

Sports Intelligence: A Systemic Perspective

Abstract

The current research was an exploratory study to better understand the nature and dimensions of sports intelligence. A six tier systemic model of sports intelligence was identified by the researcher. Each tier was considered from a systemic and cognitive perspective resulting in the proposed model being a “systems theory of sports intelligence”. The systemic orientation suggests that intelligence, when applied to sport and sport psychology in particular, is a multidimensional process. Practical applications were made in addition to recommendations for further research.

1. Introduction

Tom Eaton, 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.” He was commenting to Dale Steyn, a fast bowling sensation who at the time, was one of the top ranked fast bowlers of his generation.

The practices of speed and skill are known but what constitutes *intelligence* within a sporting context?

Ice hockey great Wayne Gretsky said, “A good hockey player plays where the puck is. A great hockey player plays where the puck is going to be.”

The paper to follow aims to better understand how and why some athletes know where the ‘puck’ will be and what processes constitute sports intelligence from a conceptual and theoretical perspective.

Early definitions of sports intelligence will initiate the discussion on what sports intelligence is while the contribution of intelligence theory and sport psychology resulted in the researcher identifying 14 hypotheses which were considered in a semi-structured interview with 15 credible sport participants. A content analysis of the hypotheses was performed with 13 accepted and the remainder included within another.

The analysis resulted in the identification and development of a systems model comprising six components. Further investigation indicated that the components operate in concert with one

another with each of equal importance. The data suggested a 'relationship psychology' between them which led to a systemic perspective adopted by the researcher when synthesising the model into a coherent framework.

The paper to follow will begin by presenting theories of sports intelligence, sport psychology and general intelligence before outlining the approach and findings. A systemic model of sports intelligence will be presented and discussed before closing off by making recommendations and suggestions for future research.

2. Theoretical perspectives

2.1 Current sports intelligence definitions

Sports intelligence was first conceptualised by Fischer (1984) in an article titled *Sports Intelligence* and argued that it consists of the **ability** to:

- Search and detect relevant cues;
- Identify patterns of actions, play and recall;
- Utilise short and long term memory and recall;
- Make effective decisions; and
- Possess a basic level of knowledge about the task requirements needed to play effectively.

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

Later research by Gould, Diffenbach and Moffet (2002) into the personality characteristics of Olympians found that they possessed 'sports intelligence'. Gould et al. (2002) noted that sports 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 elite sport and being a quick learner" (p. 186).

A recent exploratory investigation into sports intelligence exclusively within a golf context by Blue (2009) indicated that it comprises both a competitive and developmental intelligence as indicated below.

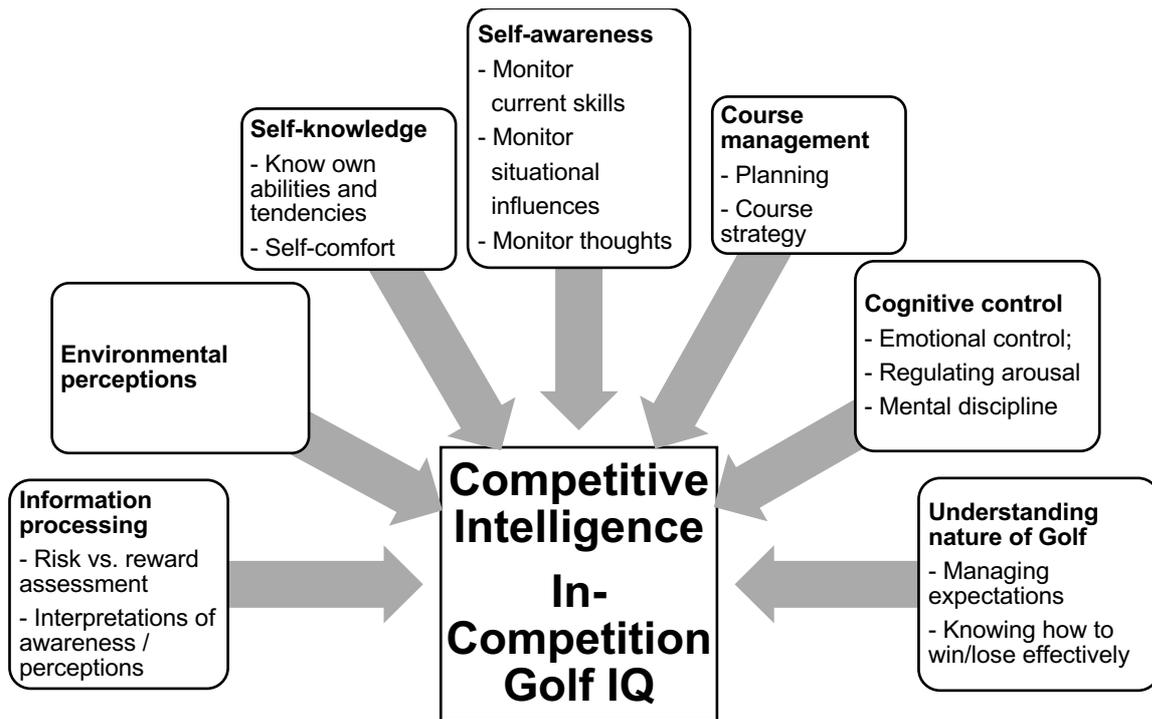


Figure 2.1a: Competitive Intelligence (Blue, 2009)

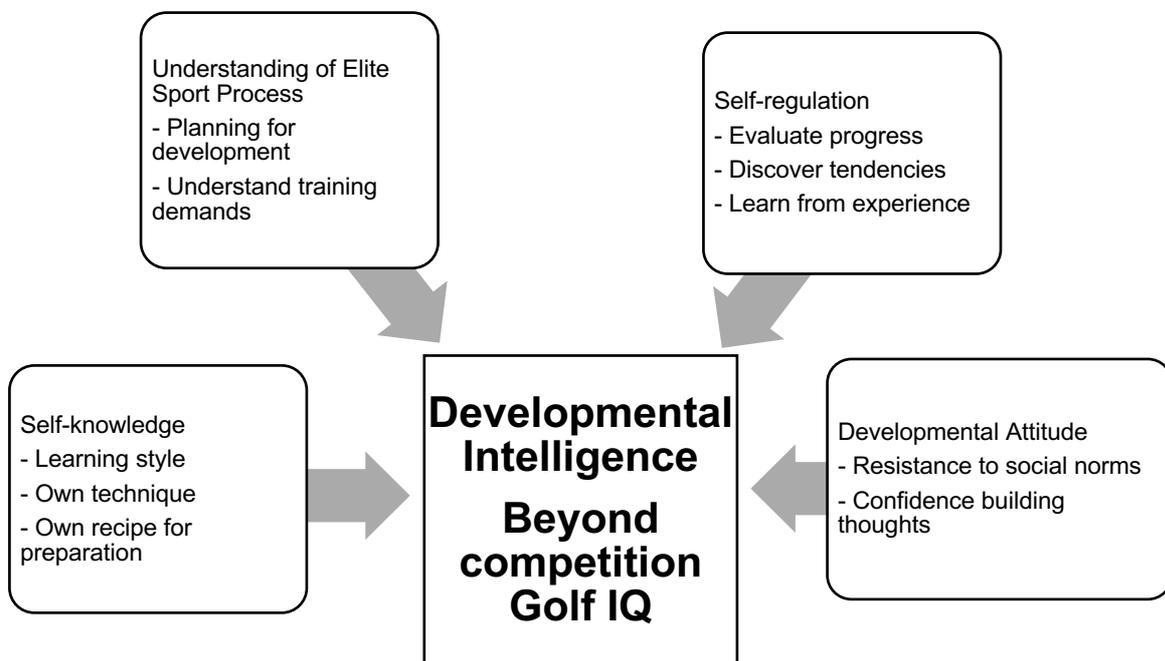


Figure 2.1b: Developmental Intelligence (Blue, 2009)

The above-mentioned studies have been completed in the USA with one article from China reported by Junwu (2013) where the definition of Zhang Li-Wei (1999) was tabled. Sports

intelligence, in the Chinese context, define sports intelligence as “the psychological conditions or characteristics in the course of mastering and performing motor skills” (p. 1).

No research data is available within the South African and African context.

Dr. Gene Brockneck delivered an insightful letter to the American Psychological Association where he suggests that sports intelligence includes a wide range of neuropsychological, cognitive, interpersonal and psychological characteristics. He sets out a series of conceptual points in his 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.)

Interestingly, the literature review found only a single study which examined the relationship between cognitive ability and athletic performance. Adams and Kuzmits (2012, p. 1) found no statistical relationship between intelligences as measured by cognitive ability and athletic performance in NFL in the USA. Their research found that other “psychological constructs... aggression, leadership, coachability and self-confidence have shown a relationship with athletic success” and recommend the use of “assessments to include higher level cognitive measurements” (p. 1).

2.2 Intelligence Theory

A detailed review of intelligence theories by Legg and Hutter (2006, p. 81) on the definitions of intelligence from collective sources, psychologists and researchers found that despite varied interpretations, similarities can be found. Intelligence is:

- a) A property that an individual agent has as it **interacts** with its environment;
- b) Related to the agents ability to **succeed or profit** with respect to some **goal or object**;
and
- c) Depends on how able the agent is to **adapt to different** objectives and environments.

Consolidating these into an initial, informal working definition of intelligence suggests that “intelligence measures an agents ability to achieve goals in a wide range of environments including a sports environment”.

Cattell was the first to develop mental tests to examine individual differences in intelligence. The Cattell-Horn-Cattell (CHC) theory built off Spearman’s (1904) general intelligence, or factor ‘g’, which posits that individuals possess a general intelligence termed factor ‘g’. The significance of Spearman’s work is that ‘g’ was considered a single construct. This is important within the sports intelligence model as it explicitly moves from the single factor model to a tiered, systemic model.

Spearman’s reductionistic theory was challenged by Thurstone who proposed a number of mental abilities and Guilford later argued a “structure of intellect model” comprising over 120 intellectual factors.

Perhaps the most recognised current theory, the CHC theory, argues that two types of intelligence exist. Gf or fluid intelligence refers to the reasoning process available to address new items and Gc or crystallised intelligence which refers to the processes available to apply acquired knowledge and learned skills.

The Western world seems to emphasise reasoning, mental ability and problem-solving as primary while Young and Sternberg (cited in Niu & Brass, 2011) researched intelligence in the East and found 5 major factors including general cognitive ability, interpersonal and intrapersonal intelligence, intellectual self-promotion and intellectual self-agreement.

Within an African context, Niu and Brass (2011) argue that “the implicit theories of Africans revolve largely around skills that help facilitate harmonious and stable intergroup relations” (p. 629).

Despite the definitional complexities outlined earlier and differing interpretations from other parts of the globe, it seems that a consolidated, universal definition of intelligence is possible and could include:

- a) General cognitive abilities – Problem solving, reasoning, working memory
- b) General skills with others and oneself – Relationships and awareness
- c) General capacity to learn, adapt and behave in goal directed ways.

Sports intelligence can be hypothesised to be conceptually similar to these.

2.3 Sport Psychology

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

They defined sports 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.

The list above outlines personality characteristics and can, therefore, be studied from a psychological perspective.

Sport psychology has concerned itself with the role of motivation and emotion with a number of techniques and skills in use to better manage emotions before, during and after sport. 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. (Behnecke (2004), Cockerill (2002), Cooper and Goodenough (2007), Davies (1989), Eccles and Feltovich (2008), Jones (2003) and Taylor & Wilson (2005))

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 2.2.

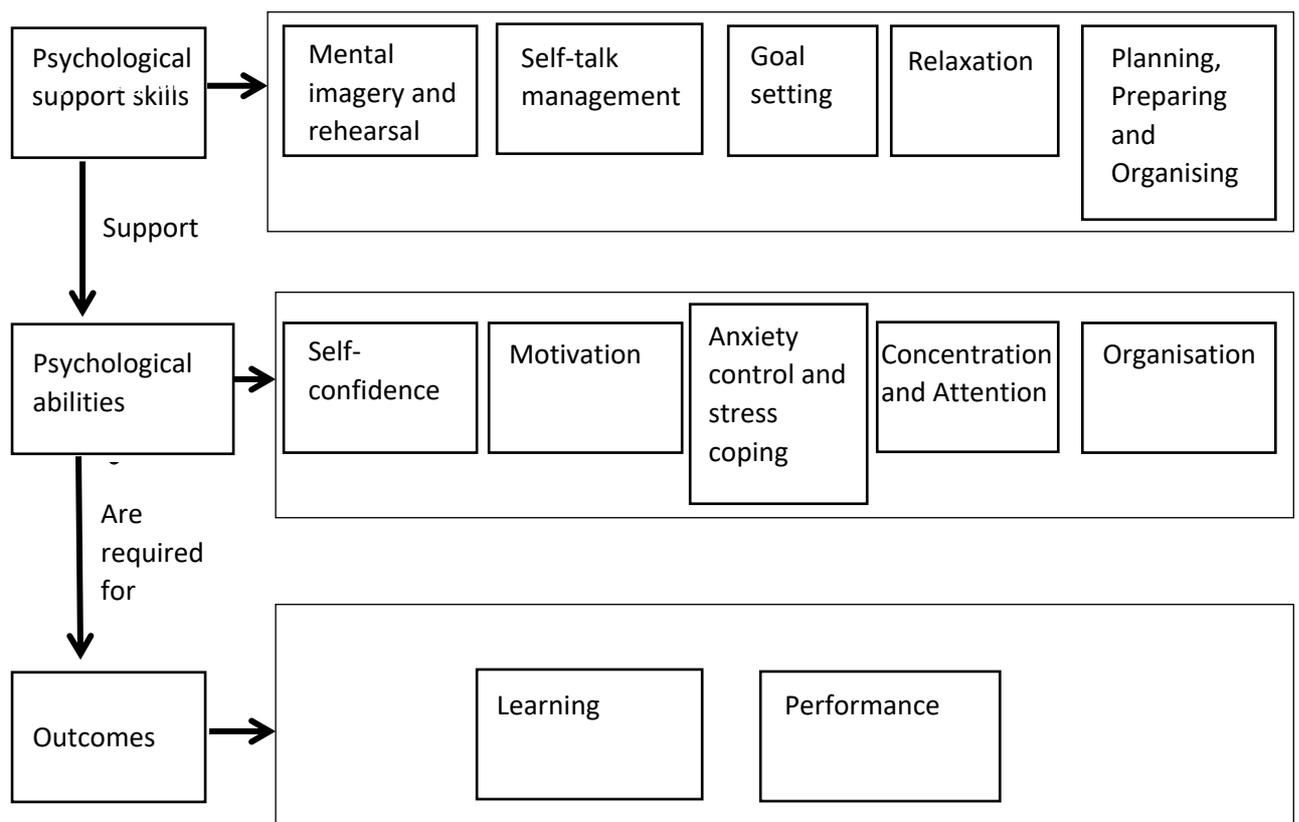


Figure 2.2 Basic mental skills framework (adapted from Eccles and Feltovich, 2008, p. 51)

2.4 Fourteen Hypotheses

The researcher identified a series of hypotheses based on an exhaustive literature review covering intelligence theory and sport psychology. These seem to possess a conceptual relationship with the current sports intelligence models.

2.4.1 Hypothesis 1: Mental speed

Effective sport participants are able to process data and information through visual and perceptual speed which impacts decision making.

2.4.2 Hypothesis 2: Working memory

A positive correlation between working memory and factor 'g' suggests that the sports intelligence framework should include memory as an element. Working memory is relevant to the theory of sports intelligence as it provides impetus for accessing relevant information while participation and play is underway.

2.4.3 Hypothesis 3: Problem solving and reasoning

Available literature of sports intelligence makes reference to decision making and problem solving within a sporting context. Lohman and Lakin (2011) point out that reasoning is closely linked to these as it is “the process of drawing inferences or conclusions from information” (p. 420).

Research by Kyllonen and Christal (cited in Lohman & Lakin, 2011) show a high positive correlation of $r = .80$ to $r = .88$ between working memory and reasoning and it is, therefore, hypothesised that a sports intelligent participant is able to more effectively reason and solve problems than others.

2.4.4 Hypothesis 4: Several intelligences

Referring to the work of Howard Gardner (2006) on Multiple Intelligence, Davies et al. (2011) argues that an individual often draws on several intelligences when performing a given ‘domain’. An individual participating in sport will need to possess a bodily-kinesthetic intelligence, an interpersonal and intrapersonal intelligence, a spatial intelligence, amongst others.

2.4.5 Hypothesis 5: Successful intelligence

Sternberg’s (2011) theory of successful intelligence argues that intelligence is:

- The ability to achieve one’s goals in life given socio-cultural context;
- Capitalising strengths and compensating weaknesses;
- Being able to adapt to and select environments; and
- Perform through a combination of analytical, creative and practical abilities.

His theory is essentially about setting, working towards and achieving goals and is, therefore, a powerful theory of motivation emphasising performance and achievement.

2.4.6 Hypothesis 6: Emotional intelligence

The previous hypotheses have emphasised rational processes but all sport participants will note that being able to manage one’s emotions is also important. Literature on ‘Emotional Intelligence’ (EQ) is abundant with some studies conceptually linking EQ and performance in general as well as sports (Mayer et al., 2011).

2.4.7 Hypothesis 7: Intelligence and personality

The role of personality in performance has been the subject of many studies. Costa and McCrae examined the relationship between the “Big 5” of personality including openness, extraversion, neuroticism, agreeableness and conscientiousness with openness/intellect showing the strongest association with intelligence at $r = .33$ (De Young, 2011). The role of personality was also explored with research participants by the researcher.

2.4.8 Hypothesis 8: Experience and knowledge

The literature indicates that achievement and intelligence share a symbiotic relationship with one another. Learning is central to this with cognitive processes like memory and information processing featuring prominently within this.

2.4.9 Hypothesis 9: Intelligence and motivation

Incremental learning theorists argue that intelligence is not fixed but malleable and with learning, training and motivation positive changes can be expected.

2.4.10 Hypothesis 10: Intelligence and creativity

The literature suggests that creativity is the result of cognitive processes and not necessarily ‘magical’ moments. The ‘magical’ moments are rather the application of what has been deliberately and extensively practiced beforehand.

2.4.11 Hypothesis 11: Developing intelligence

In line with incremental theorists’ literature, intelligence can be developed through daily tactics and practices including increasing knowledge, applying logic, using statistics, developing cognitive skills, heuristics, meta-cognitive skills, mindful habits, attitudinal changes, reasoning, counterfactual thinking and keeping perspective.

2.4.12 Hypothesis 12: Psychological strength

The sports intelligent participant possesses mental skills including confidence, motivation, stress coping, concentration, attention and organisation skills alongside psychological support skills like mental imagery, self-talk, goal setting and relaxation.

2.4.13 Hypothesis 13: Relationship competence

The proposal is that the sports intelligent participant possesses healthy, positive relationships with others and is able to optimally manage their emotional and rational makeup. Self-awareness and self-knowledge feature prominently.

2.4.14 Hypothesis 14: Effective decision making

Numerous studies show that players are constantly making decisions which have a material effect on play. Working memory and perceptual-cognitive systems seem to play a central role in this.

3. Research method

3.1 Aim

The empirical aim of the research was twofold:

- a) To explore, define and validate a proposed model of sports intelligence; and
- b) To review the proposed theory and model for application, research, development and enhancement of sport expertise and performance

3.2 A deductive and inductive approach

A qualitative study was adopted using an interpretivist stance. This relies on the participant's experience of the topic (Mackenzie & Knipe, 2006). Interpretive methods are used during inductive research where theory is generated from research data.

A deductive analysis was also adopted as it served as a point of departure when establishing the 14 hypotheses which research participants responded to in a semi-structured interview. The 14 hypotheses were set out earlier in the paper. Themes were identified after transcribing the interviews with a content analysis revealing relevant data.

The interviews were held with 15 research participants who were either international players, international or provincial coaches or award winning journalists. The research sample was comprised of a mix of both team and individual sporting codes.

3.3 Data collection

A research protocol was developed and 14 face-to-face interviews were held in South Africa over a 6 month period. The 15th interview was conducted via Skype.

3.4 Data analysis

3.4.1 Strategies to ensure quality data: A qualitative study

Schurink (2005, p. 12) notes that

Qualitative studies strive towards an understanding of peoples' meanings. Therefore, the emphasis falls on the internal validity (the production of accurate findings that agree with the subjects' life and world) ... (and) ... there is a close link between reliability and replicability of a study.

Internal validity was ensured through verbatim transcripts being used as the data source in addition to researcher notes. Content validation was ensured through adherence to the Madison guiding principles (cited in Heil, 2003, pp. 39 – 40).

Reliability and replicability was ensured through practise consistency from one case to another in how data was generated, maintained and analysed. Reliability was high as research participants concurred with the 14 hypotheses and was improved as the content analysis was conducted by the researcher and an independent psychometrist.

3.5 Ethical considerations

The researcher complied with the Guidelines for minimal standards of ethical approval from the British Psychological Society (2009). Items such as working through and signing a consent form, the anonymity of participants being guaranteed and the safekeeping of all documents at the home of the researcher. Peer reviews excluded participant details when completed by the registered psychometrist.

4. Results

4.1 Conceptual model

After coding the transcripts into themes and sub-themes and assessed from a phenomenological stance and then criticised from a cognitive and systems perspective, clear patterns emerged. Sports intelligence seems to comprise of higher order themes which are related, interconnected and part of a greater system. These are:

- Physical/biological and neurophysiological component and 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 component and sub-system.

The model can be set out schematically as follows:

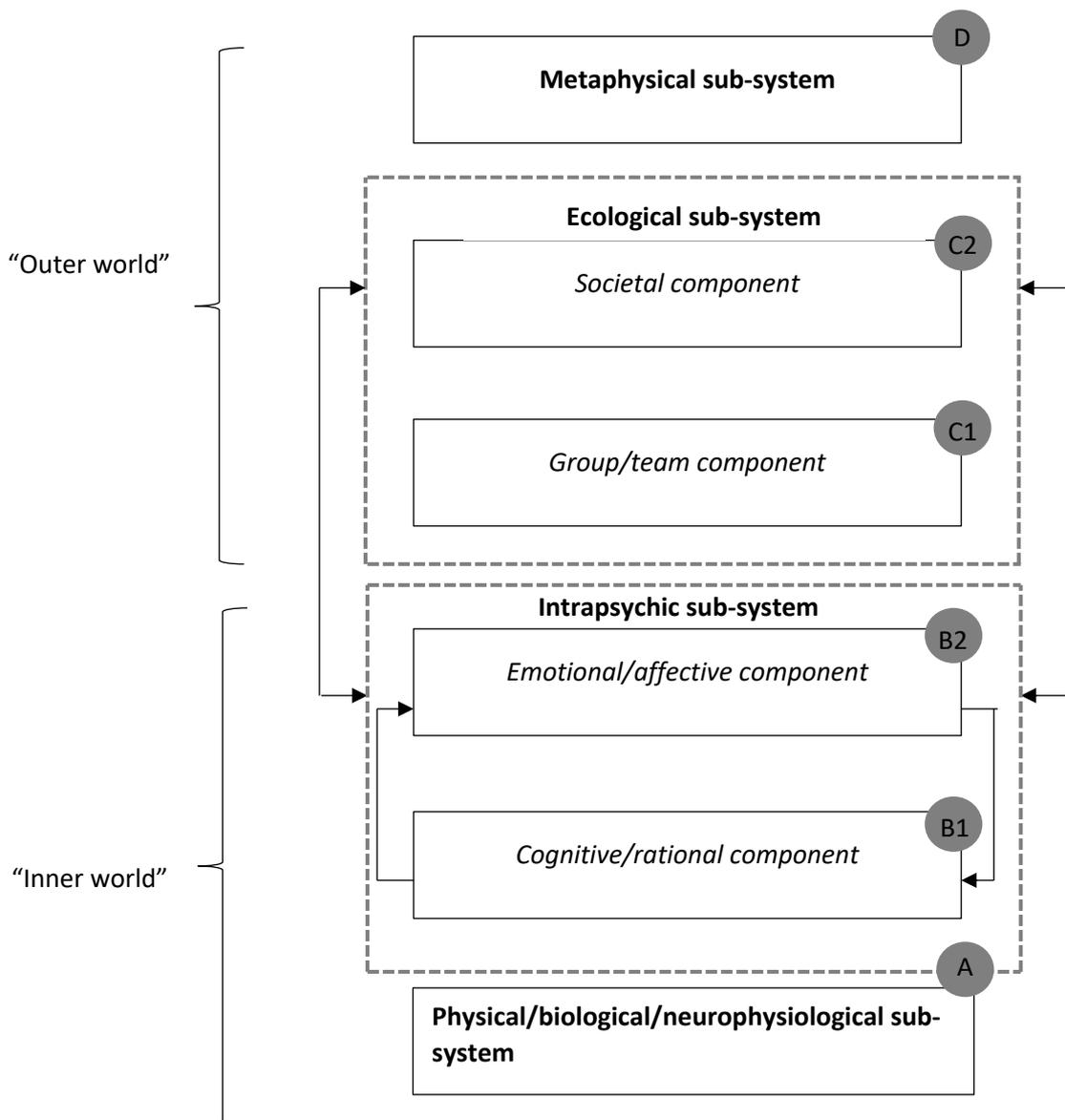


Figure 4.1: Conceptual model of sport intelligence

4.2 Sub-system A: Physical/biological/neurophysiological sub-system

4.2.1 Components

Various components were identified as part of sub-system A and included reaction time, principle adherence, physical preparation, practice, execution, body management, physical resources, inputs and demonstration.

These themes were consistent with the intelligence literature and sport psychology. Reaction time and inspection time, mastering technical skills and principles, having the ability to execute and deliver in competition, living a sport-centric lifestyle, understanding goals, standards and being goal oriented are key features of general sport psychology.

Good practices like physical preparation, training and year round practise and resources feature in other disciplines like biokinetics, kinesiology and physiology. Sports intelligence, therefore, has foundations in related disciplines as well.

4.2.2 Relationship with cognitive and systems psychology

Cognitive psychologists refer to neurons, electromechanical pulses, synapses, transmissions, stimuli, cortical activity and related neural processes result in human behaviour. These are conceptually related to mental and neurological processes. Stacey (2003, p. 47) makes the point that “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.”

Systems theory seems to provide a productive perspective when considering the contribution of cybernetics. It posits that social systems are goal seeking, self-regulating and causality is circular and linear. The themes from sub-system A may, therefore, possess a causal and linear relationship with Sports Intelligence. Predictability is also possible in a probabilistic sense whilst also noting that disturbances can be expected and may or may not affect the system adversely. Feedback from the environment may result in the system regulating itself back to stability.

4.3 Intrapsychic sub-system B1: Cognitive/rational component

A key feature is the interaction between the sub-system and within the system into a symbiotic “relationship psychology” of sorts.

4.4 Intrapsychic sub-system B2: Emotional/Affective component

4.4.1 Components

The following themes featured in the emotional sub-system:

- Focus
- Handle pressure
- Control
- Response management
- Expectations
- Focus
- Game discipline
- Instinct
- Comfort
- Arousal

- Psychological stability
- Self-understanding
- Regulation
- Confidence
- Adaptability
- Discipline

The role of emotion received considerable attention in the literature as it featured prominently in both the sport psychology and intelligence literature while also being central in the competitive and developmental intelligence of Blue (2009).

4.4.2 Relationship with cognitive and systems psychology

Humanistic psychology emphasises emotions and, therefore, concentrates on factors like motivation, satisfaction and leadership. It is by nature positive and focuses on actualising and achieving and lends itself to approaches like positive psychology and psychofortology.

Cognitive and humanistic psychology, however, focuses on conscious, visible and behavioural processes while psychodynamic psychology examines unconscious processes like repression and anxieties. It 'surfaces' these to better understand how they influence current behaviour.

Bringing unconscious processes to levels of visible awareness can provide development, change and improvement opportunities.

4.5 Ecological sub-system C1: Group/team component

4.5.1 Components

Themes identified include team effectiveness, 'teamness' (cohesiveness), team dynamics and communications and they emphasise getting on with others, relationship competence, ego management, personality differences, cohesion, standards, messaging and effective interpersonal skills.

4.5.2 Relationship with cognitive and systems psychology

Sports teams are subject to a range of group dynamics. Group dynamics have been the subject of many studies, textbooks and approaches (Tyson, 1987; Jordaan & Jordaan, 1990).

Teams, from a systems perspective, is best summarised by the work of Bion (cited in Stacey, 2003, p. 105) when noting that “a new kind of mind 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.”

Sports teams, like any other team, therefore, have their own mental models which are implicit and explicit and lived out in daily activities.

System psychodynamics suggests that unconscious processes can either be constructive or destructive for teams. Bion (cited in Stacey, 2003) identified 3 basic assumptions within teams:

- Dependence on a leader;
- Fight/flight of perceived ‘enemy’; and
- Pairing where ‘experts’ will provide the solution.

Stacey (2003) adds the work of Torquet who added a fourth assumption:

- “Oneness” where members seem lost in an oceanic feeling of unity

These dynamics make teams and their associated behaviours complex. The important point to recognise is that the dynamics will be part and parcel of teams and need to be deliberately worked on in a structured manner.

4.6 Ecological sub-system C2: Societal component

4.6.1 Components

This refers to the sport participant’s relationship with the broader society (s)he is part of.

Themes include:

- Competition intelligence
- Relationship pressures
- Sacrifice
- Influences
- Hype
- Challenge
- Inspiration
- Strategic orientation

4.6.2 Relationship with cognitive and systems psychology

Cognitive and social psychologists concentrate on social process like cognition, attitudes and group processes. As with the previous component, sport participants are subject to these and the sports intelligent athlete needs to be aware of these and how to work within them.

Various systemic perspectives such as “Interactive Planning” of Ackoff (1981, 1984), “Soft Systems Thinking” of Checkland and “The Learning Paradigm” of Checkland and Scholes (cited in Stacey, 2003) attempt to integrate national causality with emotions and human action. They do so by understanding the relationship items within a system. These form a “relationship psychology.”

4.7 Metaphysical sub-system D: Beliefs

4.7.1 Components

Components include:

- Performance orientation
- Standards
- Success
- Perspective
- Expression
- Boundaries
- Resilient
- Mind-set
- Continual improvement
- Integrity
- Habits
- Intangibles
- Trust

4.7.2 Relationship with cognitive and systems psychology

One of the most well-known contemporary fly-halves, Johnny Wilkinson reflected on his career when stating “my journey became more spiritual”. In essence, he was saying that other – perhaps parallel – realities exist when competing. This may be that sport participants gain a deeper understanding of life through sport.

Cognitive theorists would contend that the metaphysical world of sport participants is comprised of an amalgam of the perceptual, symbolic representations, language, problem solving, reasoning, conditioning, learning, memory and other faculties and

capacities. Complex adaptive system theories emphasise how individuals engage with one another through conversation, language and gestures which are stored, retrieved and later trigger responses and actions. These lead to dynamic patterns of behaviour which the systems-oriented theorist attempts to understand.

5. Discussion

The literature review outlined the difficulty in defining intelligence. Sternberg (cited in Legg & Hutter, 2006, p. 1) makes the point that “viewed narrowly, there seem to be almost as many definitions of intelligence as there were experts asked to define it” and within the broader field of intelligence, after decades of research, there are more questions than before. The debate of a single factor versus a multiple number has not been resolved. The current research was, however, clear in its findings that sports intelligence is comprised of a ‘systems intelligence’. Systems Theory emphasised ‘whole’ rather than the parts and the interplay, dynamics and relationships between **and** within the components to be a crucial feature of the model.

The six tier model, when considered from a mechanistic perspective may lend itself to ‘rationalism’ and ‘reductionism’ where “all objects and events, and their properties, can be understood in terms of ultimate events” (Flood & Jackson, 1991, p. 3). Ackoff (1993, pp. 3-6) highlights how analytical, cause-and-effect thinking results in the view that people are like machines.

This suggests that the aspirant athlete learns and applies the core elements of the sports intelligence model then performance is likely to improve – all things being equal. The athlete is, therefore, encouraged to make use of and apply the content of each tier and sub-components. This follows the analytical, cause-and-effect laws of mechanistic thinking.

A vitally important finding was, however, made by the research which indicated that not only are the components and tiers significant but, crucially, that the components are connected. It is clear from the research that the components and tiers operate concurrently and in concert with one another and operate in parallel. The ‘Parallel processing’ perspective needs to be adopted with consequent patterns of behaviour emerging. The nature of the relationships and emergent properties of the ‘whole’ should, therefore, also be considered.

The seminal systems reader and writer, Peter Senge (1970, 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.” The patterns indicate how the elements are related and connected.

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.

The systems perspective examines the emergent properties through what is termed ‘synthesis’. Synthesis, as the name suggests, is the opposite of analysis. Synthesis examines how the whole system operates while analysis looks at individual parts. System theorists attempt to examine how the entire system operates.

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**.

From a practical perspective, the systemic orientation has important consequences for the sports intelligence theory by suggesting that the eco-system, environment, history, background and context of the sport and sport participants need to be assessed and evaluated.

The sports intelligent athlete is, therefore, able to not only master the rules, regulations and requirements of their sport, in addition to the physiological, neurobiological and physical demands but also seem to have the ability to manage the rational, emotional, team, inter and intragroup dynamics, societal pressures and demands while, for some, sport makes an existential and metaphysical contribution to their psychology, perhaps spiritual wellbeing.

Crucially, the model suggests that performance can be improved and enhanced by better managing the 'system'.

6. Conclusions

The original objective of the study was to investigate sports intelligence in greater detail. The early work of Gould et al. (2002) identified sports intelligence in thematic terms while the only additional research is that of Blue (2009) who confined his study into golf.

The current study examined prevailing sport psychology and intelligence theories, established 14 hypotheses, explored these in detail with 15 credible interviewees and completed a thorough content analysis. A six-tier conceptual model was elicited from the research process.

The model provides a useful and practical point of departure when considering intelligence from a sporting perspective. The model allows for a multifaceted systemic perspective being adopted. There is considerable evidence suggesting systemic interventions yield positive results (Stacey, 2003).

The model also provides a framework for a deeper, more accurate understanding of athletes. A thorough psychodiagnostic of the athlete is now possible through this as it would outline strengths, weaknesses, gaps and intervention points. Athlete training, development and coaching can also be facilitated in a practical and concrete manner as the model provides useful content.

A limitation of the research was that it was conducted from a sample of male only participants. While this was not intended, the snowball technique employed by the researcher led to this and this could provide a topic for further investigation.

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