (Henning, van Rensburg & Smit, 2004; Mackenzie & Knipe, 2006).

### **1.6.3 The researcher**

As a result of being involved in various sport management workshops, the researcher noticed similarities between intelligent behaviour in organisations and in sport teams while also noticing other similarities between top performers in organisations and those in sport. This led to researching the topic under investigation, and as the study is from a post-modern, interpretivistic and phenomenological perspective, it is necessary for the researcher to share his view of aspects deemed to be relevant in the current study. This is done to disclose personal experiences and opinions and highlight how these may make the study biased. The literature review will consider these in greater detail.

### **1.6.3.1 Cognitive processes including mental speed, working memory and reasoning**

The researcher spends most of his occupational time with high achievers and top performers in commercial organisations, non-profit centres, academic institutions and more recently, sport teams, and has noticed that a significant portion of performers seem to possess remarkable information processing capacities. In addition, top achievers seem to have memories of an 'elephant' and an impressive capacity to store and retrieve relevant information and data as applicable to the situation.

These individuals are able to quickly assess a situation or event and are able to retrieve relevant content as applicable to the unfolding moment. They seem to possess a superior retrieval capacity and it is unheard of that such candidates would say they forgot something spoken about, learnt or experienced previously (Conway, Getz, MacNamara and Engel de Abreu, 2011). The view is held that top performers are able to more effectively process relevant quantities of information than the average person and are able to extract meaningful and relevant information, which is applied to solving the problem, exercising a judgement or making a decision (Nettlebeck, 2011).

Top performers focus on what is relevant and ignore what is irrelevant and are, therefore, able to act on that which is most significant. In addition, they seem to possess supreme contextual discernment prowess and focus on key items. This is consistent with literature findings such as those of Vickers (cited in Nettlebeck, 2011).

### **1.6.3.2 Successful and multiple intelligence**

Perhaps the origins of the current study lie in the observations and reflections of the researcher, who noticed that sport intelligence cannot be reduced to a single construct or intelligence. It is the researcher's contention that there is no 'factor g' within the sport intelligence framework; it is his view that the 'psychological sports gene' has not yet been identified and doubts that it ever will be. This view will be assessed by the research.

Early research and a practical review of achievement and performance in a sports context makes a case for talent, and later talent and hard work in the form of deliberate practice and play, as outlined in the findings of Dick (2010).

The professional sport era has, however, brought changes to sporting codes, introduced additional sport disciplines, witnessed increased competition, while also introducing the stakeholder model. Financial considerations have added to the complexity of the situation as sponsors, advertisers, investors and team owners demand positive performance outcomes in order to satisfy financial returns. Such is the power and prevalence of modern day sport that professional sport teams and sports organisations are listed on stock exchanges, as the British soccer team Manchester United is.

Professional sports teams need sponsors and it is common for amateurs, school teams and individuals to be financially supported, one way or the other. Understandably, sponsors need returns on their investments and this is achieved through product purchases or advertising revenue. The pressure on sport participants to perform is, therefore, considerable and a performer therefore needs to possess a set of varied, broad and innate sporting intelligences.

It was Gardner's (2006) theory of multiple intelligence and Sternberg's (2011) theory of successful intelligence that captured the researcher's attention, as these theories moved beyond conventional and orthodox theories of intelligence and defined the phenomenon more broadly. These perspectives view intelligence as comprising more than only one cognitive 'factor g' and reason in favour of a number of different constructs and dimensions within intelligence.

It can, therefore, be assumed that more than a single intelligence is at play if an elite sport participant is to succeed in the modern age of competitive sport. A sport participant needs to possess the knowledge and skills to compete, deeply understand the intricacies and complexities of their sporting code, and appreciate the subtleties of both on and off 'field' requirements, while simultaneously being able to navigate the rational, emotional and political aspects of sports.

### **1.6.3.3 Emotional intelligence**

A considerable amount of literature is available on emotional intelligence. Research has been published, courses presented, workshops held and assessment instruments developed on the topic. Many organisations consider emotional intelligence in some

shape or form when recruiting staff, managing talent or during performance and development processes. It has, therefore, become an intrinsic part of the dialogue around what constitutes intelligence, performance and effectiveness in general.

Having emotional intelligence implies possessing two characteristics. The first of these is emotional awareness or self-knowledge. Knowledge into and of oneself is a distinctive characteristic of many performers. Awareness of 'self' provides insight into the operations and the working of an individual's inner world and how these inner processes drive external behaviours (Mayer, Salovey, Carusso & Cherkisskiy, 2011).

The second characteristic of emotional intelligence is that of emotional control. Awareness permits choice where lack of awareness rests on instinct or ignorance. Emotionally aware individuals are able to exercise choice and control over their emotions. They use emotions optimally and don't allow their own emotional structures to result in poor or dysfunctional responses. Gardner (2006) refers to this as intrapersonal intelligence.

Exceptional achievers and top performers in various contexts seem to have an ability to get on 'with themselves' and because of this, are better able to relate to and work with others. They are generally effective team members. This relationship competence is a key feature of effective leaders especially. Gardner (2006) refers to this as interpersonal intelligence.

#### **1.6.3.4 Knowledge and learning**

Performers seem by nature curious with an innate interest in knowing, learning and development. They have an unquenchable thirst to acquire more knowledge and deepen understanding of their discipline(s) and they take responsibility for their own learning and development. Top sport participants seem to enjoy the challenge of new problems as they offer the opportunity to apply what could be relevant from other experiences but to do so in a new, perhaps innovative way. New challenges and situations offer the chance to provide new solutions. Learning is, therefore, a part of the wider discourse and process of performance and is an ongoing process, it is not an end in itself (Mayer, 2011).

Another relevant observation is that failure is regarded by top sport participants as part of the learning process. Failure is also seldom seen as an end in itself but rather as a constructive and positive process. The adage of 'learning from one's mistakes' comes to mind. These sport participants seem to be able to 'bounce back' and are resilient. Resilience and mental strength have received considerable support in the literature findings such as that of Gould (2002).

Learning in this sense can then be considered a 'performance outcome' and this contention will find support amongst the incremental theorists' approach. It seems furthermore, that performers who place less emphasis on the achievement or outcome, per se, preferring rather to focus on what knowledge and expertise was gained, what was learnt for later application and will more often than not be heard saying, "when thinking or reflecting on it, I learnt the following ...".

#### **1.6.3.5 Motivation**

A common trait in motivated individuals in various contexts is their single-mindedness and focus on their discipline, craft, occupation or pastime. Top achievers and performers are often focused and not easily distracted from their passions and interests. Success drives them to more success and it seems to be an existential challenge. Achievement and motivation are 'joined at the hip' with individuals being driven for being driven's sake. Put another way, it's the process of constantly working towards an achievement or performance that motivates them and the outcome is incidental: the **process** is therefore the outcome.

Elite sport participants are in a constant state of constructive tension in that they seem to constantly seek the next challenge, new opportunity to be challenged, to apply their previous learning, knowledge and experience and create something new, innovative or rare. They often extend the boundaries, often seeking what may be possible.

Performers are aware of their own motivational patterns and many are unfazed by their achievements. Such outcomes are considered stepping stones to the next achievement. The current researcher often asks of top performers why they seek new challenges and want to stretch boundaries and often gets the response of: "because it's there, perhaps not done before" or "I have the chance to do something that has not

been done before". They set exceptionally high standards and relish the process of achieving and realising their plans. Sir Edmund Hillary's "Because it's there" seems to be a succinct summary of the drive proposition.

#### **1.6.3.6 Psychological agility and creativity**

It is the researcher's view that performers are able to initiate, manage and cope with change more effectively than the average individual, top performers especially so as they look forward to the positive outcomes of change. They are seldom satisfied with the status quo, preferring to see how things can be done differently, more economically and effectively. They tend to live in a constant state of change readiness, openness to change and a willingness to experiment and try new, better ways. Top performers seem to be extraordinarily flexible and adaptable (Kaufman & Plucker, 2011).

An interesting corollary to this is that successful sport participants seem to have excellent judgement and insight when it comes to change related to their sports: they will only change having mastered their discipline to the extent that they are satisfied. To them, mastery seems to be the signal for change to the next level and they don't change for the sake of change. Change takes place when movement to the next level is appropriate and they are not bullied or coerced into something they do not feel ready or prepared for.

The researcher, therefore, argues that successful performers possess a change intelligence, or knowing when to do things as they have always been or when needing to do things differently. They have excellent judgement or discretion. This will be assessed in the research.

Change processes often cause emotional reactions and behavioural responses from performers. It may be that the anxiety and tensions experienced by elite performers are experienced in a constructive, positive manner. They, therefore, do not debilitate, slow down nor get in the way. The opposite occurs. Change motivates and challenges and when it leads to innovation, creativity and newness, is experienced in a productive, euphoric way.

### **1.6.3.7 Mental strength and personality**

Sport participants expect setbacks and do not expect things to go their way all the time. They, therefore, seem to be tenacious, resilient and remain focused on their goals. Obstacles are viewed as opportunities to apply their expertise in order to overcome barriers and they tend to view these as temporary and not permanent. They understand that they need to keep working in order to achieve their goals and realise their potential and goals.

Confidence in themselves, their processes and plans feature in the psychological make-up of top performers but they are aware enough to know that over-confidence is a warning signal and also that self-confidence levels will fluctuate over time. They often have concrete plans to manage times of low confidence while being able to capitalise and leverage times of optimal confidence (Gould, 2002).

It is the researcher's experience that top performers are 'serial' goal setters and constantly setting goals and objectives and working single-mindedly in achieving these while being in a constant state of review, reflection and learning. The achiever's goals and plans are almost certainly committed to paper, or more latterly, on their tablets - they serve as a reminder of what is a priority for them.

Top performers are clear on direction and strategy on what must be achieved. They have the ability to block out distractions and remain focused. Different techniques are used for this purpose including visual imagery, positive messaging and self-talk to aid in reinforcing the realisation of one's vision, strategy and tactics (Taylor, 2011).

### **1.6.3.8 Relationship competence**

Related to emotional intelligence in a conceptual, theoretical and practical sense is that of relationship competence. Being able to get on well with others, being empathetic and understanding what makes others 'tick' is a key feature of successful performers, especially those in leadership positions.

Effective and productive relationships with others are built from a healthy relationship with oneself, with performers being comfortable with who they are, their personality, idiosyncrasies and emotional and behavioural patterns. They have considerable

insight into themselves and this helps to understand others. They are able to work effectively and comfortably with those who are different to them and are self-assured enough to consider dissonant and different opinions (Eccles & Feltovich, 2008).

#### **1.6.3.9 Decision-making**

Previous comments in this section have referred to judgement in decision-making and it is the researcher's view that top performers make better and more effective decisions than others. They simply make fewer mistakes. Top performers retrieve and use relevant information, process options and alternatives to determine the best route forward. They make effective decisions, especially when in pressure situations (Williams & Ward, 2004).

### **1.7 Research Strategy**

Multiple cases for theory development and testing will be employed (Mouton, 1996). The cases will comprise 15 credible sport coaches, athletes, ex-athletes, commentators and journalists, each of whom is recognised as being an expert in their chosen area of sporting interest and achievement.

### **1.8 Purpose of the Study**

Based on the discussion thus far, sport intelligence seems to be:

- A new concept, as evidenced by the scarce literature on the topic. In particular, there seems to be no research on it within the South African context.
- A cognitive, rational process centred around analysis, innovation, decision-making and learning ability.
- Related to intelligence theory – although this relationship is not clear as yet.
- Similar to what Gardner (1993; 2006) refers to as bodily-kinaesthetic intelligence.
- Multi-dimensional, due to a relationship with other forms of intelligence including interpersonal and intrapersonal intelligence, among others.

All of these will be tested as part of this research project.

In addition, the last point above suggests that sport intelligence is related to emotions but also to cognition/intelligence and therefore seems linked to psychology. Cox (2007) highlights that the rise of sport psychology in the last thirty years has been considerable (although the first piece of research in this regard was completed as early as 1897). The relationship between emotions, psychology and sport intelligence will be explored in the study.

Cox (2007, p. 5) notes that “sport psychology is a science in which the principles of psychology are often applied to enhance performance”. Sport psychology includes areas such as motivation, emotion, confidence, communication, arousal, attention, stress, goal-setting, team cohesion, leadership, decision-making, ethics and other mental skills (Tenenbaum & Eklund, 2007). At face value, these constructs seem to possess a relationship with the theories of multiple intelligence, successful intelligence and emotional intelligence. These will be explored and reported in the study.

## **1.9 Motivation**

The investigation into sport psychology and intelligence theory, together with the content generated from the interviews, will be consolidated into a plausible theory and model of sport intelligence and this process will have practical utility and validity (Henning, van Rensburg & Smit, 2004).

The research study should contribute to the knowledge, understanding and development of sport expertise and performance in South Africa on three levels:

- a) On a theoretical level: the integration of sport psychology theory and intelligence theory into a theoretical framework on how the two operate and integrate with one another.
- b) At a research level: the study will generate a working hypothesis on the nature of sport intelligence and interplay between the various dimensions and constructs of the model. These could provide the basis for further research into the development trajectory of sport intelligence and the skills and competencies needed for its development in South Africa.
- c) At a practice level: sport coaches, athletes, commentators, researchers and spectators will be provided with a concrete framework to apply in sport/game

preparation, play and performance enhancement within the South African context.

### **1.10 Conclusions, limitations and recommendations**

Conclusions will be drawn in line with the literature and empirical aims of the study. This will be done specifically in light of the integration between sport psychology and the theories of intelligence towards a model of sport intelligence and an assessment of this by credible resources within the South African context.

The research will be conducted in the South African environment and will therefore exclude cases and data from other countries.

Data elicited will be confined to the cognitive, rational, psychological and emotional aspects of sport psychology and intelligence theory and will therefore ignore the tactical components of sport. The proposed model and theory of sport intelligence will be silent on the laws and rules that govern sport.

### **1.11 Presentation**

The research report will consist of the following chapters:

#### **Chapter 1: Introduction and scientific orientation**

The purpose of Chapter One is to orientate the reader to the study and to provide the rationale, research problem, approach, purpose, motivation and logic of the study.

#### **Chapter 2: Theories of sport intelligence, sport psychology and theoretical integration**

Section one of the literature study will outline the findings on previous research into sport intelligence.

Section two of the chapter will examine theories of intelligence and how they may relate to the model of sport intelligence. The chapter will cover a historical overview of intelligence and will examine the different theoretical approaches to understanding intelligence including information processing theories including working memory, reasoning, attention processes and mental speed, theories of multiple intelligence,

successful intelligence, emotional intelligence and practical intelligence, and literature on developing intelligence will also be shared. The relationship between intelligence and personality, achievement, motivation, expertise and creativity will close the section off.

Section three of the chapter will examine the contribution of sport psychology and begin with an overview of its history and philosophical foundation. Thereafter the core components of contemporary sport psychology research and theory including motivation, emotions, decision making, mental skills and achievement orientations will be covered.

Section four will present a theoretical model of sport intelligence and offer the theoretical foundations and dimensions of the theory of sport intelligence, which will have been formulated from the preceding chapters. It is expected that the model will elaborate on the initial work completed by Gould et al. (2002).

### **Chapter 3: Theoretical orientation**

This chapter will outline the philosophy and will show that a number of theoretical orientations will be adopted by the researcher. Data from interviews will be analysed from a phenomenological perspective where themes and sub-themes will be identified. These will form the content of the theory of sport intelligence and will be synthesised from a cognitive psychology and systems theory perspective.

### **Chapter 4: Research methodology**

Chapter four will outline the research approach, strategy and method including research setting, entree, sampling, data collection methods, recording of data, data analysis and reporting.

### **Chapter 5: Findings**

The penultimate chapter will present the findings completed from the thematic analysis and a discussion on the proposed model of sport intelligence.

### **Chapter 6: Conclusion, limitations and recommendations**

The final chapter will draw conclusions and will outline proposals for future research.

## **1.12 Conclusion**

This chapter provided the reader with an opportunity to understand the background to the study. The chapter established a sound case and rationale for the research and set out the aims, approaches and research method, while also providing an overview of the current researcher's views and available literature and potential contribution of the study.

## **Chapter 2**

# **LITERATURE REVIEW**

In this chapter the available literature on sport intelligence, intelligence theory and sport psychology will be outlined. The proposed model/framework of sport intelligence will be developed from the integration of theories of intelligence and sport psychology. Each section will end off with a series of hypotheses, which will collectively comprise a model. The chapter will close off by consolidating these and presenting a conceptual model of sport intelligence.

### **2.1 Sport intelligence**

#### **2.1.1 Premises of sport intelligence**

The literature review indicates that sport intelligence was first conceptualised by Fisher in 1984 in an article suggesting that sport intelligence comprises the ability to:

- Search and detect relevant cues;
- Identify patterns of actions, play and behaviours;
- Utilise short-term memory and recall;
- Utilise long-term memory and recall;
- Make effective decisions; and
- Identify where the sport participant possesses a baseline level of knowledge about the task.

Tenenbaum and Bar-Eli (1993) built on Fisher's work by arguing that cognitive processes such as the ability to select, process and retrieve information during game time facilitated better decision-making.

Ten years later, research undertaken into the psychological characteristics of Olympic winners by Gould et al. (2002) found that Olympic champions possessed sport intelligence. Sport intelligence was found alongside other characteristics including: coping with and controlling anxiety; confidence; mental toughness/resilience; ability to block out distractions and remain focused; competitiveness; a hard-work ethic; being goal-oriented; coachability; high level of hope; optimism; and adaptive perfectionism.

Gould et al. (2002) indicated that sport intelligence consisted of “raw data responses such as the ability to analyse, being innovative, being a student of the sport, making good decisions, understanding the nature of the elite sport, and being a quick learner” (p. 186). The current research study will endeavour to further develop a detailed understanding of sport intelligence within the South African context.

The literature therefore seems to indicate that sport intelligence is a **rational-cognitive** process involving information processing, analysis, learning, decision-making, creativity, situational understanding and having excellent perceptual abilities.

A letter to the American Psychological Association by Dr Gene Brockneck titled “On intelligence and culture” builds on this and sets out key points and elements of the sport intelligence hypothesis:

Sport is part of a global *intellectual* realm that requires a wide range of sensory motor and social cognition skills: integrating physical talent with spatial visualisation, motivation and perseverance; innovative reasoning; abstract and practical problem-solving; and the ability to assess and anticipate the behaviour of another person. Skills related to intellectual function – both the ability to delay gratification and to react instantly are essential to championship performance. Team play, without which individual talents may never yield championships, involves yet another set of complex skills involving social communication (verbal and non-verbal); the ability to subordinate personal needs to group goals; frustration tolerance; and the ability to inhibit prized skills while deliberately learning other, previously ignored or devalued, skills. I am convinced that by close study of international participants in individual and team sports we can contribute mightily to a much more sophisticated understanding of *intellectual activity* and capability. We would also do well to recall David Wechsler’s most unique contribution of the study of intelligence

was to broaden its definition from verbal acumen of “the ability to think rationally...reason...and adapt competently to the environment. (Brockneck, n.d.)

The proposals made by Brockneck, however, raise the question of how the emotional-psychological domain may contribute to the theory of sport intelligence. Intelligence is a domain within the discipline of psychology and is therefore conceptually also related to sport psychology.

Sport psychology includes **emotional-psychological** processes such as motivation, anxiety, emotions, personality, leadership, communication, confidence and team dynamics (Cox, 2007).

A recent study in South Africa by Crombie illustrates the importance of ‘emotional intelligence’, where scores on an emotional intelligence assessment predicted the performance of a provincial cricket team. Further studies are underway to assess the impact of mood states, personality, emotional intelligence and attention skills in performance (<https://psychologyafrica.com/2010/psychologyonthesportsfield>).

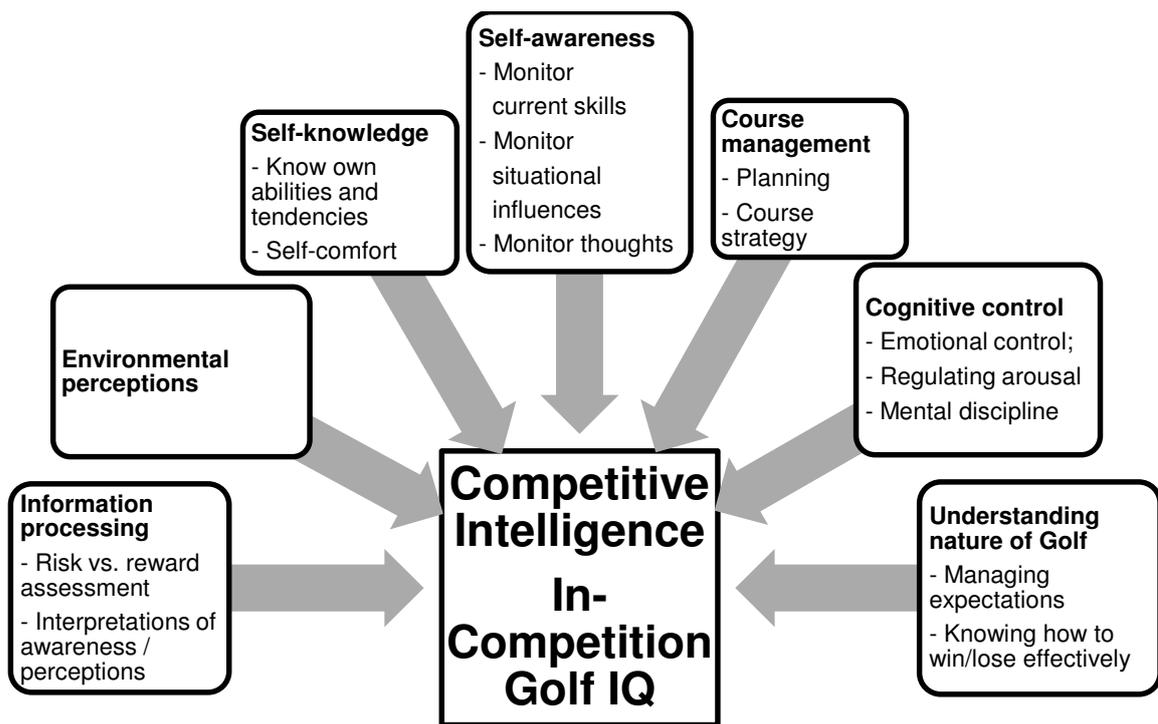
Elite sport participants are able to master the psychological challenges of sport in addition to the game/situational variables and seem to do so via a sport intelligence, among other characteristics (Gould et al., 2002). The current literature review, research and findings will be consolidated into a theory of sport intelligence as developed in the South African context.

Research on sport intelligence in China as reported by Junwu (2013) promotes the general definition as put forward by Zhang Li-wei (cited in Junwu, 2013), who proposed that “sport intelligence is the psychological conditions or characteristics in the course of mastering and performing motor skills” (p. 1).

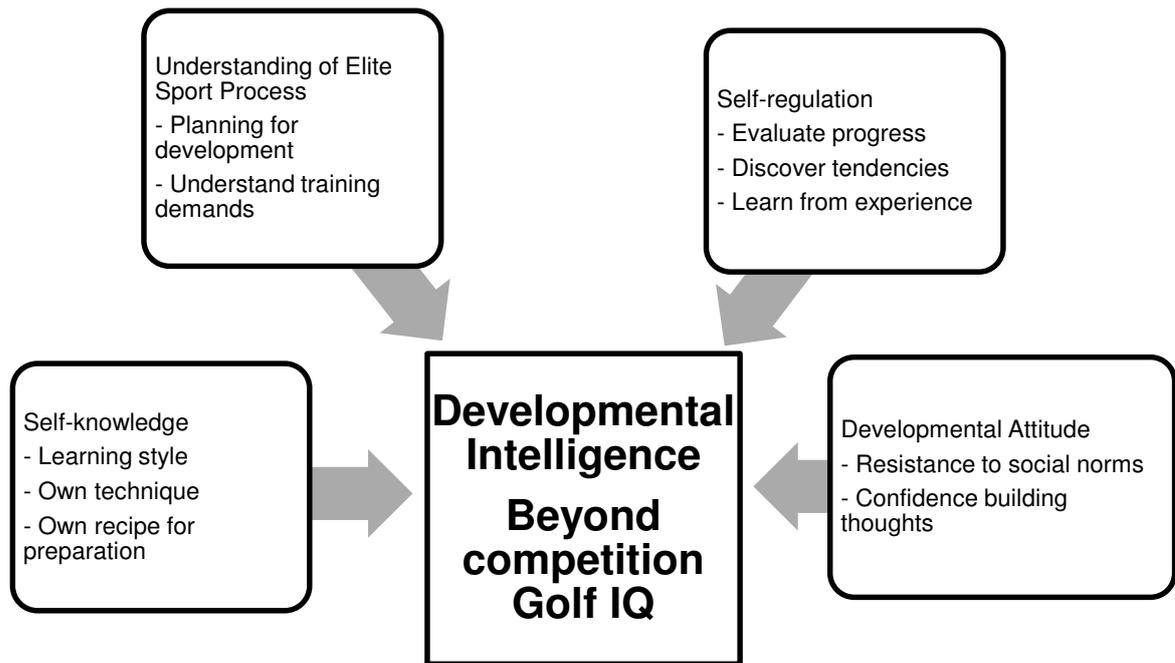
Interestingly, the method employed by Chinese scholars in investigating sport intelligence have used three approaches, including (a) the intelligence test or

traditional psychometric approach, (b) cognitive development-oriented research and (c) the biometric/physiological approach (Junwu, 2013).

A recent exploratory investigation into the components of sport intelligence within golf by Blue (2009) indicated that it comprised two components – **competitive intelligence** and **developmental intelligence** – as set out below.



**Figure 2.1** A proposed conceptualisation of “competitive intelligence” for golf (Blue, 2009, p. 82)



**Figure 2.2** A proposed conceptualisation of “developmental intelligence” for golf (Blue, 2009, p. 88)

While the models above were developed with reference to golf only, the themes identified by Blue (2009) will be considered more broadly by the current researcher.

The current research project will need to define sport intelligence more accurately and within the South African context. Limited data and research, however, exist on the relationship between intelligence and sport performance.

The literature review found a single study reported by Adams and Kuzmits (2012, p. 1) which found no statistical relationship between intelligence as measured by cognitive ability and athletic performance in the National Football League in the USA. Their research confirmed that other “psychological constructs ... (including) ... aggression, leadership, coachability and self-confidence have shown a relationship with athletic success”. They conclude by sharing “it seems wise ... to consider ... assessments to include higher level cognitive measurements” (Adams & Kuzmits, 2012, p. 1).

## 2.2 Intelligence theory

### 2.2.1 Basic definitions and definitional complexity

While the previous section identified basic themes which, it is hypothesised, comprise sport intelligence, it is important to discuss intelligence in general as the researcher moves towards developing a detailed theoretical model of sport intelligence.

It is clear from detailed research by Legg and Hutter (2006, p. 8) on 71 definitions of intelligence from collective sources, psychologists and artificial intelligence researchers, that varied interpretations do in fact share consistent similarities and find that intelligence “is:

- A property that an individual agent has as it interacts with its environment;
- Related to the agent’s ability to succeed or profit with respect to some goal or object; and
- Depends on how able [the] agent is to adapt to different objectives and environments.”

Putting these key attributes together produces the informal working definition of intelligence adopted is: “Intelligence measures an agent’s ability to achieve goals in a wide range of environments.”

Beyond numerous popular definitions, many think-tanks, institutions and study groups have added their interpretation and definitions:

- a) From “Mainstream Science on Intelligence“ (1994), an editorial statement by 52 researchers:

A very general mental capability that, among other things, involves the *ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience*. It is not merely book learning, a narrow academic skill, or test-taking smarts. Rather, it reflects a broader and deeper capability for comprehending our

surroundings – “*catching on*,” “*making sense*” of things, or “*figuring out*” what to do.

- b) From “Intelligence: Knowns and Unknowns” (1995), a report published by the Board of Scientific Affairs of the American Psychological Association: “Individuals differ from one another in their *ability to understand complex ideas, to adapt effectively* to the environment, *to learn from experience, to engage* in various forms of *reasoning, to overcome obstacles by taking thought*. Although these individual differences can be substantial, they are never entirely consistent: a given person’s intellectual performance will vary on different occasions, in different domains, as judged by different criteria. Concepts of “intelligence” are attempts to clarify and organize this complex set of phenomena. Although considerable clarity has been achieved in some areas, no such conceptualization has yet answered all the important questions, and none commands universal assent. Indeed, when two dozen prominent theorists were recently asked to define intelligence, they gave two dozen, somewhat different, definitions.”
- c) The American Psychological Association refers to intelligence as “intellectual ... which compares performance with other people who take the same test”. They go on to state that “not all kinds of intelligence can be tested”.

Retrieved from <http://www.apa.org/topics/intelligence>

Researchers and academics have understood that a number of definitions exist with regard to defining intelligence. An article by Legg and Hutter (2006) outlines a comprehensive collection of definitions. The major categories are set out in table 2.1 below

**TABLE 2.1** Researcher definitions of intelligence (Legg & Hutter, 2006, pp. 2-8)

Researcher	Definition
Cambridge Dictionary	The ability to learn, understand and make judgements or have opinions that are based on reason.
Encyclopedia Britannica	...ability to adapt effectively to the environment, either by making a change in oneself or by changing the environment or finding a one... intelligence is not a single mental process but rather a combination of many mental processes directed toward effective adaptation to the environment.
Compact Oxford English Dictionary	The ability to acquire and apply knowledge and skills
A. Anastasi	Intelligence is not a single, unitary ability, but rather a composite of several functions. The term denotes that combination of abilities required for survival and advancement within a particular culture.
A. Binet	It seems to us that in intelligence there is a fundamental faculty, the alteration or the lack of which, is of the utmost importance for practical life. This faculty is judgment, otherwise called good sense, practical sense, initiative, the faculty of adapting oneself to circumstances.
W.V. Bingham	We shall use the term 'intelligence' to mean the ability of an organism to solve new problems.
S.S. Colvin	A person possesses intelligence insofar as he has learned, or can learn, to adjust himself to his environment.
H.J. Eynsenck	Intelligence A: the biological substrate of mental ability, the brain's neuroanatomy and physiology; Intelligence B: the manifestation of intelligence A, and everything that influences its expression in real life behaviour; Intelligence C: the level of performance on psychometric tests of cognitive ability.
H. Gardner	An intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural settings.
J.P. Guilford	...performing an operation on a specific type of content to produce a particular product.
N.E. Haggerty	Sensation, perception, association, memory, imagination, discrimination, judgement and reasoning.
Humphreys	...the resultant of the process of acquiring, storing in memory, retrieving, combining, comparing, and using in new contexts information and conceptual skills.
A. Jensen	Intelligence is a general factor that runs through all types of performance.
J. Piaget	Intelligence is assimilation to the extent that it incorporates all the given data of experience within its framework... There can be no doubt either, that mental life is also accommodation to the environment. Assimilation can never be pure because by incorporating new elements into its earlier schemata the intelligence constantly modifies the latter in order to adjust them to new elements.
R.E. Snow	Intelligence is part of the internal environment that shows through at the interface between person and external environment as a function of cognitive task demands.
R. J. Sternberg	...I prefer to refer to it as 'successful intelligence'. And the reason is that the emphasis is on the use of your intelligence to achieve success in your life. So I define it as your skill in achieving whatever it is you want to attain in your life within your sociocultural context – meaning people have different goals for themselves, and for some it's to get very good grades in school and to do well on tests, and for others it might be to become a very good basketball player or actress or musician.

L. M. Terman	The ability to carry on abstract thinking
L. L. Thurstone	Intelligence, considered as a mental trait, is the capacity to make impulses focal at their early, unfinished stage of formation. Intelligence is therefore the capacity for abstraction, which is an inhibitory process.
D. Wechsler	A global concept that involves an individual's ability to act purposefully, think rationally, and deal effectively with the environment.
R. M. Yerkes and A. W. Yerkes	...the term intelligence designates a complexly interrelated assemblage of functions, no one of which is completely or accurately known in a man...
J. S. Albus	...the ability of a system to act appropriately in an uncertain environment, where appropriate action is that which increases the probability of success, and success is the achievement of behavioural subgoals that support the systems ultimate goal.
D. Fogel	Any system... that generates adaptive behaviour to meet goals in a range of environments can be said to be intelligent.
B. Goertzel	Achieving complex goals in complex environments.
S. Legg and M. Hutter	Intelligence measures an agent's ability to achieve goals in a wide range of environments.
H. Masum	...doing well at a broad range of tasks is an empirical definition of 'intelligence'.
N. Nakashima	Intelligence is the ability to process information properly in a complex environment. The criteria of properness are not predefined and hence not available beforehand. They are acquired as a result of the information processing.
Schank	Intelligence means getting better over time.

As can clearly be seen from the definitions, a number of interpretations of the concept **intelligence** exist, which adds to the complexity of the subject.

Three important points are, however, made through these definitions. Intelligence:

- Is a concept related to individual differences;
- May or may not be measured; and
- Has different theoretical foundations and interpretations.

The first two aspects above point out that the origin of intelligence theory was based on the study of individual differences or 'differential psychology' and this understanding persisted for much of the twentieth century. Although there were a limited number of theories of intelligence in the early days, "Edwin Boring's (1923) view of intelligence as whatever it is that intelligence tests measure seemed to be the starting point ... (and) ... the factor analytic theorists who belonged to the differential psychology movement generally used such tests for generating their theories" (Sternberg & Kaufman, 2011, p. xv).

However, as the twenty-first century marched on, approaches to the study of intelligence became more varied, multifaceted, multidimensional and diverse than they were earlier. The last aspect above rightly emphasises that approaches to intelligence still vary, but have begun to include other approaches as well. Hence – and as the researcher moves towards a detailed theoretical and conceptual model of sport intelligence – other views, models and theories of intelligence will be explored in detail. While this is not an exhaustive assessment of all approaches to intelligence theory, the theories that are deemed to possess a conceptual relationship with sport intelligence will be assessed and considered.

Given that definitional complexities have been highlighted, the literature study will cover the brief history of intelligence theory before reviewing intelligence and its basic processes, including information processing, working memory and reasoning. Different approaches to intelligence will then be assessed by considering Gardner's theory of multiple intelligences, Sternberg's theory of successful intelligence, various authors' views on emotional intelligence and some input on practical or contextual intelligence.

A section on developing intelligence will include concepts like attitudes, habits, heuristics and self-management, while the theoretical relationships that intelligence shares with personality, achievement, motivation and creativity will be included.

The latter section takes the discussion into how sport psychology can make a contribution to the detailed model of sport intelligence and section three on sport psychology will further investigate how psychological/emotional dynamics such as motivation, the role of emotions, mental skills, achievement and decision-making may make a contribution to the envisaged model.

The chapter will close off by proposing a conceptual model of sport intelligence.

### **2.3 History and background of intelligence theory**

Raymond Cattell is credited with the early development of mental tests and these tests examined individual differences in intelligence. The Cattell-Horn-Carroll (CHC) theory

was built off Spearman's (1904) general intelligence theory, or factor 'g', which argued that each person has a general intelligence termed factor 'g'.

Spearman was later challenged by Thurstone, who proposed a number of **primary mental abilities** and later, JP Guilford, who argued in favour of a structure of intellect model with over 120 intellectual factors (Willis, Dumont, & Kaufman, Factor analytic models of intelligence, 2011).

The widely recognised and best known current theory on intelligence, the CHC theory, posited the existence of two types of intelligence, namely:

Gf or fluid intelligence, which refers to inductive, deductive and quantitative reasoning with materials and processes that are new to the person doing the reasoning ... (and) ... Gc, or crystallised intelligence, which refers to the application of acquired knowledge and learned skills to answering questions and solving problems presenting at least broadly familiar materials and processes. (Willis, Dumont & Kaufman, 2011, p. 4)

In the Western world, intelligence is considered to be the ability to reason and the knowledge people have in addition to having verbal ability and problem-solving skills. The Western world, therefore, emphasises the role of cognitive abilities in intelligences (Niu & Brass, 2011).

In the East, however, intelligence is considered differently and is seen as intuitive and holistic thinking. Yang and Sternberg (cited in Niu & Brass, 2011) found five major factors in characterising Taiwanese conceptions of intelligence, namely:

- General cognitive ability;
- Interpersonal intelligence;
- Intrapersonal intelligence;
- Intellectual self-promotion; and
- Intellectual self-effacement.

The Eastern conception of intelligence includes attributes such as... “likes to think quietly”, or “likes to be lost in thinking” while “the implicit theories of Africans revolve largely around skills that help facilitate harmonious and stable intergroup relationships” (Niu & Brass, 2011, p. 629).

Differences in intelligence theories can be considered as qualitative and/or quantitative.

**Qualitative differences** are produced by different strategies of thinking. Cognitive styles like impulsiveness can be useful in certain circumstances or they can interfere with thought processes. A cognitive style is, therefore, a way of thinking, like the rehearsal of a cell phone number by using a code. It therefore entails a way of addressing a cognitive task. Qualitative differences in intelligence are differences in style and approach.

**Quantitative differences** in intelligence theories, on the other hand, are based on the use of instruments for measurement and assess the degree of intelligence that has been developed from an accepted theory. This is the so-called psychometric approach, and is based on factor analysis. The Intelligence Quotient (IQ) test and IQ score are rooted in this.

An individual’s intelligence appears to be genetically inherited, but environmental factors have also been found to play a significant part. Nickerson (2011) refers to the Milwaukee study which examined the role of environmental factors. The research took 40 slum infants where it was thought that their children would have IQ scores lower than 75, as their mothers had IQ scores lower than 75.

Some of these infants were seen by a teacher each day and received support, learning and tuition. At the same time, their mothers were also trained, and in so doing the environment was made more suitable for intellectual development. The remaining children, the control group, were left to develop on their own.

The experimental group was found to have higher IQ scores over time, which highlighted the contribution and importance of environmental factors in IQ scores.

Researchers have found other environmental factors such as the nature and quality of schooling to play a significant role for individuals and groups with regard to intellectual development, while family factors also play a contributing role. Child-rearing styles also seem to be associated with the ability to think creatively, while parents with wide intellectual interests suggest higher intelligence scores. Socio-economic factors have also been found to affect children's intellectual functioning (Nickerson, 2011).

## **2.4 Basic processes and intelligence**

### **2.4.1 Hypothesis 1: Mental speed and other process**

The early work by Fisher (1984) and Tenenbaum and Bar-Eli (1993) noted that cognitive processes such as information retrieval and memory are components of their theories of sport intelligence.

The search for basic processes that support intelligence has a long history. The endeavour rests on the assumption that there are individual differences in structures of the central nervous system whereby information critical to decision-making is conducted more or less rapidly. (Nettlebeck, 2011, p. 371)

Mental speed is considered a critical characteristic when attempting to understand intelligence, and is divided into two components. The first component includes attention, which refers to short-term, working or long-term memory, while the second component includes basic functions like perceptual speed and information processing speed (Nettlebeck, Basic processes of intelligence, 2011).

Mental speed is multi-faceted, as Horn and Nors (cited in Nettlebeck, 2011) indicate, but does not suggest that one reasons better because of faster basic processing. Danthiir, Wilhelm and Schaht (2005) found that "although more intelligent participants were generally quicker overall, they took longer than less intelligent participants on the most difficult items" (p. 375). Mackintosh, however, points out that those with higher IQs avoid the slower responding of those with lower IQs, and suggests that reaction time "involves more than the speed of nerve conduction" (cited in Nettlebeck, 2011, p. 385).

Inspection time has been identified as a key information processing dimension, and was first conceptualised by Douglas Vickers in the 1970s. Inspection time is the rate at which key external information can be stored. Nettlebeck (2011, p. 385) notes that “inspection time correlated with group factors including visualisation speed and perceptual speed, which together with decision time and movement time defined a general factor *g*”. Edmonds (cited in Nettlebeck, 2011, p. 387) noted “substantial correlations between inspection time and neuropsychological functions including attention/ executive, language and memory, all of which are substantially correlated with IQ”.

### **Summary hypothesis 1: Mental speed as a component of sport intelligence**

Elite sport participants process a large amount of data and information and these are processed by visualisation and perceptual speed, which impact decision-making. Decision-making, as will be shown later in this chapter, seems to be a key feature of the sport intelligence framework.

## **2.5 Hypothesis 2: Working memory**

### **2.5.1 Relevance to sport intelligence theory**

Working memory is relevant to the theory of sport intelligence as it provides impetus for accessing information while participation in sport is underway. Conway, et al. (2011, p. 394) define working memory as “a construct developed by cognitive psychologists to characterise and help further investigate how human beings maintain access to goal relevant information in the face of concurrent processing and/or distraction”. Working memory consists of three components:

- A cognitive control mechanism or central executive function;
- One to four representations in the scope of attention; and
- A retrieval mechanism responsible for the rapid retrieval of information from long-term memory (Conway et al., 2011).

The same authors estimate a correlation between working memory capacity and factor *g* to be between  $r = .72$  and  $r = .85$  while making the observation that complex span

tasks (such as spacial locations) are a stronger predictor of factor  $g$  than is a simple span task, for example, digit span recall (Conway et al., 2011).

Research by Hengle and Kane (2004) outlined the theoretical link between working memory and intelligence. This was referred to as controlled attention or executive attention theory, and proposes that “individuals with greater cognitive control mechanisms, such as goal maintenance, selective attention, and interference resolution (inhibition), will perform better on a variety of tasks including measures of working memory capacity and tests of factor  $g$ ” (p. 408).

Scope and control of attention theory suggests that “scope of attention is limited to four items, and individual differences in the scope and control of attention and what drives the correlation between measures of working memory capacity and  $g$ ” (Hengle & Kane, 2004, p. 408). The same authors cite research of Overbauer, who contends that “memory requires the binding of objects into episodes” (Hengle & Kane, 2004, p. 408). These are termed **binding limits** and note that there is a “limit to the number of bindings that can be actively maintained at once and this causes working memory capacity” (p. 409)

On a positive note, research by Jaeggi, Buschkuhl, Jonides and Perrig (cited in Conway et al., 2004) found that “subjects who underwent working memory training performed better on tests of fluid intelligence than a control group that did not get working memory training (p. 411).

### **Summary hypothesis 2: An effective working memory**

The high correlation between working memory and factor  $g$  strongly suggests that the envisaged sport intelligence framework needs to include memory as a key feature.

## **2.6 Hypothesis 3: Problem-solving, reasoning and intelligence**

### **2.6.1 Conceptual link with sport intelligence**

The available literature on sport intelligence includes references to the role played by dimensions such as decision-making and problem-solving within a sporting context or game situation. Reasoning is closely linked to these (Lohman & Lakin, 2011), and is defined as “the process of drawing inferences or conclusions from information” (p.

420). It seems to be logical that sport participants are constantly required to do this. The following section will expand on this so that an assessment can be made on how reasoning fits into the sport intelligence framework.

A discussion of **reasoning** needs to distinguish between deductive and inductive reasoning.

**Deductive reasoning** is when valid conclusions are drawn from any number of statements on premises which may or may not be true. The conclusions drawn when reasoning deductively can be valid as long as they follow premises.

**Inductive reasoning** occurs when hypotheses are drawn from a particular set of observations. Inductive reasoning leads to generalisations from an observation. This observation is seen as probable or a likely conclusion. Inductive reasoning therefore has two components, namely hypothesis formulation and hypothesis evaluation. An example of inductive reasoning is as follows:

**The team is physically and mentally prepared and is therefore likely to perform well.**

Inductive reasoning, therefore, contains an element of creativity and “comes closer to being identified with the whole of problem-solving than deductive reasoning, which is only a part” (Sharrat, 1987, pp. 106-107).

Sport participants are required to infer (automatically or deliberately) relationships in a stimulus set (a game or match, for instance). An inference captures only a portion of relationships in a set and sport participants may, however, deduce:

The consequences or implications of a rule, set of premises or statements using warrants that are rendered plausible by logic or by information that is either given in the problem or assumed to be true within the community of discourse ... (and) ... seem to do so by creating mental models of the situation. Such models tend to represent explicitly only what is true about the situation. (Lohman & Lakin, 2011, p. 420)

Sport participants, therefore, fit game situations into existing mental models and these may or may not be compatible. According to Lohman and Lakin “more advanced deductive reasoning involves providing either multiple (possibly diverged) warrants for a single claim” (p. 420). This implies that the sport intelligent player is able to assess different ‘warrants’ or considerations and to then select the best possible option and to then execute.

It is important to distinguish between the theory of mental rules and mental models (Lohman & Lakin, Intelligence and reasoning, 2011). Mental rules view humans as being natural logicians and utilise key processes when solving problems. These processes include:

- Encoding the premises into representations stored in working memory;
- Applying abstract, rule-based schemes to these representations to derive a conclusion; and
- Applying other rules to working memory for incompatibilities.

Mental models theory, however, argues that the individual “first transforms the premises of an argument into another representation (in other words, a mental model) that is consistent with the premises ... (and that) ... each mental model represents a possible state of affairs that must be re-evaluated” (Lohman & Lakin, 2011, p 421). The same authors cite the research of Bora, Buccionrelli and Johnson-Laird (cited in Lohman & Lakin, 2011) who identified the following factors that affect inference in the mental models approach:

- Assembling a propositional representation of premises;
- Constructing models that integrate information from premises;
- Formulating a conclusion that integrates relationships not expressed in the premises;
- Searching for alternative models to refute conclusions; and
- Recognising similarities between models.

The literature indicates that working memory resources are required to perform tasks and that working memory limitations will have an impact on the performance of the athlete. Reasoning also takes place at different levels and is either tacit or explicit.

**Tacit reasoning** takes place outside awareness and is memory based. It is used when quick decisions need to be made, such as when a cricket ball is pitched and a batsman is required to play a certain shot. Lohman and Lakin (2011) make the point that tacit processes are relevant in building a mental model of the problem and reveal that “effective problem solvers typically attend to different features of the problem than those attended to by less effective problem solvers. Effective problem solvers know what to seek and what to ignore” (p. 422). They further argue that this is due to greater experience and better use of past experiences. This may be especially relevant in sport participation and performance. Sport participants are constantly required to make decisions and the better the decision, the more effective the outcome.

**Explicit or intentional reasoning** takes place within conscious awareness, and occurs when existing rules are applied to situations. An example of this would be when one hears a coach telling a sport participant to apply the rule or principle to a game situation.

The role of knowledge is relevant in understanding how athletes solve problems and execute game plans. “Expertise is rooted in knowledge and experts reason differently about problems than do novices” (Lohman & Lakin, 2011, p 422). They elaborate by arguing that good reasoning is not the application of good knowledge and that experienced problem solvers form problem representations that are not only more abstract than those of novices but are more finely tuned to the problem at hand. The work of Toulmin, Rieke and Janik (1984) builds on this when they identified errors in reasoning which may include any of the following:

- Missing ground – “gaps”
- Irrelevant grounds – “red herrings”
- Defective grounds – “hasty generalisations”
- Unwarranted assumptions – “assumption confusion”
- Ambiguities – “no clear relationships”

Reasoning errors such as the above are useful to the theory of sport intelligence in that they provide principles which can be operationalised and made practical by sport participants.

### **Summary hypothesis 3: Effective problem solving**

Research by Kyllonen and Christal (cited in Lohman & Lakin, 2011) shows a clear correlation of  $r = .80$  to  $r = .88$  between working memory and reasoning and it may therefore be hypothesised that the sport intelligent participant is able to better reason and solve problems than others.

## **2.7 Hypothesis 4: Kinds of intelligence**

### **2.7.1 Introduction and context**

Early work on intelligence theory and practice concentrated on individual differences around factor  $g$ . Factor  $g$  became better understood through fluid and crystallised intelligence according to Wills, Dumont and Kaufman (2011) and was expanded to include additional abilities, including:

- Gv: Visual spatial thinking – visual processes;
- Ga: Auditory processing – recognising similarities and differences in sound;
- Gs: Processing speed or attentional speediness, especially when there is pressure to maintain focus, attention and concentration;
- Gt: Decision/reaction speed or time;
- Gsm: Short-term or immediate memory;
- Glr: Long term storage and retrieval – over longer term than Gsm;
- Grw: Reading and writing abilities; and
- Gq: Knowledge – distinct from quantitative reasoning that is a narrow ability within Gf.

Many of these abilities could possess a conceptual relationship with sport intelligence. Decision time, memory and retrieval, knowledge and problem solving form part of the hypotheses for the theory of sport intelligence as outlined earlier.

Research in the latter part of the twentieth century, however, moved beyond factor analytic models to include less orthodox, more intuitively appealing and conceptually sound theories of intelligence. Researchers including Gardner (2006) and Sternberg (2011), among others, will argue that the factor analytic approach to understanding intelligence is inadequate because while the factor analytical method undoubtedly provides useful input into intelligence theory, it fails to properly explain why and how

some people are successful and achieve, yet others do not. These same authors argue that there are a number of different kinds of intelligences while current research into expertise and the role of personality and emotions are also providing useful and practical insight into understanding the complexities of intelligence.

The focus of this literature review will now shift to these kinds of intelligence and will explore their possible conceptual contribution to sport intelligence.

### **2.7.2 Theory of multiple intelligence**

The theory of multiple intelligences was developed and advanced by Howard Gardner in the 1970s and 1980s. He argues that “individuals possess eight or more relatively autonomous intelligences. Individuals draw on these intelligences, individually and corporately, to create products and solve problems that are relevant to the societies in which they live” (Davis, Christodoulou, Seider & Gardner, 2011, p. 485). Of the eight intelligences identified by Gardner, one is bodily-kinaesthetic intelligence which refers to the ability to use one’s own body to create products or solve problems. This is where Gardner (2006) would position sport and sport performance.

Gardner (2006) explains bodily-kinaesthetic intelligence by referring to the case of ‘Babe Ruth’ who, as a 15-year-old, pitched a ball for the very first time and something special happened. Ruth (cited in Gardner, 2006) recalls “Yet, as I took the position, I felt a strange relationship between myself and that pitchers’ mound. I felt, somehow, as if I had been born out there and this was a kind of home to me.”

Gardner (2006) would argue that bodily-kinaesthetic intelligence is sport intelligence as one is using “one’s body ... to play a game ... (and) ... is evidence of the cognitive features of body usage” (p. 10).

Gallwey (cited in Gardner, 2006) outlines the computations required to solve a bodily-kinaesthetic problem of hitting a tennis ball:

In order to anticipate how and where to move the feet and whether to take the racket back on the forehand or backhand side, the brain must calculate within a fraction of a second the moment the ball leaves the server’s racket

approximately where it is going to land, and where the racket will intercept it. Into this calculation must be computed the initial velocity of the ball, combined with an input for the progressive decrease in velocity and the effect of wind and of spin, to say nothing of the complicated trajectories involved. Then, each of these factors must be recalculated after the bounce of the ball to anticipate the point where contact will be made by the racket. Simultaneously, muscle orders must be given – not just once, but constantly refined on updated information. Finally, the muscles have to respond in cooperation with one another ... contact is made at a precise point that depends on whether the order was given to hit down the line or cross-court, an order not given until after a split-second analysis of the movement and balance of the opponent ... Even if you are returning the serve of an average player, you will have only about one second. Just to hit the ball is clearly a remarkable feat; to return it with consistency and accuracy is a mind-boggling achievement. Yet, it is not uncommon. The truth is that everyone who inhabits a human body possesses a remarkable instrument. (Gallwey cited in Gardner, 2006, pp. 10-11)

Gardner asked why orthodox theories of intelligence were unable to account for outstanding performance. Unable to find an acceptable explanation, he set out to provide an account. Based on cognitive and neuroscience research, he claimed that “human cognitive competence is better described in terms of a set of abilities, talents or mental skills which I call intelligences ... and ... all normal individuals possess each of these skills to some extent. Individuals differ in the degree of skill and in the nature of their combination” (Gardner, 2006, p. 6). His view was that the narrow definition of factor ‘g’ failed to account for performance in other areas and went on to identify the following eight types of intelligences:

**Musical intelligence:** This is concerned with sensitivity to sounds, rhythms, tones, and music. People with a high musical intelligence normally have good pitch and may even have absolute pitch, and are able to sing, play musical instruments, and compose music.

**Bodily-kinaesthetic intelligence:** Control of one’s bodily motions and the capacity to handle objects skilfully. Gardner elaborates to say that this also includes a sense of timing, a clear sense of the goal of a physical action, along with the ability to train responses.

**Linguistic intelligence:** People with high verbal-linguistic intelligence display a facility with words and languages. They are typically good at reading, writing, telling stories and memorising words, along with dates.

**Logical-mathematical intelligence:** This area refers to logic, abstractions, reasoning, numbers, critical thinking and includes having the capacity to understand the underlying principles of some kind of causal system.

**Spatial intelligence:** This intelligence deals with spatial judgment and the ability to visualise with the mind's eye. Spatial ability is one of the three factors beneath *g* in the hierarchical model of intelligence.

**Intrapersonal intelligence:** Introspective and self-reflective capacities are at the centre of intrapersonal intelligence and refers to having a deep understanding of the self; what one's strengths/ weaknesses are, what makes one unique, being able to predict one's own reactions/emotions.

**Interpersonal intelligence:** In theory, individuals who have high interpersonal intelligence are characterised by their sensitivity to others' moods, feelings, temperaments and motivations, and their ability to co-operate in order to work as part of a group.

**Naturalistic intelligence:** Concerned with nurturing and relating information to one's natural surroundings. Naturalistic intelligence is the latest intelligence added by Gardner.

In his early work, Gardner (2006, p. 23) argued that "multiple intelligence theory led to three conclusions:

- All humans have a range of the intelligences;
- No two individuals have the same intelligence profile; and
- Having a strong intelligence does not suggest one will act intelligently".

Gardner (2006) closed off his original theory by being critical of what he termed 'Westist', 'Testist' and 'Bestist' stances in theorising about intelligence. By 'Westist' he referred to the over reliance on Socratic, logical thinking that emphasised rationality; 'Testist' by being biased to only that which can be tested and 'Bestist' by believing that the 'best' solution to a problem lies in one approach. He argued in favour of including

other perspectives in theorising about intelligence and was critical of the reductionistic perspective, proposing a systemic process-oriented perspective.

Davis et al. (2011, p. 498) note that “it is sometimes challenging to draw clear distinctions between intelligences and other human capacities” and also set out the assessment characteristics for multiple intelligences and traditional counterparts.

**TABLE 2.2:** Traditional versus multiple intelligence assessments (Adapted from Chen & Gardner, 1997)

<b>Traditional Assessment</b>	<b>Multiple Intelligence Assessment</b>
Over-reliant on linguistic and logical mathematical abilities and measures.	Samples the gamut of intelligences and domains.
Deficit focused.	Identifies relative and absolute strengths.
Limited connection between assessment and curricular activity/tasks.	Gives immediate feedback to students; is meaningful for students; uses materials with which children are familiar.
Captures performance in a single score.	Produces scores on a range of tasks, across several domains for each intelligence.
Is detached from context.	Has ecological validity; presents problems in the context of problem-solving; is instructed from teachers.

Intelligences rely on certain specific content (for instance, music, language, body movement, understanding self and others) but are also related to so-called ‘horizontal’ capacities such as attention, motivation and style. Thus, a sport participant with a high bodily-kinaesthetic intelligence will bring his/her own style, personality, attention process and decision making approach (among many other constructs) to bear on the sport context game or situation.

These aspects, in combination, outline the approach and style of the 'intelligence' and may manifest as a skill but Gardner warns against this and notes that a skill is not an intelligence per se and it is also culture specific. Davis et al. (2011, p. 492) elaborate that

Skills can be grouped according to the domain in which they operate ... and a domain (a neutral term designed to encompass a profession, discipline or craft) is any type of organised activity in a society in which individuals demonstrate varying levels of expertise.

Domains are identified by occupations and as such are a social construct. Skills within that domain can be acquired by various means including instruction, training, and practice. An intelligence is, however, not the same. An intelligence is an inherent virtue of being human (Davis et al., 2011).

As mentioned earlier, bodily-kinaesthetic intelligence is a sound point of departure as it seems, by definition, to be the most obvious kind of intelligence related to and involved in sport. It is, however, inadequate in isolation as it relies on two other inputs, namely:

- Its relationship with other intelligences; and
- Its relationship with other human capacities.

#### **Summary hypothesis 4: More than one intelligence at play**

Davis et al. (2011) makes a key point (as mentioned in the previous paragraph) which is perhaps the central tenet of this research into a theory of sport intelligence when they note that an individual can, and often does, **draw on several intelligences** when performing a given domain. A successful musical performance, for example, does not simply depend on musical intelligence as bodily-kinaesthetic, spatial and even interpersonal and intrapersonal intelligences are likely to work as well. It is hypothesised that sport intelligence will comprise a number of intelligences, apart from bodily-kinaesthetic intelligence, within Gardner's theory.

## **2.8 Hypothesis 5: Theory of successful intelligence**

Sport is concerned with the execution of sporting activities according to specific rules, confines and regulations. Sport participants therefore need to understand the specific sport discipline, know the rules and appreciate the parameters of the sport and to then operationalise these in practical ways.

Robert Sternberg (2011) emphasised these key concepts and practices in his theory of successful intelligence. Sternberg's theory examines what needs to be performed in order to be successful. This is relevant to sport intelligence as success and achievement are clearly implicit elements of sport intelligence. Sternberg's triarchic theory will be elaborated on when considering its contribution towards a model of sport intelligence.

According to Sternberg (2011) intelligence is:

- The ability to achieve one's goals in life, given one's socio-cultural context;
- Capitalising on strengths and correcting or compensating for weaknesses;
- Being able to adapt to, shape and select environments; and
- Performed through a combination of analytical, creative and practical abilities.

The first aspect emphasises goals and the skills to achieve objectives and Sternberg (2011) goes on to point out that these comprise three sub-items, namely:

- Identifying meaningful goals;
- Managing and co-ordinating these goals; and
- Realising the established goals.

Sternberg (2011) therefore considers having the disposition, character and skills to achieve goals to be a major component of his intelligence theory. As goal achievement theory is abundant in sport psychology and especially in motivation theory, the conceptual relationship between goal achievement and sport intelligence should be rather obvious – this will be elaborated on later in this chapter, though.

The second aspect of Sternberg's (2011) view of intelligence emphasises the ability to recognise both one's strengths and weaknesses and the wherewithal to leverage these. His argument is that one should gravitate to arenas where strengths can be positively utilised and where weaknesses can be minimised. It can be that this requires sufficient feedback and proper self-awareness.

Sternberg (2011, p. 505) recognises that "intelligence, broadly defined, is more than just 'adapting to the environment', which is the mainstay of conventional definitions of intelligence. The theory of successful intelligence distinguishes among adapting, shaping and selecting". Adaptation, according to Sternberg, is how one modifies behaviours and actions in order to fit into an environment. If a person is adaptable, then the skills and experiences from previous environments can be effectively utilised in other environments.

This is often acknowledged and referred to by elite sportsmen and women. The ability to adapt to different or changed circumstances or situations is considered a key attribute by many sport participants. Previous experience, as well as the learning and insights gained can be successfully used in new situations. The capacity to learn and apply learning, therefore, seems to be a key feature of sport intelligence.

Sternberg (2011), however, argues that adaptation is only part of intelligence and should be complemented by **shaping**, which refers to the modification of behaviour to 'fit' the environment in which one finds oneself. He furthermore makes the key point that "successful intelligence is deciding what to change and then how to change it" (Sternberg, 2011, p. 505). Sport participants are often faced with the challenge of change innovation and creativity. It seems as if elite sport participants need to be able to both cope with and manage change and this is often expressed as creativity or innovation - these will be elaborated on in the next section.

Sternberg's (2011) fourth aspect of intelligence builds on the preceding paragraph that successful intelligence relies not only on analytical qualities but also the ability to execute them effectively while also changing and innovating – and then to do so creatively.

Sternberg's (2011, p. 506) theory makes a case for a number of processes which underlie "all aspects of human intelligence". These include **metacomponents**, which plan, monitor and evaluate; **performance components**, which execute the metacomponents, and **knowledge acquisition components**, which learn how to solve problems. In addition, the theory includes three sub-theories:

- A componential sub-theory that addresses the components of intelligence;
- An experiential sub-theory that focuses on the processing of novel and new information; and
- A contextual sub-theory that focuses on adaptation, shaping and selection.

It is for this reason that this theory has been referred to as **triarchic**. The componential sub-theory includes three components, namely:

- Analytical intelligence quotient;
- Creative intelligence quotient; and
- Practical/ contextual intelligence quotient.

### **2.8.1 Analytical intelligence**

Analytical intelligence includes information processing and is "applied to analyse, evaluate, judge or compare and contrast" (Sternberg, 2011, p. 507). Components of the information processing includes:

- Encoding: registering the stimulus;
- Inference: discerning the relationship between stimuli;
- Mapping: transferring the relation from one set to another;
- Application: to the new stimuli;
- Comparison: comparing the validity of response times;
- Justification: selecting the best response; and
- Preparation-response: problem-solution response.

These may be relevant to the model of sport intelligence and seem, at face value, to provide important detail to the analytical theme of Gould et al. (2002) who argued that sport intelligence included, among other aspects, the ability to analyse situations.

### 2.8.2 Creative intelligence

Creative intelligence considers how people respond to new situations. Sport participants are constantly faced with changing situations where previous tactics may no longer apply, hence the need to do things differently. The components of creativity include intelligence, knowledge, thinking style, personality and motivation (Sternberg, 2011). These are elaborated on in later sections of the literature review.

### 2.8.3 Practical/contextual intelligence

This involves the practical application to daily problems and issues, and “involves applying the components of intelligence to experience so as to (i) adapt to, (ii) shape, and (iii) select environments” (Sternberg, 2011, p. 511). Central to practical intelligence is tacit knowledge, in other words, what one needs to know in order to participate and perform. The section on reasoning mentioned tacit knowledge and its relevance and importance to the theory of sport intelligence was demonstrated.

Practical/ contextual intelligence therefore seems to be the ability to adapt and modify the environment in order to achieve an outcome “as well as recognising when adaptation is not viable. It is also termed ‘wisdom’ and argues that it is the best predictor of success in real-life performance situations” ([www.headinthegame.net](http://www.headinthegame.net)).

The work of Richard Wagner (2011, p. 554) contributes to our knowledge of practical intelligence. He too emphasises the role and contribution of tacit knowledge and makes the point that tacit knowledge “guides action or behaviour without typically being subject to conscious introspection”. It is process-oriented in essence and is the **knowing-how** rather than only **knowing-what**.

Terenzini (1993), a psychologist studying institutions, built on what is known of practical/ contextual intelligence theory by proposing a three-tier model. This model has been applied to a sport setting as Terenzini considers a sport environment similar to any other social system.

The first tier according to Terenzini (1993, p. 4) is the **technical level** which he refers to as facts and information and needs to be “grounded in theory and technique and

mastering a host of technical skills ... (and) ... has historically been the focus of applied sport psychology training”. This focuses on skill development, motivation and biomechanics of performance but “without the higher-level forms of intelligence, however, it has little utility or value and considers them ‘foundational’”.

The second tier is **issue intelligence** and concerns itself with the problems, challenges and issues a sport participant needs to overcome during sport participation. General sport-related aspects such as arousal, performance anxiety, confidence, team dynamics and cohesion and other challenges are included in Terenzini’s (1993) view of issue intelligence.

Contextual intelligence is Terenzini’s (1993, p. 2) third tier and relates to:

Knowing the culture and context of the specific setting in which the performer operates. It is an understanding of the historical and philosophical evolution of the performance context as well as the formal and informal political structure ... (and) ... requires an understanding of the values and attitudes.

Terenzini (1993, p. 6) argues that this crowning form of intelligence “makes possible the prudent, intelligent and illuminating application of technical and methodological intelligence to locally meaningful versions of general issues”.

Contextual intelligence, as discussed above, seems relevant to the sport participant as it informs the systemic-political nature of sport in general. The following SPAM mnemonic sets this out in more detail.

**TABLE 2.3:** Elements of contextual intelligence (Brown, 2011)

<b>Structure</b>	<ul style="list-style-type: none"> <li>• Formal and informal structure</li> <li>• Authority to make decisions</li> <li>• Leaders vs. followers</li> <li>• Rigid or flexible</li> </ul>	} Hierarchy
<b>Patterns</b>	<ul style="list-style-type: none"> <li>• Timing and sequence of events</li> <li>• Information flow</li> <li>• Role of hierarchy in making decisions</li> </ul>	
<b>Attitudes</b>	<ul style="list-style-type: none"> <li>• Reflection of prevailing attitudes and prejudices</li> </ul>	
<b>Means of influence</b>	<ul style="list-style-type: none"> <li>• Those unable to exert influence, pressure at key junctions</li> <li>• Power and authority</li> <li>• Motivational issues</li> </ul>	

### Summary hypothesis 5: Successful intelligence

The sport intelligent participant needs to be aware of the contextual issues and dynamics within the discipline-specific sport structure and requires the wisdom to navigate these if they are to perform and achieve. The contextual issues and dynamics need to be considered in addition to being goal-oriented, possessing key personality traits such as resilience, and abilities to work towards and achieve goals through creative problem-solving. Analytical and creative intelligence is therefore part of the model of sport intelligence.

### 2.9 Hypothesis 6: Emotional intelligence

The literature review has thus far concentrated on rational processes and how they may conceptually contribute to a framework and theory of sport intelligence. Examining and investigating orthodox approaches to intelligence is a logical place to commence the study into sport intelligence, and the researcher focused on the information processing approach.

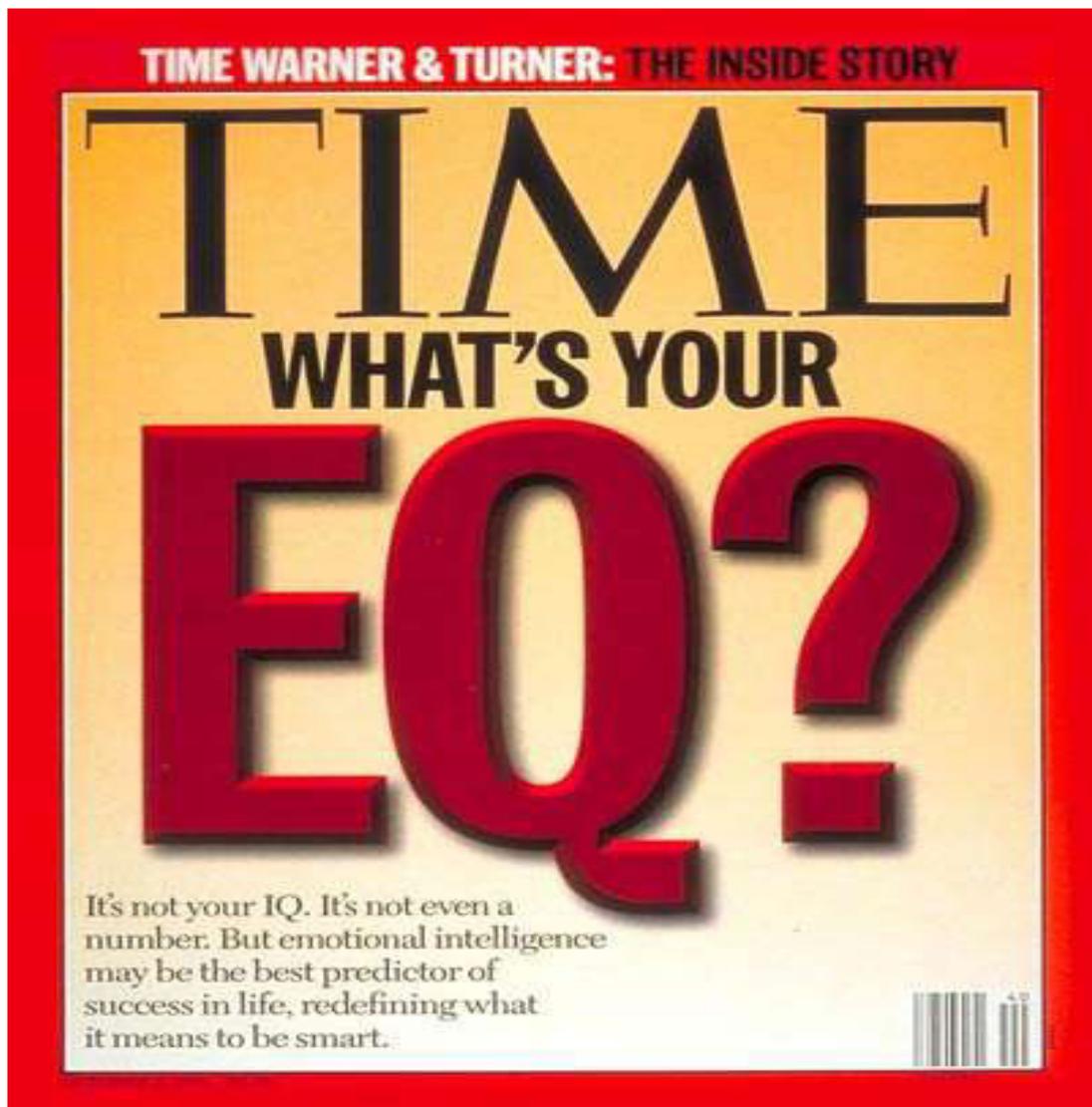
This covered the basic intellectual processes such as working memory, reasoning, problem solving and mental speed. The discussion then turned into different kinds of intelligences and referred to Gardner's theory of multiple intelligences and Sternberg's theory of successful intelligence. Each of these seem to make a possible conceptual contribution to the emerging theory of sport intelligence and the researcher has listed a number of propositions in line with these.

As many sport participants will confirm, it is however not only the rational/logical items that need to be processed, but also the emotional aspects involved in sport participation. The essence of such emotional aspects will be covered in the next section. For now, however, the focus will turn to a different kind of intelligence, namely emotional intelligence. The concept of emotional intelligence suggests the “intersection of emotion and cognition” (Mayer, et al., 2011, p. 530) and therefore flows from the preceding sections.

Mayer et al. (2011, p. 531) define emotional intelligence as “the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and in others”.

The concept of emotional intelligence became popular in 1995 when David Goleman released a popular book titled *Emotional Intelligence*, but similar theory and literature had been around for some time prior to that. Gardner (2006), for example, had offered an ‘intrapersonal’ and ‘interpersonal’ intelligence about 20 years earlier.

Goleman’s book gained much exposure and popularity as is shown by *Time* magazine using its cover with the title “What’s your EQ?” and stated: “It’s not your IQ. It’s not even a number. But emotional intelligence may be the best predictor of success in life, redefining what it means to be smart” (*Time*, 1995).



**Figure 2.3** What's your EQ? (Time Magazine, 1995)

Much research and writing on emotional intelligence has taken place since Goleman's book has been published. Mayer et al. (2011) summarises these succinctly as follows:

**TABLE 2.4:** Evolution of the journalistic accounts of “Emotional Intelligence” (Mayer et al., pp. 504-544)

<b>Goleman (1995)</b> <b>Overall definition(s)</b>	<b>Bar-On (1997)</b> <b>Overall definition</b>	<b>Petrides &amp; Furnham (2003)</b> <b>Overall definition</b>
<p>“the abilities called here <i>emotional intelligence</i>, which include self-control, zeal and persistence, and the ability to motivate oneself” (Goleman, 1995, p. xii). [...and...]</p> <p>“There is an old-fashioned word for the body of skills that emotional intelligence represents: <i>character</i>” (Goleman, 1995, p. 28).</p>	<p>“Emotional Intelligence is... an array of non-cognitive capabilities, competencies and skills that influence one’s ability to succeed in coping with environmental demands and pressures” (Bar-On, 1997, p. 14).</p>	<p>“a constellation of emotion-related self-perceptions and dispositions, assessed through self-report. The precise composition of these self-perceptions and dispositions varies across different conceptualisations, with some... being broader than others” (Petrides &amp; Furnham, 2003, p. 40).</p>
<b>Major Areas of Skills and Specific Examples</b>	<b>Major Areas of Skills and Specific Skills</b>	<b>Major Areas of Skills and Specific Skills</b>
<p><i>Knowing one’s emotions</i></p> <ul style="list-style-type: none"> <li>*Recognising a feeling as it happens</li> <li>*Monitoring feelings from moment to moment</li> </ul> <p><i>Managing emotions</i></p> <ul style="list-style-type: none"> <li>*Handling feelings so they are appropriate</li> <li>*Being able to soothe oneself</li> <li>*Being able to shake off rampant anxiety, gloom or irritability</li> </ul> <p><i>Motivating oneself</i></p> <ul style="list-style-type: none"> <li>*Marshalling emotions in the service of a goal</li> <li>*Delaying gratification and stifling impulsiveness</li> <li>*Being able to get into the “flow” state</li> </ul> <p><i>Recognising emotions in others</i></p> <ul style="list-style-type: none"> <li>*Having empathetic awareness</li> <li>*Being attuned to what others need or want</li> </ul> <p><i>Handling relationships</i></p> <ul style="list-style-type: none"> <li>*Having skill in managing emotions in others</li> <li>*Interacting smoothly with others</li> </ul>	<p><i>Intrapersonal skills</i></p> <ul style="list-style-type: none"> <li>*Emotional self-awareness</li> <li>*Assertiveness</li> <li>*Self-regard</li> <li>*Self-actualisation</li> <li>*Independence</li> </ul> <p><i>Interpersonal skills</i></p> <ul style="list-style-type: none"> <li>*Interpersonal relationships</li> <li>*Social responsibility</li> <li>*Empathy</li> </ul> <p><i>Adaptability scales</i></p> <ul style="list-style-type: none"> <li>*Problem solving</li> <li>*Reality testing</li> <li>*Flexibility</li> </ul> <p><i>Stress management scales</i></p> <ul style="list-style-type: none"> <li>*Stress tolerance</li> <li>*Impulse control</li> </ul> <p><i>General mood</i></p> <ul style="list-style-type: none"> <li>*Happiness</li> <li>*Optimism</li> </ul>	<ul style="list-style-type: none"> <li>*Adaptability</li> <li>*Assertiveness</li> <li>*Emotional appraisal (self and others)</li> <li>*Emotion expression</li> <li>*Emotion management</li> <li>*Emotion regulation</li> <li>*Impulsiveness</li> <li>*Relationship skills</li> <li>*Self-esteem</li> <li>*Self-motivation</li> <li>*Social competence</li> <li>*Stress management</li> <li>*Trait empathy</li> <li>*Trait happiness</li> <li>*Trait optimism</li> </ul> <p>(Petrides &amp; Furnham, 2001, p. 428)</p>

Early research and publications in this regard focused on single dimensions of emotional intelligence, whereas current work is focused on multiple areas and these are termed **integrative studies** (Mayer et al., 2011).

An example of an integrative model is the **systems set**. It integrates personality traits with emotional intelligence, intelligence competencies, mental models, motives, emotions, executive functions and styles. The systems set is divided into four areas:

- **Energy development:** How motives and emotions combine to drive energy;
- **Knowledge guidance:** How intelligences and knowledge combine to guide mental energy;
- **Action implementation:** Plans and procedures for situations; and
- **Executive consciousness:** Self-monitoring and self-guidance.

The former are set out in more detail in Table 2.5 to follow.

**TABLE 2.5:** The system set's four areas (Mayer et al., 2011, p. 543)

<b>Names of the Systems Set</b>	<b>Energy Development</b>	<b>Knowledge Guidance</b>	<b>Executive Management</b>	<b>Action Implementation</b>
Brief Description	Motives and emotions join together to enhance an individual's psychic energy	Intelligences operate on knowledge to enhance problem solving	Self-monitoring, self-regulation, defence and coping	Customary styles of carrying out behaviour along with plans for action
Generally relevant traits	Specific motivations of achievement, power, affiliation; positive and negative emotionality as well as specific tendencies toward emotions (eg., happiness, sadness, etc.)	Intelligence, emotional intelligence, competencies, optimism-pessimism, actual self, self-esteem, etc; mental models of other people and the world	Self-awareness, self-monitoring, defensiveness, repression-sensitisation, problem-focused coping, emotion-focused coping	Secure attachment, sociability, shyness, social skills, group competencies
Traits of the TEIQue organised accordingly	Self-motivation; trait happiness	Emotional perception self-esteem; social awareness; trait empathy; trait optimism	Adaptability; Emotional regulation; impulsiveness (low); stress management	Assertiveness; emotional expression; emotional management of others; relationships

A qualitative summary of the merits of emotional intelligence completed by Mayer, Roberts and Barsade (cited in Mayer et al., p. 541) indicate that children, adolescents and adults with higher emotional intelligence often reveal the following:

- Exhibit better social relations than others;
- Correlate positively with indices of good social relations and social competencies;
- Correlate negatively with destructive interpersonal strategies and indices of social deviance;

- Are perceived as more pleasant, empathetic and socially adroit and can be generalised to better family and intimate relations. These have been generalised to work environments where those with higher emotional intelligence exhibited more positive performance, engaged in better negotiations with others and left others feeling better in stressful work encounters;
- Often have better academic results (although often washed out when IQ was partialled out); and
- Report higher levels of subjective well-being than those with lower emotional intelligence counterparts.

### **Summary hypothesis 6: A sport intelligent participant is also emotionally intelligent**

Emotional intelligence as a concept, and relevant theoretical assumptions, is intuitively appealing to the emerging framework of sport intelligence. Being able to regulate and monitor one's emotions, being able to get on with others in both day-to-day and competition situations while feeling good about oneself in general should be more than useful in a sporting context – especially in competitive and team environments. The role of emotions in the model of sport intelligence will be covered in more detail later in section three of this chapter.

### **2.10 Hypothesis 7: Intelligence, curiosity and related constructs**

The literature review thus far has outlined the history and development of theories of intelligence and how these may contribute to a framework of sport intelligence. It has indicated that while the notion of crystallised and fluid intelligence has continued to receive attention, so too have other approaches to intelligence theory. The relatively 'new' conceptualisations of intelligence theory, like multiple and successful intelligence, have intuitive and conceptual appeal to both general intelligence theory and also towards the emerging theory of sport intelligence.

The previous section of sport intelligence presented an integrated **systems set**. This model integrates various personality characteristics, competencies, and style into an intelligence framework that includes emotional intelligence. Emotional intelligence can

be viewed as a set of personality characteristics and attributes rather than an intelligence per se.

While this is not necessarily the view of the current researcher, it is important to examine the theoretical and empirical relationship between personality and intelligence and so the discussion will now explore the relationship intelligence carries with other related constructs including motivation, achievement and creativity. Each of these aspects/constructs forms part of psychology in general and more to the purposes of this research, to sport psychology.

### **2.10.1 Intelligence and personality**

Cattell and Guilford (cited in DeYoung, 2011) initially believed personality included intelligence, but current thinking is that personality and intelligence are unrelated or are categorically distinct. DeYoung notes that three dichotomies exist in support of this view.

The first is that intelligence is seen as a cognitive activity but personality is a non-cognitive activity. This is relevant for the current research as it is the researcher's view that sport intelligence is theoretically both a cognitive and non-cognitive process.

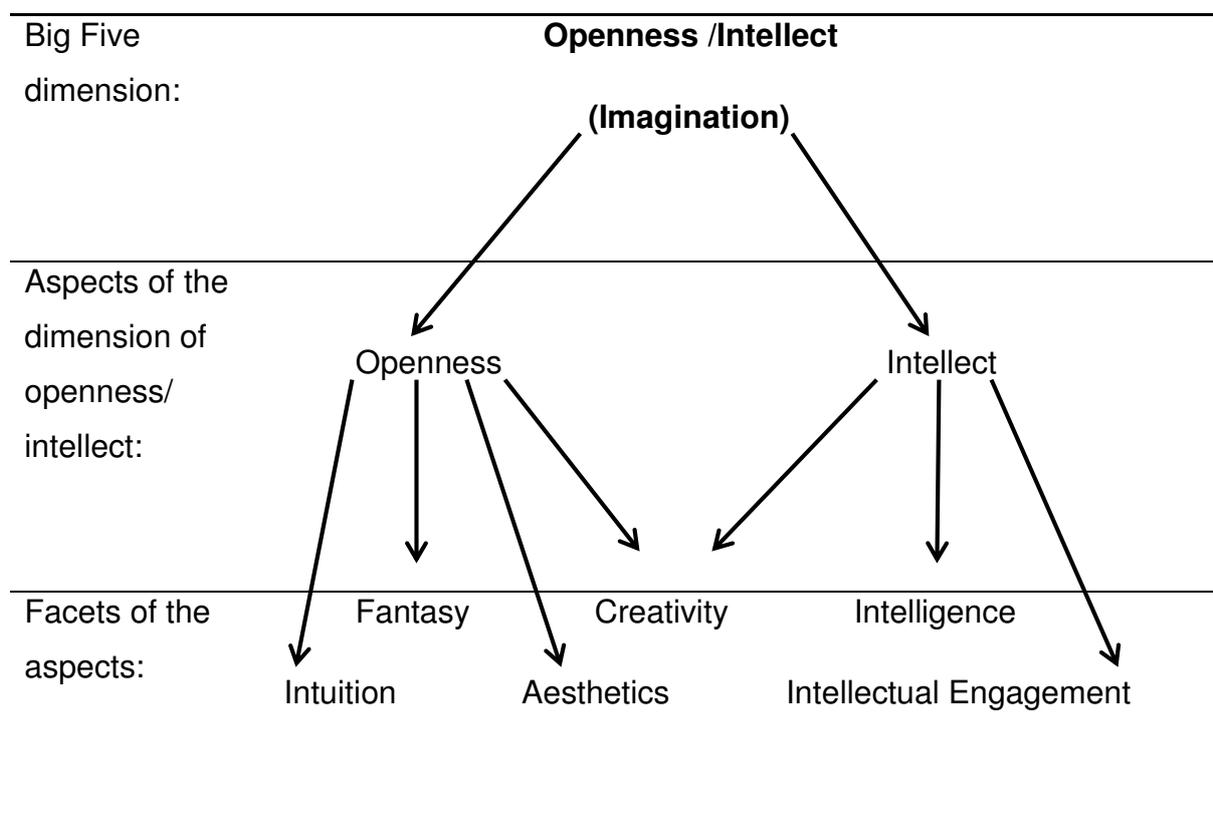
The second dichotomy, according to DeYoung (2011), is that intelligence and personality are measured in different ways. Where personality is assessed through questionnaires, intelligence is assessed through ability tests.

The third distinction between intelligence and personality also concerns measurement: personality instruments assess 'typical behaviour' while intelligence assesses 'maximal performance' (DeYoung, 2011).

The most widely used, most popular and best researched personality model proposed by Costa and McCrae, the Five Factor model (also called 'Big Five'), can be used as a point of departure in assessing the relationship between intelligence and personality. The 'Big Five' contains a natural home for intelligence descriptions based on lexical and questionnaire studies through its 'openness/intellect domain'. The remaining four

dimensions of the 'Big Five' model are extraversion, neuroticism, agreeableness and conscientiousness (DeYoung, 2011).

Each of the 'Big Five' personality characteristics includes aspects and facets as illustrated in the **openness/intellect dimension** below. The diagram indicates that the dimension of openness/intellect comprises different facets including intuition, fantasy (imagination), creativity, aesthetics, intelligence and intellectual engagement.



**Figure 2.4:** Facets and aspects of the openness/intellect dimension of the 'big five' model (DeYoung, 2011, p. 719)

The characteristic openness/intellect shows the strongest association with intelligence, according to three studies cited in DeYoung (2011), indicating a correlation of  $r = .33$ . Correlations with other dimensions seem weak or negative. Studies show extraversion negative at  $r = -.15$ ; agreeableness negative at  $r = -.20$  and conscientiousness at  $r = -.23$  (DeYoung, 2011).

DeYoung (2011) presents research using NEO PI-R (a similar personality instrument examining the 'Big Five') indicating that "correlations of self-reported intelligence with tested intelligence are similar in magnitude to correlations discussed ... for openness/intellect and intellectual engagement typically in the range of  $r = .20$  to  $r = .35$ " and goes on to say that this data indicates the "location of intelligence within the personality hierarchy but imply that self-reported intelligence should not be used as a proxy for tested intelligence" (p.721). DeYoung also shows that teacher ratings strongly predict IQ with correlations between  $r = .45$  and  $r = .80$ .

Data on the 'Big Five' has, however, indicated inconsistencies. Agreeableness as personality characteristic seems to be (in a small part) conceptually related to emotional intelligence – the ability to get on with others well – and could be similar to what Gardner (2006) calls interpersonal intelligence. Conscientiousness is also concerned with following rules and working towards goals but it (conscientiousness) also showed a negative correlation with intelligence (DeYoung, Intelligence and personality, 2011).

Working memory was covered earlier in the current literature review and DeYoung (2011) notes "the link between intelligence and openness/intellect is reinforced by studies of working memory and brain function" (p. 722).

It needs to be mentioned, though, that the question of whether intelligence is a construct within personality (or vice-versa) or a separate construct should not affect this research, as the investigation has from the outset hypothesised that the model of sport intelligence will essentially emanate through an integration of rational intellectual/cognitive theory with emotional/psychological and non-cognitive theories.

In applying the role of personality to sport performance, the research by Aidman (2007) indicated the "mediating role of personality in converting ability into achievement where personality combined with one of the coach ratings (physical potential) achieved a perfect 100% accuracy" (p. 1). This research confirmed the "utility of combining estimates of physical ability with personality profiling in predicting the likelihood of success in junior players' transition to seniors' competition" (p. 1).

## **Summary hypothesis 7: Personality factors play a role in the sport intelligence model**

This section has endeavoured to convey the point that personality characteristics play an important role in both performance and behaviour and that there is a positive correlation between intellect/openness and intelligence, intellectual engagement, creativity, fantasy and intuition – each of the facets of the openness/intellect ‘Big Five’ dimension. This provides for possible inclusion into the integrated model of sport intelligence.

### **2.11 Hypothesis 8: Intelligence, knowledge and experience**

This section will examine the relationship between achievement and intelligence and will build on the preceding section which introduced performance and ability. The section will provide additional content to the definitions of intelligence and will highlight the centrality of learning, knowledge and practice within the emerging sport intelligence framework.

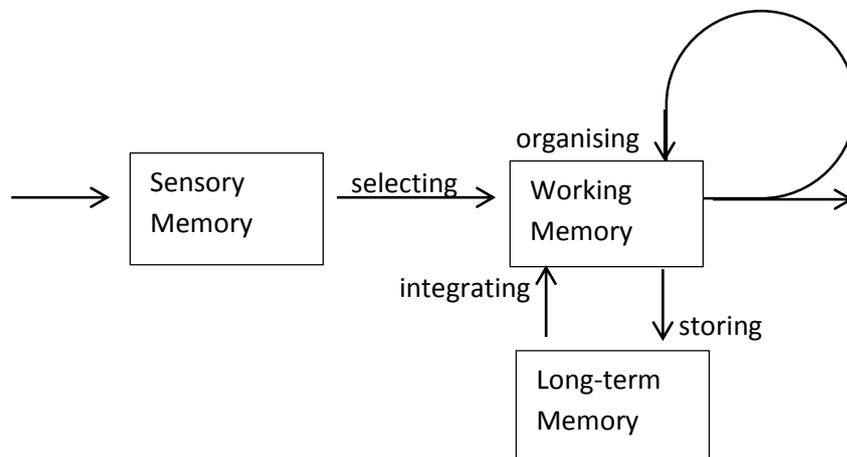
Alfred Binet (cited in Mayer, 2011) viewed intelligence as the ability to learn. His initial studies examined children who could answer questions related to facts such as colours and numbers. Children who could answer questions generally known by other children were considered more intelligent because they had learned more from the same experience as their peers.

Binet’s test was effective at predicting school success and the basis of his formula was straightforward: intelligence is viewed as an ability to learn, the evidence of which is via achievement. Intelligence is, therefore, seen as the ability to learn, while achievement is the concrete reflection of what has been learnt. There is also a reciprocal relationship between the two: intelligence enables achievement and achievement enables intelligence (Mayer, 2011).

More recently, Dick (2010, p. 192) notes that “learning is a process involving the acquiring of increased skill capacity” but he also makes the point that learning needs to be precise and correct. Spending hours on incorrect learning results in poor outcomes. Dick states that “unfortunately, simply accumulating time in the game does

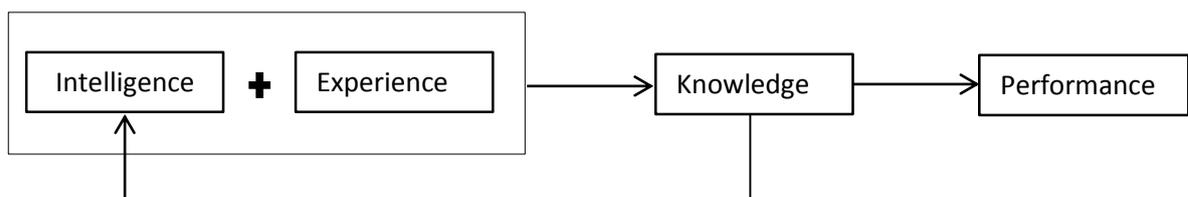
not eradicate sufficient bad habits and patterns acquired due to a lack of a stable learning base” (2010, p. 193).

Mayer (2011) elaborates on the relationship between intelligence and achievement and outlines the cognitive processes involved during learning. As expected, both working and long-term memory play an instrumental role during learning according to Mayer, building on the earlier input on working memory and intelligence. Figure 2.4 below indicates that incoming information is mentally organised and integrated with existing knowledge stored in long-term memory. Achievement is the result of the effective translation and utilisation of such information and knowledge through the process of selecting, organising and integration.



**Figure 2.5:** Four cognitive processes in learning (Mayer, 2011, p. 741)

From the preceding discussion, it should be clear that performance (or achievement) is the result of a blend of intelligence, experience and knowledge. Mayer (2011) sets the hypothesis as indicated in Figure 2.5, below.



**Figure 2.6** Intelligence and experience results in task performance (Mayer, 2011, p. 741)

The formula of intelligence with experience to generate knowledge and performance emphasises the importance of continuous and ongoing sport participation and practice. Ericsson (cited in Mayer, 2011, p. 742) builds on the theory of **deliberate practice**. This occurs when a learner continually devotes considerable time and effort to practising tasks that are challenging – that is, somewhat beyond the learner’s current level of performance – until reaching mastery, and concludes that “the willingness to engage in large amounts of deliberate practice may be dependent on the learner’s ability”.

An important feature of the intelligence-achievement discussion is that it highlights the significance of, in particular, crystallised intelligence, which depends on specific knowledge and which can be changed or modified through learning. This is significant for the sport intelligence model as it suggests that sport intelligence can be taught through improving specific knowledge and learning. In Table 2.6, Mayer (2011) provides useful and practical content on different kinds of knowledge and how it can be used to assist with the learning process.

**TABLE 2.6:** Five kinds of knowledge in academic tasks (Mayer, 2011, p. 745)

Name	Definition	Example
Facts	Characteristics of elements	Knowing the definitions of words; knowing that cars drive on roads
Concepts	Categories, principles, models, schemas	Phonemes, prose schema, mental number line, problem schema
Procedures	Step-by-step processes	Sound production algorithm, addition algorithm
Strategies	General methods	Comprehension monitoring strategy, self-evaluation strategy
Beliefs	Thoughts about one’s learning	Thinking that success depends on effort

## **Summary hypothesis 8: Experience and knowledge may improve sport intelligence**

This section of the literature review has suggested that achievement and intelligence share a symbiotic relationship and that one enhances the other. This is aided by a reminder of crystallised intelligence, which allows for learning to enhance intelligence. The point on deliberate practice as a mechanism for learning and achievement adds to this. The section has also reinforced the view that cognitive processes such as memory and information processing are relevant to the theory of sport intelligence.

### **2.12 Hypothesis 9: Intelligence and motivation**

The role of motivation in relation to intelligence will be explored in this section. Important factors such as beliefs, self-regulation and intrinsic motivation will be covered before examining how motivation could form part of the sport intelligence framework. It is, however, important to emphasise that this section covers motivation in relation to intelligence and intellectual performance only. A later section will cover motivation in the context of general sport performance.

The relationship between intelligence and motivation can be traced back to the early research done by Galton, Spearman, Terman, Binet (cited in Carr & Dweck, 2011). Galton and Spearman viewed intelligence as a static, unchangeable concept. Binet, however, held the opposing view and that “we must protest and react against this brute permission ... with practice, training and above all, method, we manage to increase our attention, our memory, our judgement and literally to become more intelligent than before” (cited in Carr & Dweck, 2011, p. 749). Termin (cited in Carr & Dweck, 2011) noticed that many high IQ scorers did not achieve much in later life and concluded that motivational factors played a significant role in intellectual performance.

Current research on motivation and intelligence has followed the fixed versus malleable view of intelligence. According to Carr and Dweck (2011) those proponents who consider intelligence as fixed are considered **entity theorists** and tend to emphasise performance goals, while those who argue in favour of learning goals are considered **incremental theorists**.

Evidence presented by Carr and Dweck (2011, p. 751) indicates that emphasising performance goals “can actually lead to a lowered intellectual performance as indexed by grades, achievement test scores and even IQ scores” and present a number of cases in support of the incremental theory which, in essence, argues that beliefs about intelligence affect intellectual performance. The studies reported in Carr and Dweck support the notion that if one is motivated to enhance intellectual performance then it is indeed possible. This view is supported by the research findings of Gagne and Tremblay (cited in Carr & Dweck, 2011).

The executive function, located in the cortex of the brain, features prominently in understanding the role of motivation in intellectual performance. Carr and Dweck (2011) cite the study of Walter Mischel on the delaying of self-gratification and self-discipline. Their research findings indicate that pre-schoolers who were able to delay gratification and exercise self-discipline and restraint scored significantly better on SAT tests 10 years later than those who were unable to exercise restraint. The ability to regulate oneself in achieving goals, therefore, seems a strong predictor of good performance.

Self-discipline and delay of gratification is central in the ‘10 000-hour rule’ as demonstrated by the Malcolm Gladwell (2001). He argues that mastery is achieved by 10 000 hours of deliberate practice.

Further research findings reported in Carr and Dweck (2011) indicate that intrinsic motivation and interest results in better intellectual performance, while the work completed by Csikszentmihalyi and Csikszentmihalyi (1988) on the concept of ‘flow’ suggests that when tasks and activities are completed for their own sake, this often results in enhanced performance, while contending that ‘flow’ is independent of external reward and is inherently intrinsic.

### **Summary hypothesis 9: Motivation and sport intelligence are linked**

The role of motivation in enhancing intellectual performance seems clear and leaves an optimistic message. This has important implications for the sport intelligence framework, because the incremental theorists have shown that with education, training and ‘method’, overall intellectual performance – and therefore also sport intelligence

– can be enhanced. It has, furthermore, the significance of self-regulation and intrinsic motivation contributing to the framework of sport intelligence.

### **2.13 Hypothesis 10: Intelligence and creativity**

Elite sport participants often display moments of brilliance that are termed ‘creative’. This section will explore the relationship between creativity and intelligence and then consider it in the context of sport intelligence.

Dick (2010, p. 159) notes that “decision-making and cognitive creativity in part determine how efficiently the sport participant will compete”. Many researchers have considered creativity in their theories of intelligence.

Guilford (cited in Mackintosh, 2011) included it in the ‘structure of intelligence’ model and is of the opinion that it is a result of the ‘product’ dimension. Sternberg (2011) refers to creativity in his theory of successful intelligence, where creativity is part of the experimental sub-theory. The Cattell-Horn-Carroll (CHC) theory (cited in Kaufman & Plucker, 2011, p. 773) includes originality/creativity as a component, while Gardner’s (2006) theory of multiple intelligences uses “case studies of eminent creative individuals to argue that creative people can shine as a function of embodying different intelligences”.

Current system theories of intelligence indicate that six elements contribute to creativity. These are listed by Kaufman et al. (2011) and include intelligence, knowledge, thinking style(s), personality, motivation and environment.

According to Lopez-Gonzalez (2012) creativity comprises four cognitive processes as set out below:

- Deliberate cognitive process, where creativity emanates as a result of sustained and continued work in a discipline;
- Deliberate emotional process, or the ‘aha’ moment typically associated with a positive emotion;

- Spontaneous cognitive process, or the ‘eureka’ moment when the problem-solving context is ignored and attention is a different – perhaps unrelated – task; and
- Spontaneous emotional process, sometimes termed an ‘epiphany’ or moments of intensity.

Other cognitive theories on creativity such as the phases of Wallas, including preparation, incubation, imitation, illumination and verification phases, and the Geneplore model of generative and explorative phases, have also received some attention of late (Kaufman & Plucker, 2011).

Kaufman and Plucker (2011) also cite the research by Batey and Furnham which indicates that the role of fluid intelligence and crystallised intelligence may shift over a lifespan with Gf more important in early career and Gc in later life.

Research on the relationship between intelligence and creativity is, however, sparse. The work of Sligh (cited in Kaufman & Plucker, 2011, p. 779) indicates that “measured intelligence and creativity were significantly correlated for the high IQ group, but they were not significantly correlated for people with average IQs”.

### **Summary hypothesis 10: Sport intelligent sport participants are creative and innovative**

Creativity features strongly in the literature as a component of intelligence. Reference to creativity is found in both the orthodox and unorthodox theories of intelligence and its elements, including intelligence, knowledge, thinking style, personality, motivation and environment, seem – at face value – to correspond with other dimensions related to sport intelligence.

The literature also suggests that creativity is the result of day-to-day cognitive processes and not necessarily magical moments. Those moments of brilliance one may see in sport is not just the result of an ‘in the moment’ response, but rather the application of what has been deliberately and extensively practised beforehand.

## **2.14 Hypothesis 11: Developing intelligence**

A number of relevant concepts and definitions have been introduced in the literature study thus far and it should be apparent that achieving a universal definition for intelligence is difficult.

Additional ideas, terms and concepts have been hypothesised in the attempt to outline and define a coherent theoretical sport intelligence framework and model. Information processing, working memory, reasoning, multiple, emotional and successful intelligence and the relationship intelligence has with other constructs such as personality, motivation, creativity and achievement, have indicated that intelligence is a complex, content-rich and exciting focus area. This research study has highlighted the point that beliefs held about intelligence exert significant influence on achievement and motivational levels.

The question on whether or not intelligence can be changed and developed over time and through intervention was introduced earlier, but needs to be elaborated on. The logical place to start examining this is to assess the merits of those theorists and researchers who argue that intelligence cannot be changed and then assess the case of those who believe intelligence is not static.

Nickerson (2011, p. 109) indicates that respected writers are found in both camps by noting that “defenders of the assumption that intelligence is largely inherited include Eysenck (1973), Jensen (1998), and Harris (1998) with proponents of the greater importance of environmental factors including Perkins (1995), Sternberg (1999) and Nisbett (2009)”.

Nickerson (2011, p. 109) summarises current data by stating:

Following the extensive review of work on the factors that affect intelligence, Nisbett concludes that the extent to which intelligence is determined by genetics varies from one population to another and that for any given population, it depends on the circumstances in which that population lives. If the environment is relatively the same for all members of a population and

favourable to the growth of intelligence, as it is for upper middle-class families in developed countries, then the heritability of intelligence is likely to be quite high – “perhaps as high as 70 percent” – but if the environment differs greatly for family within a population, as it generally does for the poor, then the environment will play a larger role than genetics as a determinant of differences in intelligences among individuals. He estimates that in the aggregate, the maximum contribution of genetics is probably about 50% and that the remaining variation is largely due to environmental factors.

It has been indicated that beliefs, motivational levels, working memory development and deliberate practice can alter overall intelligence levels, while research also indicates that intelligence as measured by IQ changes with age – peaking around age 25 and dropping thereafter while various projects such as Head Start, The Caroline Abecedarian Project in the USA and Project Intelligence in Venezuela have yielded positive results where measures of intelligence have improved after the environment had been altered (Nickerson, 2011).

Thus, where the environment is conducive to overall development, Nickerson (2011) proposes the following tactics to enhance cognitive performance:

Tactic 1: Knowledge: Enhancing domain specific knowledge but also human reasoning errors.

Tactic 2: Logic: Formal and informal logic. Familiarity with rules – written and unwritten.

Tactic 3: Statistics: Dealing with situations using probabilistic or statistical thinking.

Tactic 4: Specific: Cognitive skills, including control, memory, visual search, reasoning, and task performance.

Tactic: Heuristics: “Tricks of the Trade” and strategies for learning.

Tactic 6: Metacognitive skills: Self-monitoring and self-management and acceptance for own learning.

Tactic 7: Thoughtful habits: Mechanical application of problem solving procedures.

Tactic 8: Attitudes and beliefs: Fostering attitudes of carefulness and reflection.

Tactic 9: Principles of good reasoning (seeing the world as an interesting place).

Tactic 10: Counterfactual thinking (imagining alternative possibilities) and,

Tactic 11: Perspective thinking (looking at issues from different points of view).

### **Summary hypothesis 11: Sport intelligence can be developed**

This section has provided useful theoretical and practical perspectives and has made the point that overall performance can be improved through creating a development-oriented environment conducive to the overall enhancement of performance, while also setting out a number of practical tactics which could be used to improve performance.

## **2.15 Sport Psychology and sport intelligence**

### **2.15.1 Introduction**

This section will examine the relationship between sport psychology and sport intelligence through assessing the contribution of psychological characteristics and attributes to the conceptual framework of sport intelligence. To this end, literature pertaining to core psychological skills, characteristics and attributes that are recognised as making a contribution to sport psychology will be assessed and considered as part of the sport intelligence framework.

To start the discussion, it is important to reinforce the origins of sport intelligence as this will serve as a reminder that sport intelligence – as a concept – is rooted within the domain of psychology. This highlights how psychological constructs could form part of the sport intelligence model.

### **2.16 Hypothesis 12: Psychological strength**

The research of Gould et al. (2002) into the psychological characteristics of Olympic champions found that Olympic sport participants typically possessed 12 characteristics. These were identified by trained psychologists and academics through interviews and a battery of psychological tests. The identified characteristics included:

- Coping with and controlling anxiety
- Confidence
- Resilience
- Sport intelligence
- Focus and blocking out distractions

- Competitiveness
- Hard work ethic
- Goal achievement
- High dispositional hope
- Coachability
- Optimism
- Adaptive perfectionism

The same authors defined sport intelligence as comprising a tacit understanding of the nature of elite sport, decision-making ability, perceptual ability, self-awareness, learning ability and a learning orientation.

### **2.16.1 Motivation and emotion**

The research of Gould et al. (2002) showed motivation as one of the keys of superior performance. Their research indicates that Olympic sport participants possess a high degree of internal and external motivation where intrinsic motivation is regarded as doing something for its own sake and extrinsic motivation as doing something as a means to an end and not for its own sake (Vallerand, 2007).

This part of the literature review does not aim to provide a complete overview of the entire gamut of motivation and emotion theory – as that would be the topic of another research study. Instead it aims to show that motivation is not only an inherent characteristic but also possesses social, contextual and situational factors, and as indicated in the previous section, alternate models of intelligence emphasise the same factors. Parallels are drawn before considering how motivation and emotion may be related to the theory of sport intelligence.

The hierarchical model of intrinsic and extrinsic motivation comprises five postulates and five collaries which are indicated below:

**TABLE 2.7** Postulates and corollaries of the hierarchical model (Vallerand cited in Tenenbaum and Eklund, 2007, p. 63)

Postulate 1	A complete analysis of motivation must include intrinsic and extrinsic motivation and amotivation.
Postulate 2	Intrinsic and extrinsic motivation exist at three levels of generality: the global, contextual and situational levels.
Postulate 3	Motivation is determined by social factors and top-down effects from motivation at the proximal level higher up in the hierarchy.
Corollary 3.1	Motivation can result from social factors that are either global, contextual or situational depending on the level of generality.
Corollary 3.2	The impact of social factors in motivation is mediated by perceptions of competence, autonomy and relatedness.
Corollary 3.3	Motivation results from top-down effects from motivation at the proximal level higher up in the hierarch.
Postulate 4	There is a recursive bottom-up relationship between motivation at a given level and motivation at the next higher level in the hierarchy.
Postulate 5	Motivation leads to important consequences.
Corollary 5.1	Consequences are decreasingly positive from intrinsic motivation and amotivation.
Corollary 5.2	Motivational consequences exist at the three levels of the hierarchy and the degree of generality of the consequences depends on the level of motivation that has produced them.

The first postulate mentioned above draws a distinction between intrinsic and extrinsic motivation and these need to be understood from the sport participant's perspective.

Each postulate operates at three levels: a) at a global, general level; b) at a contextual level where one is motivated "towards a specific context or set of specific, related activities" and c) at a situational level which sport participants experience "when engaging in a specific activity at a given moment in time" (Vallerand, 2007, p. 62). The interplay between these levels and factors needs to be considered when assessing the motivational levels of sport participants.

## 2.16.2 Emotions

An earlier section introduced **emotional intelligence** where the concept, structure and merits of emotional intelligence were considered. This section will elaborate on the role and contribution emotions may bring to the model of sport intelligence. It is hypothesised that sport intelligence will include some of the emotional intelligence dimensions such as self-awareness and the ability to get on with others and therefore includes interpersonal as well as intrapersonal intelligence. This suggests that “a good deal of individuals’ self-definition and emotional experiences are defined from how they are perceived and the feelings they elicit from others in achievement settings” (Hamin, 2007, p. 46).

Research into emotions within sporting settings is for obvious reasons, however, difficult. Emotion has been referred to as ‘the missing link’ in sport performance (Botterill cited in Murphy, 2012). Hanin (2007, p. 31) makes the point that even the definition of emotion “remains ambiguous ... (and) ... it has even become a common practice to state that it is intuitively clear what emotion is but difficult or even impossible to define”.

Parkinson (cited in Hanin, 2007) illustrates four different ways of approaching the issue which can be summarised into:

- Providing examples of emotions;
- Examining different components of emotions;
- How different components interact with one another; or
- By relating and contrasting it with other psychological functions.

A generally accepted definition of emotion found in the literature is that of Deci (1980, p. 85). He stated that:

An emotion is a reaction to a stimulus event (either actual or imagined). It involves a change in the viscera and musculature of the person, is experienced subjectively in characteristic ways, is expressed through such means as facial changes and action tendencies and may mediate and energise subsequent behaviours.

Despite the definitional inadequacies, all sport participants know that emotions affect them in some way. Taylor and Wilson (2005) note that “emotions affect sport participants at many levels of personal and sport functioning, including physiological, psychological and behavioural levels ... (and) ... understanding the ways in which emotions affect sport participants is essential in helping them gain mastery over their emotions during competition” (p. 67). Explaining individual differences is, however, difficult, as some sport participants perform better while experiencing heightened emotions and vice versa.

Emotions are either reported as positive/pleasant or negative/unpleasant. Rationally one would expect the latter to not enhance performance while the former would. This is, however, not necessarily the case as Taylor and Wilson (2005, p. 69) illustrate when noting “some positive emotions such as satisfaction about one’s level of performance can cause complacency and decrease in performance. Conversely, frustration and anger can increase intensity and raise the quality of performance.”

Hanin (2007) proposes two explanations for these counter intuitive outcomes. The first is what he refers to as the **resource matching** hypothesis where a sport participant is able to identify, recruit, use, recuperate and further develop resources to perform effectively. He notes that:

The resource matching hypothesis proposes three potential causes of intra-individual and inter-individual variability in optimal emotion content and intensity. These include inter-individual differences in a) available resources, b) the ability to recruit them at the right time and place, and c) the skill to use them effectively and notes there are clear inter-individual and intra-individual differences in situational readiness to recruit, utilise and recuperate these resources. (Hanin, 2007, p. 50)

The theory is, therefore, that sport participants match available resources with the task at hand and experience emotional content as a result. Hanin (2007) refers to four emotional zones being experienced by a sport participant, namely the challenge zone – where the sport participant is ready for the game; emergency zone – where resources are not sufficient; comfort zone – where a sport participant underestimates

task demands and overestimates own resources which leads to complacency or; the dejection zone – where the sport participant, for some reason, overestimates task demands and underestimates his/her resources.

The sport participant is, therefore, in a constant state of appraisal and self-assessment, and emotions therefore possess a regulatory and signal function. Carver (cited in Hanin, 2007, p. 51) notes that “emotions are indicators of effectiveness of ongoing action that correspond either to ‘rate of progress’ or ‘error signal’”.

The second proposal Hanin (2007) makes to account for individual differences in emotions is the effective/ineffective use of energy constructs which he terms **energy mobilisation** and **energy utilisation**. He points out that four effects of emotions are derived, namely energising effects; energy demobilising effects; energy utilisation or regulation effects; and energy misuse or deregulation effects. These explain why some sport participants experience optimum emotions in a positive way yet with others, the same optimum emotion is experienced negatively.

Hanin (2007) uses the example of high and low anxiety sport participants to illustrate the proposition that low anxiety sport participants use available energy in the correct way and are not distracted by task-irrelevant and energy sapping activities but contrasts this with high anxiety sport participants who use more energy in stressful situations such as sport participation. Unpleasant emotions may, therefore, be functionally useful in that they generate additional energy.

Emotions often serve as triggers to appraisal and to make judgements as evaluations. Lazarus (cited in Hanin, 2011) argues that the appraisal can be either a threat appraisal or a challenge appraisal with the latter playing a constructive role and having better performance outcomes than the threat appraisal.

The resource-based and energy utilisation theory of Hanin (2011) and Lazarus’ (cited in Hanin, 2007) appraisal system both suggest that if sport participants feel they are able to overcome the situation by using resources, energy and ‘challenge’ thinking, then positive performance outcomes are likely. Gaining ‘mastery’ of one’s emotions is, therefore, important and this is also one of the central tenants of emotional intelligence.

Self-awareness together with understanding the effect of emotional states on training and competition performance provide sport participants with the insight and understanding to enable them to:

Choose and commit to a positive course of action directed at altering their current emotional state and the competitive situations that cause the emotions. The ultimate goal of this emotional mastery process is for sport participants to be able to choose an emotional path that will help them achieve their competitive goals.

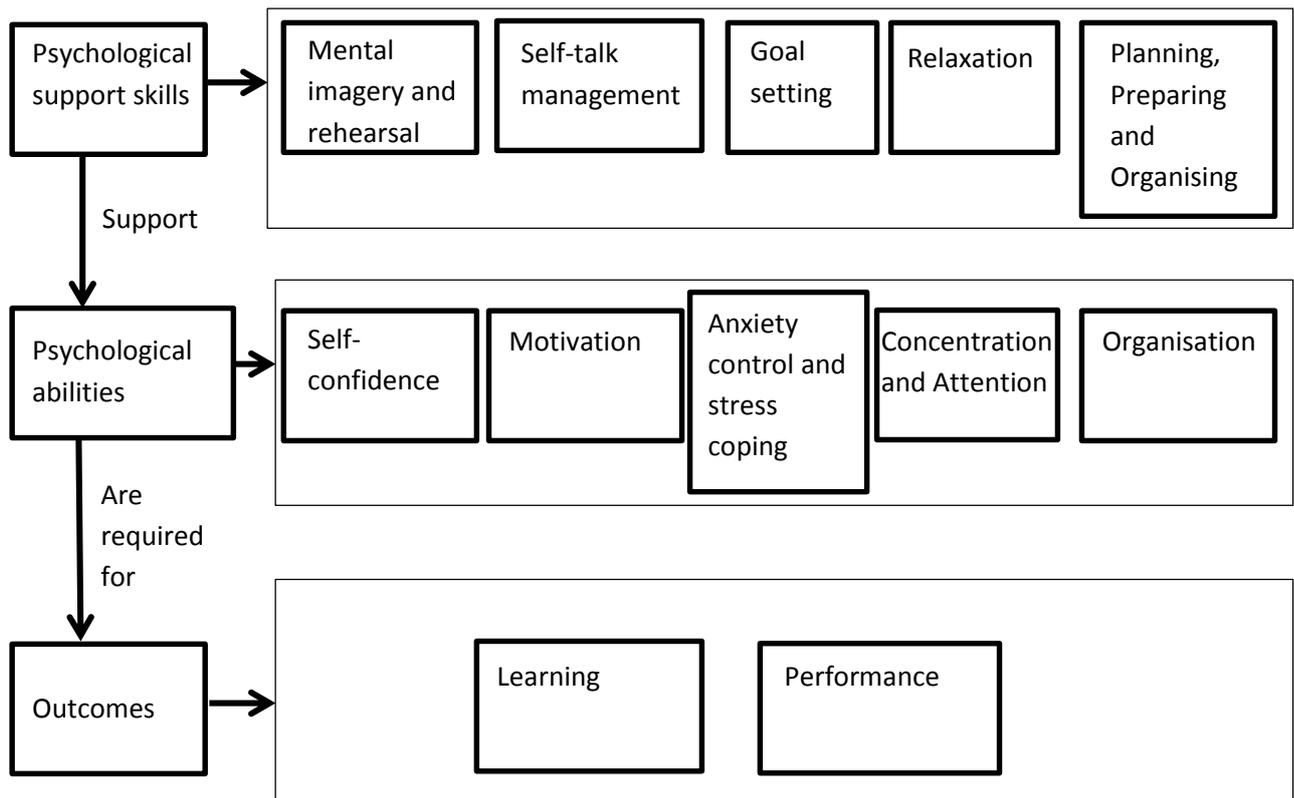
(Taylor, 2001, p. 77)

A number of techniques for the management of emotions before, during and after sport participation have been developed and used by theorists including Behnecke (2004), Cockerill (2002), Cooper and Goodenough (2007), Davies (1989), Eccles and Feltovich (2008), Jones (2003) and Taylor (2005). Some of these include:

- Re-appraisal: gaining perspective(s) on game situation;
- Problem-solving: generating alternative responses to game circumstances;
- Self-talk: positive messaging to self;
- Mental imagery and visualisation: generation of positive, helpful emotions;
- Mental rehearsal: rehearsing mental steps or physical actions required;
- Goal setting: objectives related to performance, process and outcomes;
- Intensity regulation: consciously altering emotional states including relaxation, arousal and biofeedback;
- Training success: effective use of techniques during training and preparation;
- Corrective experience: where an individual makes a conscious decision to engage in the behaviour that is a concern/evokes a particular emotion;
- Socratic dialogue: thought provoking questions are asked with the intent of getting the sport participant to re-evaluate some of their self-defeating ideas or misperceptions;
- Vicarious learning/modelling effect: a sport participant models the behavioural/emotional response of another participant or mentor who has a more positive reaction in the same circumstance; and

- Reframing: The event/behaviour remains the same but its meaning or “frame” is changed.

These techniques are also referred to as **mental skills** by sport participants and coaches while many models and frameworks exist on this. An example of how skills and abilities interact with learning and performance is provided in Figure 2.6.



**Figure 2.7** Basic mental skills framework (adapted from Eccles and Feltovich, 2008, p. 51)

**Summary hypothesis 12: The sport intelligent sport participant possesses mental skills and has psychological strength**

The section on motivation and emotion has shown how both constructs are able to contribute to the overall performance of a sport participant. Sport participants should be aware of how their motivational and emotional make-ups affect them as people and sport participants. The sport intelligent participant is able to gain ‘mastery’ over these and is, therefore, able to use them beneficially.

## 2.17 Hypothesis 13: Relationship competence

### 2.17.1 Interpersonal competence and intelligence

Getting on with others is implicit in emotional intelligence theory and is applicable to all sports. Even in individually oriented sports, sport participants need to get on with coaches, supporters and others. Interpersonal competence is furthermore fundamental to team sports where team cohesion is critically important for the performance of the team and is interestingly one of Gardner's (2006) multiple intelligences.

While research by Eccles and Feltovich (2008) shows a significant relationship between team member relationships/ cohesion and team success, it also indicates that high team cohesion has a positive influence on team performance and "when a bond between team members was forged on their commitment to team goals, the team performed better and was more successful" (Taylor, 2011, p. 174). Taylor furthermore points out that the impact of social cohesion is greater for sports that require higher team member performance such as hockey, soccer and rugby.

Research into team dynamics, team effectiveness and high performing teams emphasises the centrality of relationships. As Taylor (2011) points out, "the goal of building team cohesion is for sport participants to perceive their experience on the team as positive and rewarding" (p.182). In this regard, Taylor provides the following 12 critical conditions as researched by MacKenzie (cited in Taylor, 2011) and emphasises the quality of relationships between players, team mates and coaches.

- **Expectation clarity** between players, team mates and coaches.
- **Resources** needed to play and compete.
- **Opportunity** to express oneself .
- **Recognition** received for behaviours and performance.
- **Care** from coach and others.
- **Encouragement** from coach and others.
- **Input** – player opinions considered.
- All participants need to be **valued**.
- All participants **committed** to training and preparation.
- **Quality relationships** prevalent on the team.

- **Honest feedback** given to players and coaches.
- Personal **development** taken seriously.

One can infer that each of these conditions strengthens the psychological contract between sport participants, coaches and other support staff within a sports team context (Makin, Cooper & Cox, 1996). Most of these conditions, however, rest on effective relationships with others. Similar findings are illustrated by the work of Rosenfeld and Richman (1997) who researched the significance of an effective team climate on effective team functioning and found the following requirements were needed for optimal team functioning:

- Listening support;
- Emotional support;
- Emotional challenge support;
- Reality confirmation support;
- Task appreciation support;
- Task challenge support; and
- Personal assistance support.

All of the above require sound interpersonal relationship skills and understanding.

### **2.17.2 Intrapersonal competence and intelligence**

Continuing with the contribution and themes from emotional intelligence theory to sport intelligence is that of **knowing oneself** (Goleman, 1996; 1998; Stein & Book, 2000). Gardner (2006, p. 17) provides a concise description and definition of intrapersonal intelligence when he defines it as:

Access to one's one feeling life, one's range of emotions, the capacity to make discriminations among these emotions and eventually to label them and to draw on them as understanding and guiding one's own behaviour ... (and) ... a person with good intrapersonal intelligence has a viable and effective model of him/herself – one consistent with a description constructed by careful observers who know that person intimately.

From this one can see that intrapersonal intelligence and self-awareness refer to the same or similar dimensions. In general, emotional intelligence and self-awareness refer to knowing and understanding preferences, resources and internal states (Goleman, 1996) and include emotional awareness, accurate self-assessment and self-confidence as competencies. Stein and Book (2000, p. 53) define self-awareness as “the ability to recognise your feelings and to differentiate between them, to know what you are feeling and why and to know what caused the feelings”.

Taking these broad definitions and extending them to sport suggests that the self-aware sport participant is able to understand the implications of his/her mood state on performance and is also able to alter these, if need be. This should apply in equal measure to practice, preparation and game situations.

Dick (2010, p. 161) makes the key observation that “the opposition cannot be controlled but self-regulation is possible ... under a range of potential circumstances”. Self-knowledge and self-regulation are, therefore, empowerment skills which offer performance development and enhancement opportunities for sport participants. The sport intelligent person will need to gain mastery over these.

A further proposition is that players with high intrapersonal intelligence and good self-awareness will be able to accurately assess their own play and game status. Being able to assess one’s own strengths and weaknesses, physical capabilities, be comfortable with self, technique and preparation are all dimensions of self-awareness.

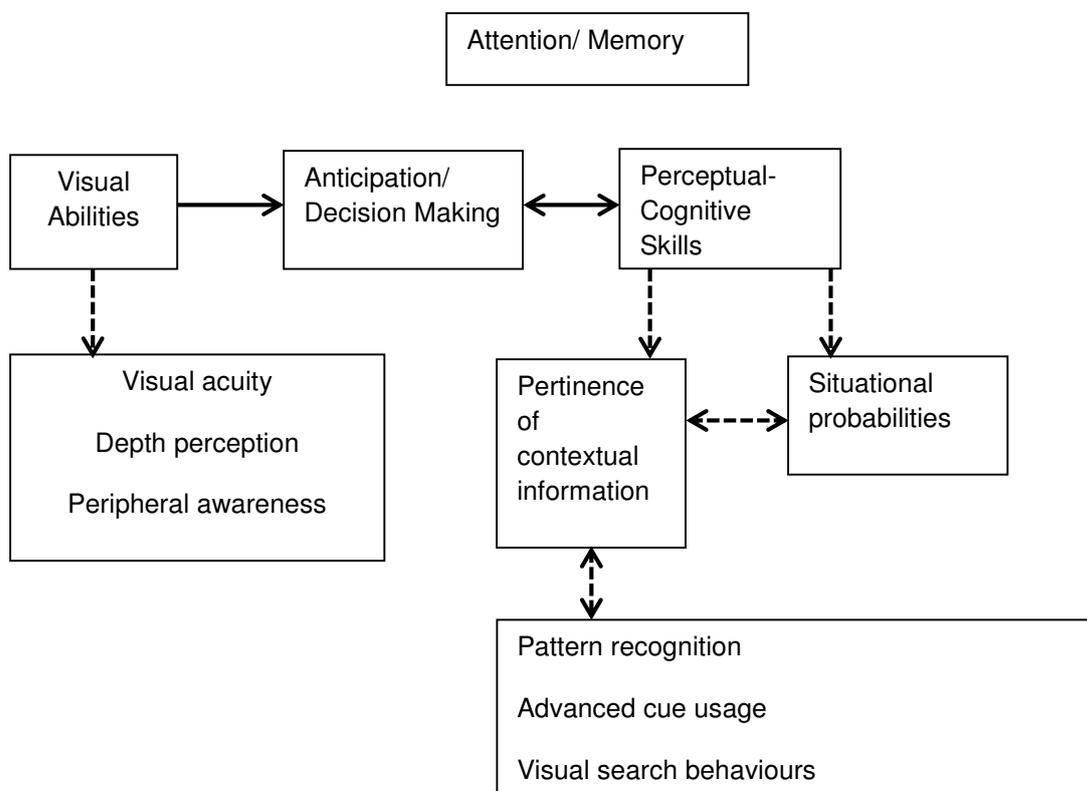
### **Summary hypothesis 13: The sport intelligent participant has healthy, positive relationships**

The literature suggests that the elite sport participant needs to know and understand him/herself in order to optimally manage his/her emotional and rational thinking process. The elite sport participant, therefore, needs greater levels of self-awareness than average players, while he/she needs to possess self-knowledge in order to assess, appraise him/herself and to make changes as appropriate. Players, however, do not exist in isolation. They are part of social systems including coaches, specialist trainers, fans, spectators, media, sponsors and managers and should be able to have

healthy, positive relationships with these key stakeholders. Relationships with competitors and opposition will be explored in the current research study.

### 2.18 Hypothesis 14: Decision-making

Despite four decades of interest and research into decision making and anticipation, a limited number of theoretically robust models are available on the topic. At present, a simple information processing model seems most widely used and is presented in figure 2.7 below.



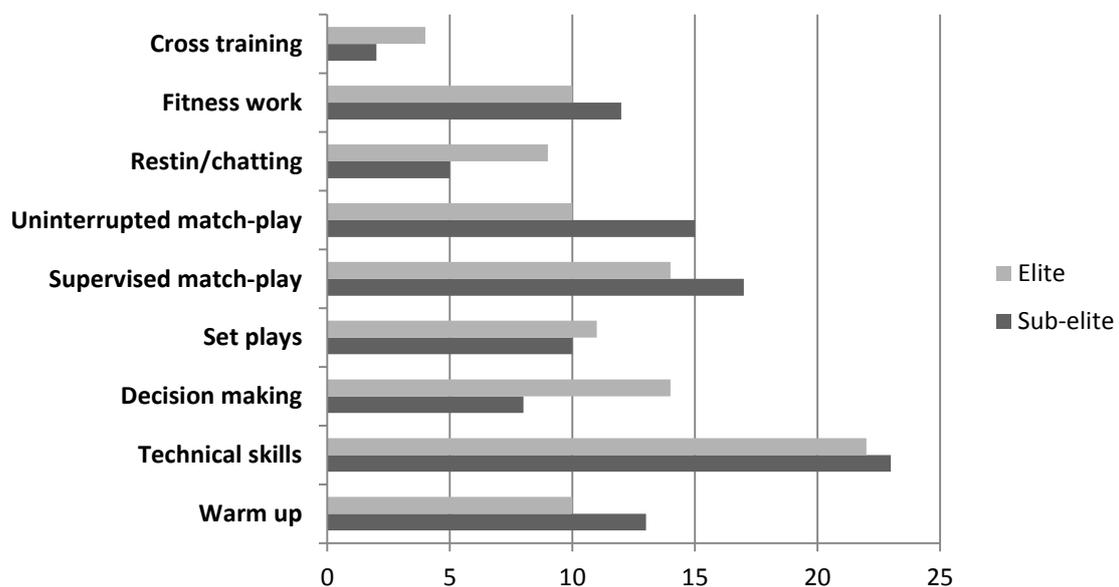
**Figure 2.8** Information processing mode (adapted from Williams & Ward, 2007, p. 215)

As the model indicates, skilled players constantly scan the environment, extracting pertinent contextual information while matching it to situational probabilities. The role of short- and long-term memory and attentional processes features prominently in information processing.

Theorists argue that expert players, according to William and Ward (2007, p. 215), acquire “skills that provide rapid encoding of information in long-term memory and allow selective access to this information when required. After extended practice, experts index information in such a way that they can successfully anticipate future retrieval demands”. This point, among others, supports the ‘deliberate practice’ principle made elsewhere in this chapter.

Williams and Ward (2007, p. 203) note that “there is growing awareness that perceptual-cognitive skills such as anticipation and decision making are crucial to high level performance across a range of domains”. Williams and Reilly (cited in Williams & Ward, 2007) argue that the perceptual cognitive skills players display and employ are likely to be as significant as technical, anthropometric and physiological profiles.

Ward and Reilly (cited in Williams & Ward, 2007) compared the proportion of time spent in various sport-related activities. Decision-making and preparation were found to be the key action areas in about 15% of elite soccer players’ time, which is almost double that of sub-elite soccer players. This is illustrated in Figure 2.8.



**Figure 2.8** Key activities of elite and sub-elite sport participants (Williams & Ward, 2007, p. 218)

In examining the history of research into anticipation and decision making, Williams and Ward (2007) show that early researchers focused on visual characteristics such as accuracy and depth perception, with the underlying assumption being that “skilled performers are endowed with enhanced visual systems” (p. 204) but this view has not been confirmed as fact with contradictory evidence. Research, as indicated in Williams and Ward (2007), has shown that visual systems operate in concert with the perceptual-cognitive system while they also show how a number of perceptual-cognitive skills are used in effective decision-making and anticipation. These are outlined below and are based on the detailed assessment of Williams and Ward (2007).

#### Skill 1: Advanced area utilisation

Skilled performers are able to identify, assess and judge more effectively than less skilled sport participants by being able to observe postural changes in the movements before key activities such as kicking a ball. Williams and Ward (2007, p. 207) note that “performers determine an opponent’s intentions based on their perception of the relative motion between specific bodily features, rather than via the extraction of information from more superficial features or an isolated area”. Performers are, therefore, able to identify subtle changes in actions, motions and behaviours and to then modify their own actions.

#### Skill 2: Pattern recall and recognition

Skilled performers are able to more accurately recall players positions and plays than unskilled players. Research by Williams and Ward (2007) indicates that skilled performers seem to be able to not only recall and recognise plays but are able to identify key plays between a few – not all – players and to focus on these in isolation. Skilled performers focus on the plays between key players/plays. This is referred to as a **perceptual signature**.

#### Skill 3: Visual search behaviour

Skilled performers are able to identify and distinguish pertinent visual cues and patterns due to the way in which game situations are searched visually and they are able to process contextual/situational information more effectively than unskilled players.

#### Skill 4: Knowledge of situational probabilities

Skilled players are able to assess and therefore judge situations and to action appropriate options more effectively than less skilled players. Investigation into this reveals that this is performed due to the ability of skilled players to extract key contextual information and to discriminate it from less relevant contextual information.

The research of Memmert (2006, p. 880) showed that “not only do movement skills need to be practised but that the cognitive, decision-making process underlying those skills require training ... (and) ... indicated that practicing cognitive and decision-making results in better performance”.

The same researcher found that skilled players with high attention scores performed better than skilled players with low attention scores (Memmert, 2011).

#### **Summary Hypothesis 14: Sport intelligent participants make effective decisions**

The proposition made in this section is that decision-making and anticipation are key dimensions in the theory of sport intelligence. Numerous studies have shown that players are constantly making decisions and that those decisions have material and direct impact on play. In reviewing the literature, short-term and working memory and perceptual-cognitive systems seem to play a central role in decision-making. Both processes contribute in the literature to understanding intelligence and should therefore be considered in the model of sport intelligence.

### **2.19 A conceptual model of sport intelligence**

#### **2.19.1 Background**

The existing literature initially defined sport intelligence as the search and detection of cues; the correct identification of actions, plays and behaviours; the utilisation of short- and long-term memory and recall, effective decision-making and possessing a baseline level of knowledge about the sports task (Fisher, 1984). Later research by Gould et al. (2002) identified themes with regard to sport intelligence including being analytical, a student of the sport, understanding the nature of elite sport and being a quick learner. The latter authors, however, called for more research into the relatively unexplored territory.

The current researcher has reviewed research data and literature available on mainstream intelligence theory and sport psychology. These have been considered, reviewed and reported on in sections two and three in this chapter. In order to consolidate the literature into a coherent model of sport intelligence within the South African context, the study firstly investigated the salient features of intelligence and sport psychology which appear to have high face validity. These were used to conceptualise the framework.

## **2.19.2 Proposed conceptual model of sport intelligence**

### **2.19.2.1 Rational, emotional and political domains**

As highlighted in Chapter 1, it is hypothesised that the framework for sport intelligence will comprise a rational/cognitive component on the one hand and an emotional/psychological component on the other. This was already elaborated on in sections one and two in this chapter.

The work of Sternberg (2011), Terenzini (1993) and Wagner (2011), however, introduced the concept of contextual intelligence which, for the current researcher, highlights the significance of the context/system that the rational/cognitive and emotional/psychological components finds themselves within. The same content provided input into the area where the aforementioned components ‘intersect’ and ‘overlap’. Some writers including Yudelowitz, Koch and Field (2002) and Dharma Partners (2002) have referred to the intersection of these as the ‘political’ domain. Being sport intelligent could therefore include this as well.

### **2.19.2.2. On-field/off-field: A systemic orientation**

Fisher (1984), Tennenbaum and Bar-Eli (1993) and Gould (2002) refer to understanding and having knowledge of the sport and the demands it places on elite sport participants both on field and off field while preparing, training and recuperating. The sections on learning, development, creativity, personality, memory, reasoning, mental strength skills, motivation, achievement and success in this chapter indicate that performance outcomes are in some way a function of the aforementioned inputs.

This suggests that a systems orientation can be adopted when studying the phenomenon of sport intelligence while practically it suggests that sport intelligence is not confined only to on-field/ game situations but applies also to off-field/ preparation situations. The critical point, therefore, argues that sport intelligence is not solely an individual endeavour but rather a systemic one and, therefore, offers an alternative view to the prevailing thinking that sport intelligence is an individual endeavour.

## **2.20 Proposed dimensions**

### **2.20.1 Hypothesis 1: Mental speed**

Sport participants process information throughout their sport preparation and sport participation. A key component of information processing is mental speed, specifically visual and perceptual speed. Sport intelligent participants are most probably able to process, act on and implement those relevant decisions quicker and more accurately than others.

### **2.20.2 Hypothesis 2: Working memory**

Sport intelligent participants are often able to retrieve information from short-and long-term memory quickly and effectively. Elite sport participants seem to be able to decipher what is relevant from past experience via memory stores and to apply that information more appropriately than other sport participants. The high positive correlation memory shares with factor 'g' as reported in section 2.4.1. makes this a credible proposition.

### **2.20.3 Hypothesis 3: Reasoning and problem solving**

Another cognitive process, namely reasoning and problem-solving, features prominently in the literature. Successful sport participants solve on-field and off-field problems more effectively than less effective sport participants. The literature indicates that skilled players seem to be able to focus on more significant aspects and patterns of play than others. They are able to direct their play, focus and energy where significant impact is made and ignore less significant plays.

#### **2.20.4 Hypothesis 4: Multiple intelligences**

It is put forward that sport intelligence is comprised of a number of intelligences, some of which could overlap. Gardner's (2006, pp. 30-31) theory of multiple intelligence was instructive when he states that "performance can involve a number of intelligences". It is hypothesised that bodily-kinaesthetic, spatial, inter- and intrapersonal, linguistic and logical-mathematical intelligence are recruited by elite sportsmen as are creative, analytical and contextual intelligence as forwarded by Sternberg (2011) and others. Emotional mastery, emotional control and emotional intelligence seem to play a significant role at all levels of sport participation and competition as well.

#### **2.20.5 Hypothesis 5: Successful intelligence**

Sternberg's (2011) work serves as a practical reminder of the significance of intelligence in reminding us that intelligence is essentially about achieving goals, using strengths and opportunities to do so, by remaining flexible and using the different components of analysis, creativity and practical intelligence. His theory emphasises wisdom which can be considered a mix of knowledge, experience, awareness and skills.

#### **2.20.6 Hypothesis 6: Emotional intelligence**

A significant portion of the literature review in this research study focused on the centrality of emotions and the impact they have on sport participants. The articles and texts suggest that the sport intelligent participant is able to identify helpful (and unhelpful) emotions and to correct them, and is thereafter able to utilise those emotions in a constructive way to enhance performance.

#### **2.20.7 Hypothesis 7: Intellectual curiosity as a component of personality**

Research on the Big 5 personality traits indicates that the facets of intuition, fantasy, creativity, aesthetics, intelligence and intellectual engagement form part of the openness/intellect dimension of the Big 5 of personality. This suggests that the sport intelligent participant enjoys and appreciates the intellectual and creative components of sport and this is consistent with what Gould et al. (2002) termed **being a student of the sport** and **being innovative**.

### **2.20.8 Hypothesis 8: Value of knowledge and experiences**

The literature review discussion outlined how intelligence, together with experience and knowledge hypothetically leads to enhanced performance. This proposition extends the key themes of **deliberate practice** and ongoing learning and application.

### **2.20.9 Hypothesis 9: Motivation**

Most, if not all, texts on sport psychology reviewed by the current researcher contain at least a chapter on the role of motivation in sport and it seems, therefore, a significant and widely researched topic. The literature indicates that a player will most probably not perform to their potential if not motivated to do so. The sport intelligent participant understands his/her motivational patterns and uses these optimally.

### **2.20.10 Hypothesis 10: Intelligence and creativity implies change**

The sport related literature refers to creativity and innovation and suggests that creative play is a result of deliberate practice of anticipated play. Creativity implies doing things differently which implies a readiness, capacity and capability to change. Change related skills may therefore be a component of sport intelligence and may include characteristics such as flexibility and adaptability.

### **2.20.11 Hypothesis 11: Learning and development**

Learning and development featured prominently in the literature review for the current research study. Various data and experiments indicate that intelligence can be improved by different means and this view can be traced back to the earliest incremental intelligence theorist, Alfred Binet. The sport intelligent participant, therefore, seems to be able to learn effectively.

### **2.20.12 Hypothesis 12: Mental skills, psychological strength and personality**

Much of the literature in sport psychology focused on various mental and psychological skills. These seem an eclectic mix of cognitive and emotional control skills and competencies. The sport intelligent participant seems to understand his or her needs and is able to utilise these appropriately in both on field and off field situations.

### **2.20.13 Hypothesis 13: Relationship competence**

The sport intelligent participant seems to get on well with others and with themselves. It is, therefore, hypothesised that they are able to understand their own personality characteristics, emotional make-up, motivational patterns and behavioural requirements and manage themselves effectively against this knowledge. They understand their own strengths, weaknesses and learning styles and are constantly seeking to improve these. They, therefore, have positive relationships with themselves. This competence seems to extend to relationships within their sphere of influence (Covey, 1989) and they, therefore, have positive, constructive relationships with team mates, coaches and other stakeholders.

### **2.20.14 Hypothesis 14: Effective decision-makers**

Research by Williams and Ward (2007) as illustrated in Figure 2.7 of this chapter indicated that elite sport participants spend almost 100% more time working on effective decision-making. Good decision-makers rely on certain skills, including pattern recall, advanced area utilisation, effective visual search behaviours and knowledge of situational probabilities. These will be explored in the current research study.

## **2.21 Summary**

This section has reviewed the available literature on sport intelligence, intelligence theory and sport psychology and has used this to propose a theoretical model of sport intelligence. The model has been outlined through a series of hypotheses which will be examined by conducting 15 in-depth interviews with respected sport participants, commentators, coaches and/or sport authors. Chapter 3 will outline the theoretical approach adopted for this current research study.

# **Chapter 3**

## **THEORETICAL ORIENTATION**

### **3.1 Introduction**

The current research is undertaken in response to a new concept that emerged when Gould et al. (2002) studied the psychological characteristics of Olympic champions. In this study they identified the concept of sport intelligence and noted general data responses in this regard; these included being a student of the sport, understanding elite sport and being a quick learner. The same authors called for ongoing research into the topic and as no such research findings are available in the local context, the researcher decided to amplify on the concept within the South African sporting environment with the aim of developing a detailed theory of sport intelligence.

The approach adopted by the researcher to achieve a scientifically sound and robust theoretical model of sport intelligence, was to assess academic theories from sport psychology and intelligence literature to form the basis of the endeavour towards a model of sport intelligence.

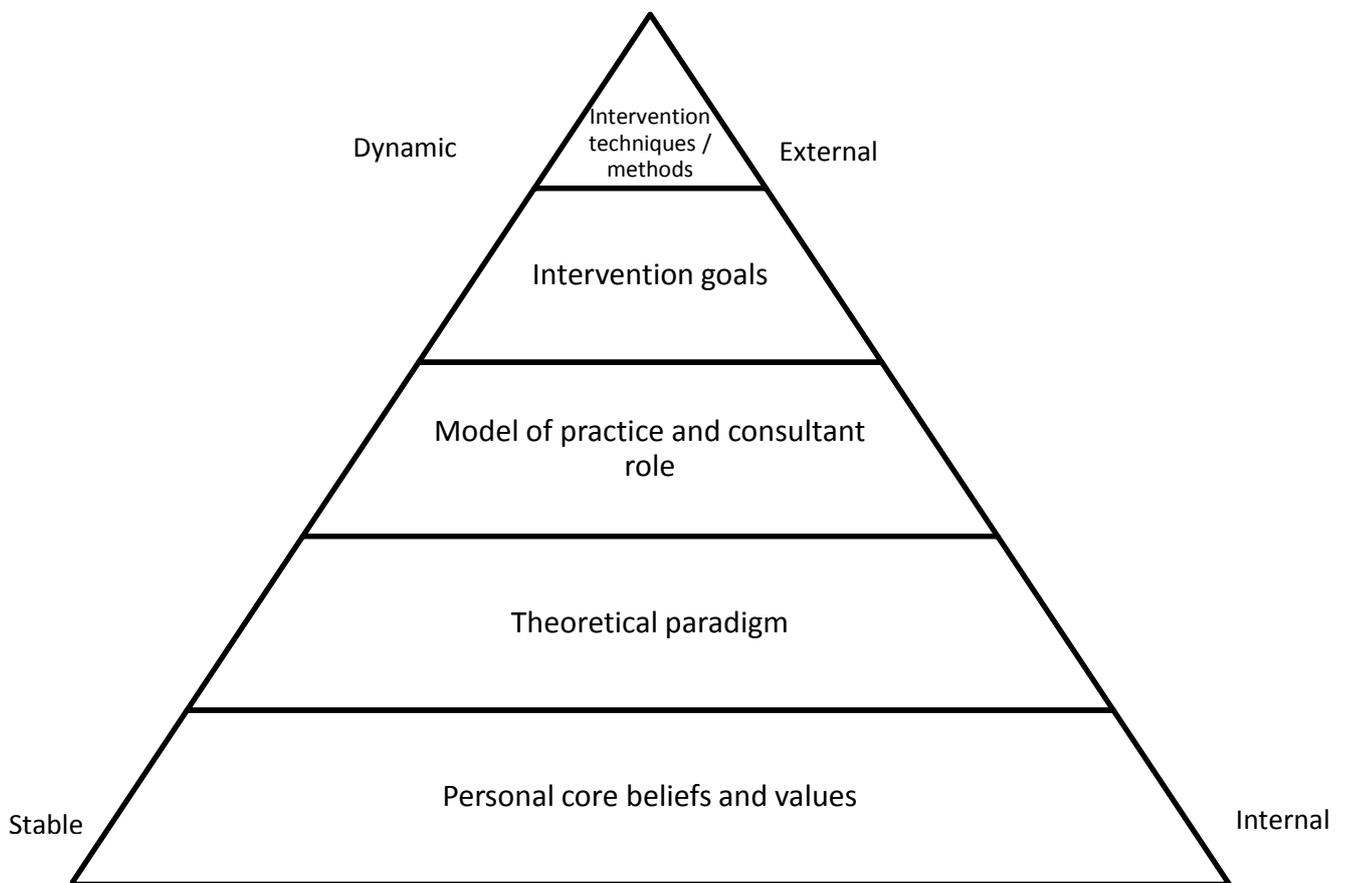
The theory needs to be rooted firmly within an appropriate philosophical framework and as sport psychology is in its infancy, coupled with limited available literature, it is necessary to make use of a systematic and organised approach to guide theory development and testing.

This chapter provides the philosophical framework that will guide the exploratory research. The first half of the chapter focuses on theoretical paradigms adopted by the researcher while the second part focuses on systems and psychological theories employed. These provide theoretical foundations and perspectives from which the sport intelligence theory will be discussed and critically assessed.

### **3.2 Practice philosophy**

As the current research study is an amalgam of sport psychology principles and intelligence theory, into a sport intelligence theory, the conceptual framework of

Poczwardowski, Sherman and Ravizza (cited in Tenenbaum & Eklund, 2007, p. 311) is used to guide the process. This conceptualisation is set out in the figure below.



**Figure 3.1** Professional philosophy in the sport psychology service delivery: Building on theory and practice (Tenenbaum & Ekland, 2007, p. 311)

As the field of sport psychology is influenced by the views and contributions of a number of practitioners from different educational and theoretical backgrounds, Stainback, Moncier III and Taylor (2007, p. 311) note, with regard to the above figure, that “although this conceptualisation is in its infancy, sport psychology has potential to positively shape examination of this important topic and implications for the advancement of education, training and practice in sport psychology”.

The crux of this is that it is hierarchical, with the “most stable and internal component (i.e. personal core beliefs and values) providing the base for progressively more dynamic and external components moving towards the apex ... (and that) ... the

components are interdependent ... (with) ... greater influence exerted by more fundamental levels” (Stainback, et al., 2007, p. 311).

This view suggests that the personal beliefs and values of a researcher need to be explored, noted and considered together with the theoretical paradigm before applicable models of practice, goals and interventions can be operationalised.

A portion of this chapter will therefore focus on the researcher’s beliefs and values and theoretical paradigms, which will collectively provide an outline of the influences and forces which have been instrumental in shaping the approach towards development of a theory of sport intelligence.

### **3.3 Researcher beliefs and worldviews**

This section highlights the researcher’s general theoretical and philosophical worldviews before considering them in the context of appropriate theoretical paradigms.

#### **3.3.1 Researcher background**

The researcher’s professional life is that of a ‘consultant psychologist’ where he works with social systems and organisations in effecting change and transformation, and typically uses qualitative, quantitative and mixed methods when facilitating interventions. His consulting and academic worldview is that:

- i. The social world can be made ‘sense’ of – this perspective is rooted in positivism;
- ii. The social world can be made sense of from a number of perspectives and theories – this implies a post-positivism approach;
- iii. Individual experiences need to be considered when making sense of reality – this is an interpretivist worldview;
- iv. Reality/truth cannot be achieved from a single scientific method – this suggests a pragmatic perspective; and
- v. Following these, a systems perspective is adopted when addressing problems, issues and challenges.

### 3.3.2 A phenomenological study

Phenomenology attempts to examine the experience or 'phenomenon' on its own and for its own sake. Phenomenology studies experience in isolation and does so independently of other criteria (Georgi cited in Kruger, 1984, p. 143). The nature and quality of the experience is central to phenomenology and little, if any, interpretation takes place. The phenomenological researcher "must develop a respect for the phenomena" (Husserl cited in Kruger, 1988, p. 143) and maintains an open stance when considering issues and dynamics.

The work of Husserl is pivotal in understanding phenomenology. He strongly argued that natural science was the only form of science and wanted philosophy to exist as a science on its own. His philosophy should, therefore, develop its own methods and processes which would be distinctly different to the natural sciences.

Phenomenology, as a philosophy and practice, therefore, strove for its own general laws and Husserl focused on consciousness as a key **intentional** construct (Snyman, 1993). This suggests that "being conscious means an intentional act through which man lets the world appear to him" (Kruger, 1984, p. 28). The phenomenon should, therefore, illustrate and speak for itself. If, for example, a tree is being examined, then the focus should be on the tree itself; only the tree needs to be assessed. Husserl (cited in Kruger, 1984, p. 29) refers to this as "Zuruch zu den Sachen" meaning "back to things as themselves". Consciousness is, therefore, not reduced to a set of atoms, not a scheme of predictable **behaviours**, neither a **cognition** but rather a process of "revealing ... an ordinary mode of presence".

The main aim of research is to provide an account of the experience followed by 'making sense of' or an explanation of the phenomena being considered. For this to take place, the researcher has to remain open, flexible and receptive to the emergent properties, content and meaning of the phenomena. As a consequence, phenomenological research involves little psychological interpretation, but rather adopts the stance that the world is constituted as a system of meanings. The phenomenologist argues that these meanings are constructed on dialogue with others. The process of finding meaning suggests a discovery and these meanings and process of discovery can lead to fuller life.

The current researcher adopted this approach by considering interviewee responses, and by coding them into meaning units that were listed as themes and sub-themes as content within each dimension. These were then synthesised into a general model of sport intelligence and considered from a systems perspective. A phenomenological investigation adopts a “transcendental attitude through a process of phenomenological reduction – a process of suspending or bracketing personal preconceptions and presuppositions by making them explicit,” notes Stones (cited in Kruger, 1984, p. 142). This transcendental attitude opens the investigator to the phenomena in their entirety without the influence of other scientific orientations. The phenomenological approach is, therefore, one of openness to the significant emergent properties and to quote Husserl (cited in Kruger, 1984) the investigator “may be described as obsessed by the concrete”. Through description and reflective awareness, psychological meaning is generated.

The current research will identify and describe themes and sub-themes generated from the interviews, compare and contrast these with the available literature and thereafter develop a conceptual model of sport intelligence.

### **3.4 Theoretical paradigms**

#### **3.4.1 Introduction**

Having introduced the researcher’s general beliefs, it is necessary to discuss worldviews and theoretical paradigms. Creswell (2009) defines these when saying “the term worldview as meaning ‘a basic set of beliefs that guide actions’ ” and goes on to point out that “others have called them paradigms, epistemologies and ontologies or broadly conceived research methodologies” (p. 6) while making the observation that “these worldviews are shaped by the discipline area of the student, the beliefs of advisors and faculty in a student’s area and past research experiences” (p. 6).

#### **3.4.2 Worldviews**

As the current research study is embarking on a new topic within the social and behavioural sciences, with limited theory and data available, it is important to make use of appropriate research paradigms. The next section outlines the paradigms used as theoretical foundations of research.

### **3.4.2.1 Positivist and post-positivist paradigms**

Positivists argue that a deterministic philosophy underpins science. It is, therefore, deterministic, rational and empirical. Positivism can be traced back to the original works of Francis Bacon (1561–1626) who developed a model for the social sciences that rejected the “deductivist model of scientific endeavour which has been the dominant tradition for nearly 2000 years” (Snyman, 1993, p. 2). Bacon was influenced by Aristotle, who originally responded to the deductive model where facts are made to fit in with pre-existing, prior ideas and theories.

Aristotle was interested in what the human psyche does and subsequently became interested in consciousness. For him consciousness arises through the “intercourse between the person and his environment” (Kruger, 1987, p. 22). It is through this intercourse that the ‘mind’ is conceived. Taking this further, Aristotle argued that “a life guided by intelligence is the best and most pleasant for man inasmuch as intelligence, above all else, is man” (Ostwald, 1962, p. 291) while he later goes on to say that “a man whose activity is guided by intelligence, who cultivates his intelligence and keeps it in the best condition, seems to be the most beloved by the gods” (Ostwald, 1962, p. 295). Aristotle was, in fact, suggesting that empirical phenomena and processes need to be examined and these should inform knowledge and understanding while Aristotle emphasised “the realm of determination and not the realm of freedom” (Berdyayev, n.d., p. 13) St Augustine took up the concept of freedom.

According to Kennedy (1995) St Augustine is the real founder of the study of the person”. St Augustine drew a marked distinction between the immortal religious soul and the mind as consciousness which was concerned with the temporary nature of man. This distinction was drawn so the man is able to become “conscious of this personal salvation and the fulfilling of his personal responsibility” (Jordaan & Jordaan, 1989, p. 7).

The emphasis he placed on the ‘will’ confirmed his thesis that, according to Kennedy (1995), “man is not only responsible for his actions but also for his evil habits”. While he viewed the ‘will’ as a deliberate action acted on by man, it was also ‘of’ man.

St Augustine explored man as a **being** existing in relation to others. Because of this relational component, behaviour could be observed, depicted, detailed for others and thereby for oneself. This in essence shows that man is able to become aware of himself just as he may be aware of others and so his writings introduced the concept of self-awareness. The St Augustine view of 'being' in relation to others could be considered the earliest **relationship psychology**.

Positivism, therefore:

- Argued that all scientific knowledge is based on empirical, testable and verifiable impressions;
- Suggested that the natural and social sciences should be studied and researched in the same way; and
- Human reason leads to advancement of social change and order (Snyman, 1993).

The qualitative method, therefore, finds its origins in positivism. Post-positivists build from this platform by arguing that positivism works from the assumption that research is influenced by a number of theories in addition to the current theory. Post-positivists argue that post-positivism is intuitive and holistic, inductive and exploratory with qualitative findings. The post-positivist, therefore, begins the research process with "theory, collects data that either supports or refutes the theory, and then makes necessary revisions before additional tests are made" (Creswell, 2009, p.7).

The key assumptions of the post-positivist traditions are, according to Phillips and Burbules (cited in Creswell, 2009) the following,

- Absolute knowledge can never be found. A hypothesis cannot be proved, only a failure to reject the hypothesis;
- Research is a process of making a claim and then refining or rejecting it;
- Data, evidence and rational considerations are included by the researcher;
- Research attempts to develop true statements at that moment in time;
- A description of causal relationships is evident in post-positivistic work; and
- Being objective is essential with reliability and validity important in quantitative research especially.

The current research is a qualitative, explorative study and will develop a theory of sport intelligence from a phenomenological perspective. A post-positive paradigm is better suited to quantitative research, but does provide useful and practical reminders for the qualitative researcher. The current research will adopt all six of the points above in its endeavour to develop a scientifically robust theory.

#### **3.4.2.2 Interpretivist/constructivist**

Philosophers have explored the idea of reality. Realists believe that objectivity is achieved through depending on facts and data that provide an unambiguous version of 'truth'. The opposite of this is relativism, which contends that the subjective nature of experience leads to personal interpretation. Objective reality is therefore impossible. A school championed by Kant and Hegel known as the **idealists**, contend that certain views and interpretations are inherited and later 'lived out' (Stacey, 2003).

Social constructionists offer an alternative which, according to Stacey (2003) can be summarised as "every explanation people put forward of any phenomenon is a socially constructed account, not a straightforward description of reality" (p. 78). This is in some ways similar to the relativists in that it renders objective enquiry difficult, as even the act of observation is a form of participation. Experience takes place, which in turn influences the interactions. Habermas (cited in Romm, 1995) considered this in his works and highlighted how facts and laws "can yield knowledge of a different kind ... (and) ... that the facts and laws discovered ... are not real entities but rather constructions made on the basis of a particular interest" (p. 181). Habermas contends that the narrow "technical" interest adopted by the realists is restrictive and favours the "practical" interest where people are able to understand others and to communicate with them.

The current research is significant in that social constructionism suggests models and frameworks adopted by the natural sciences cannot be applied rigidly to the social sciences and humanities. Relying only on facts and data results in inadequate explanations and responses. Individuals and societies are continually experiencing phenomena and interpreting those phenomena (Kruger, 1987). The current research builds on this and will consider individual experiences and responses to the theoretical hypotheses. These will contribute to the development of a model of sport intelligence.

### **3.4.2.3 Pragmatists**

Another paradigm adopted by theorists is pragmatism. A pragmatist uses “all approaches to understand the problem and is therefore not committed to any one system of philosophy or reality” (Mackenzie & Knipe, 2006, p. 4). Pragmatists are concerned with using ‘what works’ and ‘generally use mixed methods’ (Creswell, 2009). Pragmatists argue what is practical, useful and what can be implemented and used. They apply what is relevant to the situation and make use of selective theories, processes and methods. Pragmatists are interested in outcomes and practical applications.

A pragmatic angle will also be adopted by the current researcher during the research process when considering the practical application of the theory of sport intelligence.

## **3.5 Theories underpinning sport intelligence theory**

### **3.5.1 Introduction**

The theoretical assessments and literature review in this research study made use of material, theories and reviews from three sources:

- a) Theories on sport intelligence;
- b) Intelligence theories; and
- c) Sport psychology.

Each of these has offered general theories. It is, however, important to orientate the reader to the different schools of psychology that underpin these before outlining systems theory. Each component of the proposed model will be further assessed from a systems perspective in order to critically evaluate each component.

### **3.5.2 Cognitive psychology**

Theories which were elaborated on in the literature section indicated that much of it is rooted in cognitive processes. It is, therefore, important to outline the basic philosophies and concepts of cognitive psychology and how they may impact the current study.

Goldstein (2011, p. 3) defines cognitive psychology as “the branch of psychology concerned with the scientific study of the mind” while Tyson (1987) understands

cognitive psychology as “the division of psychology that is concerned with how people acquire information and how they subsequently process, store, retrieve and use it” (p. 370).

Cognitive theorists argue that “humans can best be characterised as information processing organisms ... (with) ... learning and storage in memory of what is learned ... (providing) ... the basis for thinking” (Ruch, 1984, p. 24).

The reference to ‘mind’ can be thought of and considered in a few ways. Goldstein (2011, p. 5) shows how the term ‘mind’ is used in day-to-day issues by providing a few examples:

1. “He was able to call to mind what he was doing on the day of the accident.” (The mind as involved in memory.)
2. “If you put your mind to it, I’m sure you can solve that math problem.” (The mind as problem-solver.)
3. “I haven’t made up my mind yet” or “I’m of two minds about this.” (The mind as used to make decisions or consider possibilities.)
4. “He is of sound mind and body” or “When he talks about his encounter with aliens, he sounds like he is out of his mind.” (A healthy mind being associated with normal functioning, a non-functioning mind with abnormal functioning.)
5. “A mind is a terrible thing to waste.” (The mind as valuable, something that should be used.)
6. “He has a beautiful mind.” (From Sylvia Nasar’s book *A Beautiful Mind*, about Nobel Prize winner John Nash, which was made into an Academy Award-winning movie starring Russell Crowe.)

The first three statements show that the ‘mind’ plays a role in memory, problem-solving and decision-making. It is, therefore, instrumented in perception, attention, memory, emotions, language, deciding, thinking and reasoning.

The fourth statement provides another definition, that “the mind is a system that creates representations of the world so that we can act within it to achieve our goals”

(Goldstein, 2011, p. 5). The latter definition indicates that the mind plays a pivotal role in achievement and performance.

The final two statements indicate that the mind is something to be used, perhaps exploited.

In a sporting context, cognitive psychology is relevant. Considering a simple example of a soccer player dribbling a ball during a match, the following cognitive processes are underway:

- **Perceives** his environment by noticing teammates and opposition players;
- **Pays attention** to the ball;
- **Remembers** what he did in a previous situation;
- **Recalls** what he practised beforehand;
- **Visualises** what the possibilities are;
- **Listens** to what his teammates are saying (and perhaps opposition sledging);
- Works to **solve the problem**;
- Makes a **decision**; and
- **Executes** a pass.

This simple example illustrates that at least nine cognitive processes are at play in the fairly uncomplicated task of passing a soccer ball. The nine mental processes are underway simultaneously and nine pieces of information, at the very least, are operating at one time during the innocuous dribbling and passing of a soccer ball. Cognitive psychology considers how information is processed in the mind, how information is taken in, stored, retrieved, filtered, modified and applied.

The current research hypothesises that key cognitive processes such as reasoning, learning, problem-solving, decision-making, memory, concentration, attention, knowledge, vocabulary and imagery are instrumental in the theory of sport intelligence.

From a paradigmatic and theoretical perspective, cognitive psychology is different from other psychological approaches in that:

- a) It makes use of the scientific method as a valid method of investigation; and

b) It rejects introspection (Princeton University, 2014).

These suggest that mental processes can be identified and understood and that these processes can be described in terms of rules in information processing models (Lu & Doshier, 2007).

### 3.5.3 Psychofortology

The researcher established 14 hypotheses which he believes would share a conceptual link with sport intelligence. They would, therefore, make a positive contribution to the model. This led the researcher to consider the contribution of positive psychology and psychofortology in particular.

The dominant pathogenic approach in psychology contributes to the social sciences, but is limited in its scope as its focus is on mental illness and vulnerabilities rather than on strengths and capabilities (Smith, 2007).

Stumpfer (cited in Coetzee & Cilliers, 2001) explains that psychofortology is a less orthodox approach to individuals and groups. It is rooted in positive psychology. Its title is derived from **fortology** (Latin *fortis*) meaning strong and Wissing and Van Eeden (cited in Guse, 2010) describe psychofortology as a psychology that focuses on ways to enhance psychological wellbeing and develop human capacity.

The origin of psychofortology was found in the work of Antonovsky (cited in Coetzee 2014), who asked how it was that some individuals, despite everyday stressors and series of traumatic events, are able to cope well while staying healthy. He began developing an alternative view to the common pathogenic school of thought through exploring the origin of health, *salutogenesis*. Stumpfer (cited in Coetzee & Cilliers 2001), argued that the paradigm needed to be more inclusive and holistic of the sources of strength and hence *fortigenisis* (the origin of strengths) was developed.

Wissing and Van Eeden (cited in Coetzee & Cilliers, 2001) argued that the focus should not only be on the origin of psychological strengths, but also the nature, dynamics and enhancement of psychological wellbeing. They proposed the term

**psychofortology** – the science of psychological strengths – be used for the domain of psychology in which psychological wellbeing is studied.

Bubb (2011) in her research “*Psychofortology of adults recovering from substance-use disorders*” further detailed that psychofortology comprises two domains: The first is **coping wellbeing** and the second **subjective wellbeing**. Coping wellbeing refers to the ability an individual has to manage themselves successfully through stressful events using coping resources and a sense of coherence, and this refers to the outlook/perspective one uses to successfully cope with complex stressors of everyday life. Subjective wellbeing, as defined by Diener (cited in Bubb, 2011) explains that it entails the person’s evaluation of his/her own life. Pavot and Diener (cited in Bubb, 2011) argue that the evaluation of one’s life is done against a unique set of criteria that are subjectively defined and rooted in overall satisfaction with life and emotional wellbeing.

Psychofortology not only works with psychological health or wellbeing but also explores the nature, manifestations, dynamics and enhancement of psychological wellbeing (Wissing & Van Eerden cited in Bubb, 2011).

Coetzee and Cilliers (2001) show that many constructs have been proposed to conceptualise aspects of psychological wellbeing. Stumpfer (cited in Coetzee & Cilliers, 2001) identified six processes that collectively describe the core of salutogenic and fortigenic functioning. These are:

- Sense of coherence – The self-belief that life and situations can be adequately managed;
- Locus of control – The belief that individuals believe that their behaviour has a direct impact on the events that follow;
- Self-efficacy – The belief an individual has that they can successfully perform the behaviour required for a specific task and that one can cope effectively in a broad range of situations;
- Hardiness – Comprises commitment, control and challenge.
- Potency – The self-belief or confidence that an individual has in one’s own abilities; and

- Learned resourcefulness – The skills an individual has to control their own behaviour (Coetzee & Cilliers, 2001, p. 62 – 67).

Psychofortology seems to possess a conceptual link with sport intelligence as it emphasises the theoretical attributes discussed in the literature review as well as interviews.

### **3.5.4 Systems theory**

Systems theory was developed in response to the need for workable ways of viewing individuals and acting within organisations, societies and community (Senge, 1990). The traditional approach to people, institutions and organisations has relied on mechanistic thinking. Also known as “rationalism” and “reductionism”, mechanistic thinking claims “that all objects and events, and their properties, can be understood in terms of ultimate events” (Flood & Jackson, 1991, p. 3).

Russel Ackoff (1993, pp. 3-6) shows how the emphasis is placed on analysis, cause-and-effect thinking and “everything is understandable” as key elements of this theory and holds the view that because most things are “like machines”, the environment, context and historical foundation is of little significance. Pre-determination is the essence of reality. People are subsequently viewed as “machines”.

The point is that mechanistic thinking is applied to individuals, groups and organisations even though they have been of limited effect and impact. This has led to a move from a ‘single individual’ psychology towards a psychology that recognises the impact of eco-systems, interactions and human experiences in the day-to-day functioning of people (Keeney & Spenkle, 1982).

#### **3.5.4.1 Advantages of systems thinking**

As society and the environment becomes more complex, the reductionist view of ‘cause-and-effect’ limits understanding of individuals and societies. Systems thinking offers an alternative approach that can be used to systematically organise “conceptions of the world” (Flood & Jackson, 1991, p. 5) in order to better make sense of individual, team and societal dynamics.

Peter Senge (1990) was one of the early exponents of systems thinking although the origins of the approach can be traced back to the 1940s and 1950s (Flood & Jackson, 1991, pp. 2-10). Senge emphasises the “interrelatedness and ways of making patterns of relationship clearer and the importance of feedback” (cited in Henry, 2002, p. 144). Senge (1990, p. 7) notes that “systems thinking is a conceptual framework, a body of knowledge and tools that has been developed ... to make the full patterns clearer”. These patterns highlight the terms of relatedness and connectivity within individuals and groups and are the fundamental principles of systems thinking.

Relatedness and connectivity are the opposite of mechanistic thinking. Senge, in his introduction to *The Fifth Discipline*, says that “the ideas presented in this book are for destroying the illusion that the world is created of separate, unrelated forces” (1990, p. 3). He argues that individuals, groups and organisations can best be understood if the **whole** – rather than the parts – are seen as primary. Chapter 8 in Senge’s seminal text, *The Fifth Discipline*, is titled *The Art of Seeing the Forest and the Trees* and provides an apt illustration of what systems thinking is. Mechanistic thinking would only notice the trees (the parts) while systems thinking considers **both** the parts and the whole. This distinction is critical if we are to appreciate what systems theory offers as a philosophy.

Flood and Jackson (1991) emphasise the importance of patterns and relationships with and between individuals and goes on to explain how relationships “form highly organised feedback loops” (p. 10). Feedback systems exist in relation to one another in a dynamic way and give rise to both intended and unintended consequences. These consequences are termed **emergent** properties.

Systems theorists examine emergent properties through what is termed ‘**synthesis**’. As the name suggests, synthesis is different to the detailed thinking of **analysis** and mechanistic thinking. Through synthesis the entire system is viewed – not only selected parts and pieces (Systems Thinking and Practice: Course Video, n.d.).

#### **3.5.4.2 Complexity and complex adaptive systems**

Reason (1999) argues that mechanistic, reductionistic thinking is limited in its application and fails to predict processes as it may have previously. He goes on to

argue that mechanistic thinking has limited potential growth and evolution by noting that logical, linear thinking is one way to see, live and act in the world but is not the **only** way. Complexity offers an alternative to the non-linear, mechanistic view of the world.

#### **3.5.4.3 Feedback**

Lorentz (cited in Reason, 1999), researching in the 1960s was one of the early thinkers and writers on complex adaptive systems and identified what was termed a **strange attractor**. This phenomenon stated that a very small change in initial conditions could lead to unintended consequences. This became known as the 'butterfly effect' and used the metaphor of a butterfly flapping in South America leading to a change in weather conditions elsewhere in the world. Hence, small disturbances (the effect of the butterfly) "can produce exponentially divergent behaviours" (Reason, 1999, p. 2). These views led to further research and by the mid-1980s, according to Prigogine and Stengeus (cited in Ortegon – Monroy, 1999), systems were found to be:

Continuously fluctuating ... as a result of positive feedback, these fluctuations may become so powerful that they shatter the pre-existing organisation, forcing the systems into far from equilibrium condition ... consequently the systems may disintegrate into irritability or threat to a new level of order or organisation: a dissipative structure. (p. 77)

Such findings led researchers to the contention that the behaviour of some non-linear complex systems could be classified into three domains, namely: stable, unstable and something which is located in between and the **edge of chaos** as it became known. Behaviour at the edge is "unpredictable but the general structure of behaviour is predictable" (Ortegon – Monroy, 1999, p. 77).

Other properties have been identified and better understood since. **Emergence** refers to spontaneous behaviour arising in a system that produces a new set of patterned behaviour as suggested earlier whilst **feedback loops** are inputs made into systems and processes which can be positive or negative (Ortegon – Monroy, 1999).

It is impossible and impractical to isolate and reduce properties to one-dimensional constructs when attempting to understand complex adaptive systems. As Casti (1994) notes “complexity is really more a property of the interaction between two systems than it is an intrinsic aspect of a system taken in isolation” (p.10). That is why it is important to examine and take note of the patterns within systems and to this end, it is required to “get outside of a system in order to really understand it (p. 17). This is, however, difficult in some cases, especially in the social sciences where the subject-object dichotomy makes it nearly impossible for, say a team captain, to view dynamics in his/her team in a totally objective way (Kruger, 1984).

#### **3.5.4.4 A relationship psychology**

The concept of ‘relationship’ is central to systems theory. Understanding complex systems needs an appreciation of the nature of relationships that exist between the system and its environment, and the consequent patterns of interaction and behaviours that emerge. These can, therefore, be considered a ‘relationship psychology’.

Relationships are fundamental to understanding individuals’ behaviour and provide valuable clues and insights into systems. Bossomaier and Green (1998) built on this by observing the links between people. Through this, they argue, one can begin to see what is important in that **particular system**.

### **3.6 Research method employed in the current research study**

A qualitative approach will be followed for the current investigation. This is because the investigation is of an exploratory nature and theory will be generated. Qualitative research acknowledges the experience of participants in understanding phenomena and explores a social or human issue or problem through compiling a complex, holistic picture. This approach makes use of tools and methods which capture such experiences and therefore utilises reports, interviews, observations, participant engagement, records and data sources (Creswell, 1998).

The data and findings from sources are not in number form nor are they easily converted to number formats. Researchers in this tradition are, therefore, concerned with how meaning is extracted and how those meanings are experienced, interpreted

and made sense of. Qualitative assessments focus on the subjective nature of the experience and usually employ cases, observations and experiences to construct theory (Creswell, 1998).

Qualitative research is different to quantitative research in that the latter examines analytical causal variables which are considered central to the quantitative research approach where the purpose of such an investigation is to determine the extent, quality and direction of phenomena. Inferences and conclusions are generally 'deducted' and this approach typically arrives at broad generalisations which either contribute or fail to contribute to the original models, frameworks or theories. The quantitative approach adopts an interpersonal style and uses factual information (Denzin & Lincoln, 1994).

Once the literature survey for the current study has been completed and hypotheses set, fifteen semi-structured interviews will be held with reputable subjects. Each interviewee will be asked to expand on the hypotheses and to share their personal experiences, observations and narratives. Interviewee content will be analysed via the deductive qualitative analysis which "begins with a preliminary theory ... (which) ... can be composed of loosely formulated hunches based on personal or professional experience, formal hypotheses or a set of that is a model of how things work" (Gilgun, 2010, p. 1).

Deductive qualitative analysis follows the analytic induction method which is associated with the renowned Chicago School of Sociology, which argues that research should "elaborate upon many ... ideas and add new ones" (Gilgun, 2010, p. 2). The research conducted will follow this principle.

The explorative nature of the research implies theory development. Whetten (2000) notes that theory development addresses Kant's criteria of 'systematic' understanding. This includes:

- i. Looking through the lens **and** looking at the lens;
- ii. Improving our theoretical lenses **using** logical, empirical and/or practical tests;
- iii. 'Unpacking' a theory by specifying its **key** components, propositions; and
- iv. Formal **models** and **propositions** facilitating detailed analysis of broad theoretical perspectives.

The current research study adheres to these criteria by utilising systems theory (point I above), by applying empirically sound theoretical paradigms and methods (point ii above), by examining existing theories (point iii above) and by hypothesising formal hypotheses which are consistent with available literature (point iv above).

In the following chapter the research design, working hypotheses, participants, data collection, data analysis, reliability and validity strategies and ethical considerations will be outlined.

# **Chapter 4**

## **RESEARCH METHODOLOGY**

### **4.1 Introduction**

The current research project aims to develop a model of sport intelligence within the South African context. Previous research into the concept of sport intelligence is scant and makes this, therefore, an exploratory study based on the available literature. Sport intelligence theory seems to consist primarily of a number of themes identified by Gould et al. (2002) and includes making good decisions, understanding the nature of sport, being innovative, being a student of the sport and being a quick learner. The current researcher has assessed relevant theory and research into intelligence and sport psychology and considered how these could build on the themes identified by Gould et al. (2002). These were detailed in Chapter 2 and integrated into a series of hypotheses that will be considered as foundational items in the model of sport intelligence.

This chapter outlines how the researcher is endeavouring to add to the available research and data on sport intelligence by outlining the research aim, approach, design sample, participants, instruments used, data collection process, interviews and analysis, strategies taken to help ensure reliability and validity as well ethical considerations.

### **4.2 Research design**

#### **4.2.1 Research aim**

The primary research aim is to develop a theoretical model of sport intelligence. Fourteen hypotheses were developed after a thorough literature review and then assessed via a semi-structured interview from a suitable sample. A subsequent deductive content analysis was conducted from a phenomenological perspective, which will reveal thematic data for consideration into the model of sport intelligence.

### **4.2.2 Approach**

As outlined in chapter 3, the current research study adopts a post-positivist perspective as this is common in the social sciences for practical and conceptual reasons.

Post-positivists argue that the background, knowledge and experiences of the researcher impact and influence what is being studied. For this reason the researcher's opinions and beliefs on each of the hypotheses will be included in the next section. The deductive approach is emphasised in post-positivism where a hypothesis is tested against data. This is the case in the current research study where a set of hypotheses have been tested by the researcher and participants.

In addition, the research study adopted an interpretivist stance, which relies on the participants' experience of the topic (Mackenzie & Knipe, 2006). To build reality, interpretivists utilise naturalistic procedures including text examination, observation and interviews. Interpretive methods are emphasised in research where theory is generated from research data. The proposed theory of sport intelligence will be generated from the fourteen hypotheses and participants' responses to these.

Furthermore, the research study also adopted a deductive approach. Through deductive analysis, fourteen hypotheses were formulated which provided an initial framework of sport intelligence to be explored during interviews and content analysis.

A deductive analysis provided the foundation for the theoretical model and served as a point of departure when establishing the initial fourteen hypotheses. Participants responded to and elaborated on each. Responses addressed the degree, extent and suitability of each while adding relevant content. This, in turn, led to an analysis where content was used to generate themes within each hypothesis. Transcripts were read three times by the researcher and coded through a thematic analysis. A number of themes and sub-themes were identified.

The data elicited was drawn from semi-structured qualitative interviews which were held with professional sport coaches, international players or award-winning

commentators and journalists. Each interview followed a similar format and was conducted from an interview protocol that contained 20 questions (See Appendix 1).

### **4.2.3 Advantages and disadvantages of the research design**

#### **4.2.3.1 Advantages**

The research is seeking to develop a detailed model and theory of sport intelligence which does not yet exist and aims to provide a framework and description of that theory. As it is an exploratory study, a qualitative, interpretative stance will be adopted. A qualitative approach defines the processes taking place and indicates how, over time, the nature of the processes contrast with one another (Breakwell et al., 1988). The approach adopted is theory generating, which is the organising of ideas in an inventive and thorough manner, which depicts a methodical view of phenomena.

The fact that a plausible theory may be formulated through the **research process** suggests that the “design typically evolves an emerging design that develops in the course of the study” (Pohl & Beck cited in Maritz & Visage, n.d., p. 5). The reasons for conducting qualitative research in support of the current study are as follows:

- An attempt to answer ‘how’ or ‘what’ research questions;
- A topic needs to be explored in order to present a detailed view of the topic;
- It involves a study of individuals in their natural context;
- The researcher has a preference for writing in a literary style and using him-/herself as the primary research instrument;
- Sufficient time and resources are available to spend on field work activities;
- Audiences are receptive to qualitative approaches; and
- The researcher can narrate the story from the insider perspective rather than an expert who passes judgement on participants.

Thematic analysis was used by the researcher as a primary tool when analysing the data provided by the research participants. As previously mentioned, the hypotheses were generated process after a thorough literature review was performed.

Brown and Clark (2006) argue that thematic analysis, due to its congruency with constructionist as well as essentialist concepts as well as its self-determination, has

the ability to deliver an intricate but comprehensive interpretation of data, making it an advantageous instrument in research.

Thematic analysis is therefore appropriate as it attempts to “both reflect reality and to unpick or unravel the surface of reality” (Brown & Clark, 2006, p. 9) while providing the ‘freedom’ to engage and develop an ‘emergent’ theory within the confines of scientifically valid methods.

Gilgun (2010) reminds the reader that science creates understanding through development of hypotheses. Hypotheses tested against observations, and reinvented under circumstances if not corresponding with observations.

Because the current research is exploratory and is theory generating, the advantages of a qualitative, thematic analysis are its flexibility and appropriateness for working within a participatory, explorative research design. A thematic analysis can summarise key features and offer a ‘rich description’, is able to generate unanticipated insights, and perhaps most important of all, allows for social as well as psychological interpretation of data.

#### **4.2.3.2 Disadvantages**

The main disadvantage of qualitative research is the risk of researcher bias, which may negatively influence the quality and outcome of the endeavour. According to Saunders, Lewis and Thornhill (2000) the chief disadvantage of qualitative research is bias, because the researcher may be compelled to incorporate his/her own views, which could result in interpretations being flawed.

Some of the advantages of qualitative, thematic research are also its disadvantages with the most obvious being that it is ‘broad’. Brown and Clark (2006) note that due to the flexibility of qualitative research it encompasses a variation of diagnostic possibilities which could result in a variety of different conclusions being drawn from a researcher’s data. This suggests that the findings of the research and the theoretical model may not be as specific and detailed as it would have been, had other research designs been employed.

#### **4.2.4 Hypotheses: Sport intelligence framework**

As mentioned earlier, the theoretical and literature assessment followed a deductive approach, which resulted in fourteen relevant and applicable hypotheses. The following aspects were, therefore, investigated during the interviews and include:

- Mental speed and information processing;
- Working memory;
- Problem solving and reasoning;
- Multiple intelligences including spatial and bodily kinaesthetic intelligence;
- Creative, analytical and practical/ contextual intelligence;
- Emotional intelligence and awareness;
- Curiosity and engagement;
- Knowledge and experience;
- Motivation and achievement;
- Creativity and change;
- Learning and development;
- Personality and mental strength;
- Relationship competence; and
- Effective decision making.

### **4.3 Participants**

#### **4.3.1 Sample and inclusion criteria**

The qualitative nature of the study depends on information-rich data. Participants, therefore, needed to have an in-depth understanding of the topic to deliver relevant and concise data. Four categories of research participants were identified to broaden perspectives regarding the theory of sport intelligence and included:

- Professional sport coaches, each with over ten years coaching experience at provincial or national level and who have been successful at winning trophies or leagues while being a professional coach. They were all registered with an appropriate coaching body.
- Players/ former players who have been professional sportsmen or sportswomen and have competed at provincial or international level for no less than three years. They have been recognised by their peers as being an expert in their discipline.

- A career commentator who has commentated over 300 first class / national and/or international sporting events and is recognised by peers as knowledgeable and informed in his field of sporting interest.
- A journalist who has worked as a sport journalist for over twenty years and published more than 500 articles, has reported on 4 Olympic games, Paralympic and Commonwealth games and is recognised by peers as a credible and reputable journalist who has twice won the prestigious South African Breweries Sports Writers Award.

Fifteen research participants were interviewed, of which twelve have international experience as a sport participant or coach, while two were well respected, award-winning journalists who had commentated for over twenty years. The remaining participant was a provincial sport coach. Of the fifteen research participants, seven had coached at international level.

The rationale for using research participants who had coaching experience at national and international level is because of the researcher's belief that coaches are in the best position to identify the components of the sport intelligence hypotheses. It is estimated that the coaches involved in this study have over 300 years' combined experience as coaches and over 200 years collective experience as sport participants at an international level.

The researcher decided to use a research sample of individuals which consisted of a mix of both team and individual sports. A short biography of each interviewee is set out in Table 4.1.

**TABLE 4.1** Research participant résumé at the time of interviewing

<b>Participant Code</b>	<b>Age</b>	<b>Biography</b>
JOURN1	54	Award winning sports commentator. Commentated on over 500 international and provincial rugby games.
SCR1	50	Soccer international. Coach and commentator. Over 500 professional games played in RSA and Great Britain.
MM1	28	All Africa Mixed Martial Arts champion. 2012 – current.
GLF1	81	Golf international; Pro Golfer; Coach and commentator. Over fifty years experience.
RGY1	27	Professional provincial rugby coach. Five years experience.
CRT1	33	International age group cricket coach and selector. Twelve years experience.
ADV1	31	International adventurer and “Seven Summit coach”. Ten years experience
CRT2	36	International cricketer, coach and commentator. Seventeen years experience.
CRT3	47	International cricket coach. Twenty-eight years experience.
JOURN2	46	Award winning journalist; over 500 articles published and reported on 4 Olympic games, Paralympic and Commonwealth games.
UDS1	52	International ultra-distance athlete and coach. Thirty-four years experience.
PBL1	28	World cup paintball winner. Nine years experience.
DCE1	25	World champion freestyle, Latin and ballroom dancer. Eight years experience
WPL1	26	International water polo player. Four years experience.
FCE1	31	Olympic fencer. Ten years experience.

The researcher made contact with the identified research participants through his social network, referrals and recommendations from other research participants. The

youngest research participant was 25 years old with the oldest being 81 years old. All fifteen are male and residents of South Africa.

The gender bias was due to the snowball method of getting interviews; in other words, one interviewee recommended another who then agreed to be interviewed. The researcher feels there might be scope for a future comparative study on sports intelligence in males and females.

### **4.3.2 Research instrument**

A research protocol was developed by the researcher based on the literature review. The protocol consisted of nineteen questions covering the ambit of the fourteen hypotheses with a final question requesting a referral to additional research subjects. Refer to Appendix 1 for a copy of the protocol.

### **4.3.3 Data collection**

#### **4.3.3.1 Interview format**

Fourteen face-to-face interviews were held over a six-month period in South Africa with one interview conducted via Skype. Interviews were held in commentary boxes, homes or offices of participants and conducted by the researcher. Interviews were scheduled telephonically, via text messaging or through e-mail.

The purpose, background and rationale of the study and interview was shared with each research participant a week before the interview. All interviews started by obtaining consent and participants were asked to review and sign an informed consent form, which is both ethically and methodologically the correct procedure.

The content of the consent form was read by the researcher and outlined the confidential nature of the interview, that they could withdraw at any time and were under no obligation to answer any of the questions asked. All participants agreed to this while giving consent to the recording of the interview for data capturing purposes as well as notes which would be taken by the interviewer and these may be used for research purposes. Consent was given by all research participants that interviews would be transcribed verbatim by an independent transcriber and that the data would only be used by the researcher for a doctoral degree at UNISA.

All interviews followed the same format starting with the participants sharing their understanding of what constitutes the phenomenon of sport intelligence. Questions in the protocol were stated with the research participants responding and the researcher probing where appropriate. The researcher would refer to current literature and research when building on or elaborating on a point or insight made.

Interviews closed off by the researcher asking the research participants whether anything else should be added or considered. Finally, research participants were asked if they knew of any other potential research participants who could be considered.

Interviews were conducted in English in a relaxed, free-flowing and engaged manner. Interviewees were encouraged to share thoughts and opinions as they occurred and reminded that there were no right or wrong answers.

Interviews for this current research study lasted for approximately two hours each, and were transcribed within a week of the interview.

#### **4.3.4 Data analysis**

##### **4.3.4.1 Strategies to ensure quality data: A qualitative study**

The current research is a qualitative study and is interested in the subjective experience of 15 interviewees, all of whom have competed at an elite level. The findings are recorded as themes from meaning units, which are used in the development of a theoretical model of sport intelligence. The findings are, therefore, used to construct a theory and build it up (Creswell, 2009).

Building on the construction theory, the current research is furthermore considered from a phenomenological perspective where the theory is described. Kruger (1989) shows that within phenomenological research “the researcher aims to describe as accurately as possible the phenomenon as it appears, rather than indulging in attempt to explain it within a pre-given framework” (p. 143). The research, therefore, acknowledges the phenomena as reported by interviewees rather than being completely and solely involved in rigorous scientific explanation.

Kruger (1989) argues that phenomenological research should adhere to five considerations for it to be considered rigorous.

- Phenomenological research is a process and includes a critical and exhaustive investigation but **not necessarily an experiment**. An experiment may be used in the process;
- **Meaning** is a paramount while measurement is not suitable;
- Meaning takes place with a **context** and cannot 'lend itself to reductive analysis';
- The researcher is not an independent observer but rather a **participant observer** bringing their own experiences and history into the research situation; and
- Traditional research argues that exact outcomes can be replicated and will recur, but within the phenomenological framework an essential theme is identified but is not necessarily an identical manifestation.

Schurink (2005) notes that "qualitative studies strive towards an understanding of people's meanings. Therefore, the emphasis falls on the internal validity (the production of accurate findings that agree with the subjects' life world) ... (and) ... there is a close link between reliability and replicability of a study" (p. 12).

#### **4.3.4.2 Validity**

The fact that the current research is developing a theory and that limited data exists on it elsewhere, meant that the issue of validation on input sources became apparent to the researcher. In other words, content validation needed to take place.

The researcher made use of guiding principles of Madison (as summarised in Heil, 2003, pp. 39-40). The theory:

- Needs to be consistent and coherent: **Coherence**: The researcher followed an appropriate research method in this regard, was supervised and assessed;
- Must take into account the author's thoughts as whole: **Comprehensiveness**: The researcher shared his experiences and opinions;
- Should bring out guiding intentions and not be superficial: **Penetration**: Hypotheses were generated from relevant literature;

- Has to be thorough in its description: **Thoroughness**: The literature and findings were considered in detail;
- Should be appropriate and relevant to daily practise: **Appropriateness**: The content generated was from relevant sources with a practical slant;
- Must not be considered out of context: **Contextuality**: Results were considered in the context of a theory of sport intelligence;
- Must say what it means to say and not imply something not directly stated: **Agreement**: Points made were clear and to the point;
- Can stimulate ongoing research: **Suggestiveness**: Recommendations and limitations were set out; and
- Needs to be extended: **Potential**: Future research was suggested as were practical application steps.

#### **4.3.4.2.1 Internal validity**

Validity refers to “whether or not... (research) ... explains what it claims to explain” (Breakwell et al., 1995, p. 57) and comprises internal and external validity. Internal validity refers to “whether the findings or results of the research relate to and are caused by the phenomena under investigation and not other unaccounted for influences” (Breakwell et al., 1995, p. 104).

Internal validity was ensured through verbatim transcripts being used as the source from which the data content was generated. In addition, the researcher’s notes from the interview protocol guide were used as a method to confirm data generated during the interviews. Reliability and replicability were ensured through consistency of practice from one case to another and the way in which the data was generated, maintained and analysed. Copies of transcripts, storage, coding and content analysis were maintained (Henning, Van Rensburg & Smit, 2004).

#### **4.3.4.2.2 External validity**

External validity is the extent to which results can be generalised and applied elsewhere. The findings can, therefore, be considered stable as interviewees were consistent in their support for the hypotheses. A key caveat, however, is that respondents were asked to comment and elaborate on these hypotheses but were not

asked if others could exist. It is, therefore, not known if others exist or whether or not other respondents would have generated the same responses. This will hamper the validity of the research which will also have affected the reliability of the study.

#### **4.3.4.3 Reliability**

According to Breakwell et al. (1998, p. 56) reliability refers to “the consistency or stability of any experimental effect ... the most common technique for establishing reliability is by replication”. As mentioned in the previous paragraph, this will have been affected and could, therefore, not have been guaranteed particularly in light of the constructivist/interpretivist approach taken by the researcher.

#### **4.4 Limitations**

The current research study relied on theoretical inputs from intelligence theory and sport psychology in order to develop a model of sport intelligence. Intelligence, by definition, was shown to be a complex, multifaceted phenomenon and contains both orthodox and contemporary views which some researchers may consider to be conceptual at best. The current research may, therefore, be limited by the lack of universal understanding of the term ‘intelligence’.

As sport psychology as a field for investigation is still in its infancy, many theories used by sport psychology are applied from general psychology and only provide a conceptual link to sport. The dearth of sound sport psychology theory is a similar limitation.

It is also necessary to mention that the current researcher is not a practising ‘sport psychologist’ but rather a registered psychologist (Industrial) with most of his experience in social systems within an organisational context. Although this is closely related to social systems and performance psychology, his experience and world views could serve as limitations in the overall interpretation of data, hypotheses and theory generation.

#### **4.5 Ethical considerations**

Proper ethical considerations have been maintained by the researcher complying with the *Guidelines for the minimum standards of ethical approval research* from The British

Psychological Society (2004), The Health Professions Guidelines and referring to the ethical standards in reputable academic texts including Creswell (2009).

In order to adhere to requirements beyond the borders of the Republic of South Africa, the British Psychological Society Guidelines for minimum standard of ethical approval research was referred to and used while the researcher also made constant reference to the work of Creswell (2009). This meant that items such as ethical issues during data collection, such as those included on the consent form, were elaborated on at the start of each interview, and were read and signed by the interviewees in order to properly orientate participants (See Appendix 1).

The anonymity of participants was guaranteed as they were never referred to by name while transcripts and recordings were kept in safekeeping at the home of the researcher. The only persons who had access to the data were the researcher and the co-researcher, who assisted in transcribing of data. Peer reviews excluded participant details and was completed by a registered psychometrist (Creswell, 2009, pp. 87-93).

#### **4.6 Conclusion**

This chapter has outlined the research methodology used by the researcher in the formulation of a plausible theory of sport intelligence. The research aims, approach, instruments, participants, data collection and analysis methods were outlined while confirming that both inductive and deductive methods will be utilised within the confines of a qualitative study.

It was pointed out that the interview data was analysed using a thematic analysis which provided content to each of the hypotheses. The advantages and disadvantages of both the qualitative and thematic analysis was discussed together mitigation items, as were the limitations and ethical considerations employed by the researcher.

# Chapter 5

## RESULTS

### 5.1 Introduction

This chapter outlines data from the research interviews and starts off by reminding the reader of the outcome of the deductive assessment before presenting results of the content analysis. The latter will show that 73 meaning units were generated from the initial 14 hypotheses, which fell by one to 13 hypotheses with intellectual curiosity later considered to be part of the learning hypothesis.

The remainder of the chapter outlines a working definition of the theory of sport intelligence which will be proposed in addition to a theoretical model of sport intelligence. The proposed model of sport intelligence is set out as a system comprising six sub-systems. Each sub-system discussion closes off with a synthesis from a systemic and cognitive perspective.

### 5.2 Results of deductive, theoretical assessment

The first phase of data collection was completed through a literature and theoretical review through which 14 working hypotheses were identified. The reader is reminded of the hypotheses:

- Mental speed and information processing;
- Working memory;
- Problem solving and reasoning;
- Multiple intelligences including spatial and bodily kinaesthetic intelligence;
- Successful intelligence including creative, analytical and practical/contextual intelligence;
- Emotional control and awareness;
- Curiosity and personality;
- Knowledge and experience;
- Motivation;
- Creativity;
- Learning and development;

- Mental skills and strength;
- Relationship competence; and
- Effective decision making.

Each hypothesis was considered and elaborated on during the second phase of data collection through semi-structured interviews conducted with reputable coaches, commentators and journalists from South Africa.

### **5.3 Results of the content analysis**

#### **5.3.1 Definition of sport intelligence**

As this is an exploratory study and little research data is available on sport intelligence, coupled with definitional complexity as outlined in previous chapters, the current researcher decided to start each interview by asking respondents what they considered as 'sport intelligence'. This was done to provide initial content, as none was available from a South African perspective. All data and theory had been generated elsewhere, mostly in the United States of America, and where it did exist, was from a golf-specific perspective.

The table below outlines findings generated from a content analysis of responses to the first question (See Appendix 1). Each finding will be discussed and elaborated on.

**TABLE 5.1** Sport intelligence definitions

Number	Theme	Content / Sub-themes	Total sub-themes
1	Handle pressure	Play-as-planned; expectations; positive / negative effects; success management	4
2	Body management	Balance; internal messaging; use of resources; skill optimisation; feel / movement; nutrition; supplements; fatigue	8
3	Team effectiveness	Getting on with others; relationship builder; self-management in different environments	3
4	Performance orientation	Highest standards; success management; achievement oriented; competitive	4
5	Decision making	Knowledge of game and nature of elite sport; deep understanding of technical aspects of game; game awareness; in the moment	4
6	Ability to learn	Learn from mistakes; execute plans; keep up with trends; apply learning	4
7	Situation awareness	Understand context of game; ability to react to events; exercise good judgement	3
8	Focus	Not distracted; able to concentrate for periods; 'live the life'	3
n = 8			n = 33

\*Note: In no order

### 5.3.1.1 Handling pressure

Being able to perform effectively under pressure was mentioned by all interviewees as a key feature of sport intelligence. Pressure is exerted on players from themselves, coaches, team-mates, spectators, fans, opposition, media and family members. SCR1 made the point that “if you can teach players this at 14 then you will create great sportsmen”. He elaborated by using an example of the Argentine soccer player Lionel Messi, who has been taught to make the right plays from an early age while under pressure and as a consequence is able to do so as a professional footballer.

The negative effects of pressure may result in over-arousal, hyper-anxiety and nervousness which can be overwhelming with outcomes including lower than optimal performances. Other negative aspects of pressure are that sport participants become overwhelmed and “simply forget what had been practised and drilled previously” as CRT1 noted.

Some sport participants, however, benefit from increased pressure, which is generally referred to as **Big Match Temperament (BMT)**. JOURN2 elaborated on how pressure impacts sport participants when saying:

Some of the problem is inability to shut out a situation and then play to the situation... (It) ...changes your natural game and also subverts all your learning, all the stuff you know and all the stuff you have practised. Dealing with pressure is the biggest thing at the top level.

An interesting comment was made by CRT1 on Big Match Temperament, saying that “BMT is usually seen from guys when their side starts losing and those are the players that stand up and are accountable. Those are the ones that can assess situations and change them.”

Interviewees who themselves had played elite sport at the highest level and were professionals noted that each successful performance (such as tournament victory or trophies won) put the sport participant under additional pressure to succeed again. The **‘success syndrome’** therefore has side effects. Ongoing success demands more of the same.

### **5.3.1.2 Body management**

The use of one’s body is at the heart of athletic endeavours and is the instrument used for execution. Interviewees noted that sport intelligent participants are aware of their body, its requirements and make the point that their body needs to be properly cared for and maintained.

Knowledge of **nutrition, diet and supplementation** is a necessity while also having the ability to **‘listen’ to their body** as an effective way to manage fatigue, over-training, excessive competition and exhaustion. The point was made that finding **balance** to properly manage oneself is a key attribute of sport intelligence.

Sport intelligent participants have effective ‘internal messaging systems’ and, more importantly, understand the importance of acting on these internal messages, such as

when to speed things up, when to be more intense or when to slow down, recuperate or rejuvenate.

Gardner (2006), referred to elsewhere in this research where he forwards a theory of multiple intelligence, identified bodily-kinaesthetic intelligence as one of the intelligences in his theory and this was confirmed by the current research study when referring to the use of specific **body movements** to execute plays. Skills demonstration was therefore considered part of body management.

CRT3, with considerable international coaching experience, said that: “One of the interesting things about sport is the people you are working with, the way they are wired, the way they work with their bodies. They are so kinaesthetic that they operate with the body and feeling and a lot of the time, the capacity to think strategically and tactically needs to be taught”.

Some interviewees defined sport intelligence as having a natural **‘feel’** for their chosen sport or sports in general and used examples which indicate an innate ability for sport. They pointed out that many elite sport participants were competent at sports from an early age and more often than not, skilled in a wide range of sports. Many examples were cited in support of this view.

### **5.3.1.3 Team effectiveness**

Being a competent team-mate was mentioned as a core component of sport intelligence. **Getting on with others**, contributing to overall **team processes** and **positive relationships** featured strongly throughout interviews. It was noted that being a ‘good’ team-mate did not imply deep friendships, but rather mutual respect and trust. RGY1 went on to say that “team-mates don’t need to be big buddies with one another, just as long as they are working towards achieving team goals, then all is fine”.

Effective **relationship building** and maintenance seems to be an important dimension of sport intelligence. Getting on with coaches, team-mates and administrators featured prominently in the interviews and, therefore, it seems that having good interpersonal skills is a significant characteristic of the sport intelligent participant. This theme seems

similar to what Gardner (2006) defined as interpersonal intelligence in his theory of multiple intelligences.

An especially interesting phenomenon emerged from the interviews when coaches mentioned how team dynamics and effectiveness are altered on sport tours and that some sport participants have difficulty in **unfamiliar environments** while some battle with homesickness. CRT1, CRT3 and JOURN1 referred to the case of Marcus Trescothick, an international cricketer, who battled with depression that was exacerbated when touring.

The sport intelligent participant seems to be able to tour effectively and enjoys new and diverse environments with different conditions in which they challenge themselves while maintaining constructive relationships. They are able to cope and manage themselves within a team context regardless of whether on tour, playing at home or at neutral venues.

#### **5.3.1.4 Performance orientation**

Not surprisingly, all interviewees emphasised the performance orientation of competitive sport participants, which was expressed in different ways. Some interviewees emphasised the fact that many sport participants enjoy competition for its own sake. They enjoy the **process** of executing their skills against competitors or against a set of standards such as a time or course record. Other sport participants saw competition as an opportunity to apply learning.

Some respondents used the term **success** when defining sport intelligence saying that sport intelligence entails being successful on and off the sports field. Success was, therefore, not only viewed as 'game' success but was extended to training, preparation, competitive occasions and lifestyle in general.

An additional theme that emerged was knowledge about what the **highest standards** are in their specific discipline and to work towards achieving – and exceeding – those standards set by competitors or previous sport participants.

Interviewees elaborated on the **winning/losing** continuum within the performance dimension, having winning on one end and losing on the other. Interviewees spoke about one or the other; the way in which competitive sport participants enjoy winning, going to any lengths to do so, working compulsively to win and gaining satisfaction from victory.

The other side is that of losing. Interview data suggests that players perform due to the discomfort losing brings with it. The thought of being beaten on the sport field drives and motivates this category of sport participants.

**Managing success** and achievement was a theme identified within the performance orientation category as well but with a different nuance. Success and achievement often drives players to test new standards, '**push boundaries**' and to try and perform at higher levels.

#### **5.3.1.5 Decision making**

All respondents referred to decision-making in the course of the interviews, which was then clustered into five sub-themes. **Knowledge** of the game, its **rules, regulations, history, trends** and **technical aspects** were considered foundational elements of decision-making in sport. The sport intelligent participant, therefore, spends time and resources understanding how their game originated, its fundamental principles, laws, how performance is achieved and they keep up with current trends, as these all aid decision-making.

Related to the nature and rules of the sport are principles of **elite sport**. Sport at the highest level – as this research indicates – is rather complex and requires a mix of talent, hard work and resilience. It also relies on emotional agility, multiple and successful intelligences, knowledge and insight in order to perform.

#### **5.3.1.6 Learning orientation**

CRT3 argued that sport intelligence was solely about learning and “little else”. The capacity to learn, an interest in learning, curiosity and appreciating that learning is a lifelong process, were emphasised as factors contributing to sport intelligence.

**Mistakes** were identified as a sub-theme and it was noted that mistakes offered learning opportunities with one respondent noting that “he who makes the least mistakes, will win”. GLF1 said that: “The greats are able to rationalise their mistakes” and used an example from golf:

The really top guys, they will fire away that it wasn't a good line, that's why the ball skewed, it wasn't their fault. Somehow they have got this ability to say no well, the green bumped the ball off line, it wasn't because they hit it off line, whereas the ordinary guy is also fairly quick to blame himself; where with the champion, it is never his fault. Not in a nasty way. They train themselves to think. They can rationalise it and make sense of their mistakes.

During the course of this study, the researcher listened to a radio interview with Lewis Hamilton, a current Formula One driver, who reinforced this when saying: “I win when I make no mistakes.”

The sport intelligent participant understands the importance of **continual improvement** and that ‘enough is never enough’. They keep up with scientific findings and trends and improve their technical knowledge base. Insights and innovations are generated through this ongoing, iterative process.

#### **5.3.1.7 Situational awareness**

Interviewees elaborated on situational and game awareness. Being able to ‘read’ the **game situation**, to understand what is needed and to then execute properly emerged as a sub-theme of respondents’ initial definition of sport intelligence. The sport intelligent participant, therefore, has insight into game status, is able to assimilate and comprehend the ‘as-is’ (current state) and knows both the ‘to-be’ (desired state) and what is needed to achieve a satisfactory outcome. The sport intelligent participant is, in this sense, flexible and adaptable and can perform in a disciplined way, perhaps having to “leave instinct behind” as JOURN2 stated.

Two related items, namely game analysis and synthesis, were identified during the data analysis. By game **analysis**, interviewees referred to the systematic assessment

of competitor and own game plays and the ability to break this into its constituent parts. From those assessments, observations are made and following this, predictions are made on how opposition players/competitors tend to compete and behave. Game analysis is usually performed by watching live or recorded performances of opposition or oneself during competition or practice sessions.

Game **synthesis** is the opposite of analysis and involves the systematic 'piecing together' of the analytical process into a coherent, holistic, systemic comprehension and understanding. Synthesis, in a sporting sense, involves generalisations from the specific detail of analysis and which allows sport intelligence participants to make predictions based on trends. Sport intelligent participants will observe general game philosophies and styles from game synthesis and plan future participation from this.

CRT2 started his interview in this regard by stating that "sport intelligence is about how someone reads situations" while PBL1 said that "somebody who lacks sport intelligence is someone who cannot read a situation".

Sport intelligent participants are able to execute their skills in the **moment**. CRT1 made the observation that "what we find is, in the moment when we create some tension, or a little bit of pressure, the wheels tend to come off". The ability to perform under pressure as a characteristic of sport intelligence featured again in this instance.

#### **5.3.1.8 Focus**

Research by Gould et al. (2002) referred to **distractibility** as a key personality attribute of Olympic champions and this dimension was confirmed in the current research study. Interviewees emphasised 'on-field' focus and 'off-field' distractions with CRT2 and DCE1 referring to the film *For the Love of the Game*, to illustrate focus in which the lead actor refers to a 'clearing mechanism': "He is a baseball pitcher... (who) ...says, 'clear your mind" which is basically freeing his mind of everything that's there now and trusts instinct and what has been taught".

The sport intelligent participant stays focused whether on or off-field and is not distracted by issues, events and distractions, especially at key times of the season.

These sport intelligent participants 'periodise' the year into phases which would typically cover pre-season, in season, post-season and off-season activities.

It is evident that being able to **concentrate** on key play and game features for differing periods of time is significant. The ability to concentrate was referred to and was done so in the context of game time, preparations and training. CRT1 mentioned that if players "train poorly then they will perform poorly" during this section of the analysis.

### **5.3.2 Summary**

Eight themes were identified in response to the opening question of "What is sport intelligence?". These themes ranged from bio-physiological themes (body management) to rational, cognitive (decision-making, learning, focus and situation awareness) to emotional processes (handling pressure), working with others (team effectiveness) and a values perspective (performance orientation). These will be compared to current theories later in this chapter and applied in the definition and model of sport intelligence.

### **5.4 Content analysis**

Each research hypothesis was considered and elaborated on during interviews. Interestingly, all interviewees agreed with the hypotheses with only the curiosity hypothesis being considered a sub-theme of the hypothesis on learning (hypothesis 11). These hypotheses were positively accepted and considered strengths, the psychology of strengths was considered as a paradigm when assessment took place, and a psychofortology perspective was, therefore, adopted.

The consolidated content from each hypothesis is presented in Table 5.2 and outlines themes generated.

**TABLE 5.2** Hypotheses and sub-themes

Hypothesis Number	Hypothesis category	Number of themes	Themes
1	Mental speed and information processing	8	Reaction time, principles, clarity, process awareness, psychological preparation, competition awareness, physical preparation, practice
2	Working memory	8	Game data processing, competition awareness, game analysis, experience, control, recall, response management, knowledge recall
3	Problem solving and reasoning	8	Expectations, standards, focus, game discipline, preparation, success, instinct, pressure
4	Multiple intelligence	5	Comfort, competition, team effectiveness, execution, perspective
5	Successful intelligence	8	Teamwork, resources, relationship pressure, success, sacrifice, arousal, influences, hype
6	Emotional intelligence	4	Psychological stability, understanding self, regulation, expression
7	Curiosity, engagement	0	Learning
8	Knowledge, experience	5	Understanding, mistakes, boundaries, confidence, inputs
9	Motivation	5	Challenge, inspire, demonstration, perspective, resilient
10	Creativity	5	Strategic, adaptability, controlled imagination, preparation, execution
11	Learning	7	Mind-set, continual improvement, assimilation, flexibility, discipline, style, self-teaching
12	Personality and mental makeup	3	Self-awareness, pressure, integrity
13	Relationship competence	4	Communications, team dynamics, habits, intangibles
14	Effective decisions	3	Judgement, insight, trust
Total		N = 73	

**Note:**  Later included under learning hypothesis

In the following section the findings will be outlined and discussed before a detailed framework discussion is conducted in the second part of the current chapter when the theoretical model of sport intelligence is tabled.

#### 5.4.1 Hypothesis 1: Mental speed and information processing

Eight themes were identified during the assessment of the hypothesis of mental speed and information processing as an aspect of sport intelligence. Sport participants with high sport intelligence observe, process and act on relevant game data and are able to filter out and ignore irrelevant data. Effective sport participants do so quickly and effectively.

**TABLE 5.3** Mental speed – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Reaction time	Fast reaction time, dexterity, eye hand co-ordination	3
Principle adherence	Game principles and values, on and off field	2
Clarity	Tactics, who, when, why, what, how, where	7
Process awareness	Situation assessment, environmental scan, consequences, evaluation, execution, act, review	7
Psychological preparation	Solution focus, self-understanding, challenge, positive	4
Competition intelligence	Opposition analysis, key player prediction, visual cues, body language	4
Physical preparation	Fitness, preparation, conditioning, injuries	4
Practice	Periodisation, commitment	2
<b>n = 8</b>		<b>n = 33</b>

Having **fast reactions**, excellent eye-hand co-ordination for ball sports especially, and dexterity were noted by the researcher as being basic fundamental factors. The sport participant’s ability to process information was mentioned as being significant for sport intelligence, but when probed in greater detail, interviewees considered information processing as akin to how sport participants should go about **solving problems** during play execution.

A common theme was adherence to the **principles of the particular sport** which, typically, would have been developed by coaches and sport participants in line with an

overall game philosophy. Game principles were sometimes considered as sport participants' 'values' or responsibilities by interviewees and would, therefore, be applicable to both on- and off-field behaviours. CRT1 emphasised this when saying that "mapping out responsibilities, behaviours and contexts with regard to being in a team is very important".

**Clarity** of sport participation principles, strategies and tactics, roles and responsibilities was a theme mentioned by sport coaches in particular. Sport participants and coaches need to be clear on what is needed to be done, by whom, why, how and when. There should be no ambiguity amongst players and non-players as to their role and contribution to success in their sport and the **formula for success** is clear, well understood and articulated in simple, concise messages. Plays and tactics are established through **scenarios** which are made succinct to players and deliberately practised and rehearsed beforehand. The sport intelligent participant has, therefore, rehearsed plays ahead of competitive play.

The sport intelligence participant has **process awareness** through ongoing situation assessment, environmental scanning, risk assessments and consequence evaluation. CRT2 said: "The really good players are always assessing the situation, scanning the game and understanding the consequences of their actions." Self or peer reviews also featured, where sport participants provide themselves with accurate feedback on performance.

Interestingly, the respondents highlighted that effective processing had its roots in **psychological and physical preparation**, with the latter including **fitness, conditioning, practice, game preparation** and **injury** prevention and the former including remaining solution-focused, self-understanding and staying positive. These characteristics featured in other hypotheses as well, but emerged as a theme in the analysis of content of this hypothesis.

**Competitor intelligence** was an additional theme identified and included competitor analysis, key play and player prediction, watching visual cues and body language of the opposition. CRT2 noted: "We teach players to take in visual cues, to see what's unfolding, to learn to anticipate what's going to happen, remain visually oriented and

to act on it.” These findings are consistent with literature findings reported elsewhere in this study.

The final theme of **practice** is also reported in other hypotheses in this study but its sub-themes are different and were identified in this hypothesis as well. Interviewees made the point that the sport intelligent participant ‘periodised’ information processing. This is related to ‘periodisation theory’, which proposes that different degrees of information are focused on at different times of the year, which suggests that detail may be worked on at peak season, new skills in off-season and strength during post-season, for example.

#### 5.4.2 Hypothesis 2: Working memory

It is hypothesised that an effective working memory will enhance performance if previous game and preparation data is retrieved, acted on and applied in the present situation.

**TABLE 5.4** Working memory – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Game data processing	Observations of self, competitors and team-mates, previous experience matching, sports knowledge	5
Competitor awareness	Key player tactics, key plays	2
Game analysis	Components, detail, specificity, deconstruction, meticulousness, thoroughness	6
Exposure	Related exposures from other sports	1
Control	Self, opposition, team, game	4
Response management	Behaviours, emotions, self, others	4
Knowledge	Improving literacy	1
Recall	Pre-game planning, previous games, event recall	3
<b>n = 8</b>		<b>n = 26</b>

Research respondents were unanimous in supporting the question posed by the researcher when quoting that “sport intelligent people have superb memories. Yes, no or irrelevant?” (See Appendix 1, question 11).

The theme of **recall** is central in working memory and includes being able to recall pre-game plans, previous events or historical game performances. JOURN1 noted that good players have “brilliant memories” while CRT1 suggested that “players have to know what to remember, what happened previously, what was analysed and what needs to be executed”. SCR1 confirmed this by saying that “sports people have superb memories. It’s needed for player recall, plays, tactics, moves and competition dynamics”.

Interviewees argued that **improving sport specific knowledge** increases game literacy, which can be retrieved and applied, and leads to enhanced recall and positively influenced performance.

Not only was the rational recall of events, tactics and plays mentioned but also **emotional reactions**. It seems that recall of both emotional reactions and behavioural responses can act as cues and reminders with the sport intelligent player being able to recall the reactions and responses of competitors. These would then be considered during competitor analysis, game synthesis and during competition.

In addition, **competitor analysis** and reviews highlight game tactics, key player movements, skills, strengths, weaknesses and limitations. These need to be recalled and employed as the situation demands.

Actual **game data processing** of events and processes ‘in the moment’ and as they unfold also need to be observed by the sport intelligent participant. Observations of oneself, competitors and team-mates should be integrated with pre-game preparations, situational assessments and experience matching and then executed in a ‘systemic manner’. This occurs in ‘real time’ during competition. SCR1 argued that you need to have “capacity to keep going on, keep on processing without overload and think as well and without that overload of confusing your decision-making, confusing your belief and making you frightened”. He went on to say that: “The one who achieves sporting success and therefore has sporting intelligence is the one who, in the last five minutes, analyses and asks ‘where are they most tiring quickly? I’ve just seen the left full back cramping up, let’s swing our entire attack against him because

that would be our breakthrough in the last five minutes. It is that ability to think clinically, clearly, strategically, under immense pressure”.

**Control** also featured as a theme when considering the contribution of memory in sport intelligence. Being able to retrieve relevant information and apply it allows the sport intelligent participant to control and manage games rather than the other way around. Control was referred to as control of self, opposition and team-mates.

A final sub-theme of **exposure** to similar situations and related disciplines was highlighted in developmental terms as it seems that it would improve recall and probably also performance in a positive manner.

### 5.4.3 Hypothesis 3: Problem solving and reasoning

Both individual and team sport provides challenges and can be seen as issues which need to be solved by reasoning processes. The sport intelligent participant is aware of reasoning and problem solving processes and employs rehearsed tactics. This takes place before, during and after practice, preparation and competition.

**TABLE 5.5** Problem solving and reasoning – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Handling pressure	Systemic pressure, opposition, execution management	3
Managing expectations	Systemic pressures	1
Standards	Successful and unsuccessful standards	2
Focus	Moment, staleness, not distracted, fatigue, concentration, winning / losing	6
Discipline	Fundamentals	1
Instinct	Gut feel	1
Preparation	Before – during – after, training plans, energy management, conditioning	4
Success	During and after competition	2
n = 8		n = 21

#### 5.4.3.1 Handling pressure

All research respondents in the course of the interview referred to a sport participant’s ability to handle pressure and many considered it when defining sport intelligence in

the first instance. Sub-themes that emerged in this regard included **'systemic' pressure**, pressure from **opposition** players and pressure when executing.

**Systemic pressure** refers to pressure from ones 'internal self', perceived pressure from family, friends, peers and coaches. Pressure with sponsors and the general public was also identified as systemic pressure. Opposition pressures come from that of competitors, opposition teams or competitor plays, and the effect those pressures may have on individual or team performance. The sport intelligent participant is able to remain 'focused' on what the issue is and is able to execute previously planned for and prepared plays through correct and proper **execution management**.

#### **5.4.3.2 Expectations**

A sub-theme of the 'under pressure' theme includes **systemic performance expectations**. Interviewees made the point that some sport participants place pressure on themselves to win, perform well or even beyond their standards. Their self-imposed performance requirements often results in increased anxiety and over-arousal which can hamper performance. Additional expectations come from coaches, family, peers and other stakeholders.

A pertinent observation on this theme was made by ADV1, saying that "the more sensible individuals tend to invest time in levelling expectations amongst the team and participants".

#### **5.4.3.3 Standards**

Interviewees referred to **standards**, which include play, tactics, training, preparation and other 'off-field' behaviours. CRT3 used the acronyms of "**WGLL**" and "**WGDNLL**" to explain with the former referring to 'what good looks like' and the latter, its converse, meaning 'what good does not look like'. JOURN1 set it out in simple terms including "what is acceptable and unacceptable".

The content analysis revealed that some players prefer using standards as a performance gauge rather than scores or win/loss ratios. An excellent example of this theme was made by was made by UDS1, who said:

Look, I would never do, like a Muhammad Ali, it's going to be the third round and I'm going to put him down with a knock-out, you know. I would never do that, but I used to say, 'I know I can run five and a half hours'. So if someone runs faster they are going to beat me but I'm not going to let myself down.

#### **5.4.3.4 Focus**

Focus was a general theme generated from the content analysis for responses related to hypothesis 3 and is similar to the research of Gould et al. (2002) whose study identified intractability as a key psychological characteristic of Olympic champions. The current research data suggests that sport intelligent participants are able to remain focused 'in the moment' and concentrate for periods of time as applicable to their sport. They are, therefore, able to switch 'on' and 'off' as the situation needs, regulate their energy levels in this way and can manage **fatigue** more effectively than other sport participants.

The research data indicated a sub-theme of **concentration** within the theme of focus. Sport intelligent players seem to remain centred on the significant and important parts of game play, preparations and training. They are not easily distracted and are able to focus on what needs to be performed regardless of the situation and competitor behaviours. They do not focus on unimportant items. CRT3 and CRT2 used the example of Jacques Kallis when talking about focus and pointed out that he is able to concentrate for long periods of time while batting and does so through switching on and off between balls delivered to him.

Remaining focused was identified by interviewees as a key attribute in the **winning versus losing** debate. CRT2 said: "I think you've got to be a bad loser ... some people can show it off better than others as being a good loser but I think it burns sportsmen. I think it burns them if they lose or if they perform badly so you have to want to be a winner".

An interesting observation was made when linking **staleness** and focus by CRT1 noting that "focus goes when players are stale". Coaches therefore need to guard against this by periodising the sport year through regular breaks, 'time outs' in addition to varied training, practices, focus areas and commitments. The role of coaches was

furthermore highlighted by JOURN2 who, subsequent to his interview, provided the researcher with an article from *The Economist* indicating that “in most states the highest paid public official is a coach” (The Economist, February 2014, p. 35).

#### **5.4.3.5 Discipline**

The theme of player discipline was highlighted in responses related to hypothesis 3. Discipline was defined as sticking to the **fundamentals** of the sport and suggested knowing the rules of the game, ‘formula for success’ and includes both on and off field principles. Players who do not adhere to these or ‘do their own thing’ were chided by all research respondents. The interviewed coaches were unanimous in saying that players who lacked discipline would usually not be considered for selection and are, therefore, not regarded as sport intelligent participants.

#### **5.4.3.6 Preparation**

Reference was made to the **10 000-hour rule** in the literature review and this research data highlighted the point that a significant amount of time is needed on preparation and training for a specific sport. It is generally regarded that a skill is only ‘mastered’ after about 10 000 hours of practice. This theme was extended by interviewees noting that a considerable amount of time and resources need to go into **training** and **preparation**.

Training is one of the inputs needed for successful sport participation and should therefore be as scientific and detailed as participation itself. RGY1 made the remark that “if a player trains like a monkey then he will play like a monkey”. The researcher was told by a provincial coach (not interviewed) that training programmes in the United States of America’s baseball teams are **measurement led and act as predictors of game performance**. For example, the number of balls dropped or taken successfully **during catching practice** is a key indicator and coaches use this as input into team selection and development activities.

The researcher attended a rugby coaching course (Jake White, 2009) where one of the guest speakers, Dr Sherylle Calder, accurately predicted a Springbok winger would drop the ball twice in the forthcoming test as he had stopped doing eye-drills. This was confirmed by the researcher while watching the test match.

Proper training is, therefore, an important theme within problem solving and reasoning and most research participants elaborated on it at some point during the interview. An amusing anecdote was told by GLF1, who reflected on the fact that a player might hit between 100 and 200 golf balls a day while a tournament is underway, comparing when he started by adding that: “Early on in my career that was almost frowned upon, anyone who hit a few balls was sort of frowned at but now it’s almost like a practice session for these guys, they hit balls for three quarters of an hour before the play and then again when they are finished”.

The training theme was built on by SCR1 who made the observation that: “Some players actually say that the training sessions should be harder than the matches because they grill you on how you are going to play, what you are going to do, what your standards are, what your work ethic is. So if that’s dealt with in training, then he knows that his players go into a game environment very comfortable because they know exactly what that guy is going to do under a certain situation”.

Related to training as a theme of hypothesis 3 is **conditioning and fitness**, with the sport intelligent participant being at a specifically planned-for phase of fitness and conditioning at a specific point in time. Conditioning and fitness are all year round disciplines and include active rest, recuperation, pre-season, in-season and post-season phases. This is done to prevent staleness, to ensure peaking, to optimally utilise energy and for **energy management**. Energy management refers to a balance from being focused on sport to the detriment of other parts of one’s life.

Preparation for the sport intelligent participant was not viewed only as pre-game but included in-game evaluation and post-game activities. The latter referred to what needs to be done after a game or competition has finished and includes activities like cool downs, stretching, and ice baths from a physical perspective, with reflection and learning from a sport intelligence perspective. This is to better prepare the sport participant for subsequent training and competition.

#### **5.4.3.7 Success**

Most respondents mentioned success and achievement in sport as an issue that needed solving and argued that success was found along a continuum with one end

being positive and the other negative. The positive consequences of success in sport are achievement and positive performance outcomes while the negative consequences include having to maintain success and coping with poor performance **during competition**.

Interestingly, some interviewees spoke about how some sport participants become unsuccessful **after competition** and when their **playing careers end**. SCR1 emphasised this when saying: “Sport intelligence is creating a psychological state that exists in harmony long after you stop playing sport. To crash and burn after sport is a lack of sporting intelligence.”

#### **5.4.3.8 Instinct**

Related to the earlier point on game play and competition is **instinct**. A category of sport participants play on instinct – what they know and what they have done throughout their sporting lives. Instinct may have made them successful but can also sometimes work against them. Performing at the required standard and as the situation demands may force a sport participant to play against his or her instinct and to play in a more disciplined manner. This could result in trying something that was not prepared for with negative consequences.

JOURN2 elaborated on this during his interview when saying: “On the field, problem wise, is sometimes going against instinct. The problem for me, fighting against instinct, fighting against the fight or flight thing, puts pressure on you.”

#### **5.4.4 Hypothesis 4: Multiple intelligences**

The literature review indicated that sport intelligence entails a multi-dimensional phenomenon and, therefore, cannot be based on a single factor or dimension. The multi-dimensional nature of sport was confirmed in the current research study.

**TABLE 5.6** Multiple intelligences – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Comfort	Hygiene factors	1
Communications	Systems engagement, self	2
Team effectiveness	Relationships, enjoyment, cohesion	3
Execution	Delivery	1
Maintaining perspective	Success and failure	1
n = 5		n = 8

#### 5.4.4.1 Comfort

Sport participants need to feel at ease, comfortable and ‘psychologically safe’ on and off the sport field. This was identified as a **hygiene** factor or **foundational** item. SCR1 used the example of individuals playing for a famous soccer club when saying: “They make it very easy. Something you want at the club, they will help you. They will sort it out. You unhappy at home, they will sit with you and chat it through. They just go out of their way to make sure you, the player, arrive at training without any undue pressures”.

The lack of comfort – ranging from physical, technical, skill or psychological – was seen as a debilitating factor for sport participation. Sport coaches, therefore, need to remain alert to ensuring that the basic necessities and requirements of sport participants are attended to and available. JOURN1 made the point that some coaches try to do complex, advanced or sophisticated plans without having the fundamentals in place which heightens anxiety levels, leads to mistakes and dents confidence.

CRT1 argued that a balanced lifestyle should be led by sport participants, so that burnout is prevented. CRT2 continued by saying to players: “You should be living your life. When you step into an arena, then you need to be focused.”

#### 5.4.4.2 Communications

Being able to **engage** with others was a theme for hypothesis 4 identified during the data analysis. **Articulating** with preciseness and clarity was seen as important. Communications included engagement with coaches, team-mates, and other stakeholders as well as with **oneself**. The sport intelligent participant knows what is expected and engages in self-communications like self-talk, confidence building words

and affirmations. Gardner (2006) referred to this as intrapersonal intelligence which was then confirmed in the current research study. JOURN2 noted how elite sport participants “also ... (have a) ... realisation that relationships, they need to work on relationships, they need to still keep journalists and the public on their sides”.

#### **5.4.4.3 Team effectiveness**

Being a team participant, getting on with team-mates and having **healthy, productive** relationships with others was a theme identified during the data analysis. Sport participants need to **enjoy** practices, training sessions and games and this ‘enjoyment factor’ was often mentioned. It was argued by respondents that individuals and sport teams who were not enjoying themselves more often than not deliver sub-standard performances.

#### **5.4.4.4 Execution**

The theme of execution in the context of multiple intelligences was synonymous with **delivery** of game plans and tactics. RGY1 argued that “your whole theory of sport intelligence results in nothing if a player cannot execute what has been prepared”. SCR1 said that a sport intelligent participant “needs to have the ability to know how to execute against the opportunity”.

#### **5.4.4.5 Maintaining perspective**

Maintaining perspective in times of **success** and **failure** was identified and the sport intelligent participant is able to cope with both success and failure with the same respect and understanding. They are managed in equal measure, with both offering opportunity for reverence and learning.

SCR1 used a personal example where he was blamed for a loss in a tournament final: “And my dad actually said to me, ‘you know what, just be grateful that you played in one of the biggest games in the world, that very few South Africans will ever get to play in. Yeah, you did not win, but sheesh, you still played in it”.

He later used other words when saying: “Be thankful because it’s a powerful energy to get you through and I can guarantee that if you stood on a pitch and had two choices, one is ‘why is it always me’ and the other is ‘you know what, I

am so grateful to have stood out here even though I'm facing a difficult ball or this or that, I'm just so grateful'. I can guarantee you that the second one will always bring you success. That's the power of gratitude”.

#### 5.4.5 Hypothesis 5: Successful intelligence

Based on Sternberg's (2011) theory that intelligence is concerned with achievement, reaching goals and performance in general, this hypothesis suggests making use of and leveraging personal resources, strengths and positive influences to help the sport participant succeed.

**TABLE 5.7** Successful intelligence – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Teamness	Dynamics, life-in-a-team, personalities, conflict, egos, non-negotiable	6
Resources	Time, demands, money	3
Relationships	Personal pressures, personal life / privacy	2
Success	Coping mechanisms	1
Sacrifice	Peers, stage development	2
Arousal	Switch on / off, maintenance	2
Influences	Negative influences	1
Hype	Media, supporters	2
n = 8		n = 19

##### 5.4.5.1 Teamness

Most sport participants are part of a team: even individual sports include other role players related to the sport participant and would typically include coaches and supporters. The **dynamics** within sport teams, therefore, featured as a theme for the envisaged framework for sport intelligence. Living, training and playing together, sometimes for long periods of time, can prove challenging and difficult for sport participants. CRT3 summed this up in a short statement: “I don't care how talented they are, if they cannot get on with the team, they just don't play.”

The research data shows that different **personality types** and **egos** sometimes lead to conflicts. The sport intelligent player understands the demands of teamness, the

uniqueness of personalities, with some being more and others less difficult, and that egos need to be kept in check. The sport intelligent participant understands that working effectively with his/her team-mates is non-negotiable. CRT2 even indicated that he would “choose a team player over talent any time”.

Sport participants who are not team players can be destructive and divisive. SCR1 used the example of Sir Alex Ferguson who “insisted on him, his staff and players only talking about ‘us’ and ‘we’, never ‘I’ and ‘me’”. SCR1 also later made the observation that “it’s about your words, the weight your words carry: intentions, thoughts and words carry a whole lot of energy and you have the chance to change them.”

#### **5.4.5.2 Resources**

Playing sport at a competitive level requires **time** to practice, prepare, train and rest, often to the detriment of other parts of the sport participant’s life. Financial resources needed to train and compete, and money therefore featured as a key sub-theme while WPL1, an international water polo interviewee, said: “Without resources and financial backing competing at the highest level is almost impossible.”

The demands of competition in sport include staying up to date with latest trends, competitor intelligence, expert coaching and specialised equipment. This implies access to resources and funding. However, exposure to competitions are costly but critical to player development and improved performance. The sport intelligent participant needs to keep abreast of trends and developments in their sport-specific so that their overall sport knowledge-base continues to improve.

#### **5.4.5.3 Relationships**

The importance of having positive, constructive, personal relationships was identified by several interviewees who highlighted the stresses and pressures sport participants put on **personal relationships**. The private lives of competitive athletes exert considerable influence over their emotional and psychological well-being and need to be cared for, nurtured and maintained. Players’ **personal lives** was identified as a theme within hypothesis 5, as was the need for **privacy**.

DCE1, a professional dancer, elaborated on his experience when saying: “Your social life goes down the toilet. Your friends will never see you, nor will your family.” Later he reminded the researcher that he found himself asking the same questions over and over: “Is your sport career worth giving up your family life, your friendship life, your education? Everything practically gets consumed by your sport”.

#### **5.4.5.4 Success**

The ‘success syndrome’ was identified as a theme within hypothesis 5 and was referred to as having developed **coping mechanisms** to effectively manage success. Coaches, mentors and agents are used by sport intelligent participants as support in addition to mental skills such as reverence and gratitude.

#### **5.4.5.5 Sacrifice**

A common theme among research respondents was that of sacrifice through participation in sport. The sport intelligent participant ‘lives the life’, manages the trade-offs that sport demands and has less time for **friendships, social time and relationships**. Stage **development** was also highlighted and refers to going through the normal developmental stages of adolescence, early adulthood, adulthood and middle age. CRT2 added: “You have to be 100% committed ... you have to keep yourself fit, keep yourself healthy. There will always be a fork in the road, which is: my mates are going to the pub and I normally go to gym, what do I do?”

#### **5.4.5.6 Arousal**

Being able to switch ‘on’ and ‘off’ was a sub-theme within hypothesis 5 which emerged in this section as well as other sections and referred to players who are able to become attuned, aware and alert at the ‘switch of a button’. These sport participants are also apparently able to switch off and disconnect quickly. They are, therefore, focused and centred on what is **important at the right time**. They are very good at regulating energy and direct it more effectively and do not focus on irrelevant distractions. They don’t ‘sweat the small stuff’, as RGY1 noted.

#### **5.4.5.7 Influences**

Managing **negative influences** was seen as important when referring to sport intelligence. Negative influences could include competitors, team-mates, media, social

media platforms, family members, coaches, administrators and politicians. The sport intelligent participant minimises negative influences and focuses instead on having positive and constructive perspectives.

#### 5.4.5.8 Hype

Hype was mentioned by research respondents and included the type of exaggerated feedback players get when successful and that they run the risk of believing they are invincible. This may result in over-confidence and later, sub-standard performance. JOURN2 said in this regard, “It’s believing in the hype and believing what people tell you about how good you are without actually having self-awareness of your actual abilities.”

#### 5.4.6 Hypothesis 6: Emotional intelligence

Many observers, participants and coaches make the point that sport is as much in one’s head as anywhere else. The theory and application of an emotional quotient as a dimension in the proposed model of sport intelligence should therefore be considered.

**TABLE 5.8** Emotional intelligence – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Psychological stability	Relevance, balance, focus	3
Understanding self	Awareness, image, philosophical,	3
Regulation	Control, intensity, pressure, aggression, arousal, excitable	6
Expression	Leadership / example, motivating self / others, plays, body language, presence,	4
n = 4		n = 16

##### 5.4.6.1 Psychological stability

Psychological stability was a significant theme within hypothesis 6, elicited during the data analysis. ADV1 referred to “emotional intelligence as stability” and argued that psychological stability is more important than emotional intelligence. It seems to include a sub-theme of **maintaining balance** and **remaining focused** as a **lifestyle** decision. Sport intelligent participants, therefore, need to live a balanced lifestyle while

remaining steadfast and certain about direction, energy expenditure and realising a personal vision.

Stability as an identified theme for emotional intelligence was defined as remaining stable on **relevant** items and is similar to utilising optimal energy on key items while not focusing on less relevant content and processes. FCE1 distinguished between being psychologically strong and psychologically stable by saying the latter is far more important as “psychologically strong participants sometimes lack flexibility and are rigid as they cannot change things when they need to”.

#### **5.4.6.2 Understanding of self**

Self-understanding and appreciation of one’s inner world emerged as a sub-theme for hypothesis 6. Sport intelligent participants have high levels of self-awareness, and know and understand themselves as people and players. As **sport participants** they are aware of their strengths and limitations and play according to them. As **people** they are aware of their personalities, their strengths, weaknesses and importantly, how their personalities can influence individual performance, team dynamics and performance in general.

Interviewees made a case for **image** and how it and reputation could work for or hinder sport performance. JOURN1 remarked that “most players think about image at some point and many use it to further their careers. Look at David Beckham: perhaps he is the best example.”

Unexpectedly, a life **philosophy** sub-theme was identified during the data analysis and it seems as if sport intelligent participants develop deeply held beliefs over life and the role of sport in their lives. These philosophical foundations serve as ballasts and assist in keeping them centred, ‘grounded’ and firmly rooted as **human beings**. The life philosophies may take on religious formats, for example.

#### **5.4.6.3 Self-regulation**

Being able to **control** one’s emotions in competition especially was a significant sub-theme. Losing emotional control usually leads to sub-standard performance and sport

participants needed to learn how to keep their emotions in check from an early age in order to develop sport intelligence.

GLF1 was forthright in saying: “They can play like hell sometimes because they don’t let anything bother them ... the big trick is to let yourself play.”

**Intensity** was seen as a means for sport intelligent participants to manage emotions where sport participants remain emotionally **aroused** but not overly excited. Sport intelligent participants exert **pressure** on opposition but don’t do so in an **aggressive** manner as this results in distraction, loss of focus and poor execution. Being overly **excitable** was, therefore, viewed negatively in terms of sport intelligence.

#### **5.4.6.4 Expression**

Sport intelligent participants **express** themselves as people through their discipline and plays. Sport, in addition, provides an opportunity to lead others which is satisfying for players with an interest in **leadership**. These types of sport participants enjoy **setting the example** and motivate themselves and others in this way. Expressing themselves through their **body language** and ‘**presence**’ were additional sub-themes identified for hypothesis 6.

#### **5.4.7 Hypothesis 7: Curiosity and engagement**

The interviews indicated that curiosity and engagement will be included as themes under the **learning** hypothesis (ie. hypothesis 11).

#### **5.4.8 Hypothesis 8: Knowledge and experience**

GLF1 made the point during the interview that “One cannot buy experience”. Having performed sport tasks under various difficult circumstances and situations increases knowledge and experience for future applications which may then again contribute towards being sport intelligent.

**TABLE 5.9** Knowledge and experience – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Game Understanding	Assimilation, learning	2
Mistakes	Less mistakes	1
Boundaries	Challenge / stretch goals, challenge enjoyment	2
Confidence	Self, structures, team-mates, consistency, dominate, deliver, value of experience	7
Input	Practice, sacrifice, lifestyle	3
n = 5		n = 15

#### 5.4.8.1 Sport discipline understanding

Sport discipline understanding was identified during the analysis of data and referred to comprehending the rules, regulations and the technical requirements of a specific sport discipline. These aspects need to be observed, **assimilated** and understood during practice and training, but also during games and competition. Sport intelligent participants assimilate game events, patterns and plays and are able to execute in accordance with those observations. These sport participants **learn** ‘in the moment’ and implement as needed. The sport intelligent participant does so quickly and more effectively than others.

#### 5.4.8.2 Mistakes

“Excellent players make fewer mistakes than others” remarked JOURN1. “To learn from mistakes is a massive thing” said MM1. UDS1 went on to say that “the really good ones just make fewer errors” while GLF1 said: “Tiger Woods is great because he does not waste a shot”. It seems that the sport intelligent participant makes fewer errors than others and this was a significant sub-theme within hypothesis 8. CRT3 noted: “People who keep making the same mistakes haven’t learnt from their mistakes and will continue making mistakes until they are learnt”. “People who learn quickly also tend to lose bad habits quickly and have the ability to analyse bad habits and to know that you’ve got them, and that’s awareness too,” said GLF1.

#### 5.4.8.3 Boundaries

**Challenging** of boundaries was identified with some sport participants enjoying setting records, others **chasing** records, some wanting to break barriers while others being

'serial **goal setters**'. Sport intelligent participants set goals and objectives for each training session or game and work towards achieving these. Another category of sport participant wants to **set the standard**. The sport intelligent participant knows and understands his 'boundaries' as his/her unique strengths or limitations.

JOURN2 built on this in the context of limitations when noting that: "Once you know your limitations then you know you can push a little bit further, see how much you can push that. It's about going from one barrier to the next barrier and whether that be a barrier in confidence, technique or belief".

#### **5.4.8.4 Confidence**

Knowledge about and experience in a specific sport helps build confidence which is generated from faith in **oneself**, game **structures** and **team-mates**. Confidence was another theme which many interviewees commented on and which they considered a fundamental attribute in sport intelligence as it allows players to execute as planned, dominate and **deliver**.

The value of experience was highlighted by several comments including JOURN2 who summarised by saying: "Players with the best sport intelligence have got immense self-belief... they are certain of what's going to happen, there is a certainty to the way it's going to happen, there is a certainty to the way it's going to work."

#### **5.4.8.5 Input**

"What a player puts in is what they will get out," noted CRT3. Inputs in this regard included items such as drills, analysis, training methods, competition, skills, conditioning and rest as sub-themes. This is of particular relevance to the theory of sport intelligence as it emphasises training, practice and preparation as being vital. It also makes the point that sport intelligence is not only about competition or being 'game-day' specific.

#### **5.4.9 Hypothesis 9: Motivation**

The sport intelligent participant is motivated and excited to play their sport and motivated for different reasons. The sport intelligent participant is aware of and understands their own motivational patterns and leverages these to their own benefit.

**TABLE 5.10** Motivation – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Challenge	Winning / losing, testing of self versus others	2
Inspiration	Improve oneself, others	2
Demonstration	Courage, standards, satisfaction	3
Perspective	Bounce back, retraining	2
Resilience	Perseverance, optimistic, stands back – never!, determination, tenacity, psychological strength, keep getting better, overcoming barriers	8
n = 5		n = 17

#### 5.4.9.1 Challenge

The challenge of **testing one’s skills and abilities** against that of others, a record or a standard featured as a theme when analysing motivation themes toward the proposed theory of sport intelligence. **Enjoying winning** and/or **hating losing** was again identified in this section. SCR1 made an observation: “People always ask why Manchester United get stronger as the season goes on – it’s because they work as a team; they are constantly getting excited about new challenges. They don’t see it as ‘let’s get to the end of the season because we are knackered and we need a holiday break’. They are the opposite – as we come to the end of the season it’s time for trophies and challenges and excitement”.

#### 5.4.9.2 Inspiration

A surprising finding was that some sport participants are motivated to **inspire** themselves and others. The content analysis was clear on this and indicated that having the opportunity as an elite sport participant to directly influence and affect others had considerable appeal for many. This is a significant finding, suggesting that some sport intelligent participants participate for factors other than themselves. Some participate for team-mates, for society or their country or perhaps a spiritual reason.

SCR1 noted a juxtaposition in South Africa when saying: “Our role models are often contradictions. On one hand they set the example but on the other hand, the ones you

hear about the most are the ones that get themselves into trouble ... we have Oscar [Pistorius] and Joost [van der Westhuizen] and Hansie [Cronje].”

#### **5.4.9.3 Demonstration**

Having the opportunity to demonstrate sporting skills and participate at the highest level had motivational and satisfaction effects. Participation at different levels needs varying degrees of **courage** and sport intelligent participants are motivated by the opportunity to compete, respond to challenges and achieve goals and standards. CRT2 announced that: “I loved playing to the crowds.”

#### **5.4.9.4 Resilience**

Resilience was the most common sub-theme and most talked about item generated from the current research study. This sub-theme was referred to by all interviewees. Resilience as a characteristic of sport intelligence was mentioned in different ways and different terms, including mentions of **tenacity**, **determination** and **perseverance**, while others referred to it as ‘psychological strength’. RGY1 summarised it when saying that: “You just need to keep going and believing in your process and then believing that a change will come... working with what you got and remaining clear with what you’re going to do.”

Resilience was also referred to as players having the willpower to **overcome barriers** in the face of adversity. The researcher often heard comments like CRT2 saying: “They just don’t give up,” and MM1 having said: “To never stand back.” ADV1 saw it as a determination to “keep getting better” while others argued that sport participants can be taught how to be resilient and that it applies when training, preparing or participating and not only during competitions.

#### **5.4.9.5 Perspective**

Following the emphasis placed on resilience, the sport intelligent participant seems to be able to keep perspective whether winning or losing. They are able to **‘bounce back’**, quickly recover from setbacks and can do so through **reframing**. They tend to reframe in a positive manner.

ADV1 explained that he looked into the meaning of resilience and said, “It is something that is moulded but is able to go back to its original shape”. The sport intelligent participant can, therefore, return to their original, motivated state after a setback.

#### 5.4.10 Hypothesis 10: Creativity

The instances of genius and out-of-the-ordinary sport performances that are sometimes witnessed are not a result of ‘in the moment’ brilliance, but rather the demonstration of hours and hours of preparation, practice and in-game application. Sport intelligent participants seem to be able to adapt and change as the situation needs.

**TABLE 5.11** Creativity – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Preparation	Before	1
Strategic	Bigger picture	1
Adaptability	Preparation for any situation, application, versatility, flexibility	4
Imagination	Controlled, seeks opportunities, practical, stretch goals, boundaries	5
Execution	Application, keeping it simple	2
n = 5		n = 13

##### 5.4.10.1 Preparation

The question posed by the researcher on exploring creativity as a characteristic of sport intelligence was more of a statement when saying that “sport intelligent players are by nature creative” (Appendix 1, question 12). Many research respondents provided a yes **and** no answer. When answering ‘yes’, they suggested that to participate at the highest level suggests that sport participants are by nature creative, but some interviewees disagreed. Their argument was that game time is not the opportunity to try something different. New shots, different plays and innovative executions needed to be practised and rehearsed thoroughly during the **preparation** phase and when training.

JOURN2 emphasised this by saying: “It’s not so much being creative under pressure. I mean, there is a space for creativity, but in sport generally, you just have a standard

approach to a certain situation. You rarely have to do it differently, you just have to do it the way you normally do it. That's the hardest part".

#### **5.4.10.2 Strategic**

A sub-theme of being **strategic** rather than creative was also identified within hypothesis 10. Elite sport performance includes a strategic as well as a tactical orientation. Strategy, in a sporting sense, would refer to the process of agreeing on an end state or 'vision' aligning participants behind that and employing the correct personnel to execute game plans and tactics. Respondents emphasised being able to execute what has been prepared for rather than trying things out during competition. CRT3 was forthright when saying: "Some guys just don't have the capacity to think that in a sense they need to be led ... you are not going to change 17, 20 or 24 years of brain development."

#### **5.4.10.3 Adaptability**

The sub-theme of adaptability was also found amongst other themes but featured under creativity as well. The data analysis showed that adaptability in a sport intelligence sense included **versatility** and **flexibility** and allowed one to be prepared for any situation while having the capacity to apply oneself in different environments or situations.

#### **5.4.10.4 Imagination**

Consistent with related findings was the theme of imagination within hypothesis 10 where it was viewed as having the **opportunity** to identify and achieve new **challenges** and to push boundaries. Imagination, however, should be done in a **controlled** manner and not done in unrealistic but rather pragmatic ways in a sport environment. GLF1 said: "Imagination plays a huge part in everything. I mean, you get the really good golfers, they will see probably three, four or five ways of playing a particular shot and making the ball do what they want it to in four or five different ways where the ordinary guy can't see it at all. He will just sort of go at it without a great deal of thought but a really good player can see different ways of producing a result which I think is very important. So I think imagination – controlled imagination – is a huge asset".

#### 5.4.10.5 Execution

The theme of execution as a characteristic of sport intelligence featured in creativity and served to reinforce the earlier point of creativity being beforehand and only applied once the skill or play was mastered. A sub-theme of ‘**keeping it simple**’ emerged and referred as to not ‘complicating’ sport and adhering to fundamentals. GLF1 stated succinctly: “In certain circumstances the big thing is not to allow yourself to try a shot you don’t know. In other words, trying to hit a shot that you have never really hit before. You have got to stay within what you know you can do”.

#### 5.4.11 Hypothesis 11: Learning

Ongoing learning, development and improvement is a theme of the sport intelligent participant. Sport intelligent participants view most situations as an opportunity to learn, gain additional insights and apply when needed.

**TABLE 5.12** Learning – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Mindset	Curious, eager to learn, able to rationalise, learning orientation	4
Continual improvement	Knowledge, never enough, trends, science, record, listen, observing	7
Flexibility	Change, capability, challenge paradigms	3
Discipline	Survival, organised, methodical	3
Style	Own style, definition of self, strengths and limitations	4
Assimilation	Pace, capability, grasp concepts	3
Self-learning	Teach oneself	1
n = 7		n = 25

##### 5.4.11.1 Mindset

The initial set of hypotheses for the current research study included curiosity as a hypothesis but interviews and subsequent findings indicated that it did not possess sufficient ‘weight’ to remain a stand-alone hypothesis. While respondents did refer to it, they did so as part of the learning question and it is, therefore, included as a component of the mindset theme.

Sport intelligent participants seem to be curious by nature and **eager to learn** about their discipline, its related fields of expertise and, therefore, they adopt a **learning orientation**. CRT3 argued heavily in favour of learning as the key dimension of the entire sport intelligence framework. He stated that: “Around sporting intelligence, I think of performance as it being in their ability to learn faster ... they need to be able to learn, they need to be able to hold information and work with it ... they need to engage in their own learning ... they need to participate in their own learning”.

#### **5.4.11.2 Assimilation**

The research data suggests that learners are able to understand, comprehend, **assimilate** and clearly articulate what they need to learn, are in the process of learning and have learnt in the past. A sub-theme of learner rationalisation became evident. Sport intelligent participants are able to **rationalise** their learning, **grasp concepts** and practices which need to be learnt quickly and are able to make changes as needed.

#### **5.4.11.3 Continual improvement**

Understanding that learning is an ongoing, iterative and lifelong process emerged as a sub-theme during the data analysis. Skilled sport participants are continually improving their game, skill levels and performance through adopting an ‘enough is never enough’ attitude and do so through staying up to date with the latest **trends**, by understanding sports **science** and by **recording**, **listening** to and **observing** role models, tactics and plays. The sport intelligent participant is, therefore, engaging in ongoing learning. GLF1 emphasised the importance of continuous improvement when stating that “it drives you mad, I mean it’s an incredible game. You try not to let yourself think you’ve got it because the minute you think you’ve got it, that’s when the game kicks you in the guts.”

RGY1 emphasised the theme of continual improvement when saying: “We like to use the term ‘headspace’. You’ve got to be in the right headspace. Part of that headspace is being very aware of who you are and where you are in terms of what your strengths are, what your weaknesses are, where you are going, how you are going to get there, what you need to do to get better and better. Then you are on your way”.

#### 5.4.11.4 Flexibility

The theme of flexibility was identified in the learning hypothesis as well as in other hypotheses. **Change readiness** and possessing a change **capability** emerged during the content analysis as well and referred to being “open to and capable to change as the situation demands it,” as MM1 noted.

An earlier section outlined the theme of boundaries and a similar, related theme of **challenging paradigms** was identified in this hypothesis. The sport intelligent participant, having mastered the “technical and skill requirement and having performed well above average tends to want to try new things out which can result in new plays, shots or tactics,” said CRT2.

These changes can be successful, can influence outcomes and perhaps rules and general practices. Examples cited by interviewees were varied but they collectively made the point that challenging paradigms can be ground-breaking; the Fosbury flop (highjump) and Dilshan scoop and Dhoni helicopter (both cricket) were cited while Sonny Bill Williams was mentioned as a contemporary sportsman who is able to challenge paradigms by competing at an elite level at rugby union, rugby league, mixed martial arts and professional boxing.

#### 5.4.11.5 Discipline

Discipline was highlighted in the literature review in addition to other hypotheses and also featured within the learning dimension. Sport participants need to not only be disciplined in the game plays and preparation but should do so in a **meticulous** and **organised** way while remaining disciplined about the learning process itself. Learning is therefore not an ‘on / off’ or ‘loose’ sub-theme but rather one which needs to be worked on consistently and constantly. It is therefore “not an event, but part of the process” as JOURN1 remarked.

Interviewees furthermore argued that a relationship exists between learning and **survival**. Learning is “seen as part of surviving in the ultra-competitive universe of competitive sports,” said SCR1.

#### **5.4.11.6 Style**

The sport intelligent participant is keenly aware of their own style of participation and this gives **definition of self** as “most players are proud of who they are, how they play and the contribution they would make to the team and how they can influence games”. Sport participants need to know how they play, their **strengths**, gaps and **development areas**.

#### **5.4.11.7 Self-teaching**

Consistent with the research data related to learning, knowledge and experience was the sub-theme of **teaching oneself**. Experienced players are able to observe themselves – both during play and practice – and have the ability to correct their own mistakes, learn and make subsequent changes and modifications. SCR1 provided an example:

The Americans have a psychology where you take a bit of grass, chuck it on the back of the goal and that's where you leave the mistake until the end of the game. Then you grab the piece of grass out of the back of the net (at the end of the game) and say, 'Right, here is the problem, how do we deal with it?'

The sport intelligent participant can teach themselves. In this regard, SCR1 noted that: “Sports people learn extremely quickly the things they need to learn because its survival, you know”.

#### **5.4.12 Hypothesis 12: Personality and mental makeup**

Sport intelligent participants possess a mix of psychological and emotional skills. Most significant is that they display high levels of self-awareness and insight into themselves and how they react and respond in situations. They are, therefore, better able to cope with unfolding and changing situations.

**TABLE 5.13** Personality and mental makeup – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Self-awareness	Own game, reactions, responses, compensation for weakness, 'type', limitations, strengths	7
Pressure management	Challenge, demonstration of skills, compete against peers, BMT, routine, expectations, off-field pressures, rhythm, body language, enjoyment	10
Integrity	Honesty, thankful, self-assessment, gratitude, assured, appreciation	5
n = 3		n = 22

#### 5.4.12.1 Self-awareness

Self-awareness has been reported as a sub-theme in other hypotheses and was also found within hypothesis 12. Understanding **one's game**, its **strengths**, and **limitations** is the point of departure. Sport intelligent participants understand their own game, their strengths and are able to **compensate for their weaknesses** and leverage their strengths. CRT3 elaborated on this by using the example of the Australian cricket player, Steve Waugh, who stopped playing a hook in cricket as he often went out when playing that shot. He compensated for that weakness by intentionally not playing the shot. RGY1 used a case where strength, size and aggression is leveraged by Bakkies Botha, a South African lock forward who used his considerable size, strength and contact skills to act as an 'enforcer' in the 2007 Rugby World Cup competition. JOURN1 argued this when saying: "The best players of any sport plays to their strengths and limitations ... it's a self-awareness and self-belief and the awareness of limitations and what sort of player you are.:

Both examples suggest that participants can take on an **identity** based on what **type** of sport participant they are and what their personality offers as a leverage opportunity. These are inherent strengths and opportunities for sport participants to take on-field and off-field responsibilities.

Understanding and having insight into how one **reacts** emotionally and **responds** behaviourally was a theme that emerged in the research of the study. Sport intelligent participants need to know what 'triggers' them in both constructive and destructive

ways. “Insight into oneself permits insight into others which can be used for team effectiveness and competitive purposes,” noted CRT3.

#### **5.4.12.2 Pressure management**

Pressure management was the most common theme used when defining sport intelligence.

The content analysis indicated that pressure can be generated from oneself, one’s team-mates, coaches, supporters and others like the public or institution sport participants may be part of. For some sport participants, the challenge of competing against **peers**, specific **game expectations** and the opportunity to **demonstrate performance outcomes and skills while winning or losing** also featured as a sub-theme in sport intelligence.

The research study reinforced the **‘off-field’ pressure items** and arguments in favour of harmony at home, positive relationships and staying focused for the development of sport intelligence. This was built on by indicating that pressure can be alleviated by adhering to **routines**, sticking to and having trust in **game plans**, **belief**, maintaining a positive **body language**, **rhythm**, **constructive self-talk** and **‘enjoying the moment’** – all aspects contributing to sport intelligence.

“Off the field pressures are massive,” noted CRT2 and then illustrated how international sportsmen are constantly “tempted with distractions including laziness, girls, drugs and alcohol, amongst others,” which then hampers sport intelligent behaviour.

#### **5.4.12.3 Integrity**

Integrity did not feature significantly in the literature review but emerged clearly when analysing the current research data. Interviewees emphasised **honesty** as a feature of sport intelligence. Coaches, not surprisingly, spoke about having to be direct and honest with players about their performance, training, conditioning, fitness, skill levels and team contribution. Coaches also mentioned the importance of senior sport participants being honest with other sport participants, especially junior and less

experienced ones. Communicating and facilitating honest, two-way engagement as well as accurate **self-assessment** emerged as part of the engagement process. An interesting theme emerged from the research data around integrity. Sport intelligent participants seem to be thankful for the opportunity to participate, play and express gratitude at the chance to demonstrate their skills, compete with others and perform. The research data suggested that, despite high levels of competition, playing sport with integrity and applying the rules fairly and consistently was an important theme in sport intelligence.

#### 5.4.13 Hypothesis 13: Relationship competence

Whether participating in individual or team sports, the sport intelligent participant possesses effective interpersonal skills. They get on with themselves, coaches, team-mates, competitors and other stakeholders.

**TABLE 5.14** Relationship competence – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Communications	Messaging, style, motivational, direct, clear	5
Team dynamics	Vision realisation, ground rules, standards, values, ethos, motivational patterns, cohesion	7
Habits	Good practices, ways of going about, rituals	3
Intangibles	Culture, mood, attitude, 'feel'	4
n = 4		n = 19

##### 5.4.13.1 Communications

Section 4.4.12.3 referred to engagement and feedback as features of sport intelligence. Communications was added to these and can be defined as **clear, unambiguous messaging** performed in a **positive style** which **motivated** oneself and others. SCR1 emphasised the role of positive messaging in this regard when noting that Sir Alex Ferguson “emphasises messaging – all the time – he is your greatest psychologist, practicing psychologist, in the world. That man, he’s just a phenomenon. Everything he does is about creating success within that team environment”.

#### **5.4.13.2 Team dynamics**

Another sub-theme within hypothesis 13 which also featured elsewhere in the findings but again emerged in this section was team dynamics. Sticking to **ground rules, standards, values** and a **team ethos** was also found here when analysing the importance of relationship competence in sport intelligence. **Understanding motivational** and relationship patterns of behaviour was also identified. CRT1 pointed out that “senior players run the side and they set the ground rules, values, and vision... It’s how to control it and it’s important.”

#### **5.4.13.3 Habits**

Habits were identified as a sub-theme when analysing the importance of relationship competence in sport intelligence. Data suggested that effective teams and individuals engage in **good practices** that are in line with generally accepted scientific philosophies and theories. SCR1 summarised this succinctly by stating: “No excuses, no issues, no problems. But again, that is something you have done before. You can’t do this stuff in the moment. It’s something you were taught as a 14-year-old at the club. It is something you have sat with your psychologists and chatted about, it’s something that’s a habit. So maybe sport intelligence is creating excellent sport related habits that allow you to cope at your optimum under pressure”.

#### **5.4.13.4 Intangibles**

Themes such as **culture, mood, attitude** and **feel** emerged as sub-themes for sport intelligence and CRT1 made the observation: “The environment that players play in is so important.” The sport environment was seen as being shaped by coaches, administrators, leaders and senior players – all of whom ‘write the script’ for a team or an individual to function optimally.

#### **5.4.14 Hypothesis 14: Effective decision making**

The sport intelligent participant makes fewer mistakes than their competitors. They understand their own and their competitors’ game style, they prepare and execute accordingly. Effective decisions are at the centre of this proposition as all sport participants are in constant ‘decision making mode’.

**TABLE 5.15** Decision making – related themes and sub-themes

Theme	Sub-themes	Number of sub-themes
Judgement	Mistakes, awareness, anticipation, risks	4
Insight	Opposition, self, game, preparation	4
Trust	Self, team-mates, tactics	3
<b>n = 3</b>		<b>n = 11</b>

#### 5.4.14.1 Judgement

“Effective decision-makers exercise good judgement.” noted JOURN1 in an interview and this theme was confirmed as a component of sport intelligence by the data analysis. Good judgement results in fewer mistakes and as mentioned previously, fewer mistakes result in enhanced performance. Mistakes are minimised by sticking to fundamentals, a deep understanding of the technical requirements, adhering to good practices and deliberate practicing of routines. JOURN2 said that: It’s about recognising the moment ... and you can break it down to any sport, on attack and defence ... it’s a bit like gambling, you hold cards and you know what to pull out: would you rather take the safe option or the tricky option?”

Judgement is again influenced by **awareness** of competitor plays and **anticipation** of what might happen next. This was a clear theme. JOURN2 used the example of hockey player Wayne Gretsky when saying “he always knew where the ball was going to be. The puck rather. So he would disappear through tackles and come up in the middle of nowhere, where the puck was going to be.”

#### 5.4.14.2 Insight

Understanding what might take place and having prepared beforehand was a theme in sport intelligence identified by the content analysis. Insight includes insight into competitors, self, opposition, tactics and scenario enactment.

#### 5.4.14.3 Trust

Trust emerged as the final theme for hypothesis 14 and was constituted as having trust in oneself, one’s tactics and game plans. RGY1 noted that: “Decision-making

relies a lot on trust. Trust in your coach, trust in your own abilities and trust in your team-mates ... (and) ...comes from practice and familiarity with opposition.”

## **5.5 Summary**

The chapter has also thus far outlined the findings of the content analysis conducted during the research. The results of the review revealed 14 hypotheses, 73 meaning units within these and a further 245 sub-themes. These were elaborated on in detail. The initial findings and content analysis were presented in the preceding section and revealed that all 14 hypotheses were found to possess a conceptual relationship with the literature. They can all, therefore, be considered psychological strengths. Hypothesis 7 was included in the learning hypothesis and a number of sub-themes were duplicated due to them being experienced differently. The following section will outline the theoretical model generated from the current research study and serves as a proposed theoretical model of sport intelligence.

## **5.6 Theoretical model of sport intelligence**

### **5.6.1 Introduction**

The current research is investigating a theoretical model of sport intelligence. The origins of sport intelligence date back to the work of Tenenbaum and Bar-Eli (1993) and others in the late 1970s. Later, Gould et al. (2002) identified key themes when exploring personality traits of Olympians and noted sport intelligence as one of these personality traits. Blue (2009) completed exploratory research on sport intelligence amongst golfers in the United States of America and proposed a two-part model comprising a ‘competition intelligence’ and a ‘developmental intelligence’.

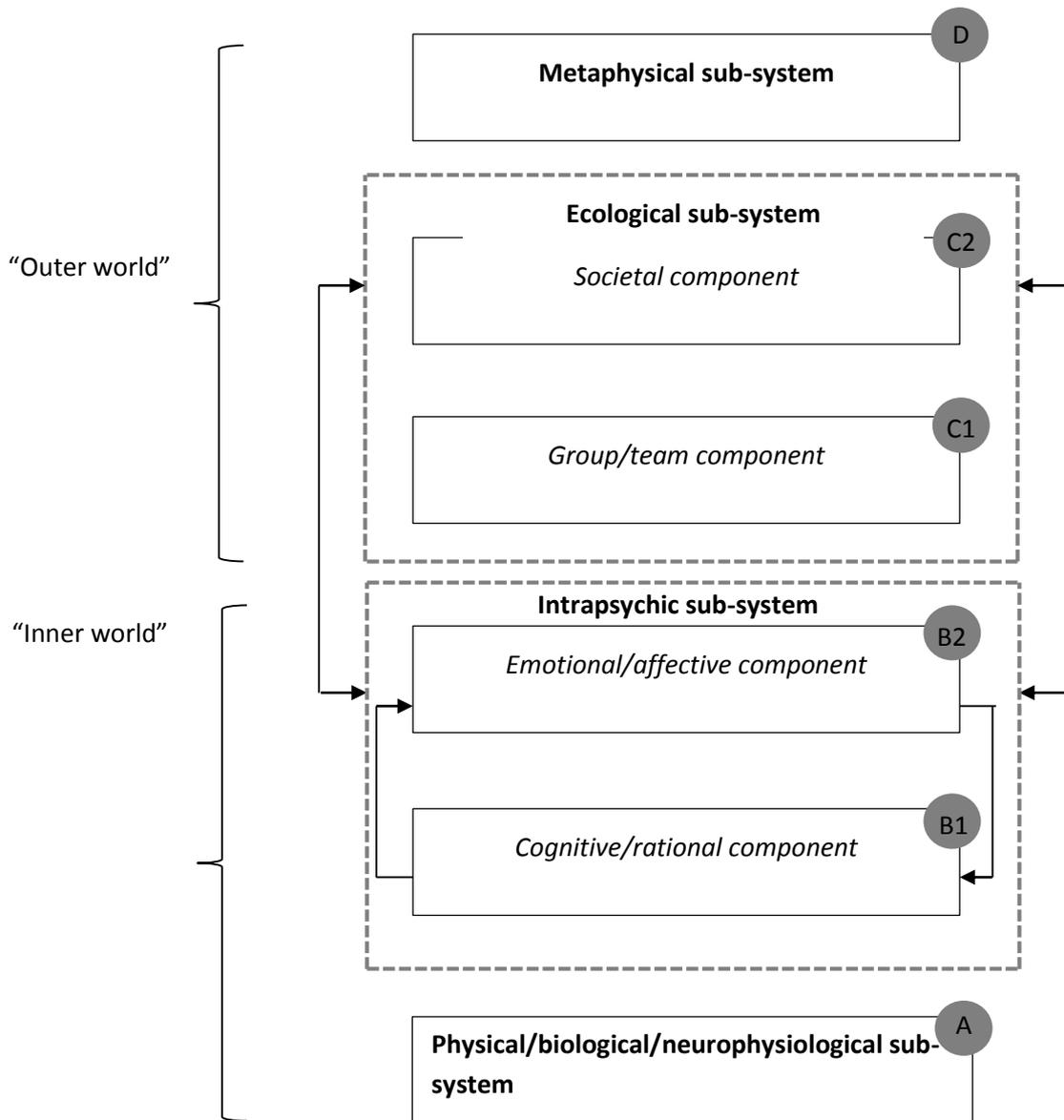
The current researcher did a detailed study of intelligence and sport psychology theories and completed 15 semi-structured interviews with experienced sport participants, coaches and sport journalists from South Africa. Interviews were transcribed, coded into themes and sub-themes and assessed from a phenomenological stance and then criticised from a cognitive and systems perspective. These have been condensed into a model of sport intelligence.

After in-depth examination of the research data, patterns began emerging and it became clear that sport intelligence comprises six ‘higher order’ themes and,

importantly, that they are believed to be related, interconnected and part of a greater system. The six higher themes are:

- Physical/biological and neurophysiological sub-system;
- Cognitive/rational component and sub-system;
- Emotional/affective component and sub-system;
- Team/group component and sub-system;
- Societal/ecological component and sub-system; and
- Metaphysical/higher order sub-system.

The six higher order themes can, furthermore, be considered from an **inner** world perspective with the first three being those sub-systems which take place 'inside' the sport participant and are internal in nature. The remaining three sub-systems are observable and can be seen through activity and behaviours and are, therefore, external in nature. They are referred to the **outer** world orientation of the sport participant. The conceptual model is set out in Figure 5.1 to follow.



**Figure 5.1** Conceptual model of sport intelligence

Each sub-system will be elaborated on in detail with the researcher highlighting themes and sub-themes generated during the content analysis, by citing examples and quotes provided by interviewees in support of the content and by referring to literature where applicable. New information in the form of examples and research data not covered in the theoretical chapter will be shared where relevant.

The discussion of each sub-system will be rounded off in each section by assessing it from a 'sense-making' perspective. This is done to "better understand the interactive and relational nature of the phenomena conceptualised" (Stacey, 2003, p. 12). To aid

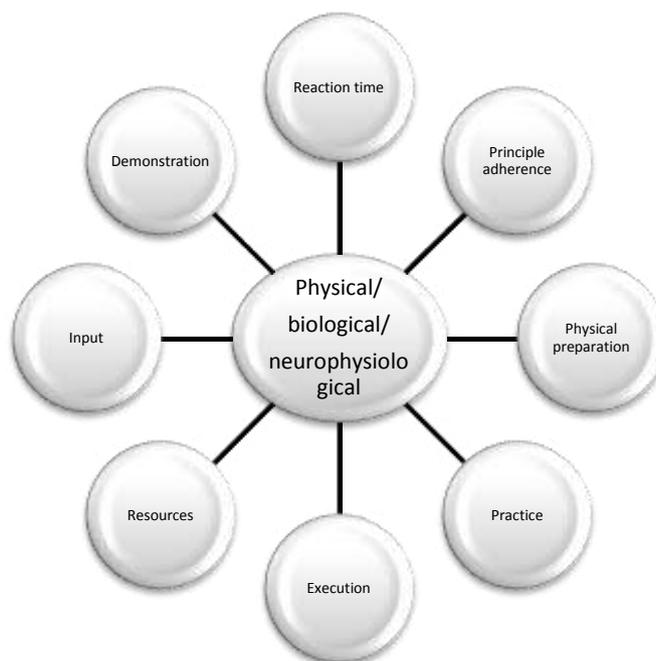
the summary of each sub-system, the following questions will guide the synthesis of each sub-system:

- How does it relate to intelligence theory and sport psychology literature?
- What theories of human psychology are also considered? (Contribution of cognitive and systems psychology in particular.)
- What theory does it assume through a 'paradigm control' section?

### 5.6.2 Sub-system A: Physical/biological/neurophysiological sub-system

Interviewees referred to the physical nature of sport and how the body of sport participants is used and manipulated during training and competition. Themes from hypotheses 1 (mental speed), hypothesis 4 (multiple intelligences), hypothesis 5 (successful intelligence), hypothesis 8 (knowledge and experience) and hypothesis 9 (motivation) were used in addition to it being one of eight key themes identified by general responses to what interviewees considered when defining the concept of sport intelligence.

Body management was referred to directly and indirectly by interviewees and included themes of reaction time, principle adherence, physical preparation, practice, execution, resources, input and demonstration and is set out in a conceptual map below:



**Figure 5.2** Sub-system A: Physical/biological/neurophysiological sub-system

### 5.6.2.1 Body management

The body of a sport participant is the **primary** instrument used in the execution of plays, activities and behaviours. The body needs to be nourished, cared for and not under, nor overused and should be kept in balance and equilibrium. It is, therefore, the key resource in the sport participant's arsenal. MM1 elaborated on this core theme when saying: "I suppose your body's intelligence. Be that training wise, like learning to listen to your body, when you can push your body to the maximum, knowing when you need to slow down training or in the session itself. How to pace yourself." UDS1 concurred when saying: "I needed to look after myself throughout the year. I was constantly paying close attention to my body."

The sport participant's body has to demonstrate skills and **expertise** which are practised in advance of game or competitive situations. Games and competition offer the ultimate opportunity to **optimise skills** and this seems to be conceptually and theoretically similar to Gardner's (2006) theory of bodily-kinaesthetic intelligence where the sport participant's body is to control motion, activities and handle objects skilfully.

Much preparation needs to go into managing the body of the sport participant and includes motivation, diet, supplementation, strength, fitness and weight control. This was termed **conditioning** by MM1 who went on to say: "So intelligence, for me, for my sport, I need to understand my body, I suppose nutrition wise ... supplements, food, how to prepare my body physically, so strength and endurance wise and then obviously skill wise, what I am lacking, where I am lacking, what is my strength".

Getting and maintaining **balance** between training, preparation, games, competition and relaxation were identified as elements that need to be controlled in order to manage **fatigue** and prevent burnout. UDS1 provided concrete examples of this by "taking structured rest periods between key events."

### 5.6.2.2 Reaction time

Early research into intelligence (Nettlebeck, 2011) and sport intelligence (Fisher, 1984; Tenenbaum & Bar-Eli, 1993) identified reaction time and inspection time and these were confirmed in the current study. Reaction time included short-term attention and

working memory while also including basic functions like perceptual and information processing speed (Nettlebeck, 2011). PBL1 supported the reaction time hypothesis when saying: “If your mind is not strong, your intelligence or reaction time won’t be as good.” Sub-themes included having fast reaction time, especially for sports that include projectiles, dexterity and having superior hand-eye co-ordination. Inspection time, referred to in the literature review, was indirectly inferred and included visual and perceptual speed (Nettlebeck, 2011).

### **5.6.2.3 Principle adherence**

Interviewees were of the opinion that sport participants’ skills, expertise, scores and performance outcomes only improve having mastered the **foundational game principles and values**. JOURN1 noted that: “You simply cannot perform at higher levels if your technique is flawed.” SCR1 said: “You have to stick to the basics and the sooner one learns them, the better.” ADV1, when referring to adventuring, said: “If you get the basics wrong, it could cost you your life or someone else’s.”

All sporting codes have a set of written and unwritten rules and values that should be well known to the sport participant and adhered to, as breaking them would have negative implications. PBL1 recognises a problem many sport participants face: a lack of knowledge as a result of lack of adherence, and says, “They need to learn the technique and stance, how to stand correctly ... how to be comfortable with your gear.” Foundational principles and values applied to both on-field and off-field items and activities.

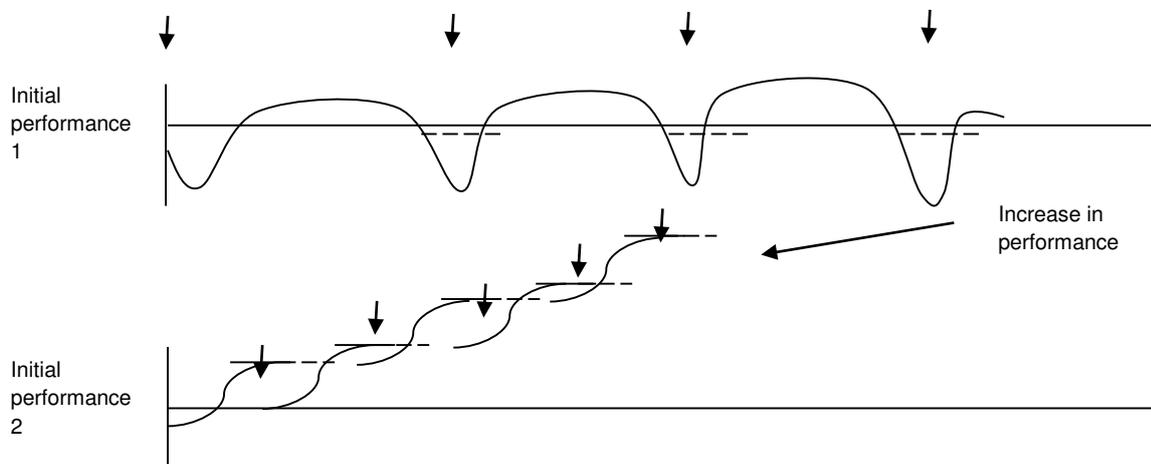
### **5.6.2.4 Physical preparation**

Physical preparation was referred to in section 5.3.1 but is included in this instance as sufficient preparation leads to improved performance. MM1 noted this when talking about mental speed, saying: “When I’m prepared and ready then everything I do happens faster. I’m more alert, clearer in thinking and focused when my preparation has gone well.” UDS1 was clear in his thinking when saying: “I knew I would do well if my preparation was excellent.”

Other interviewees also emphasised physical preparation. CRT2 said that: “I almost knew when I’d perform well as I used my preparation as a gauge.” RGY1 argued the

same point when noting: “We can pretty much predict how we will perform on Saturday as the week’s training and preparation will tell us where we are.” DCE1 elaborated on this when saying: “You have to physically push your body beyond the limit. If you don’t do this at practice, you’re not going to get where you want to be ... so you have to live, sleep and eat your sport no matter what.”

This foregoing discussion highlighted the relationship between physical preparation and **performance** with much of the data, literature and research indicating a relationship between the two aspects. The figure below depicts the cumulative effects of training which was confirmed in the current research study.



**Figure 5.3** Cumulative effects of training (Dick, 2010, p. 323)

### 5.6.2.5 Practice

Practice was referred to in themes of **periodisation** and **commitment**. Periodisation is described by Dick (2010) as “an organised division of the training year in pursuit of performance objectives” (p. 305) and suggests an annual calendar divided into different training and preparation schemes as indicated below.

<b>Month</b>	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	September
<b>Macro</b>	← Preparation →							← Competition →			← Transition →	
<b>Meso</b>	I			II				III	IV	V	VI	

**Figure 5.4** Division of the training year (Dick, 2010, p. 305)

CRT2 used an example of playing British county cricket in the South African off-season by saying: “I used the county games as opportunities to refine and improve a part of my game that was lagging behind or where I did not get the chance to improve in summer at home ... (and) ... it also gave me a break in routine which always reinvigorated me.”

Commitment was the other sub-theme identified and was best explained by JOURN2 when he said: “There is no way you can put yourself through what you need to get to the top and then stay there if you are not committed. Elite sportsmen and women have to give their lives to their pursuit.”

The work of Dick (2010) however notes that practice needs to be “precise and correct: Spending hours on incorrect learning results in poor outcomes.” (p. 193) Practice, therefore, needs to be done correctly. Sport participants should, therefore, be motivated to perform to their best ability, to achieve and exceed performance standards and do so by being committed and focused. Incremental theorists have shown that performance is improved through education, training and ‘method’.

#### **5.6.2.6 Execution**

Execution was understood as referring to performance **delivery**. A recent interview on a sports television programme with an international rugby coach summed this up when saying: “Execution is everything. Nothing else matters.” WPL1 also touched on execution, saying: “It all requires some form of intelligence to kind of, how can I say it, to execute.

#### **5.6.2.7 Resources**

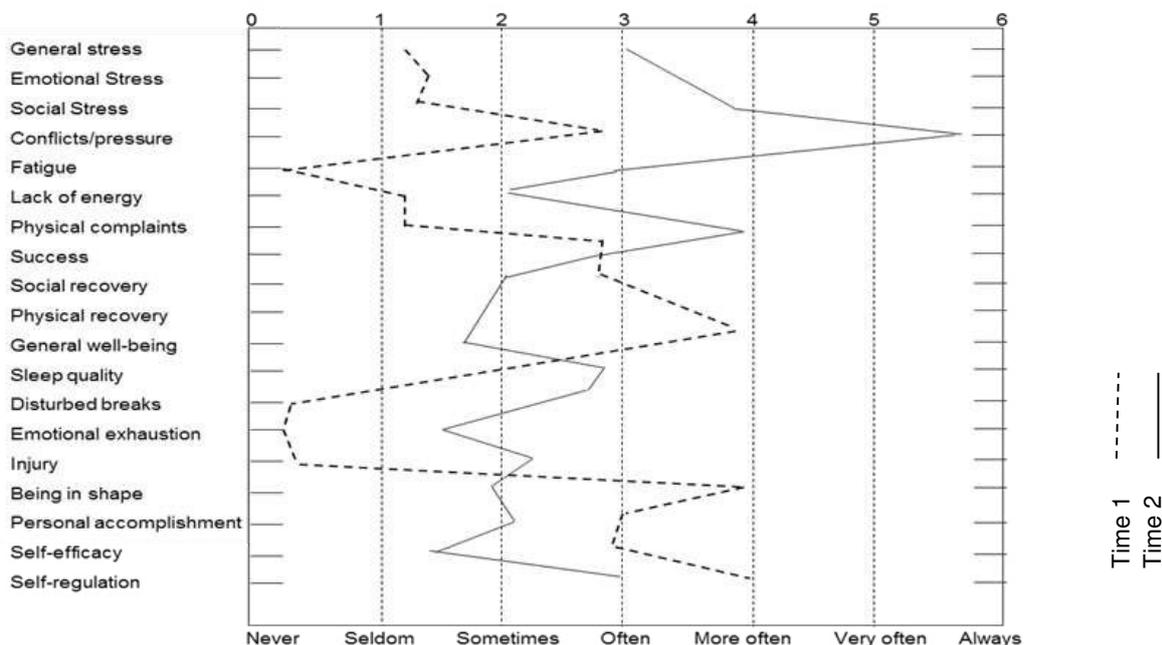
DCE1 was adamant that “a lack of resources severely impacts the likelihood of improved performance”. Having sufficient **time** and **money** to prepare for, train and compete was fundamental to sport performance at an elite level. Access to latest equipment, training techniques, technology and expert coaches seems to be critical for enhanced sport performance.

WPL1 elaborates on the importance of adequate resources: “Some challenges are financial backing, I would say, and training availability.”

### 5.6.2.8 Input

Input comprised of three sub-themes including **practice**, **sacrifice** and **lifestyle**. DCE1, when referring to his lifestyle as an elite sport participant, said: “My lifestyle’s hectic. I was dancing for seven hours and I was training in the gym for two. My diet was strict enough ...I was eating 5000 to 5500 calories a day to maintain my energy and strength”. He mentioned the sacrifice involved in being an elite sport participant: “... there is also family and friends, you miss out on time with them. You lose birthdays, you lose anniversaries, even big moments like births”. UDS1 said: “I would lose half my year to intense training. I basically trained, ate and ran for January to the end of May, when preparing.”

The researcher was reminded of the stressors that sport participants experience and explored a stress inventory for athletes to better understand stress issues.



**Figure 5.5** Recovery-Stress questionnaire for athletes (Taylor & Wilson, 2005, p. 95)

### **5.6.2.9 Demonstration**

JOURN1 said: “Sports people need to be courageous”. ADV1 said “climbing Everest was terrifying and exhilarating at the same time,” while CRT2 said “you have to have guts to face a ball coming at you at 150km/h”. Courage was, therefore, identified as a sub-theme.

**Standards** were identified as another sub-theme in the context of demonstration, as UDS1 noted: “Having high standards means you are always showing off your talents and skills at a world best level.”

Satisfaction was the final sub-theme in the context of the physical/biological/neurophysiological sub-system and considered the **experience** of demonstrating performance to ourselves and others. DCE1 spoke of personal experience during his interview: “When we danced Worlds, there’s a thousand people, maybe even more, in the hall and you’ve got a 12-line judge, 12 judges in front of you.”

### **5.6.2.10 Sub-system: Biological/physical/neurophysiological synthesis**

#### **5.6.2.10.1 Relationship with intelligence and sport psychology theory**

The themes and sub-themes generated by the content analysis are consistent with those in intelligence and sport psychology literature. Reaction and inspection time, mastering technical skills and principles, having the ability to execute and deliver in competition, living a sport-centric lifestyle, understanding the importance of goals and standards and being goal-oriented are key features of general sport psychology and intelligence theories and practices.

Themes like year-round practice, physical preparation and training, and preparation resources are not confined to psychological and intelligence theories, but can also be found in other disciplines including human movement studies, physiology, kinesiology, physiotherapy, biokinetics and physical education. This suggests sport intelligence has foundations in other disciplines and sciences and can, therefore, be considered multi-disciplinary.

#### **5.6.2.10.2 Relationship with cognitive and systems psychology**

Cognitive psychologists are interested in the brain and its operations and refer to neurons, electromechanical pulses, synapses, transmissions within the brain, stimuli, templates, cortical activity and how these, amongst a multitude of related neural processes, result in human behaviour.

The brain and its resultant human behaviour are conceptually connected to the theory of sport intelligence through these mental and neurological processes. As Stacey (2003, p. 47) notes: “These form the template, stored in a particular part of the brain against which other ... perceptions could be compared and categorised, forming the basis of the body’s response.” The biology of the brain structure, its processing of information and transmission into behaviours, therefore, needs to be considered when developing the model of sport intelligence.

A systems theory perspective, specifically cybernetics, seems to be constructive in this instance. Cybernetics suggests that individual or social systems are goal seeking, self-regulating and causality is circular and linear. The themes, sub-themes and content generated from the research **may**, therefore, according to cybernetic thinking, have a causal and linear relationship with sport intelligence. Predictability is also possible in a probabilistic sense while also suggesting that disturbances are expected and may – or may not – adversely affect the system. Feedback from the environment may result in the system regulating itself back to a state of stability. Stacey (2003, p. 44) convincingly argues that “success is a state of stability, consistency and harmony”.

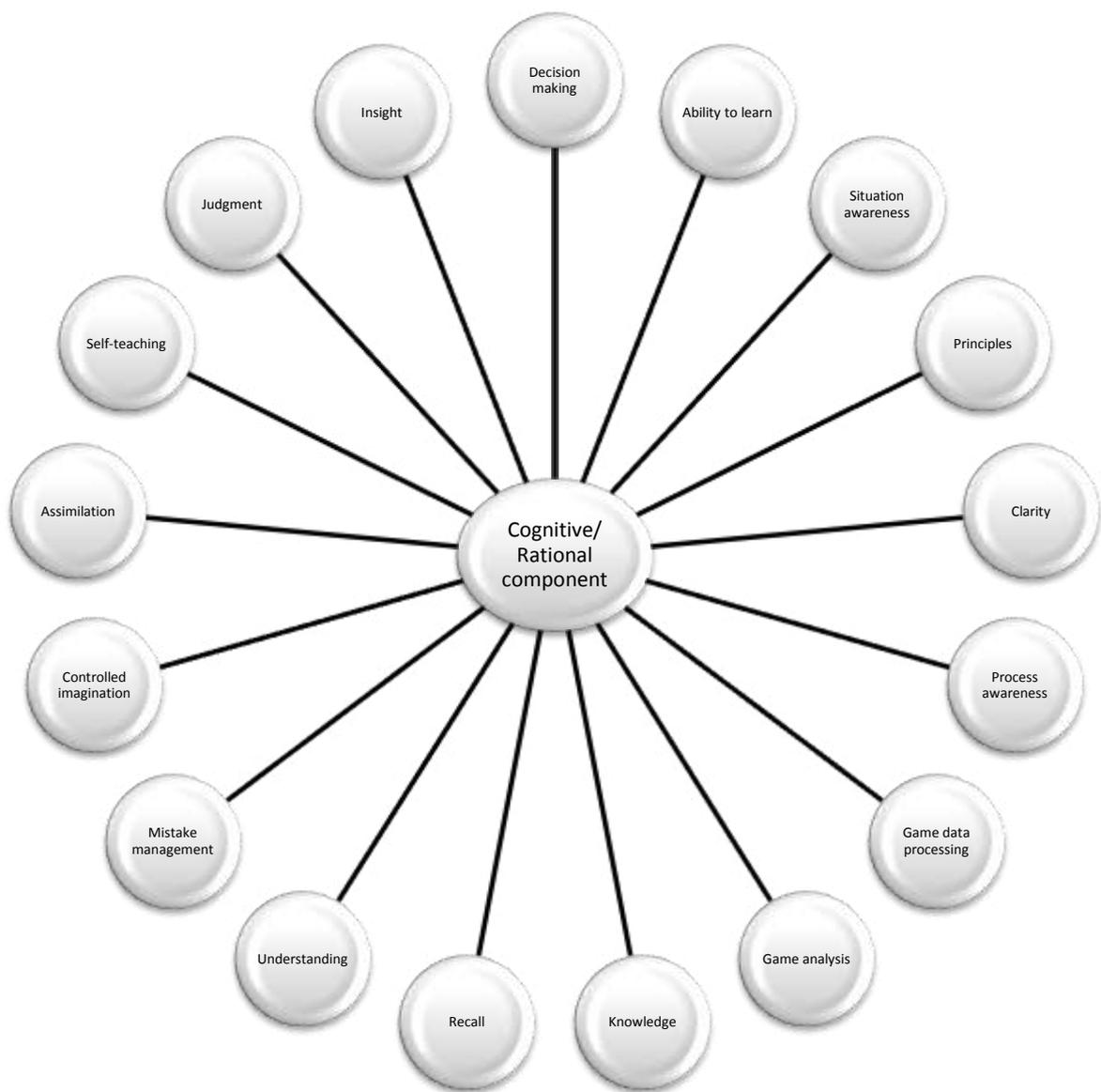
#### **5.6.2.10.3 Paradigm control**

Cognitive psychology and systemic approaches, specifically cybernetics in this instance, adopt a realist position. They make use of and apply laws and principles of logic to explain behaviour and to predict how individuals behave.

#### **5.6.3 Intrapsychic sub-system B1: Cognitive/rational component**

Both rational and emotional components were identified during the current research study and while some theorists consider them separate components (Epstein, 2013) they have been combined into an intrapsychic sub-system by the current researcher as it is believed they refer to the ‘inner’ world of the sport participant.

The intrapsychic, rational sub-component featured strongly in the current research and was derived from hypothesis 1 (mental speed), hypothesis 2 (working memory), hypothesis 8 (motivation), hypothesis 10 (creativity), hypothesis 11 (learning) and hypothesis 14 (decision making). It includes decision making, ability to learn, situation awareness, principles, clarity, process awareness, game data processing, game analysis, knowledge, recall, understanding, mistake management, controlled imagination, assimilation, self-teaching, judgement and insight and is set out in the conceptual map to follow.



**Figure 5.6** Intrapsychic sub-system B1: Cognitive/rational component

### 5.6.3.1 Decision making

Decision making was often referred to by interviewees and together with performing under pressure, was the item elaborated on most. Sub-themes included possessing a deep understanding of the **technical** aspects of the sport that the participants are involved in. Biomechanics would feature within this. Having an excellent **knowledge** of the sport, its history, origins, trajectory and changes would also be considered a prerequisite. MM1 touched on knowledge of the game when saying: “The game is continually evolving”. The nature of elite sport was also mentioned by WPL1.

The theory of Lohman and Lakin (2011) seems to have been confirmed where they argued that “expertise is rooted in knowledge and experts reason differently about problems than do novices” (p. 422). The same authors make the point that experienced players are more finely attuned to the problem.

Sport participants need to be aware of game processes where process is defined as: “A series of actions that produce something or that lead to a particular result” (Webster, 2014) and was summarised by WPL1 who noted that it is: “Being able to kind of see something in your head and trying to take what you planned in your head in that short phase of time and put it into action. I think that is very important.”

Elite sport participants are clear on what pattern is emerging from early on in competition and are able to respond to those ‘real time’ as SCR1 said when referring to the **in-the-moment** sub-theme. The research of Williams and Ward (2007, p. 218) indicates that elite athletes spend about 100% more time and activity on decision-making than sub-athletes and this seems to have been conceptually confirmed in the current research study.

### 5.6.3.2 Ability to learn

RP9 made a strong argument that: “Learning is the single most important factor in competitive sports.” DCE1, CRT2, JOURN1, JOURN2, SCR1 and MM1 all made the point that learning from **mistakes** and **mistake management** is an important facet in competitive sports. They collectively argued that great players become great players because they make fewer errors.

The researcher was reminded of tactics used to minimise mistakes when referring to the example in Dick (2010, p. 70)

**TABLE 5.16** Refocusing plan for Tim Stimpson (of West Hartlepool), Leicester and England, Rugby Union (Dick, 2010, p. 170)

KEY: When you pass the ball, you don't give away responsibility	
<b>1. Loss of concentration through mistakes</b>	
Loss of attention	missed kick... it's gone, park it
Use gearbox	select a gear, 1 <sup>st</sup> to recover
2 <sup>nd</sup> gear	up to playing speed
Concentration 1	use movement pattern (fist hit on leg)
Loss of focus	come back to here and now
5-point kick plan	visualise, successful imagery
Concentration 2	use trigger word ' <i>precise</i> '
Return to game pace	change gear, 3 <sup>rd</sup> for aggressive pace change
Acceleration	4 <sup>th</sup> gear in control, smooth play
<b>2. Loss of concentration through fatigue</b>	
Reinforce gearbox	keep changing gear
Positive self-talk	use triggers ' <i>big hit</i> '; ' <i>safe hands</i> '
Team energy	talk to team-mates, remember 'the hill'
Energise	energy-ball imagery
Be aware of roles	attack, support
<b>3. Heads are down</b>	
4 points down	we need 5 to win
Team energy	keep recycling
Basics	keep it simple
Time	use up every second

**Executing** of plans and **keeping up with trends** were additional sub-themes. UDS1 emphasised the latter when saying that he kept detailed notes of his training and preparations while always knowing what his competitors' activities and states were. He said: "Learning also, to me, is like reading about the subject. I would be amazed at how my opposition knew nothing about the Comrades... surely you want to know who won, where, why, what did they do, what's the story?"

RGY1, CRT3, JOURN1, CRT2, SCR1 and UDS1 felt strongly that learning and insights have to be practised and trained beforehand for positive performance outcomes to be expected. They were also of the view that learning is limited if it is left on a “board in the change room as it needs to be done once the action starts” as JOURN1 noted. MM1 made the observation that: “Learning is not just about getting it in your head but being able to apply it once the bell goes.”

Nickerson (2011) proposed 11 tactics to enhance performance and these have been theoretically confirmed in the current study and include knowledge, logic, statistics, heuristics, self-mastery and management, habits, attitudes, principles, imagination and keeping perspective. Blue (2009) emphasised learning in “*Developmental Intelligence: Beyond Competition Golf IQ*” conceptualisation when he identified developmental attitude as a key component.

#### **5.6.3.3 Situation awareness**

CRT1, RGY1, GLF1, DCE1 and MM1 noted that superior performance is generated from summing a situation up and applying the appropriate skills and play correctly in the context of the requirements of the situation. RGY1 said: “Players sometimes go to sleep or try too hard when all they needed to do was simply scan the situation and to adapt as need be.”

#### **5.6.3.4 Clarity**

I keep six honest serving men  
They taught me all I know  
Their names are What and Why and When  
And How and Where and Who.

(Kipling, 1999)

The researcher was reminded of the ‘5WH’ rule (Kipling, 1999) while reading and analysing the data and identifying the theme of clarity. The five Ws refer to **who, when, what, why, where** with the H referring to **how**. The sport intelligent participant is clear on tactics, how they will be executed, their role therein, what needs to be achieved, how, where and when. RGY1 emphasised the ‘**why**’ item when sharing that: “Players need to constantly ask themselves why they are doing what they are doing and if they

can't answer that question, then I am not coaching properly. PBL1 spoke about the importance of clear communication when saying: "It's quite challenging but it's all in the communication. You need to get the comms going up the course. If you don't get the tight comms on the break as it happens, you can lose that course."

#### **5.6.3.5 Process awareness**

Process awareness referred to a constant awareness of the unfolding **game situation**, **environmental scanning**, **competitor plays** and **what is needed** to remain competitive. RGY1 referred to "a constant review in real time of what's going on and what's not going on". CRT1 said: "It's important to watch the game like a movie: remaining detached and involved at the same time," while MM1 said: "You've got to be ahead of your opponent and you do this by assessing what he's doing compared to the homework you did on him." CRT3 argued the same point when saying: "Players need to dial in to what's going on and then be able to apply it throughout the game."

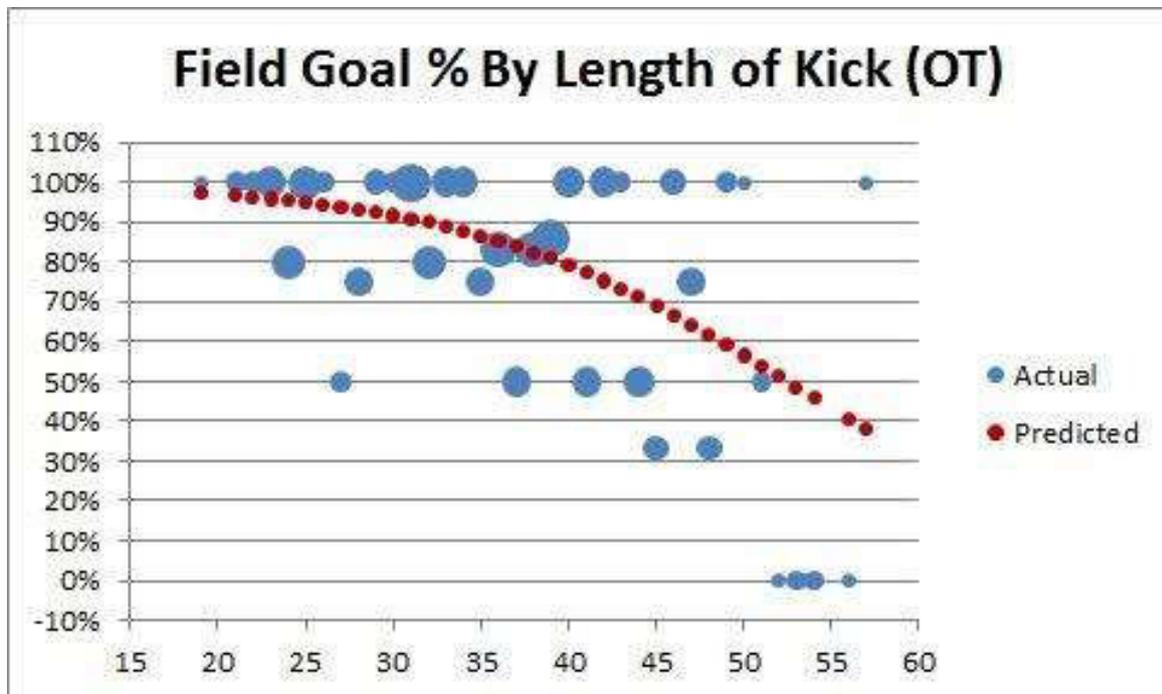
#### **5.6.3.6 Game data processing**

Game data processing is similar to process awareness within the sub-themes including **competitor observations**, **team-mate observations** and an awareness of **one's own executions and performance**. DCE1 said: "You have to be cautious on who you dance against, where you dance, if the judges are actually seeing you, your placement," and PBL1 spoke of the dangers in not processing game data when saying: "that's also a problem for a player is that he gets tunnel vision, he's just focused what he's doing, he's not aware of his surroundings".

#### **5.6.3.7 Game analysis**

Interviewees referred to the role that technology has played in the last 20 years and how it has allowed for **detailed analysis** of the game and its specific components. Data has become part of sports with most professional and national teams having a full time 'analyst'. GLF1 noted how sport has changed by observing: "When I started out as a professional golfer, I'd have a few practice rounds a week and then play competition golf on weekends. Today, players and their team of coaches, caddies, analysts, media specialists meet every day to go through the previous, current and next day's numbers. Everything is analysed and planned for". Data needs to be

**accurate** and **meticulous** and this is achieved by **deconstructing** every facet of games and training into its **constituent** parts.



**Figure 5.7** Field goal percentage graph (Morris, 2010)

Sternberg's (2011) theory of successful intelligence comprises three components, one of which is an 'analytical intelligence quotient' and includes encoding, inferences, mapping, applications, comparisons, justification and preparation response. These are defined in detail in the literature study, but seem conceptually related to game analysis and are, therefore, confirmed by the study.

### 5.6.3.8 Knowledge

Gaining **knowledge** to improve **game literacy** was identified by interviewees as significant. SCR1 mentioned that: "You need to have the knowledge base to know how to execute against the opportunity". The work of Mayer (2011) indicates that knowledge would include facts, concepts, procedures, strategies and beliefs and, therefore, seems to be theoretically supported by the current study.

### 5.6.3.9 Recall

The literature review indicated that working memory consists of a cognitive control mechanism, scope of attention and a retrieval mechanism (Conway et al., 2011).

Having the ability to recall **previous performance, pre-game plans and tactics** and **previous events** or episodes was also mentioned by interviewees as being important to the model of sport intelligence.

FCE1 said: “Others react by recall – remembering what happened previously in a situation and reacting accordingly.” The research of Hengle and Kane (2004) indicates that individuals with a greater working memory perform better on a variety of tasks and has conceptually been supported by the current study.

Early researchers into intelligence noticed how subjects who were considered clever were able to recall events, activities and behaviours in detail. They, therefore, have excellent short, medium and long-term memories and this seems to apply to sport intelligence as well. MM1, JOURN1, CRT2, CRT3, UDS1 and FCE1 referred to this during the research process.

#### **5.6.3.10 Understanding**

Understanding, in this instance, is seen as: “Being able to comprehend what is needed and how it will be effectively executed” said CRT3. Sport participants need to **assimilate** and **appropriate** all technical, developmental and competitive requirements. Appropriation was further explored by Bernard Lonergan (cited in Cronin, 1999) and is an important term that refers to the awareness of oneself. His cognitional theory examined the operations which take place when ideas occur and forwards the notion of ‘self-appropriation’. To appropriate means “to take possession of, to make one’s own” (Cronin, 1999, p. 49) and his view is to become aware of one’s own intellectual activities, to understand the implications and modify one’s own approach if required. Cronin’s interest in understanding consciousness enticed Lonergan (cited in Cronin, 1999) towards the concept of knowing who argued that a duality exists in that it either can be descriptive and can thereby comment on appearance and structure or it can be exploratory. This rests on connections, relationships and patterns which are conceptual processes.

Lonergan (cited in Grace, 2001) proposed that individuals who understand their own cognitional operations acknowledge an “awareness not of what is intended, but of the intending” (p. 4). Lonergan’s proposition extends the ‘know oneself’ sub-theme.

Cognitive operations take place at potentially four levels: The first is the empirical or experiential level which rests in the senses; the second includes the intellectual or understanding level, which uses ideas, concepts and grasps that which is relevant; the third level is termed the rational or judgement level, which tests the truth or falsity of evidence and the fourth is that of decision and application. He termed this the responsible level and is of the opinion that this is where deliberation, evaluation and choice is made (Lonergan cited in Cronin, 1999).

Without assimilation and appropriation, it is unlikely that effective learning will ever take place.

#### **5.6.3.11 Mistake management**

Mistake management was identified as a theme and emphasised the point that the sport participant with the fewest errors is usually the winner. JOURN1 cited a few examples of errors in sport such as error rates in tennis “where first serves are missed and balls hit out, in soccer where possession is lost and rugby where missed tackles and turnovers are counted as errors”. The cricket respondents unanimously argued that: “In cricket there is no margin for error. One mistake and you are done” as CRT1 argued.

RGY1 reminded the researcher of a film in which the cost of mistakes and errors are emphasised. The film is titled *Any Given Sunday* and below is an excerpt from a pre-game speech in the film (Stone, 1999).

But, you only learn that when you start losin' stuff. You find out life's this game of inches, so is football. Because in either game – life or football – the margin for error is so small. I mean, one half a step too late or too early and you don't quite make it. One half a second too slow, too fast and you don't quite catch it. The inches we need are everywhere around us. They're in every break of the game, every minute, every second.

#### **5.6.3.12 Controlled imagination**

Controlled imagination emerged when discussing creativity, where it was considered as part of sport intelligence. Interviewees made the point that imagination is useful but

whatever is imagined needs to be mastered before executed during competition. Imagination, therefore, makes a contribution but should be done in a **controlled** and **practical** manner where opportunities are sought to **express oneself**, to **extend boundaries** and **stretch goals**.

#### **5.6.3.13 Assimilation**

Assimilation includes sub-themes including having the **capability** to **grasp concepts** and to do so at an appropriate **rate** and **pace**.

#### **5.6.3.14 Self-teaching**

Self-teaching from a rational/cognitive perspective refers to a sport participant being able to accurately assess their own technical and behavioural execution, to compare with what they have learnt and to self-correct. They are able to do so during training and practice and in real time competition situations. CRT3 made the point that: “The very best cricketers are constantly reviewing what and how they are doing and what bad habits need to be undone.”

“If you don’t learn fast, if you’re not smart enough, if you don’t pick up things fast enough you’re going to fall behind continuously. You have to be intelligent enough to know the difference between one dance and the other,” said DCE1.

#### **5.6.3.15 Judgement**

Judgement is defined as “The ability to make considered decisions or come to sensible conclusions” (Oxford University Press, 2014) and in the sport intelligence context is comprised of sub-themes including managing **risks**, making **fewer or no errors**, **anticipation** and **awareness**.

CRT2 noted that: “Your world class players have excellent judgement. They almost always do the right thing at the right time.” JOURN2 said something similar in announcing that: “Being fully aware of everything going on is a gift ... it’s almost magical ... and being able to make the right call at the right time means great judgement and decision making.” When responding to the topic of awareness, DCE1 said: “If you are not aware of where you are standing on the dance floor, you’ll disappear.”

Sternberg's (2011) theory of successful intelligence included a practical/contextual intelligence dimension, involving the adaptation and shaping of environments, which seems to have been supported by the current research.

#### **5.6.3.16 Insight**

Having insight into one's endeavours was an identified theme in the intrapsychic sub-system and consisted of insight into **opposition, competition, oneself** and one's own game. RGY1 noted that: "Good performances are assured when you've done the right amount and right quality of preparation and when players have been given accurate feedback on their competence, skills and executions and have acted on those insights."

Sternberg's (2011) theory of successful intelligence emphasised insight into one's relative strengths and weaknesses arguing in favour of individuals gravitating towards areas where strengths can be maximised and weaknesses minimised. Insight into one's own performance was confirmed by the current research study.

#### **5.6.3.17 Sub-system: Cognitive/rational component synthesis**

##### **5.6.3.17.1 Relationship with intelligence and sport psychology theory**

During the course of the study, the researcher remembered a saying his swimming coach, who coached a number of provincial, national and international swimmers, water polo players and synchronised swimmers, often used: "You don't just swim, you think and swim". Rational, thinking processes were, therefore, emphasised in this component and included cognitive themes like game processing, knowledge, recall, assimilation, judgement, decision making, learning, clarity and situational awareness. All of these are found in both sport psychology and orthodox intelligence theories.

Theories of general intelligence, especially orthodox approaches to intelligence, measure how well a performer does against a standard, which is articulated in a 'score'. The 'score' indicates how many responses were correct and how many errors or mistakes were made and the same philosophies and principles could be applied when assessing the relationship between cognitive/thinking process and sport intelligence. The idea of sport intelligence being a cerebral, logical, rational, mechanistic process will find support in this component.

### 5.6.3.17.2 Relationship with cognitive and systems psychology

Cognitive psychology is a logical, rational, mechanistic approach to understanding individual and group behaviour. Individual parts are significant in that they produce and maintain the system and the interactions between the parts are clear and concise. The relationship between the parts is unambiguous: A causes B. B is not affected unless A acts on it. Causality and linearity are at the basis of the nature of the relationship.

Systems psychology, however, considers how the whole operates and moves. It, therefore, takes into account individual and collective operations and processes, as well as the patterning of interaction. Systems psychology explores how systems operate as a whole and Table 5.17 illustrates this.

**TABLE 5.17** Difference between simple and complex systems (Kutz, 2013, p. 41)

<b>A simple system</b>	<b>A complex system</b>
<ul style="list-style-type: none"> <li>• Has many independent parts</li> <li>• Eliminates outliers as irrelevant</li> <li>• Is closed and unresponsive to outside influences</li> <li>• Views solving problems as complicated and requiring the intervention of specialists</li> <li>• Isolates and quarantines problems so no one finds out</li> <li>• Has component parts extracted and analysed individually, apart from the whole</li> </ul>	<ul style="list-style-type: none"> <li>• Has many related parts</li> <li>• Views outliers as meaningful</li> <li>• Is open and responsive to outside influences</li> <li>• Views solving problems as simple – anyone can do it</li> <li>• Accounts for the holistic impact of problems</li> <li>• Has component parts that have a symbiotic relationship with other parts and which cannot be analysed in isolation</li> </ul>

In terms of the sport intelligence theory, each sub-system or component can be considered a ‘simple’ system in the sense that it has many independent parts, operates on its own and can be analysed by its own and in isolation. The themes and sub-themes can be considered in this way. The component can, however, also be

assessed in systemic terms as cognitive processes can be influenced by external pressures, has many known and unknown parts and engages with other parts of the system as symbiotic, relationship psychology.

#### **5.6.3.17.3 Paradigm control**

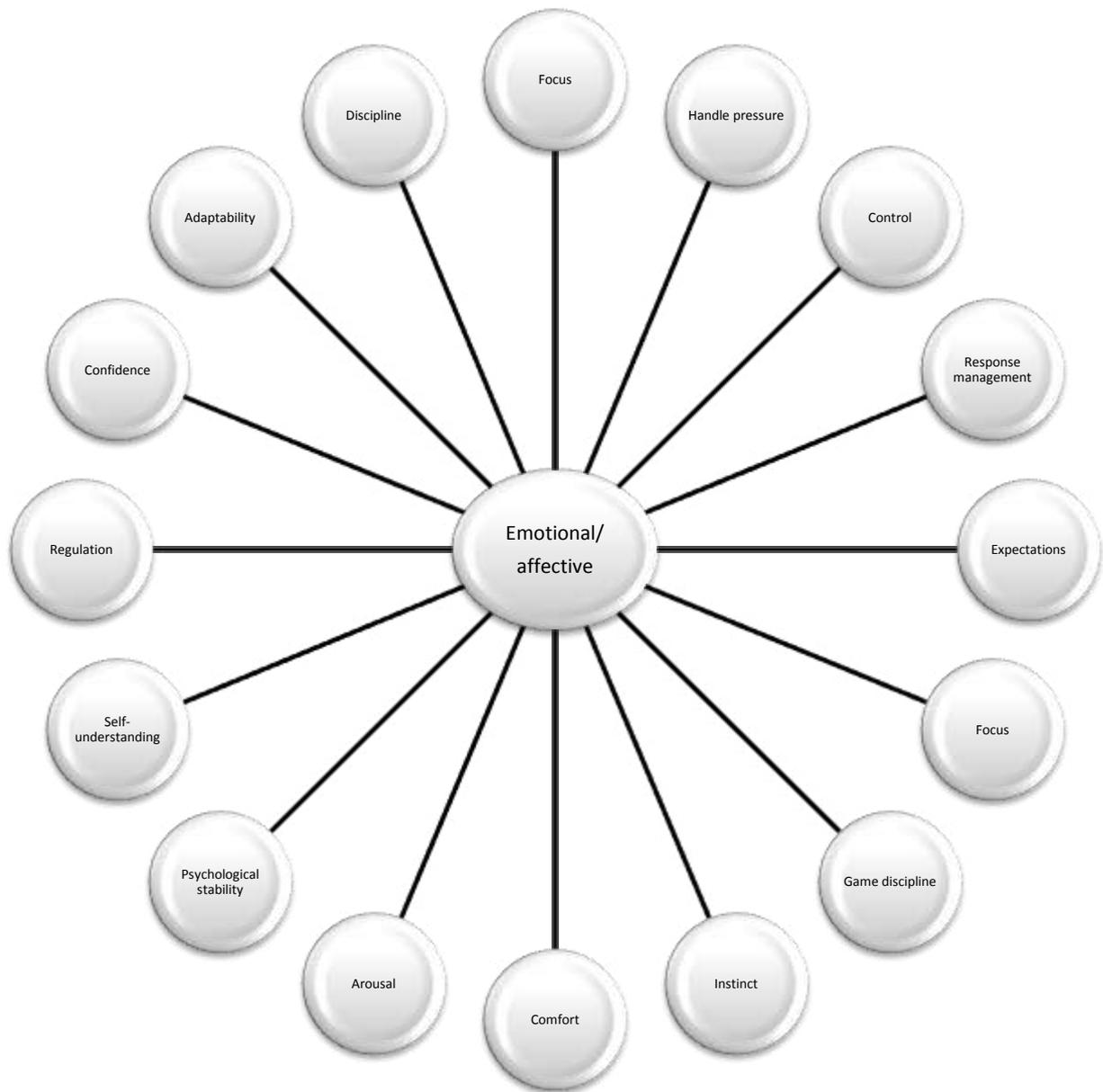
Logical rationalism implies that choice leads to performance and can be summarised along the lines of 'if a sport participant exercises correct choices then performance is guaranteed'. Prescribed procedures and practices are, therefore, likely to achieve success.

When operationalised, reality is, however, different. The 'formula for success' and blueprints are sometimes ineffective and are, according to systems theorists, due to the factors in the formula being incomplete and not all factors being included, in addition to not understanding how the factors interact with one another. Systems theorists attempt to understand these interactional patterns and how the system is influenced by internal and external forces.

In summary, thinking and rational processes are important facets of sport intelligence theory. They provide explanation for the benefits of predictable, routine, stable and repetitive aspects in the sport participant's arsenal. Over-reliance on them will, however, yield limited effect.

#### **5.6.4 Intrapsychic sub-system B2: Emotional/affective component**

The second component of the intrapsychic sub-system includes themes related to the emotional hypothesis and incorporates the themes of focus, handling pressure, control, response management, expectations, focus, game discipline, instinct, comfort, arousal, psychological stability, self-understanding, regulation, confidence, adaptability and discipline. These were generated from hypothesis 2 (working memory), hypothesis 3 (problem solving and reasoning), hypothesis 4 (multiple intelligences), hypothesis 5 (successful intelligence), hypothesis 6 (emotional intelligence), hypothesis 8 (knowledge and experience), hypothesis 10 (creativity) and hypothesis 11 (learning) in Figure 5.8 below.



**Figure 5.8** Sub-system B2: Emotional/affective component

David Epstein (2013, in his best-selling text *The Sports Gene*, argues that rational and emotional dimensions have been found in theory and research to be distinct from one another and this is one of the reasons why they are regarded as separate components in the current research study.

The sport intelligence model reflects this by indicating the two aspects as being theoretically distinct from one another and categorised as 'components'. Collectively, however, they form part of the intrapsychic sub-system.

#### 5.6.4.1 Focus

Non-distractibility was identified by Gould et al. (2002) as a personality characteristic of Olympian athletes. Remaining focused on tasks and not being **distracted** was also confirmed by the current study and being able to **concentrate for periods** were sub-themes identified. MM1 spoke about focus when saying: “I need to stay calm and try stay completely in the moment. Be that even in the build up, in training. Even in the warm up for the fight, my mind was worrying about money, worrying about my wedding coming up, worrying about a million things and my mind wasn’t focussed on just getting the job done”.

Blue (2009) refers to ‘competitive’ and ‘developmental’ intelligence in his research, which were also confirmed in the current investigation where staying focused on one’s endeavour is a constant, deliberate process. The sub-theme of **live the life**, therefore, applies to making lifestyle decisions on how the sport participant manages their life. JOURN1 made the observation that “You can’t be a part-time professional sportsman; you have to do it full time and at 100%.”

#### 5.6.4.2 Handle pressure

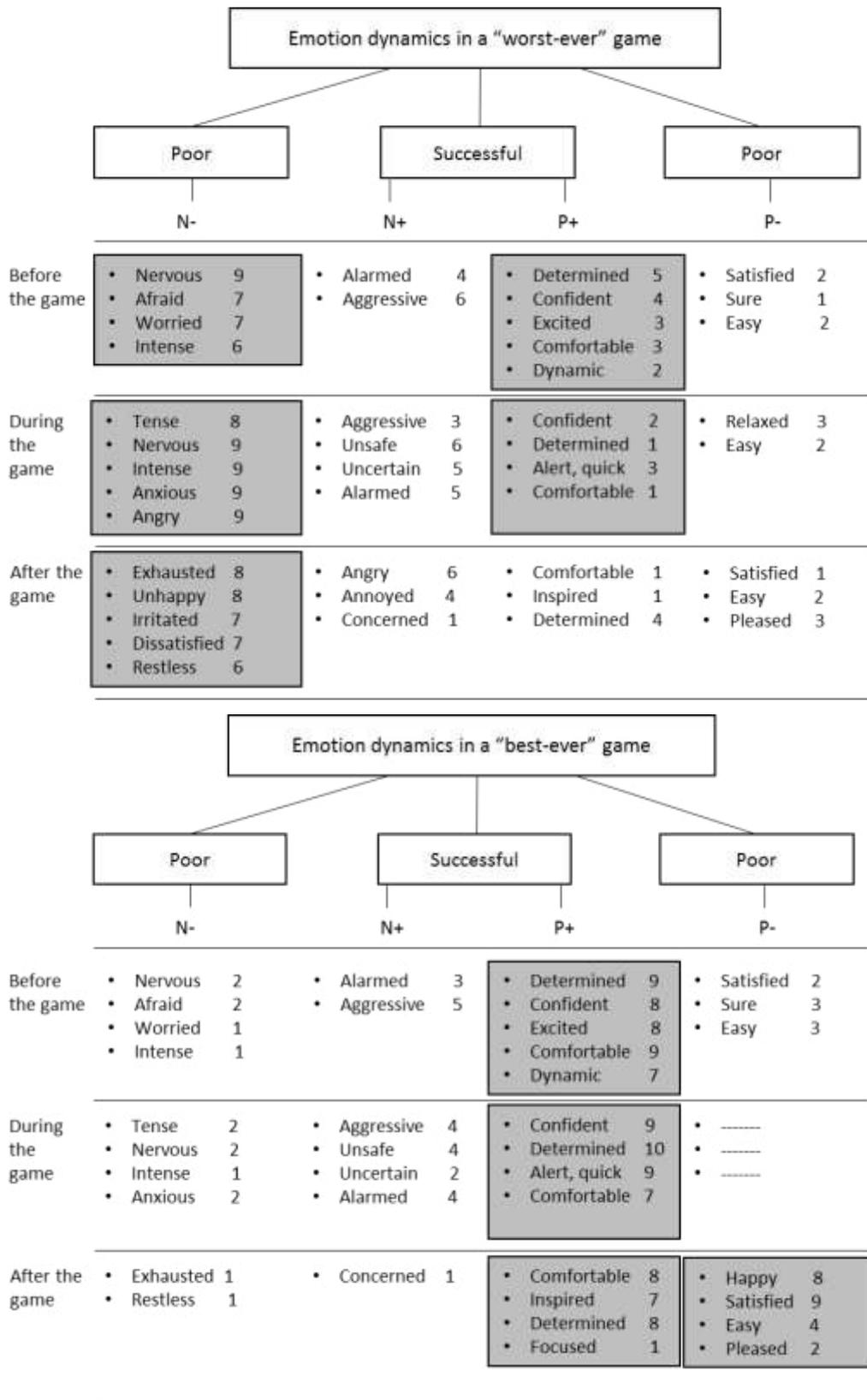
All research respondents referred to the aspect of handling pressure at some point of the interviews. RGY1 said: “In order to handle pressure you have to have confidence and confidence is two-fold that leads into each other. One is a self-belief and a belief in yourself as an athlete or a coach or whatever you are and then two is the belief in your plan”.

JOURN2 shed light on how to handle pressure when saying: “It’s about remembering how to play and then forgetting what you know is going to go wrong or what you think may go wrong,” while FCE1 responded to the topic saying: “Small games obviously bring with them an amount of pressure but it is that heat in a big game that really gets some players switch it on and perform at the optimum level.” CRT1 elaborated by saying that a sport intelligent participant should have the ability to “execute skill under pressure.”

Bar-On (cited in Mayer et al., 2011) referred directly to the **under pressure** theme when defining emotional intelligence as “one’s ability to succeed in coping with environmental demands and pressures”.

Gould et al. (2002) found handling pressure as a personality characteristic of Olympian champions in their study while many other researchers, academics and practitioners have referred to pressure management in their studies and experiences.

Pressure situations seem to result in a range of emotional dynamics. Figure 5.9 below indicates the emotional dynamics of an international tennis player in (a) best and (b) worst games and states in successful and unsuccessful competitions. This suggests that multiple emotions are at play during competitions which adds to anxiety and pressure, and subsequently makes pressure situations intricate, complex and multifaceted.



**Figure 5.9** Emotional dynamics in an international tennis player (Tenenbaum & Eklund, 2007, p. 40)

#### 5.6.4.3 Control

Control, in this instance, refers to emotional control and is similar to self-regulation as reported elsewhere. The analysis indicated different sub-themes including control of **oneself**, **opposition**, **team**, and overall **game**. GLF1 spoke of a fellow golfer saying: “He was the start of the Europeans really becoming great players – he learnt to control it all,” and FCE1 emphasised the importance of controlling one’s own emotions: “Allowing your emotions to control you, instead of you controlling your emotions can be the determining factor between a win and a loss.”

Many of the dimensions of emotional intelligence refer to control. Goleman (1995) refers to ‘self-control’ while Petrides and Furnham see emotional regulation as a major skill (cited in Mayer et al., 2011). Regulation is also considered a key component of the emotional intelligence systems set referred to in the literature review. Blue (2009) identified emotional control, regulating arousal and mental discipline in his study and these were confirmed by the current research investigation.

#### 5.6.4.4 Response management

Response management possesses sub-themes of **behaviours**, **emotions**, **self** and **others** and refers to the behavioural response a sport participant displays in a competitive/game or off-field/developmental role. The behavioural display is in response to an inner, emotional reactions and is manifested in behavioural terms.

The sport intelligent participant is aware of the impact of emotions; both potentially positive and negative on their overall performance together with how these are demonstrated and is able to exercise control over them.

#### 5.6.4.5 Expectations

The reader is reminded that the current research study is conducted from a systems perspective where “the whole phenomenon was thought of as a system and the parts as sub-systems within it” (Stacey, 2003, p. 24). Systems, therefore, comprise any number of sub-systems which include various stakeholders who, in turn, place performance expectations of the sport participant. ADV1 discussed the importance of managing expectations, saying: “More sensible individuals tend to invest time in levelling expectations amongst the players, amongst the team, participants,” and PBL1

elaborated on team expectations: “You’ve got a job to do and the team expects you to do that job.”

From the above, expectations can be positive or negative. SCR1 cited an example of Sir Alex Ferguson’s approach in a situation where his soccer team lost a final game: “He said we get a chance to win it back. So before anyone could go into a spiral about having just lost it, he was already planning for next season. It is that sort of reframing of challenges that I think is so important”.

The theme of expectations was similar to that identified by Blue (2009) who forwarded expectation management as part of his *Understanding Golf* conceptualisation, which was again supported in the current study.

#### **5.6.4.6 Focus**

Interviewees elaborated on focus as an important dimension of sport intelligence when this aspect was probed by the researcher. Additional sub-themes emerged and included being able to remain **in the moment**, not getting stale and bored with routine and coping with the psychological and physical demands of constant play, practice and travel, which can result in mental and physical fatigue. The sport intelligent participant prevents burnout and thereby managed fatigue by variety, periodisation, relaxation and time off. This sub-theme was related to the items identified in the **body management** theme.

#### **5.6.4.7 Game discipline**

Two sub-themes were elicited during the current research into game discipline and included sticking to **fundamentals** and that **winning** and **losing** are part of the sport process. Blue (2009, p. 69) considered “knowing how to win/lose effectively” a sub-theme in understanding the nature of golf in his study and this was again confirmed in the current research study.

#### **5.6.4.8 Instinct**

JOURN2, CRT1, JOURN1 and RGY1 provided examples of sport participants who play on instinct and argued that it may have both positive and negative impact on performance outcomes. The positive aspects of instinctive play is that in-game

opportunities can be taken advantage of and sometimes change the trajectory of a game while the negative effect could be that game plans are not adhered to or scenarios not executed properly. MM1 said: “Practice and practice until it becomes instinctive” while JOURN2 emphasised the relevance of instinct to sport intelligence when saying, “That’s sporting intelligence: What is learned, and what is instinct. It’s a combination of instinct, and learning.”

#### **5.6.4.9 Comfort**

RGY1, JOURN1 and CRT3 referred to the win/loss ratio of sport teams who play away from home versus home games. RGY1 provided the researcher with a statistic from his own sources showing how poorly South African rugby teams perform in the Super Rugby competition when mentioning that: “South African teams lose something like 80% of their away games but win the same amount when playing at home. As a country, we don’t play well when our environment is unfamiliar, home comforts are taken away and the spectators are not supporting us. We need to be able to overcome these basic **hygiene** factors if we are to be world champions.”

#### **5.6.4.10 Arousal**

Research data indicates that sport participants are able to switch the ‘on/off button’. JOURN2 referred to the case of one of the greatest all-rounders in cricket, Jacques Kallis, being able to switch on when batting, bowling or fielding and to then switch off when play was not fully underway. The switching ‘on’ refers to being completely centred on play, not distracted, focused on task relevant items and to then be able to take a break from intensity to ‘switch off’ mode. The switch off mode allows the sport participant to relax, take a break and rejuvenate. The switch on/off routine allows for extended periods and **maintenance** of concentration.

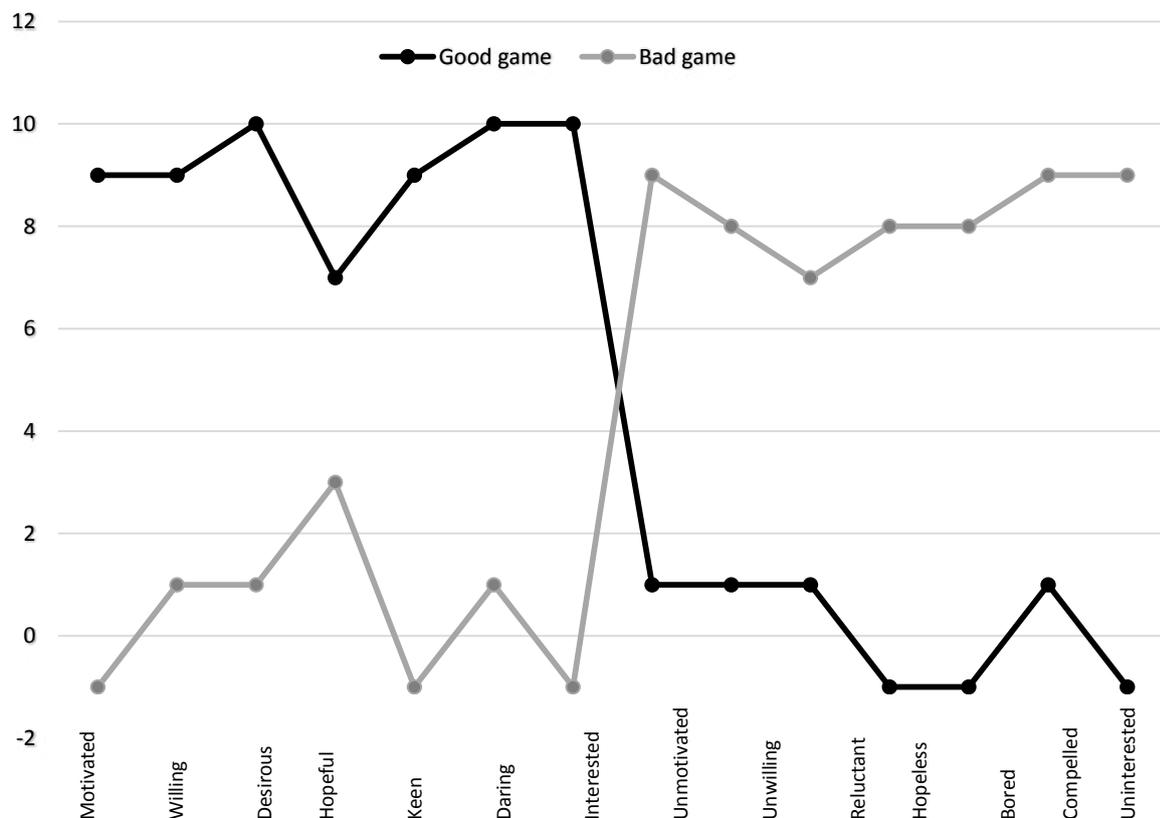
#### **5.6.4.11 Psychological stability**

The researcher asked a question on psychological strength to which all respondents argued that psychological strength is a prerequisite or foundational item for sport intelligence. MM1 said: “you need to be very, very mentally strong for this competitive sport” and RGY1 spoke of the importance of being psychologically strong: “Most importantly, there is coping with the setbacks that all players experience throughout

their careers, whether through injury, poor form, they get dropped – the ability to see the setback as an opportunity to come back even stronger and better”.

Some interviewees, however, argued that psychological strength was **not** as important as psychological stability as when FCE1 said: “Although I’m sure it plays a role, I would think that psychological stability is more important. Although someone may be psychologically strong, it doesn’t mean they are psychologically stable.” PBL1 said: “You have to be psychologically strong and consistent with that as teams will dominate you, teams will intimidate you, players will intimidate you”.

Figure 5.10 to follow shows how stability shares a conceptual relationship with sport intelligence where good games are consistently rated above seven by sport participants for positive emotions and one or less for negative emotions with the converse for bad games.



**Figure 5.10** Individualised motivational profile of ice hockey player (n = 29) (Tenenbaum & Eklund, 2007, p. 35)

Sub-themes of **focusing** on **relevant** emotional items were identified in the current study which suggested the sport intelligent participant maintaining psychological **balance** during and after competition. The work of Lohman and Lakin (2011) suggested that effective problem solvers “know what to seek and what to ignore” (p. 422) and this has been confirmed by the current study.

#### **5.6.4.12 Self-understanding**

Self-understanding was mentioned by RGY1 when he said: “... being very aware of who and where you are in terms of what are your strengths, what are your weaknesses, where are you going, how you going to get there, what do you need to do to get better”. This reflects the point that the sport intelligent participant is aware of their personality, mental and psychological make-up and the advantages and disadvantages of these. Sport intelligent participants make provision for these and manages themselves accordingly.

Self-understanding was identified by the current study to be conceptually and theoretically similar to Gardner’s theory (2006) of ‘intrapersonal intelligence’ while Blue (2009) also identified confidence, self-knowledge and self-awareness as fundamental to competitive intelligence.

#### **5.6.4.13 Regulation**

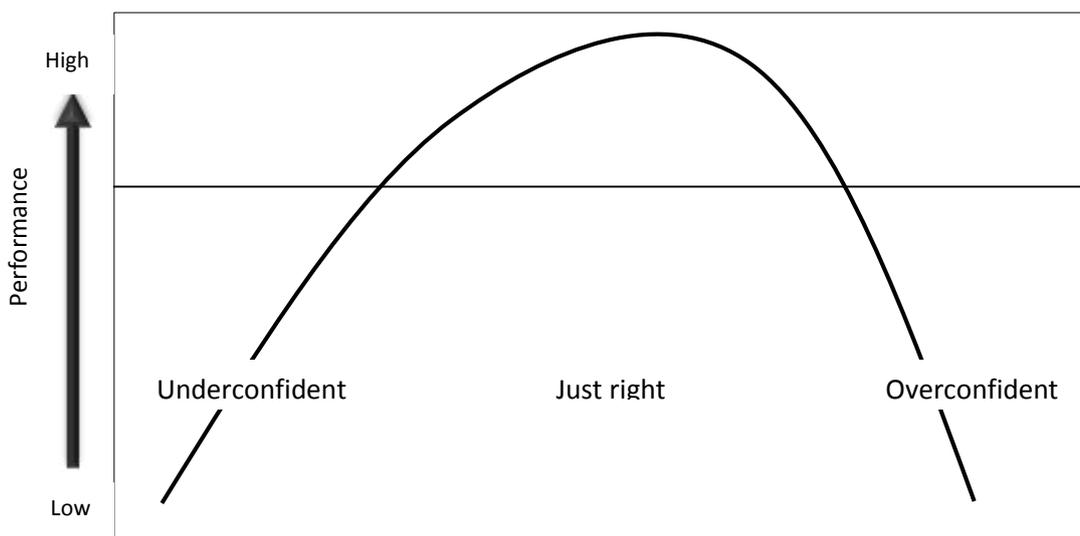
Emotional regulation emerged as a clear theme in the current study and included sub-themes of **control**, **intensity**, **pressure**, **aggression**, **arousal** and **excitement**. The sub-themes are consistent with the research and data on emotional regulation.

MM1 said: “I need to stay calm and completely in the moment and have taught myself to do that no matter what is happening”. WPL1 was succinct when saying: “I don’t let emotions get in the way of the game”. This view was supported by other interviewees.

#### **5.6.4.14 Confidence**

RGY1 noted that confidence is generated from knowing one’s game and being able to: “deconstruct your own game from doing a thousand drives and when you get your thousand drives right then you do a thousand fifty-metre shots and then a thousand chips and then a thousand putts and then your confidence improves”. DCE1 said:

“Confidence plays a huge role in sport ... as long as you do anything with confidence nobody will know the difference.” PBL1 made the observation that: “A guy who is not confident in himself, he’s not going to get the chance.” The theme of optimal confidence was highlighted by interviewees and the inverted U illustrating the confidence-performance was discussed by the researcher with some interviewees.



**Figure 5.11** Confidence-performance relationship (Weinberg & Gould, 2007, p. 325)

Confidence included a sub-theme of confidence in oneself and additional sub-themes included confidence in **team-mates**, being **consistent**, **dominating** and the value of **experience**. PBL1 referred directly to this when integrating sport intelligence and experience when arguing that: “Because the younger players are very fast, they are very active, aggressive and good but they don’t have the intelligence and they don’t have the knowledge to play clever ... So that’s not the guy that you want to keep at the back and finish the game because he will just go out and run down the field and do something stupid. Where the older players, you know, they very smart. They may not be as fast and aggressive but they can out think you and out work you and that’s also now the combination!”

#### **5.6.4.15 Adaptability**

Adaptability in the context of sport intelligence was defined as being **prepared** for any situation, being able to **apply oneself** according to situational demands, being **versatile** and **flexible**. MM1 had an interesting comment in relation to adaptability when saying: “I work off what you give me ... (and combine with that) ... where I want

to take the fight". He was, therefore, suggesting that while tactics and plans are significant, so too is the response to competitors. Being able to adapt and 'feed off' opponents offers an opportunity to perform on the sport field.

#### **5.6.4.16 Discipline**

Discipline in the context of the emotional intelligence sub-component included sub-themes of **survival**, and being **methodical** and **organised** in your physical and mental play. MM1 noted "There are two aspects: Your body's physical preparation and your mental, tactical, strategic preparation ... if I've done the drills and I've got muscle memory and I've got superior skill from my learning, I will beat you. I will beat you, guaranteed." PBL1 reinforced on the point mentioned elsewhere by saying: "Teams will intimidate you, players will intimidate you ... so it's survival of the fittest out there."

#### **5.6.4.17 Sub-system: Emotional/affective component synthesis**

##### **5.6.4.17.1 Relationship with intelligence and sport psychology theory**

The literature review indicated that the influence of emotions is considerable on the performance or lack thereof of the sport participant. Emotions received much attention in the literature study and was covered in both intelligence theories in addition to sport psychology. Emotions were also part of competitive and developmental intelligences identified by Blue (2009). The content and findings generated confirmed what was presented in the literature with arousal, psychological stability, emotional control, coping under pressure, adaptability and confidence featuring as key themes within the emotional component.

##### **5.6.4.17.2 Relationship with cognitive and systems psychology**

Traditional approaches to scientific enquiry emphasised a linear, cause-and-effect relationship between dependent and independent variables. The general formula within linear thinking is if there is more or less a cause then proportionally less or more the effect.

The scientific revolution, with its century long and ongoing views supported the deterministic, cause-and-effect thinking and practices. The deterministic, reductionist thinking however suggested that man was not 'free' but rather subject to laws of nature. Reality was, therefore, that which was perceived through the senses and is

external. All humans are born that way, with parts being the primary tool in reductionistic theory.

Hume (cited in Stacey, 2003, p. 19) challenged this in the middle of the 18<sup>th</sup> century, taking a radically sceptical position, and said: “the mind imposes an order of its own on the sensations coming from the external real world but this order is simply an association of ideas, a habit of human imagination through which it assumes causal connections.” According to this view, ideas are generated from experience and intelligence reflects habits of the mind.

Kant (cited in Stacey, 2003, p. 20) advanced this by proposing a dualism arguing humans could not know reality itself but rather the appearance and sensation of reality. The mind, therefore, “consists of innate categories which impose order”. Kant, therefore, posited the notion that individuals are self-organising systems rather than mechanisms and the whole is required for the parts to work. The system works due to the interactions within the organism.

Academics questioned the reductionistic thinking from about the 1920s which built on Kant’s writings and led to systems approaches to understanding individuals, communities and societies. Cognitive psychology also became the prominent psychology of the time and focused on rationalist processes in understanding organisms and from this perspective, individuals are logical, rational beings while emotions are not considered relevant, nor are power variables, influence patterns and structure relationships.

The literature review and findings, however, suggest that emotions and unconscious processes play a significant role in the overall effectiveness of the sport participant.

#### **5.6.4.17.3 Contribution of humanistic psychology and the unconscious perspective**

Humanistic psychology considers the contribution of emotions and gained momentum in response to the pessimism of the psychoanalytic tradition. Humanistic psychology offered an optimistic alternative, and emphasised motivation, satisfaction, leadership and culture – all of which featured in the current research study. Humanistic

psychology focuses on actualising one's potential, as highlighted by the work of Abraham Maslow, who developed a hierarchy of needs according to which basic needs have to initially be fulfilled before higher order factors can be delivered on. Basic needs in this regard included food, social needs like safety and esteem culminating in self-actualisation and once those needs have been satisfied, then powerful emotional and motivational states occur.

Positive psychology and psychofortology or the psychology of strengths has developed from the humanistic school and focuses on that which is positive and can be used by agents in a constructive manner. Psychofortology argues that individuals should leverage their strengths and emphasise them in any situation. This is consistent with literature and research findings in the current study, where playing to strengths and minimising limitations was referred to.

Cognitive systems and humanistic psychology focus on conscious, visible processes whereas psychoanalysis makes use of unconscious processes. Unconscious processes include desires, repression, anxieties and memories. Psychoanalysis furthermore considers how these processes play an instrumental role in the emotions and behaviours of individuals, groups and societies.

Psychoanalysis attempts to understand the unconscious processes by bringing them to awareness so that the individual can exercise choice rather than to remain subject to the determinism of one's infantile and early years. Unconscious processes clearly manifest throughout a sport participant's existence, during competition and off the field. It can, therefore, be stated that unconscious processes affect sport participants individually and in group contexts, therefore, offering development opportunities for individuals and teams.

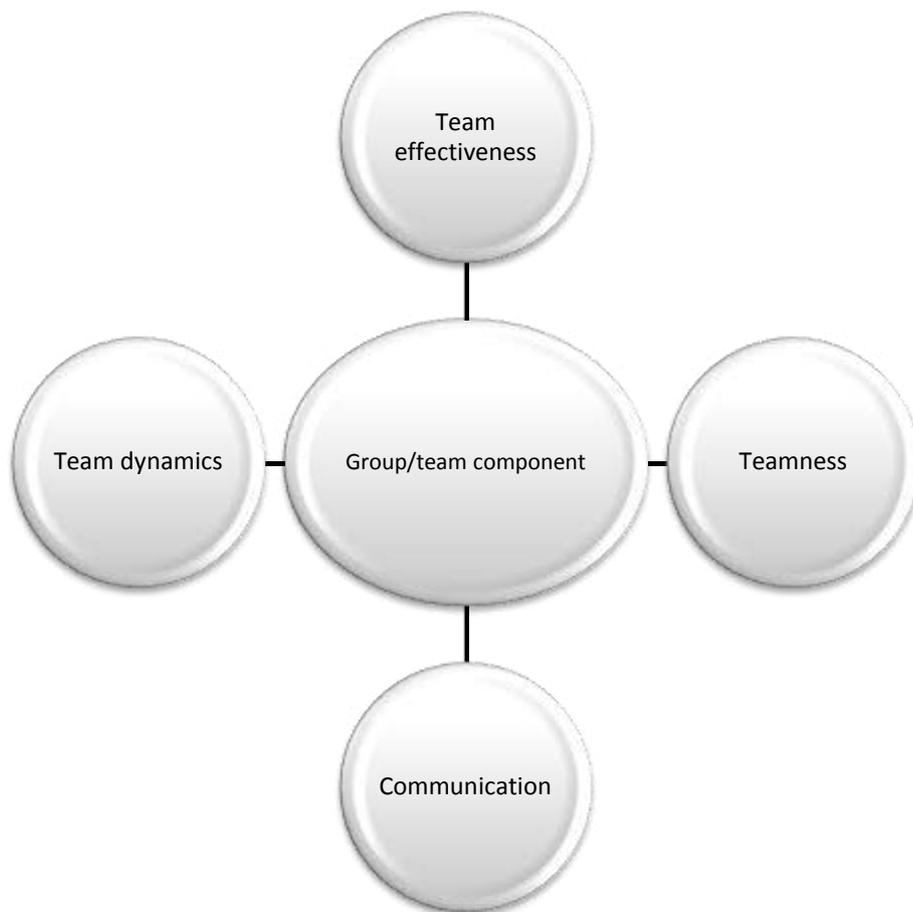
#### **5.6.4.17.4 Paradigm control**

This section has introduced emotions and their centrality in the proposed model or theory of sport intelligence. Sport psychology and intelligence literature as well as research findings show how significant emotions are in the sport participant's repertoire. Humanistic psychology, positive psychology and psychofortology emphasise the potential of emotions and, therefore, can be considered from a post-

modern perspective. Emotions can be viewed from a constructionist perspective where individuals are able to select and develop emotional states with the aim of developing emotional states to the advantage of the sport participant.

### 5.6.5 Ecological sub-system C1: Group/team component

As with the previous sub-system, the ecological sub-system includes two components, namely a group/team component and a societal component. The group/team component emerged as a powerful theme and refers to the sport participant's relationships and interactions with others. This includes sport participants' role as a team player, relationship with coaches, administrators and other stakeholders. Dynamics between the sport participants also featured, as did communications. The group/team component was mainly generated from hypothesis 5 (successful intelligence) and hypothesis 13 (relationship competence) and is set out in Figure 5.12.



**Figure 5.12:** Ecological sub-system C1: Group/team component

### 5.6.5.1 Team effectiveness

Gardner's (2006) theory of multiple intelligence identified interpersonal intelligence, which was also confirmed in the current research study. Sub-themes of **getting on with others** and **relationship building** emerged with CRT1 arguing that: "making the team first and the individual second" was a mantra in the teams he has coached. RGY1 said: "It's important to develop a team ethos and it works well when players work for each other." CRT3 noted that: "It is very important to get the right guys on the journey, you want guys who can work together and we workshop through making sure that we can respect each other's personal space and that sort of thing." SCR1 argued that: "Players need to be able to get on with one another and **manage themselves in different environments.**"

### 5.6.5.2 Teamness

Teamness referred to the role of different **personalities** and how these could **conflict** with one another. It included sub-themes of **ego management**. CRT3 used an example of how a player was forced into a squad and "he was a huge distraction on a daily basis ... and the most effective way of managing them is to adhere to the broader team protocol and professionalism." Adhering to values and accepted behaviours is seen as non-negotiable from a sport intelligence perspective.

Team effectiveness and teamness are similar to one another in a lexical sense but were defined differently through the content analysis. They seem to share common ground with the work of Gardner (2006) and his theory of multiple intelligences, specifically his theory of interpersonal intelligence where being sensitive to others' moods, personalities and ability to co-operate with others was considered significant.

### 5.6.5.3 Communication

The case of soccer team, Manchester United, was presented by SCR1 to illustrate the importance of **messaging** when saying: "So the words they use create a teamwork environment. They also do everything for the players so as to take away the excuse of 'I'm not happy, I'm not this, I'm not that'." The work of Rosefeld and Richman (1997) emphasised listening, emotional, reality, task and personal support as significant and this was also confirmed in the current research study.

Actual game time, competition and in-competition **communications** were identified as a sub-theme within the team sub-system where clear, concise and direct communications were identified as significant. DCE1 referred to non-verbal in-competition communication: “If she doesn’t listen to what I say to her on the dance floor then she can mess up the connection,” and PBL1 went on to say: “All on the field while you playing so it’s a lot of communication. The teams that communicate are the teams that are winning.”

Communication, therefore, seems to share a conceptual and practical link with Gardner’s (2006) theory of linguistic intelligence where people are able to communicate effectively through verbal communications, writing, telling stories and memorising. Communication is, therefore, an important part of the sport intelligence model.

#### **5.6.5.4 Team dynamics**

Team dynamics refer to the extent that team members are aligned behind a **vision**, **goals** and **objectives**, the extent to which they adhere to **values**, **ground rules** and **standards**. Team dynamics also refer to the level and **degree of cohesion** in the team. DCE1 spoke of the importance of team dynamics in his own discipline: “I’d continuously keep contact with my dancing partner. If it’s holding her hand or talking to her, I’d always have to physically touch her so I know that we connected fully before we go on, we continuously like pumping each other up and connecting psychologically.”

Individual and team motivational patterns were also referred to by RGY1, SCR1, MM1, PBL1, CRT3 and JOURN1 while team dynamics seem conceptually similar to Gardner’s (2006) interpersonal intelligence.

#### **5.6.5.5 Ecological sub-system: Team/group component synthesis**

##### **5.6.5.5.1 Relationship with intelligence and sport psychology theory**

The literature on interpersonal intelligence indicated that effective relationship skills are important in any sporting endeavour, including individualistic sports. Different approaches to understanding and defining intelligence emphasised working effectively with others. Gardner’s (2006) interpersonal intelligence argued convincingly in favour

of this while much of emotional intelligence theory supports sound relationships with others.

Sport psychology does the same and contends that a significant portion of the sport participant's existence is in relationship with others with the theory ranging from being extrinsically motivated, playing to the crowds or simply interacting with others. The nature, direction and dynamics of those relationships is, however, rather complex. In the next section the key challenges of groups and teams will be outlined.

#### **5.6.5.5.2 Relationship with cognitive and systems psychology**

A group is defined by Tyson (1987) as “two or more people who have a common interest or goal and who interact and influence each other” (p. 346). Jordaan and Jordaan (1990) indicate that “groups have a number of characteristics including awareness of membership, interactions with one another, implicit or explicit objectives, a set of norms and conforming behaviours, leadership and followership patterns and interpersonal relationships” (pp. 751 – 755). Tyson (1987) adds conformity and social facilitation, group productivity, polarisation and group thinking as well as actual and historical items to the way groups are influenced.

Sport teams are groups, but from a systems perspective allow for insights that cannot be achieved by individual sport participants. Stacey (2003) refers to the work of Bohm who talks about “a new kind of mind that comes into existence. People are said to participate in this pool of common meaning, which is not accessible individually. He talks about the whole organising the parts” (p. 105). Sport teams, therefore, possess either implicit or explicit mental models. These models should be ‘lived out’ in every day activities and functions.

Groups and teams experience phases in their development and overall learning process. Early cognitive theorists like Tuckman forwarded a forming, storming, norming and performing stage while Lewin referred to an unfreeze-refreeze phase (Stacey, 2003) as phases of team learning and development.

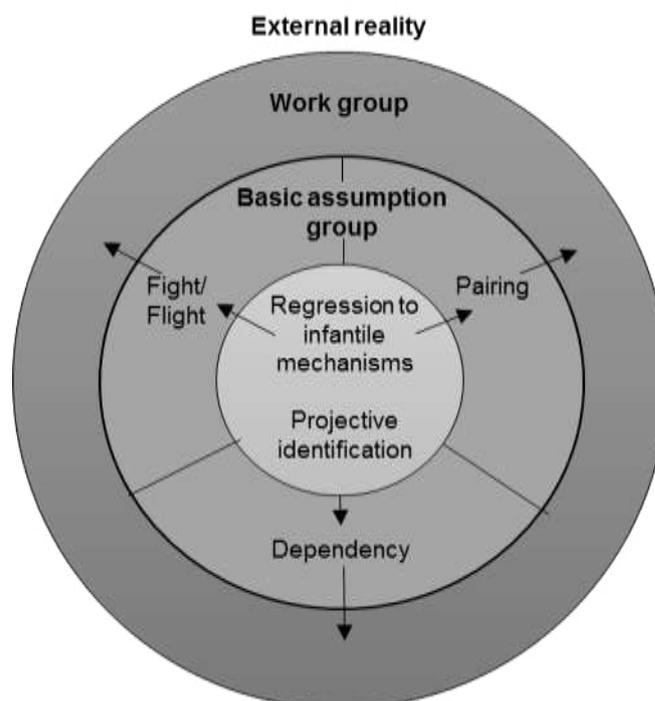
Systems psychodynamic theorists emphasise unconscious processes as being constructive or potentially destructive for teams. Bion (cited in Stacey, 2003) identified three basic assumptions when studying team dynamics, namely:

- Dependence on a 'leader';
- Fight/flight of a perceived 'enemy'; and
- Pairing where 'experts' will provide the solution.

Stacey (2003) shows that Torquet added a fourth assumption for team dynamics, namely:

- Oneness where members seem lost in an oceanic feeling of unity.

The dynamics can be represented as follows in Figure 5.13.



**Figure 5.13** Unconscious group processes (Stacey, 2003, p. 143)

A team and group intelligence is a key component of the sport intelligence framework and a number of theories and approaches are taken when considering teams and their underlying dynamics. Groups and teams are understood, in system psychodynamic terms by the mnemonic BART and include:

B = Psychological **boundary** between individuals and groups;

A = **Authority** as the authorised leadership to regulate behaviours;

R = **Relationships** between individuals and role; and

T = **Task** referring to what needs to be performed (Coetzee & Cilliers, 2001)

#### **5.6.5.5.3 Paradigm control**

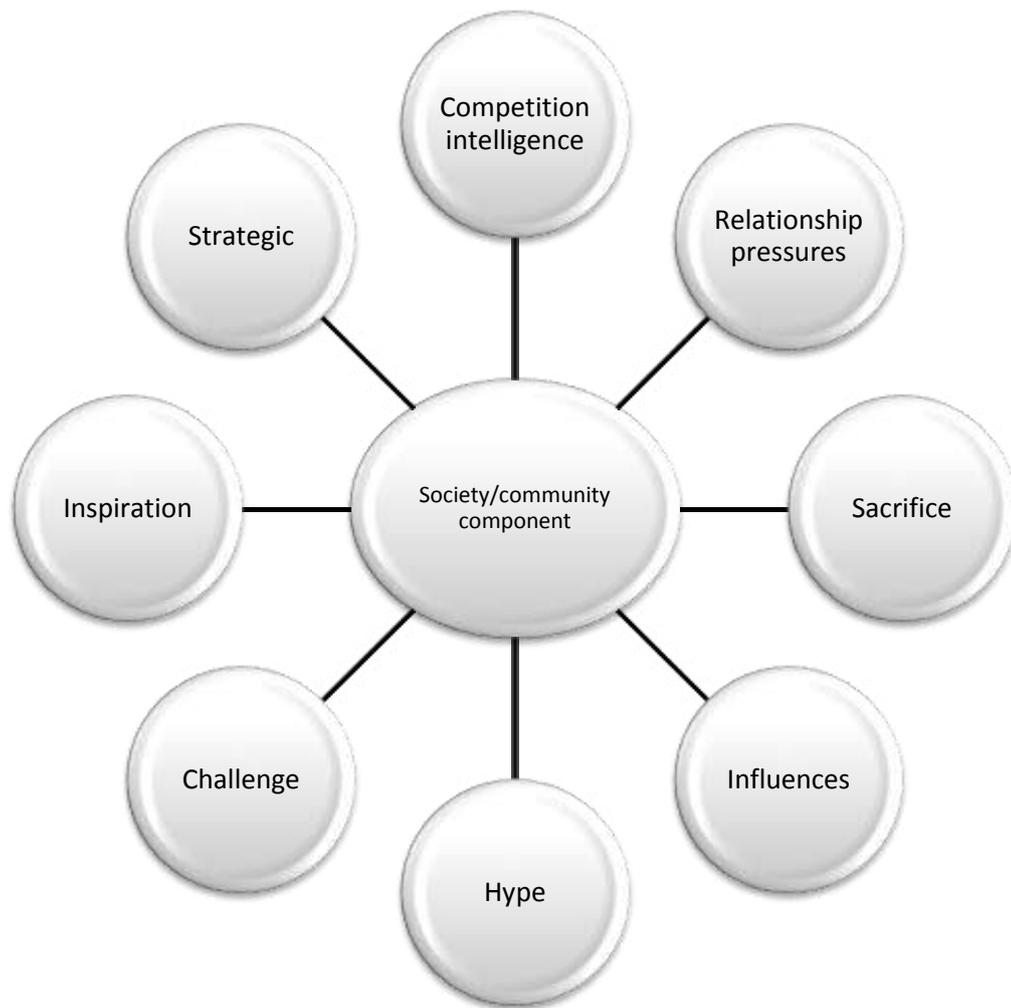
This section has indicated that a key sub-system within the proposed sport intelligence model is that of teamwork, which includes being able to participate constructively with others and possessing good interpersonal skills. Teams and groups were shown to be complex systems with dynamics occurring at both conscious and unconscious levels.

Cognitive theorists emphasise development stages: Tuckman and Lewin (cited in Stacey, 2003), for example, who argue that teams move toward stable states like performing and refreezing. System psychodynamic theorists including Bion (cited in Stacey, 2003) show that constructs like dependency on leadership, fight/flight, projective and transference patterns are continually at play and propose that groups are worked with from boundary, authority, relationship and task perspectives. These are relevant to the sport intelligent participant in that they illustrate the depth and extent of dynamics that are at play in any group or social system. These dynamics enhance performance.

Leadership implies authority which is relevant to the sport intelligent participant as they need to remain in their own 'authority'. The sport intelligent participant considers authority as valuable and are manageable.

#### **5.6.6 Ecological sub-system C2: Societal component**

A second component of the ecological part system is that of a societal component. This refers to the sport participant's relationships with and the effect of broader society on the individual. This sub-system includes themes of competition with others, relationship pressures, sacrifice, influences, hype, challenge, inspiration and being strategic and was mainly generated from hypothesis 1 (mental speed), hypothesis 5 (successful intelligence), hypothesis 9 (motivation) and hypothesis 10 (creativity) and is set out conceptually as follows:



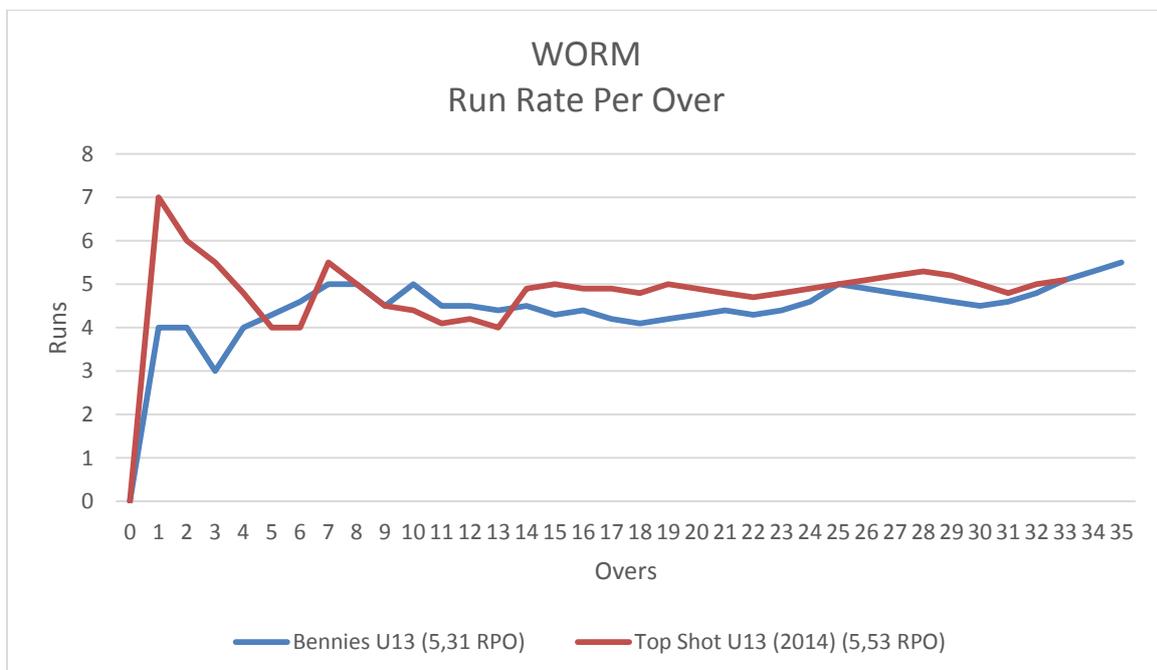
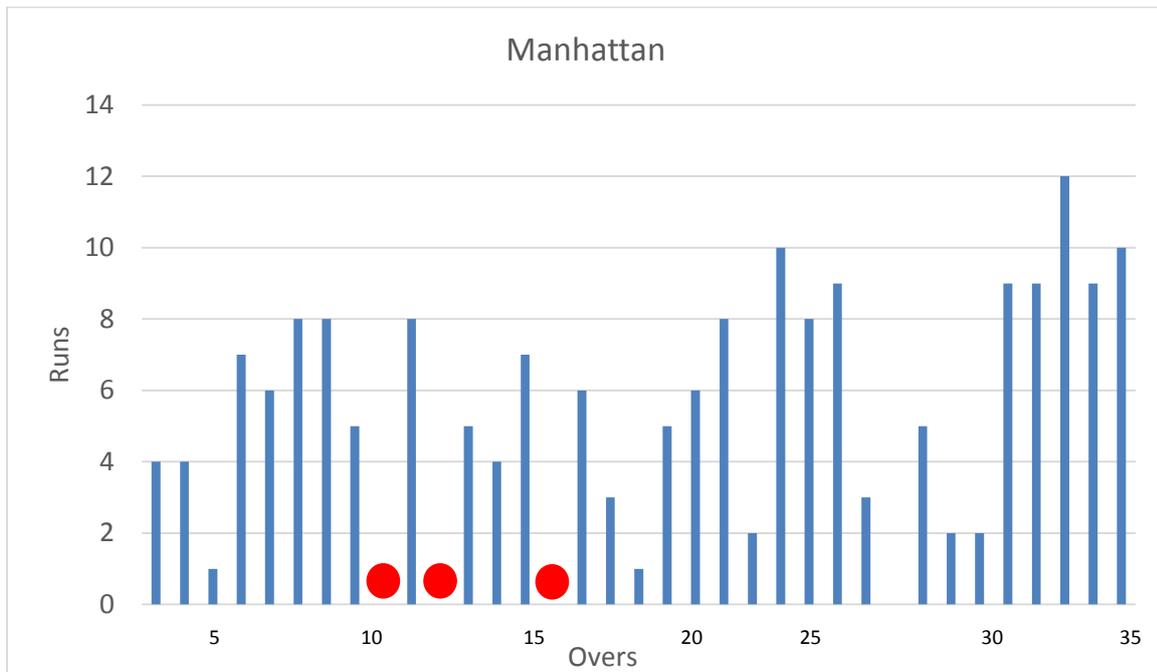
**Figure 5.14** Ecological sub-system C2: Societal component

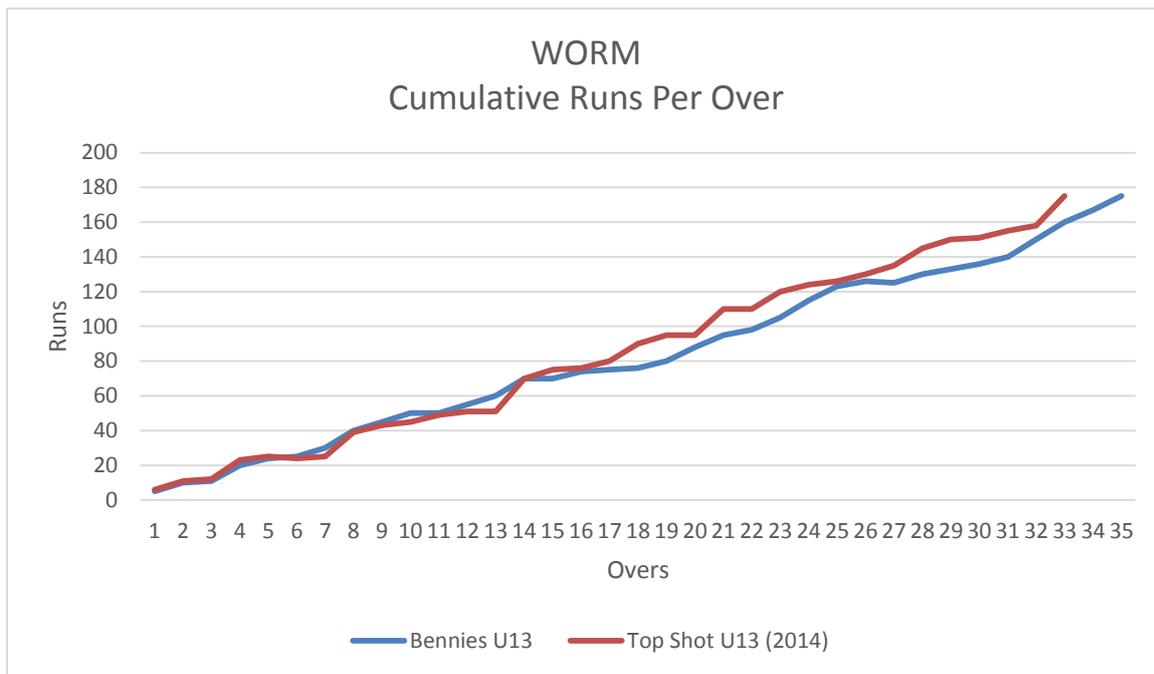
### 5.6.6.1 Competition intelligence

Sport participants compete against an existing standard like a time or distance or against opponents. Competition intelligence, as part of the societal part system, refers to knowledge, data and information about the opposition. Information should be collected, analysed and studied so that the sport participant can decide on an effective strategy and tactics. Through **analysis**, opposition plays are broken down into as much detail as possible so that the sport intelligent participant is able to predict what their opposition may or may not do in game situations.

Competition analysis is usually done before and after competition using different kinds of technology and statistics but it can also be performed during competition using visual cues, behaviours, body language and movements.

Below is an example of a cricket team performance. Data from these sources will, for example, be used when analysing opposition.





**Figure 5.15** Example analytic graphs (nxCricket, August 2014)

### 5.6.6.2 Relationship pressure

DCE1 referred to the effect of international competition during his interview, saying: “I was overseas for like two to three months, you miss your family, you’re missing events and when you come back people are completely different.” Sub-themes in this regard included **personal pressures** on personal life with some players needing privacy. This can be partly explained in Jungian terms where introverts typically lose energy in team contexts and need ‘time out’ to rejuvenate. Extroverts, on the other hand, are more energised by increased interaction with people.

### 5.6.6.3 Sacrifice

Many interviewees referred directly or indirectly to the sacrifice and impact that elite sport can have on individuals, their friends and families. DCE1 said: “Your friends will never see you, nor will your family.”

Sacrifice was also considered from a developmental perspective as young players miss out on the developmental stages they go through as children, teenagers and young adults due to being on tour, constant training or other means such as home schooling. JOURN2 referred to the lifestyles of gymnasts in the 1970s and 1980s when

young elite gymnasts such as Nadia Comaneci experienced developmental problems which led to psychological problems including anorexia nervosa.

Blue (2009) identified resistance to social norms such as socialising and celebrations in his exploratory study with similar findings identified in the current study. The sport intelligent participant seems to be willing to sacrifice time, effort and other opportunities in favour of competition preparation and competition itself.

#### **5.6.6.4 Influences**

Influences were mentioned by JOURN2 when stating: “Players get influenced by all kinds of people who hang onto them ... and some of those influences are negative,” while CRT3 said: “In South Africa, board members get involved with playing matters and it’s just not professional.” The responses from the research participants indicate that so called **negative influences** should be minimised with the emphasis rather on **positive influences** such as role models, values and vision alignment coupled with strong formal and informal leadership. The sport intelligent participant seems to have positive, optimistic and constructive relationships with others and with society at large.

#### **5.6.6.5 Hype**

“Elite sportsmen and women are idolised; they are on TV, in newspapers, magazines, Twitter, on phones, laptops and iPads the world over ... they are almost always on show and have to guard and maintain their image constantly,” noted JOURN2. Managing **media**, **supporters** and **stakeholders** was, therefore, identified as a sub-theme. Equally important, for the sport intelligent participant, though, would be the requirement to remain ‘grounded’ in the midst of the media and public exposure. JOURN1 listed players like: “Jacques Kallis and Jean de Villiers, who have remained decent blokes while becoming world champions”.

#### **5.6.6.6 Challenge**

The challenge theme included sub-themes of enjoying **winning**, being dissatisfied with **losing** and having the opportunity to **test** oneself against others. The sport intelligent participant seems to enjoy the challenge of competition, the process of competition including training, preparation and post-game activities and the positive outcomes of competition. ADV1 said: “You define what’s possible, how far you want to go,” and

JOURN2 went on to say: “Once you know your limitations then you know that you can push a little bit further, see how much further you can push that limitation. It’s about being able to go from one barrier to the next barrier almost.”

#### **5.6.6.7 Inspiration**

CRT3, CRT1, WPL1, MM1 and RGY1 argued that sport provides the opportunity or vehicle to make a difference to other people in addition to the sport participants themselves and is, therefore, included in the societal component. They argued that sport can alter individuals, groups, communities and societies and “be a positive force” as KM10 commented. JOURN2 argued that the winning of the Rugby World Cup and hosting the Soccer World Cup in South Africa positively influenced the course of the country.

SCR1, however, shared the ‘shadow’ side when sharing local examples of role models whose actions and behaviours later on were negative when saying: “We have the Hansie Cronje, Joost van der Westhuizen and Oscar Pistorius cases that are just plain negative.”

#### **5.6.6.8 Strategic**

Earlier sections outlined the term **strategy** and this was referred to throughout the interviews and data analysis. Strategy refers to how individual and/or collective goals will be achieved and was viewed in a similar way by interviewees. CRT1 argued that: “You need to have a clear strategy and plans and some options” while MM1 made the point that one needs strategic insight but must also be prepared for change when saying: “I work on my strategy, roughly. I will beat you, I will take you to my strength,” and later in the interview again mentioned strategy when he said: “I focus on my strength and my strategy but I can’t neglect the other stuff.”

A sub-theme identified in this regard was, therefore, one of seeing the ‘**bigger picture**’ and how tactics, activities and behaviours are all significant in achieving the “BHAG – the big hairy audacious goal” as RGY1 referred to it.

Blue (2009) identified 'course management' as part of his 'competitive intelligence' theory and included planning and strategy which were also confirmed in the current research study.

#### **5.6.6.9 Sub-system: Societal component synthesis**

##### **5.6.6.9.1 Relationship with intelligence and sport psychology theory**

The previous sub-component referred to the sport participant's relationship with teammates, coaches and competitors and this component extends the relationship thesis to include the community and society in which they participate. Intelligence theories referred to in the literature review included approaches like Gardner's (2006) interpersonal intelligence and Goleman's (2006) reference to social intelligence. The work of Sternberg (2011) referred to contextual intelligence which implies assessing the context and social milieu in which the sport participant finds themselves. Emotional intelligence is also included in this instance and implies positive, constructive relationships with others.

Sport psychology literature makes reference to society and the role of sport in general, and sport participants in particular. Motivation theory, for instance, relies on being externally or internally motivated where the sport participant who is externally motivated is being satisfied primarily by reactions and responses from external agents and the external environment.

Interviewees supported the literature findings. CRT3 noted that he "loved playing to the crowds" where JOURN1 and JOURN2, both veteran and award-winning journalists, noted how "some players perform because of the feedback and reinforcement they get from the fans in their communities". JOURN2 argued that "some players play for their country so that they can become household names and get recognised everywhere they go and want to be heroes."

The societal/community component included relationship pressures according to which sport participants' relationships experience stress and difficulty; influences referred to extraneous issues which could impact performance and development; believing the 'hype' that accompanies being a household name; being strategic in relation to others while remaining up to date on competitor activities and behaviours.

#### 5.6.6.9.2 Relationship with cognitive and systems psychology

Cognitive psychologists, sociologists and social scientists are tempted to suggest that “human beings learn their behaviour and use their intelligence whereas animals simply act on instinct” (Haralambos, 1986, p. 1). This, however, seems to be incorrect. Ideas, habits and behaviours are passed from generation to generation and culture, therefore, determines behaviours. Individuals are socialised into a set of norms, values and roles.

Sport has evolved as a mechanism where status is defined, especially among elite and professional sport participants. Sociologists emphasise social stratification, politics, education, organisations, families and gender as focal points when studying society and the implication is that these play an instrumental and influential role on sport participants (Haralambos, 1986).

Cognitive and social psychologists pay attention to and focus on social processes including social cognition, attitudes, group processes and cognition (Ruch, 1984, pp. 529-564). Sport participants are, therefore, subject to sociological and psychological influences in their endeavours. A number of systemic perspectives on the social nature of systems are found in the literature. These include the **interactive planning** of Ackoff (1981, 1984) and **soft systems thinking** of Checkland (cited in Stacey, 2003) and the **learning paradigm** of Checkland and Scholes (cited in Stacey, 2003). These perspectives attempt to integrate rational causality with emotions and human action and to do so through understanding the development and maintenance of relationships within systems (Stacey, 2003). These seem to form a ‘relationship psychology’ within systems.

Another systems approach which emphasises social relationships is that of a ‘community of practice’ which has, according to Wenger (cited in Stacey, 2003), three dimensions:

- **Mutual engagement** in actions whose meaning is being negotiated;
- **Joint enterprise** where a collective process of negotiation creates “relations of mutual accountability” (Stacey, 2003, p. 205); and

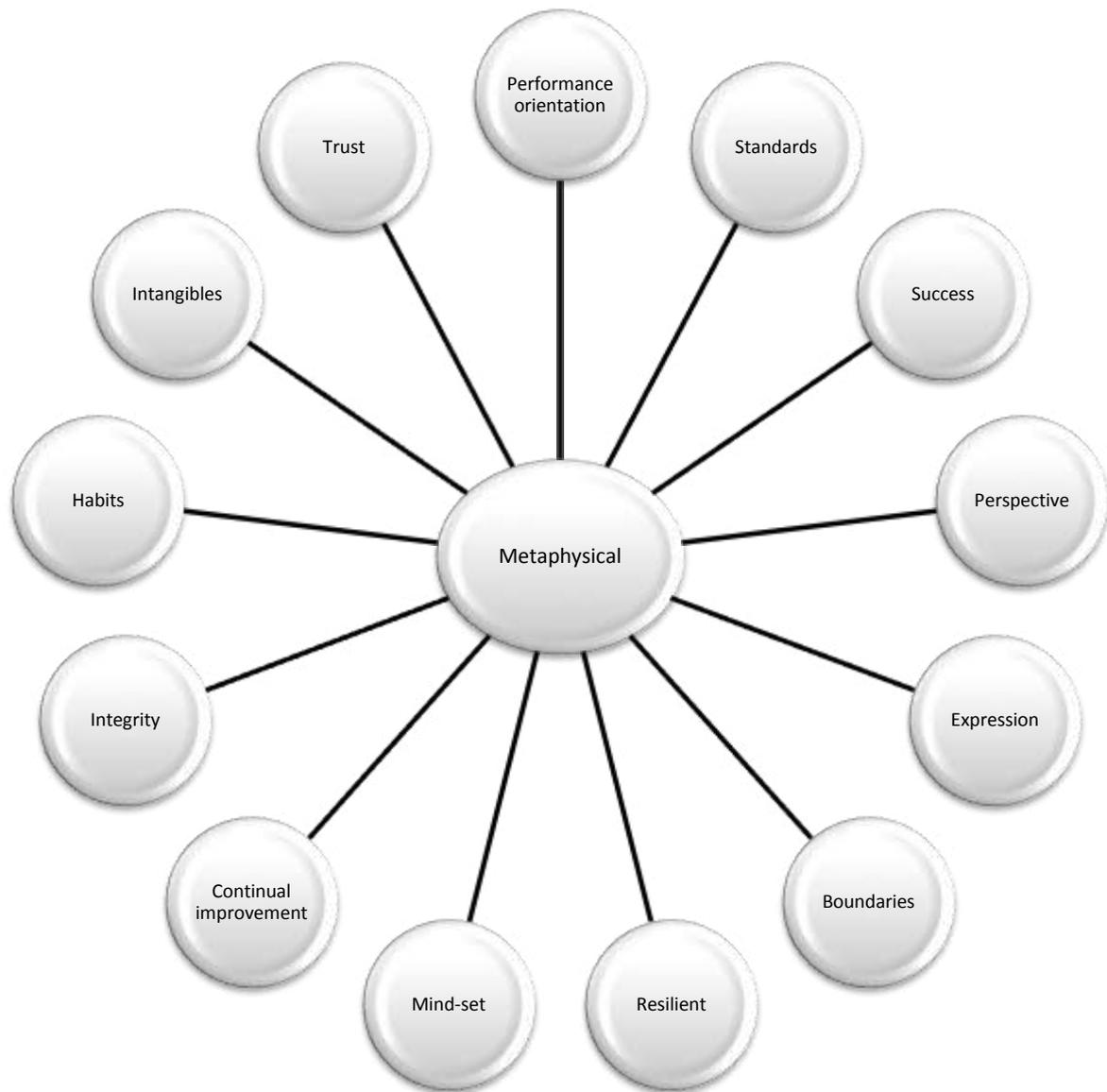
- **Shared repertoire** which consists of unique messages, routines, vocabulary and symbols.

#### **5.6.6.9.3 Paradigm control**

Reference to society, community and other collective forms imply a social perspective and, therefore, adopts a constructivist and social constructivist paradigm. Stacey (2003) defines this succinctly when outlining the “constructionist position is this: every explanation people put forward of any phenomenon is a socially constructed account, not a straight forward description of reality” (p. 8).

#### **5.6.7 Metaphysical sub-system D: Beliefs**

The final part system identified referred to beliefs, values and ‘higher order’ factors. This was a powerful theme in the research and surprising to the researcher. The emphasis fell on being performance-oriented, setting high standards, coping with success, maintaining perspective, expression, boundaries, being resilient, a learning orientation, a belief in continual improvement, integrity, effective habits, understanding culture and trust themes. These were generated from hypothesis 3 (problem solving), hypothesis 4 (multiple intelligence), hypothesis 6 (emotional intelligence), hypothesis 8 (knowledge), hypothesis 9 (motivation), hypothesis 11 (learning), hypothesis 12 (personality), hypothesis 13 (relationship competence) and hypothesis 14 (decision making). It is set conceptually out below.

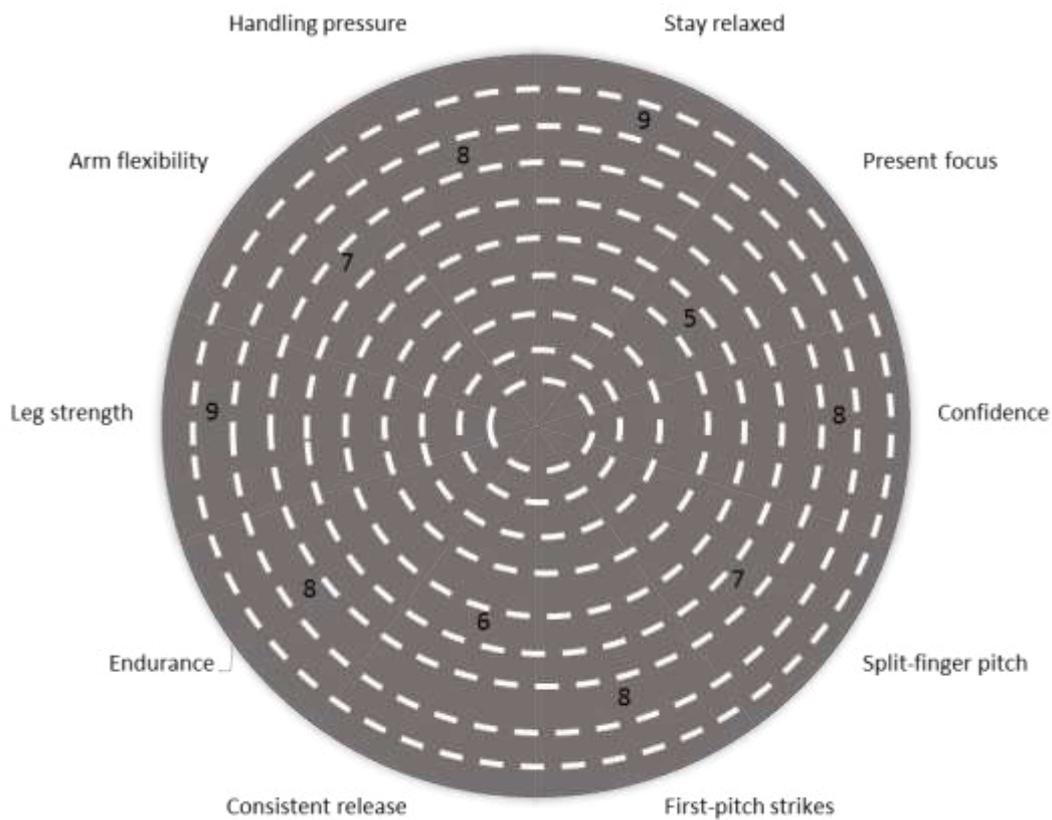


**Figure 5.16** Metaphysical sub-system D: Beliefs and Values

### 5.6.7.1 Performance orientation

Possessing a performance orientation was seen by interviewees as fundamental to sport intelligence and was one of the eight themes identified in response to the initial open ended question : “What is sport intelligence?” JOURN2, RGY1 and CRT2 all agreed that it is about “believing that highest standards should be worked towards throughout one’s life – not just on the sports field,” as RGY1 said. Sub-themes included being **achievement oriented**, being **competitive** and **managing one’s own success**.

The sample below is an example of a self-report performance profile indicating the focus areas where the sport participant needs to perform.



**Figure 5.17** Sample goal-based performance profile for a baseball pitcher (Adapted from: Taylor and Wilson, 2005, p. 111)

### 5.6.7.2 Standards

Standards were referred to in different ways by interviewees. CRT2 said: “As a player, you know what the highest standards are and you need to keep working at exceeding them”. DCE1 noted: “My partner and I knew what was needed to be successful and unsuccessful and the line between them was so fine”. RGY1 used an example of the film, *Any Given Sunday* (Stone, 1999), referred to earlier where the coach who is performing the team talk reminded his players of the difference between being successful and unsuccessful by saying: “On this team we fight for that inch. On this team we tear ourselves and everyone else around us to pieces for that inch. We claw our finger nails for that inch. Because we know when we add up all those inches, that’s gonna make the difference between winning and losing! Between living and dying! I’ll

tell you this, in any fight, it's the guy that's willing to die that's gonna win that inch ... now I can't make you do it. You've got to look at the guy next to you, look into his eyes. Now I think you going to see a guy who will go that inch with you. You gonna see a guy who will sacrifice himself for this team, because he knows when it comes down to it you're going to do the same for him. That's a team, gentlemen and either we heal, now, as a team or we will die as individuals”.

The sport intelligent participant understands that achieving high standards are implicit in positive performance outcomes. It's part of their belief system.

### **5.6.7.3 Success**

Sternberg's (2011) theory of successful intelligence was supported in the current research study. Interviewees reinforced his theory of intelligence which emphasised achieving goals by capitalising on strengths and compensating for weaknesses by being able to adapt and shape environments and to do so through a combination of analytical, creative and practical abilities.

### **5.6.7.4 Perspective**

Perspective was identified as a theme with regard to how the sport intelligent participant can cope with **success** and **failure**. Maintaining perspective was emphasised by PBL1 when saying: “Players that actually think that far ahead and realising the facts of the sport and life is that it will never be always fair, you know”. SCR1 used personal examples as a professional footballer in saying: “Be thankful because it is a powerful energy to get you through ... it will get you through the good times and the bad. That's the power of gratitude”.

### **5.6.7.5 Expression**

JOURN1, JOURN2, MM1 made the point that participation and achievement in sport provides the opportunity for the sport intelligent participant to express and motivate themselves and others. Their **plays, behaviour** and **performance** can set an example and demonstrate **leadership**. Leadership is demonstrated by the sport intelligent participant in behavioural and attitudinal ways, by remaining '**present**' to the current reality and future aspirations and by role modelling positive, values-driven behaviours.

### 5.6.7.6 Boundaries

CRT2 referred to his own career as a professional cricketer and provincial captain when he “constantly set goals and **stretch goals** and extended goals for the season to ball-to-ball goals and constantly encouraging my players and myself to exceed those goals”. MM1 wanted to break records and achieve what no-one else had and “I knew I could if it all went for me.”

Other sub-themes in this regard included challenge and enjoyment, which reminded the researcher about the work of Csikszentmihalyi (1990; 1993) and Csikszentmihalyi and Csikszentmihalyi (1988) on the concept of **flow**. Goleman illustrates Csikszentmihalyi and Csikszentmihalyi’s theory by using an example of a composer describing his work as being at its best when:

You yourself are in an ecstatic state to such a point that you feel as though you almost don’t exist. I’ve experienced this time and again. My hands seem devoid of myself and I have nothing to do with what’s happening. I just sit there watching in a state of awe and wonderment. And it just flows out by itself. (Goleman, 1996, p. 90)

Goleman (1996) contends that:

Flow is a state of self-forgetfulness, the opposite of rumination and worry; people in flow are so absorbed in the task at hand that they lose all self-consciousness ... (and) ... that watching someone in flow gives the impression that the difficulty is easy; peak performance appears natural and ordinary. (pp. 91-92)

Csikszentmihalyi and Csikszentmihalyi (1988) propose the ‘flow’ experience has an autotelic experience as its point of departure. The autotelic experience proposes that individuals complete activities that are enjoyable and rewarding in and of themselves and argue that it is independent of external rewards and is, therefore, intrinsic by nature. ‘Flow’ theory, therefore, includes a balance between boredom, learning and discovery.

Czikszenmihaly (cited in Anderson, Crous, & Scheepers, 1996) proposes eight dimensions of the 'flow' experience, namely:

- Clear goals;
- Personal skills are suited to challenges;
- Awareness and enactment occur and ensure focus;
- Intensive concentration on the task at hand;
- A sense of potential control;
- An awareness of the 'self' disappears while a strong sense of awareness/self appearing after the experience;
- Time passes quickly; and
- The autotelic experience persists.

#### 5.6.7.7 Resilience

**Resilience, perseverance, being determined, psychological strength and tenacity** were referred to by all interviewees as characteristics/components of sport intelligence. UDS1 said: "You need to keep overcoming all kinds of barriers – all kinds of unexpected things and it's not just about competitors. It's mostly about you."

"You can't keep on saying the problem why you not dancing properly is because your knee is sore. Your knee is past, long gone, you have to just work through it," said DCE1 and he also said: "Also off the floor, I burnt out three times. When I was 21 people thought I was going to be dead. If I was older the doctor said I would have had a heart attack and died. So you push the body to the extent where you think you can carry on".

JOURN2 defined resilience as: "The ability to come back from a loss," and JOURN1 said: "If you are not resilient, you are not going to make it as an elite sportsman".

The work of Seligman was referred to during interviews with the three Ps being emphasised by SCR1 and ADV1. Martin Seligman (2007) studied optimism and pessimism for the last 20 years in more than one thousand studies, involving more than half a million children and adults ... (and found that) ... pessimistic people do

worse than optimistic people in three ways: “First they get depressed much more often. Second, they achieve less at school, on the job and on the **playing field** than their talents are. Third, their physical health is worse than that of optimists.” (p. 51)

Seligman (2007) argues that “the basis of optimism does not lie in positive phrases or images of victory but in the way you think about the causes,” (p. 52) and that it consists of three dimensions, namely:

- **Permanence:** Sometimes vs always, where ‘bad’ events are seen as temporary by optimists and permanent by pessimistic attitude. Good events are seen as temporary by pessimists and permanent by the optimistic attitude;
- **Pervasiveness:** Specific vs global, where bad events are considered specific from its source while pessimists globalise and generalise the issue. When it comes to good events. When it comes to good events, the optimist believe that their causes will enhance everything he does but the pessimist believes they are caused by specific factors; and
- **Personal:** Internal vs external reasons, when negative things take place, blame can be internal or on external circumstances.

Pessimists, therefore, seem to engage in general self-blame while optimists engage in behavioural self-blame.

In summary, pessimists argue in favour of permanence, pervasiveness and external events while optimists argue in favour of temporary, specific and internal explanations. This seems to make a strong recommendation that optimism works best when accurate and realistic. The sport intelligent participant seems to be positive, optimistic and adopts a learning orientation.

#### **5.6.7.8 Mind-set**

RGY1 proposed his “headspace theory” according to which sport participants “need to be in the right frame of mind, clear on where they are headed and how they will achieve their goals while **learning** and being **curious** throughout the process, always asking why”. CRT3, as mentioned earlier, felt very strongly about sport intelligent participants being learning-oriented as a core personality characteristic. JL6 was

concerned that “some players just lose it when the pressure is on”. The sport intelligent participants perform under pressure.

#### **5.6.7.9 Continual improvement**

Continual improvement emerged as a sub-theme of never knowing enough, being **scientific, listening, discovery** and gaining **knowledge**, which refer more to a life philosophy and set of beliefs than only for occasional practices. SCR1 noted that: “It’s not just about what happens on the sports field, but what happens off it as well. What happens after one’s career on the pitch has ended that other sides reveal themselves.”

#### **5.6.7.10 Integrity**

Integrity was identified and included sub-themes of **honesty, thankfulness, gratitude** and **appreciation**. SCR1 spoke on this topic: “And my personal experience of pressure was gratitude and reframing. Those for me are incredibly powerful energy sources,” and ADV1 spoke about integrity, saying: “I think ideas like integrity are increasingly going to come at a premium in the professional sporting world. I think down the line sponsors, corporates are going to start putting a value to integrity. It’s hard to quantify, it’s now taken for granted, you know. I think there’s a shift”.

Integrity theory was not referred to during the literature review and, therefore, will be briefly covered in this section. Weinberg and Gould (2007) define integrity as: “The ability to maintain one’s morality and fairness coupled with the belief that one can (and will) fulfil one’s moral intentions” and suggests that the sport intelligent participant will “do the right thing when faced with a moral dilemma” (p. 562). The same authors provide practical strategies for enhancing character development, including:

- Defining good sporting behaviour;
- Reinforcing and encouraging good sporting behaviour;
- Modelling appropriate behaviours;
- Explaining why certain behaviours are appropriate;
- Discussing moral dilemmas and choices;
- Building moral choices into practices;
- Teaching co-operative strategies;
- Creating a task-oriented motivation climate; and

- Transferring process from leaders to participants.

#### **5.6.7.11 Habits**

Engaging in constructive, helpful and **good practices** and one's way of **going about business** was highlighted as important by MM1, SCR1, RGY1, DCE1 and WPL1. Living life in a certain way and existing in a manner appropriate was considered a lifestyle or set of habits. Living the 'good life' was, therefore, identified as a theme in the current research. The same interviewees cited examples of sport participants who held a set of necessary beliefs and behaviours which manifested in habits and these were considered a metaphysical item in terms of the proposed model of sport intelligence.

#### **5.6.7.12 Trust**

Trust is constituted in the context of sport intelligence as having trust in **oneself**, one's **tactics** and **game plans**. RGY1 said: "Trust is built off structures, systems and routines and by being 110% familiar with them".

#### **5.6.7.13 Metaphysical sub-system: Beliefs and value synthesis**

##### **5.6.7.13.1 Relationship with intelligence and sport psychology theory**

Multiple trophy winner and perhaps one of the greatest rugby flyhalves, Johnny Wilkinson, when reflecting on his career, said that: "My journey became more spiritual" (*Sunday Times*, 3 August 2014). In making this statement, Wilkinson was suggesting that besides the reality of competing at the highest level and winning world cups and other championship trophies, lay another reality. This 'other reality' can be considered as the ability to know and understand what is the origin, nature, purpose and meaning of an individual's life.

The current research elicited a clear pattern on beliefs that sport participants hold. Those beliefs were clustered around being performance oriented, setting high standards, managing success, keeping perspective, finding expression, trust, integrity, continual improvement, habits and the value of intangibles. All of these are consistent with the literature in sport psychology and intelligence theory.

The point, however, in a metaphysical sense, is that participation in sport does, for many people, provide meaning, relevance and helps answer the existential question of the meaning of a person's life. RGY1, JOURN1, ADV1, UDS1, SCR1 used examples of sport participants who found expression and meaning through sport which they articulated through religion or deity and argued that these had a strong influence over their actions and behaviours.

In attempting to better understand belief, the researcher examined theories of belief and found that:

At the root of many of our daily perceptions, thoughts, feelings, dispositions, self-experiences and actions lies the belief or unbelief that something is the case or will be the case. In saying this we are implying that belief and unbelief are not relevant only to religious matters but also to a wide range of human activities. In a certain sense it can be said that to be human is to believe in some things and not in others. We simply cannot get by without believing and disbelieving. (Jordaan & Jordaan, 1990, p. 814)

Jordaan and Jordaan (1990) indicate that individuals exhibit three categories of behaviour when living the belief theory. Firstly, the individual acts and behaves in ways which s/he believes to be actually and fundamentally true. This fundamental belief pattern was also found in the current research where interviewees noted that sport participants "do what they do because that's all they know," as JOURN1 said.

Secondly, the total person is involved in the sporting endeavour and this presupposes a full and ongoing engagement and openness to what life has to offer. This was supported in both literature and research findings, especially pertaining to learning, continuous improvement, an ongoing performance orientation and achieving standards.

The final characteristic is that individuals take decisions within specific situations where key information is evaluated and includes:

- What are the goal, objectives and outcomes?

- What is needed to achieve the goal and what actions?
- What are the real motives and are these in line with belief propositions?
- What are the direct and indirect consequences, in both the short and long term, of those decisions?

#### **5.6.7.13.2 Relationship with cognitive and systems psychology**

Cognitive theorists would argue that the metaphysical ranges of sport participants are made up from an amalgam of the perceptual, symbolic representations, concepts, language, problem-solving, reasoning, creative thinking, conditioning, learning and memory faculties and capacities. The individual's sub-system and their understanding of the world would, therefore, make a contribution to the content of the sport participant's metaphysical existence. Personal circumstances and the socio-cultural climate would play an additional role.

Systems theory, specifically complex adaptive systems theory and cognitive theories, are similar in this instance as they both emphasise how individuals communicate and engage with one another through conversations, language, gestures and symbols. These are stored, recognised, retrieved and acted on, triggering responses and reactions which lead to individual and collective patterns of behaviour, little of which is predictable.

Where the two approaches differ is in the role, influence and impact of unconscious processes. Complex adaptive theory argues that power relationships configure experiences, themes and responses and these need to be recognised as dominant forces when studying individuals and groups. The unconscious can, therefore, be seen as operating in a causal manner but "cannot be accounted for in terms of conscious intentions" (Kruger, 1984, p. 128). This suggests that the unconscious triggers individualistic responses which are specific to the individual case. This differs with complex adaptive theory in some ways, which suggests individual responses are similar to collective responses.

### **5.6.7.13.3 Paradigm control**

The metaphysical sub-system considers the meaning a sport participant derives from engaging, participating and competing. From a metaphysical perspective, the sport participant is concerned with questions around the ultimate truth, ultimate human behaviours and ultimate meaning of life.

Various philosophies can account for this. The realists and naturalists would argue that ultimate reality and meaning requires no metaphysical explanation and that things happen because of natural laws and science can provide answers. The facts are as they are.

Pragmatists would consider the practical consequences of the acceptance of a particular metaphysical component. The practicality of the component is the single criterion from which it can be assessed. The usefulness, workability and application in everyday life is what matters. Reality and meaning is constructed in this way. Hence, if the consequences of the metaphysical sub-system are acceptable then it could be considered real.

Social constructivists would argue that the metaphysical sub-system is generated by constructing a view of the metaphysical sub-system. It is, therefore, possible to extract meaning from life – a key question that the existentialists posed.

In mitigation of these limitations, the researcher made every effort to ensure the trustworthiness and integrity of data collection, processing and reporting. This included:

- Rigorous literature controls;
- Member checks and referencing;
- Co-researcher recording and note taking;
- Transcript generation to ensure consistency;
- Independent data coding;
- Peer reviews;
- Researcher belief disclosure;
- Researcher notes;

- Reliability and validity checklists; and
- Academic supervision.

## Chapter 6

# CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

### 6.1 Introduction

The current research set out to investigate sport intelligence and to propose a theory of sport intelligence. A number of working and relevant hypotheses were developed after a comprehensive literature review was done. Relevant theories from sport intelligence, general intelligence and sport psychology were considered in detail. A research protocol comprising 20 questions was developed and administered to 15 qualified and experienced coaches, ex-players and journalists – all of whom had sufficient international playing, coaching or commentating experience.

As this was an exploratory study, the data solicited from the interviews was analysed from a phenomenological theoretical perspective. Themes and sub-themes were identified and clustered into a systemic model of sport intelligence comprising six sub-systems, namely:

- A neurophysiological component;
- A cognitive/rational component;
- An emotional/affective component;
- A team/group component;
- A societal/ecological component; and
- A metaphysical sub-component.

The proposed componential model forms part of a larger system with interplay between components which emphasises that a 'relationship psychology' is evident in the dynamic interchanges and exchanges between the components and constructs. The sub-components were synthesised from both a cognitive psychology and systems theory perspective for critical evaluation.

A crucial finding and feature of the research and the proposed systemic, relational psychology is that it provides an alternative view that performance is essentially an individual endeavour to the theoretical possibility that it is also a systemic endeavour.

The final chapter will conclude the study by assessing the extent to which the research study achieved its original objectives, by highlighting the limitations of the current study and will make recommendations for future research and investigation.

## **6.2 Review of original objectives**

### **6.2.1 Theoretical review**

The original proposal submitted by the researcher hoped that the investigation would extend current thinking and theory of sport intelligence in addition to integrating intelligence theory and sport psychology into a coherent rational-emotional model of sport intelligence.

The research added to the limited sport intelligence theory and has contributed significantly to the early work of Gould et al. (2002) by identifying sport intelligence as a concept which can be explained through a plausible theory. Equally importantly, the research findings are positively comparable with the research findings of Blue (2009) who identified similar characteristics when investigating sport intelligence among golfers in the USA.

The research has provided a pragmatic and practical link in bridging the philosophical schism between different approaches and schools of psychology and intelligence theory. The systems model of sport intelligence proposes that neuro-psychology, cognitive psychology, psycho-dynamic psychology, developmental psychology and transcendental psychology are simultaneously in operation in the sport intelligent sport participant.

From an intelligence theory perspective, the findings, data and model make it clear that being sport intelligent does not rely on a single factor. The 'factor g' is absent and nor could evidence of the existence of a sports 'gene' be found in the current research. On the contrary, the research data and findings indicate that several types and kinds of intelligence are at play in the phenomenon of sport intelligence.

### **6.2.2 Research review**

The original proposal indicated that the research would generate hypotheses on the nature of sport intelligence, their dimensions and constructs. A significant portion of

the research process included reviewing applicable literature and developing plausible hypotheses based on available literature.

The hypotheses formed the basis of the semi-structured interviews and significantly, each of the hypotheses were supported by respondents. Interviewees added to the hypotheses statements by providing personal experiences, cases, examples or situations which confirmed and elaborated on the initial hypothesis.

The content generated from the interviews and subsequent data analysis provided the essence of the structure and model of the sport intelligence framework. The material was then critically evaluated from a systems theory and cognitive psychology perspective in attempting to further synthesise the content.

### **6.2.3 Practical review**

The practical utility of the proposed model of sport intelligence was also considered. The researcher hoped that sport participants, coaches, administrators and observers/spectators would be provided with a concrete framework that could be applied in sports training, preparation and competition.

As mentioned earlier, all interviewees considered the hypotheses favourably by referring to actual instances, practical examples and personal experiences when elaborating on them. This suggests that the theory is pragmatic and practical while its adaptation of models which are currently being applied – including emotional and multiple intelligence, memory, reasoning, problem-solving and decision making models – indicate its practical utility and validity.

## **6.3 Limitations**

### **6.3.1 Research limitations**

The literature review indicated that intelligence is in itself an abstract concept and has many definitions and interpretations. The words of Sternberg (cited in Legg & Hutter, 2006, p.1) come to mind when noting that “viewed narrowly, there seem to be almost as many definitions of intelligence as there were experts asked to define it”. The broader field of intelligence, despite more than a century of research and writing, has

more questions now than before, while the debate of a 'single factor g' versus 180-factor models rages on.

Measuring intelligence is, therefore, difficult and even more so when it comes to a qualitative measure as is suggested by the current research study. Quantitative measures seem to simplify a complex phenomenon and when expressed as a score such as an IQ score, the message is concise and compact albeit reductionist and mechanical.

The current research study did, however, not aim to develop a single factor score. The proposed model indicates sport intelligence to be comprised of a 'systems intelligence' with equal emphasis on the interplay, dynamics and relationships between and within the system. Measurement of the model will therefore be difficult and challenging due to the complexity involved. A direct measure will be difficult to achieve.

A further limitation of the research was due to interviewees sharing personal cases and experiences in relation to the hypotheses, where such cases only supported the hypotheses. Interviewees seemed to be talking about skills, expertise or in a few limited cases, to applied learning and knowledge. They, therefore, did not engage in detail with sport intelligence per se or with intelligence theory nor were they expected to. Interviewees were asked to elaborate on and respond to the hypotheses set by the researcher and were only asked to define sport intelligence at the start of the interview. This will have impacted the reliability of the research.

### **6.3.2 Representivity**

The research was conducted by a fairly homogenous grouping of 15 males and, therefore, the question of transferability to other populations is raised. While unintentional, the effect of interviewees making interviewee recommendations through their network resulted in the cultural norms of males between the ages of 28 and 81 being used in the sample. There were no females included in the study and so gender bias could be considered a limitation.

All interviewees spent most of their lives in South Africa, while five interviewees were born and spent their childhoods in other countries including England, Ireland, Hong Kong and Zimbabwe.

Furthermore, only 15 interviews were conducted with a range of sportsmen from various sport disciplines. This was intentionally performed so that the theoretical model could equally serve a diversity of sporting codes and sport participants from mainstream, Paralympic and 'unorthodox' codes were conducted.

To this end, interviews were held with journalists who covered Olympic, Commonwealth and Paralympic Games and international and provincial coaches and players from rugby, cricket, ultramarathons, water-polo, fencing, mixed martial arts, soccer, adventuring, paintball and dancing. Sample size and representivity could be raised as a limitation, but the intention was to broaden the study to sport in general rather than within a single code as in the Blue (2009) investigation. As mentioned earlier, the research findings of Blue and the current research were nevertheless consistent with each other.

A number of steps were taken to ensure the trustworthiness of the research data, which included a literature control, co-researcher support, transcript generation, independent data coding, peer review, researcher belief disclosure, researcher notes and diary checks, reliability and validity checklists and doctoral supervision.

## **6.4 Practical implications**

The research has a number of practical implications and applications:

### **6.4.1 Conceptual model**

First and foremost, the model provides a useful and practical point of departure when considering the phenomenon of sport intelligence. The conceptual model comprises six sub-systems within a dynamic system. Each of these can be considered an entity in itself, with each providing relevant content for conceptual reasons, practical uses and real life applications. The conceptual model delineates the sport intelligence philosophy, theory and practice.

#### **6.4.2 Intervention programmes**

The nature and structure of the sport intelligence model allows for a multi-faceted and systemic intervention process. Interventions could take place at one, two or more system levels while intervention at all levels would allow a systemic and process-oriented intervention. There is ample evidence suggesting that systemic interventions yield positive results (Stacey, 2013).

#### **6.4.3 Diagnostics and analytics**

The six-tier model provides a framework to aid a deeper, more accurate understanding of a sport intelligence status amongst subjects, participants or users. A diagnosis will assist in outlining strengths, weaknesses, development gaps and potential intervention points.

A diagnostic assessment is useful from a practitioner/consultant and sport participant perspective as it provides the basis on which improvement discussions, learning opportunities and development activities can take place. Furthermore, it aligns users on vocabulary, semantics and understanding of philosophy, concepts and practices. It is, therefore, an instrument to achieve alignment between users.

It is expected that an assessment and diagnostic tool would follow a process orientation similar to the manner in which Gardner's (2006) multiple intelligence is measured.

#### **6.4.4 Training**

The proposed model of sport intelligence can be used to introduce, embed and further develop the sport intelligence of sport participants, coaches, managers, supporters and others interested in sport, its effects and consequences.

As mentioned earlier in the study, sport psychology is still a relatively new topic, while sport intelligence is also in its infancy. The proposed sport intelligence model provides a comprehensive point of departure, and can be taught. It is also the researcher's opinion that much can be learned by sport participants and coaches alike, from the model.

#### **6.4.5 Development**

The proposed sport intelligence model can be used for overall personal development in addition to its use for enhancement of sport achievement by sport participants. The nature and content of the model may, however, also be empowering for all individuals and can be applied to other spheres of general life as well. Each of the components is firmly rooted in established psychological and intelligence theories.

#### **6.4.6 Coaching and programme development**

The literature research findings and proposed model of sport intelligence indicate that sport intelligence is prevalent across all sports. The research findings indicate that sport intelligence is evident from an early age. The contribution of developmental psychology is relevant and instructive and suggests that each component should follow its own developmental path.

Theoretically, each of the six components should follow a developmental trajectory starting at birth, through infancy, early and middle childhood, teenage, early, middle and into late adulthood. Coaching and programme development would have to be customised for the various stages of growth, learning and development.

#### **6.4.7 Applications**

The systemic nature of the proposed model of sport intelligence and multi-level components suggest it can be applied to social systems in general. As such, the model could be practically used to enhance individual, team and organisational performance in industry and commerce, non-governmental bodies, not-for-profit centres, schools, universities and tertiary educational centres and other institutions like churches and the state.

At face value, the model can also be applied to individuals in small, medium and large systems.

### **6.5 Recommendations**

Sport intelligence was initially identified in the latter part of the twentieth century and elaborated on in some detail by the research of Blue (2009) who proposed a 'competition' and 'developmental' intelligence. The current research yielded similar

findings but expanded it into a six-tier systemic model of sport intelligence and also identified six sub-systems with content-rich data in support of this.

The systemic perspective adopted by the researcher suggests a dynamic interplay **between** its components and **within** the components. This was previously referred to as a 'relationship psychology'. The research and findings have, however, not progressed the relationship psychology hypothesis further and this needs to be researched in more detail. Dynamic and systems psychology may offer useful content to aid the understanding of dynamic relationships within and between systems.

The components were identified using a phenomenological content analysis that solicited themes and sub-themes, but did not organise them into a hierarchy nor a detailed set of behaviours. These too could provide further research opportunities as could the development of a competence model and development trajectory of the components and overall model.

While contextual intelligence was referred to in the research study, the researcher did not assess whether or not, or how the system and its components could be affected in different contexts and situations.

As this was an exploratory and theoretical study, it did not assess whether or not the theory and model actually enhanced sporting performance. This key question could be the subject of a further study.

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**Appendix 1**  
**INTERVIEW PROTOCOL**

## Informed Consent Form

I, \_\_\_\_\_ (full name) hereby consent to participating in an interview conducted by Garrath James Rosslee (6901145031087)

I am aware of the following and consent thereto:

- a. The interview will be digitally recorded for purposes of data capturing
- b. Written notes may be taken by interviewer during the interview for purposes of data capturing
- c. All information obtained during the interview will later be transcribed verbatim by an independent transcriber
- d. Information will be used for a research proposal conducted by Garrath James Rosslee as part of a PhD in Psychology at the University Of South Africa (UNISA)
- e. The purpose of the interview is research for proposing a theory of sports intelligence

All information given during the interview will remain confidential and the interviewee is entitled to withdraw from the interview at any point that he / she might deem necessary.

The interviewee is under no obligation to answer the questions put forward by the interviewer and may at any time choose to not answer a question.

Please see below for contact details of a UNISA representative, should you have any further questions.

Signed on this day, the \_\_\_\_\_ of \_\_\_\_\_ 20\_\_\_\_, at \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Prof. Ilse Ferns

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### ***Preamble***

The research undertaken has not been done before. I am interested in exploring whether or not a “Sports Intelligence” exists. We know of IQ, EQ, social intelligence and music and art intelligence. Howard Gardner has proposed a “bodily-kinesthetic” intelligence where we use our bodies to “fashion products and services”. But this theory is vague and has not been researched in a great deal.

There is virtually no theory nor research on the topic. What is available suggests that Sports Intelligence is about analysis, good decision-making, learning. I will explore your opinion on these but am equally interested in your own views about this exciting topic.

I will interview 15 prominent South African coaches, players, ex-players and a small number of journalists and researchers. Once we have completed the interview, I would like to know whether you would recommend one or two insightful others who you believe would add to the data.

My literature review, interviews and analysis should be completed by December of this year, where after I plan on writing up my dissertation during 2014. I will keep you updated on the theoretical development if it interests you.







































