Cognition and value systems at a leadership level in a multinational organisation

by

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submitted in accordance with the requirements for
the degree of

MASTER OF ARTS

in the subject

INDUSTRIAL AND ORGANISATIONAL PSYCHOLOGY

at the

University of South Africa

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February 2014

ACKNOWLEDGEMENTS

My sincere thanks go to the following people for their contribution towards the completion of this research:

- Dr Leona Ungerer, for her detailed evaluation and timely feedback.
- Dr Maretha Prinsloo for her ongoing professional and personal support, as well as providing her technical expertise and advice.
- My parents, John and Lesley Satchel, for always encouraging me to further my education.
- My business partner, Wea van Heerden, for her interest and support while completing my dissertation.
- Molly and Rosie who were with me when I wrote every word.

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I declare that the dissertation **"Cognition and value systems at a leadership level in a multinational organisation"** 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.

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COGNITION AND VALUE SYSTEMS AT A LEADERSHIP LEVEL IN A MULTINATIONAL ORGANISATION

SUMMARY

Globalisation had a major impact on the way organisations operate. Access to information and innovative technology connote that organisational leaders need to make timely decisions while considering a range of rapidly changing variables. Leaders of global organisations need to make sense of complex information and anticipate the long-term outcomes of making different decisions. This requires highly developed cognitive skills. However, these are not the only factors influencing strategic decisions. Value systems also affect the choices organisational leaders make. Limited existing research has investigated the relationship between values and cognition within organisational leadership.

The aim of this study was to investigate the relationship between cognitive complexity, cognitive processes and individual values at a senior management level in a multinational company. Cognition is explored in terms of cognitive processes and levels of work (as measured by the Cognitive Process Profile), and values are explored in terms of value systems (as measured by the Value Orientations questionnaire).

The study is based on a quantitative research design, where a sample of 265 executives, senior managers and directors employed at a multinational organisation completed the assessments. The empirical study (N = 265) yielded some weak, yet statistically significant, relationships between cognition and value systems among organisational leaders in a multinational organisation.

Key terms: cognition, cognitive complexity, cognitive processes, Cognitive Process Profile, levels of work, Spiral Dynamics, values, Value Orientations questionnaire, value systems.

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CHAPTER 1: SCIENTIFIC OVERVIEW OF THE STUDY

In this study, the relationship between cognition (measured by the Cognitive Process Profile (CPP)) and Spiral Dynamics value systems (measured by the Value Orientations questionnaire (VO)) is investigated in a sample of 265 senior managers and executives in a multinational company.

In Chapter 1, the background and motivation for the research, a review of related literature, proposed research questions, and also the research aims are outlined. Furthermore, the proposed research methods are discussed in relation to the suggested research steps.

1.1 BACKGROUND AND MOTIVATION

The focus of this study is an investigation into the relationship between cognition and Spiral Dynamics value systems in a leadership team of a multinational organisation. The context of this study is to better understand the way strategic decisions are made, in particular within a multinational environment. Globalisation and technological advancements have changed the way in which organisational leadership operates. Leaders have to react to rapidly changing situations, and understand the long-term impact of their decisions on the organisation as well as on the broad environment (Denton & Vloeberghs, 2003). Leaders of multinational organisations further need to make sense of complex information and anticipate the long-term outcomes of making different decisions. This requires highly developed cognitive skills (Jaques & Clement, 2006). However, cognitive skills are not the only factor influencing strategic decisions. Value systems and individual preferences also affect the choices organisational leaders make (Cowan & Todorovic, 2000).

Globalisation has had a major impact on corporate leadership (Denton & Vloeberghs, 2003). Some of the factors that contribute to a rapidly changing environment include increased access to information, and innovative technology. Adaptability has, therefore, become the key to success: organisations have to be flexible, responsive, decisive, and quick to change to remain competitive in a global economy (Denton & Vloeberghs, 2003). Organisational leaders and corporate executives need to be able to process complex information quickly and make decisions that enable the organisation to adapt appropriately and remain sustainable in the long term (Jaques, 1998; Grobler, 2005; Jaques & Clement, 2006).

Leadership as a concept is central to the practice of industrial psychology and psychometrics, the purpose of which involves the realisation of human potential and ensuring that the organisation's culture enhances, integrates and evolves within the organisation's system and overall functioning (Prinsloo, 2012a). Leaders are responsible for ensuring that

the organisation is sustainable in the long term, which requires them to make judgements about a wide range of inter-related variables that have a long-term impact on the organisation and its employees (Jaques, 1998).

Although cognitive ability appears to be essential in making appropriate decisions (Grobler, 2005; Jaques, 1998; Jaques & Clement, 2006), it may not be the only requirement for doing so. Organisational strategies are often not realised because they are not aligned to organisational and individual value systems (Cowan & Todorovic, 2000). Beck and Cowan (2006) suggested that effective leaders need to value complexity, and understand the nature of these complexities, within a changing environment. Jaques and Clement (2006) argued that values are a major factor to be considered in understanding a person's cognitive capability. They maintained that the opportunity for challenging work which enables growth and development is an aspect of effective managerial leadership that is generally valued. If people value something, they will pursue doing it, suggesting that it may be important to gain a clear concept of values within the work environment (Jaques & Clement, 2006).

Furthermore, Burke (2008) suggested that leaders also search for meaning and purpose beyond that of material satisfaction, such as the corporate profits and the individual compensation that are typically associated with leadership roles. For example, Krishnan (2001) found that transformational leaders place more value on collective welfare than on their personal welfare, while Sarros and Santora (2001) found that executives' value systems are largely grounded in fundamental human virtues such as benevolence and honesty, as well as a need for personal gratification. Values often reflect a desire to make a difference and to help create a meaningful world (Milliman, Ferguson, Trickett & Condemi, 1999). Values therefore influence individual decisions, as well as having an impact on organisations and the global collective (Burke, 2008). When setting strategies, the leadership team needs to have the cognitive ability to perform the analysis that underpins the strategy, as well as ensuring that the organisation's employees implement it (Cowan & Todorovic, 2000). If an ability to understand and adapt to changes in the business environment is lacking, other factors influencing leadership are less effective (Raghavendran & Rajagopalan, 2011).

Prinsloo and Prinsloo (2012) suggested that values, as high level organising frameworks, impact on the way in which individuals utilise their capability and personality. Values are considered to be coping mechanisms to meet life challenges and to conceptualise reality (Van Marrewijk, 2004). In addition, values are important motivators of behaviour, because people strive to achieve or obtain something that they value, while they generally move away from things that they do not deem important (De Bruin & De Bruin, 2009). Clawson (2012)

suggested that when people observe something, they immediately compare that event with a personal set of values, assumptions, beliefs and expectations. Any gap between what is observed and what is expected creates inner conflict and can impact on performance (Clawson, 2012). Groenewald (2011) argued that effective leaders have a strong internal drive and passion to succeed and they want to achieve that which they value. The underlying value systems of leaders are likely to direct and guide their actions, behaviour and decision-making (Krishnan, 2001; Ng & Sears, 2012). Value systems advocated by executives within organisations arise from the application of the personal values within the business context (Robinson, Goleby & Hosgood, 2006). Clawson therefore proposed that an understanding of values, assumptions, beliefs and expectations and how they impact on decision-making is essential to effective leadership.

1.2 PROBLEM STATEMENT

Ryan, Emmerling and Spencer (2009) argued that there is a growing level of dissatisfaction with traditional measures of cognition and personality constructs, since these explain only some variance in job performance at an executive level. Significant relationships between cognitive ability and personality, between personality and tolerance for managing complexity, as well as between motivation and intelligence, have been identified (Carr & Dweck, 2011; Grace, 1997). It, however, appears as if the relationship between cognition and value systems at an executive level has not been investigated extensively. Lichtenstein (2012), for instance, maintained that a void exists in the examination of the values of strategic leaders and their relationship with the development of an organisation's strategy.

Jaques and Clement (2006) argued that leaders have to deal with high levels of cognitive complexity to perform the tasks associated with their roles – particularly when working in multinational organisations. They viewed complexity as a function of the number of variables operating in a situation, the ambiguity of these variables, the rate at which they are changing, and the extent to which they relate to one another. Technology and globalisation have significantly increased the levels of complexity that multinational leaders have to manage on a daily basis (Winsborough & Sambath, 2013). Leaders need to be able to respond appropriately to the multitude of challenges that arise from complexity and should be open to new ways of thinking about leadership (Raghavendran & Rajagopala, 2011). Cognition has been a key factor in leadership, and a substantial body of research findings has for decades indicated the important impact of cognition on job performance. However, these findings largely reflect the results of traditional intelligence tests, even though there is considerable evidence of their limitations. There is a strong need for further exploration of cognition and

the ability to manage complexity within a leadership context using tools designed to assess cognitive functioning in culturally heterogeneous contexts (Prinsloo & Barrett, 2013).

Cognition is a complex construct that should rather be explored in more detail using a number of variables simultaneously, instead of in isolation. The use of contextualised methods provides an ideal opportunity to examine a broader range of variables in relation to cognition or intelligence (Sternberg, 2009). Pretz and Sternberg (2005) suggested that future research on cognition should include measures of personality, affect, motivation and values, and such variables are likely to be best understood in real-world contexts. In this research, therefore, the relationship between cognition and value systems is explored within the leadership team of a multinational organisation.

Jokinen (2004) suggested that the acceptance of complexity describes an attitude towards ambiguous and unpredictable work environments, rather than a cognitive function. While cognitive ability plays a role in understanding complexity, accepting it appears to require a certain attitude. Cognitive skills influence the way in which the environment is experienced and interpreted. In the global environment work-related problems are increasingly uncertain and complex, and executives and organisational leaders should have divergent thinking skills and be able to switch their focus quickly between concepts. The acceptance of complexity, the consideration of differing worldviews across countries and cultures, and the ability to make appropriate decisions within this diverse environment, are all essential for leaders in multinational organisations.

Prinsloo (2012a) argued that value systems, and their underlying energies, determine the way in which personal characteristics and cognitive capability are implemented and thereby influence the behaviour and decisions of organisational leaders. Prinsloo (2012a) maintained that cognitive capacity remains a prerequisite, rather than a guarantee, of effectiveness. She claimed that cognitive capability needs to be applied according to Spiral Dynamics criteria to unlock its full potential. Information quantifying the relationship between cognitive abilities and value systems as in the current study should, therefore, contribute to a better understanding of leadership behaviour.

Since values have an impact on work performance, it is an important research topic in organisational psychology. Value systems that influence behaviour and work performance are related to, but not limited to, work ethic, pursuit of excellence, status aspiration, authoritarianism, the need for material gain, mastery, and competitiveness (Schreuder & Theron, 2004). A recent development in values research relates to Spiral Dynamics, which

presents a framework for understanding dynamic forces that influence human behaviour (Beck & Cowan, 2006). The newly developed theory of Spiral Dynamics suggested that people's behaviour can be explained according to their levels of existence and life experiences. People respond to life conditions by developing adaptive worldviews and capabilities, which are referred to as levels of existence (Prinsloo, 2012a). According to this theory, as an open system, value systems are constantly emerging and can change in response to a person's experiences. Peoples' worldviews are dependent on the type of problem they are trying to solve, and this can change in response to major life events (Graves, 1970; Kotze, 2009). A worldview, or a belief structure, represents a core intelligence that directs behaviour and has an effect on life choices as a decision-making framework. Worldviews are also referred to as value systems or memes in the theory of Spiral Dynamics (Beck & Cowan, 2006).

The theory of Spiral Dynamics is based on the study of the emergence and patterns of deep value systems that directly influence leaders' worldviews, which in turn have a strong impact on corporate mindsets, and the structure of relationships within the organisation, as well as the establishment of decision-making structures (Cowan & Todorovic, 2000). Understanding deep value systems according to Spiral Dynamics provides a basis for the analysis of individual behaviour and decision-making (Cowan & Todorovic, 2000). In a South African study including 176 adults, Kotze and Mauer (2013) found a significant relationship between Spiral Dynamics value systems and the Dogmatism scale developed by Rokeach (measuring the extent to which individuals assume their beliefs are correct). Limited research appears to be available on the relationship between cognition and Spiral Dynamics value systems, and a contextual analysis of cognition in relation to these value systems in a multinational environment should add depth to the current knowledge and understanding of these leadership constructs.

Beck and Cowan (2006) argued that leaders with higher level Spiral Dynamics value systems (also known as Second Tier leadership value systems) are able to build an inner-directed view that integrates (previously) separate entities and their functions into linear or systemic flows. This suggests that there is a link between what individuals value and cognition, such as their ability, for example, to develop a value chain that interlinks suppliers, customers, producers and investors throughout a business. This implies a certain level of cognitive capability and the ability to manage high levels of complexity (Beck & Cowan, 2006). Second Tier leadership value systems also involve making decisions that impact on the greater good, which includes being concerned with the longer-term sustainability of a company, a community, a nation or any other living system (Beck & Cowan, 2006). Achieving this ideal

requires the drive to achieve it, as well as the ability to understand the complexity underpinning how relevant factors relate to, and influence one another in the long term (Prinsloo & Prinsloo, 2011). All in all, effective leaders have a good understanding of their value systems, as well as the cognitive skills required to achieve business aims (Klenke, 2005).

According to Spiral Dynamics, higher level (or Second Tier) leadership value systems suggested that people can use their capability to make decisions with few boundaries to restrict thinking (Beck & Cowan, 2006). However, in a multinational organisational context, an individual's ability to do so effectively requires a certain level of cognitive ability to make the most appropriate decision within the given context (Jaques & Clement, 2006). This relationship may particularly warrant research attention because it has been suggested that Spiral Dynamics value systems represent the core intelligence that guides behaviour and influences life choices by acting as a decision-making framework (Prinsloo & Prinsloo, 2012; Du Preez & Nash, 2008).

Lichtenstein (2012) argued that there is a gap in existing research that examines leaders' values in relation to the development of organisational strategy. Previous research on organisational leadership suggests that both cognition and values influence decision-making (Lichtenstein, 2012). Furthermore, Russell (2001) found that value systems influence personal and organisational decision-making significantly – he even argues that value systems serve as the essence of leadership. However, limited research exists which explores the relationship between Spiral Dynamics value systems and cognition at an executive or senior management level. In this study a contextual analysis of cognition is provided in relation to value systems in a multinational environment, which should add depth to the current knowledge and understanding of these leadership constructs.

1.2.1 Research questions with regards to the literature review

In this research, the relationship between cognition and Spiral Dynamics value systems is explored within a leadership team of a multinational organisation.

Based on the above, the following research questions were considered in the theoretical and literature research component of the study:

- What is cognition?
- What are cognitive complexity and cognitive processes?
- What are value systems?

- What is the theoretical relationship between cognitive complexity, cognitive processes and Spiral Dynamics value systems in an organisational context?
- What are the implications of the theoretical relationships between cognitive complexity, cognitive processes and value systems for leaders in an organisational context?

1.2.2 Research questions with regards to the empirical study

The empirical study will address the following research questions:

- What is the empirical relationship between cognitive complexity and value systems within a leadership team in a multinational company?
- What is the empirical relationship between cognitive competencies/processes and value systems within a leadership team in a multinational company?
- Based on the research findings of this study, what are the implications for the field of industrial and organisational psychology in terms of cognitive competencies/processes and value systems within leadership teams in multinational companies?

1.3 AIMS

Given the above research problems, the general and specific aims set out below were formulated.

1.3.1 General aim of the research

The aim of this study is to investigate and quantify the relationship between cognition (specifically relating to cognitive complexity and cognitive competencies) and value systems of the leadership team in a multinational company.

1.3.2 Specific aim of the research

The specific aims listed below were formulated for both the literature review and the empirical study:

1.3.1.1 Literature review

The specific aims relating to the literature review were to conceptualise:

- cognition, cognitive processes and cognitive complexity;
- values and value systems; and
- the theoretical relationship between cognition (specifically relating to cognitive processes and the management of complexity) and value systems of organisational leaders.

1.3.1.2 Empirical study

The specific aims relating to the empirical study were to:

- determine whether a relationship exists between leaders' ability to manage complexity and Spiral Dynamics value systems in a multinational organisation; and
- determine whether a relationship exists between leaders' cognitive processes and value systems in a multinational organisation.

1.4 PARADIGM PERSPECTIVE

According to De Vos, Strydom, Fouche` and Delport (2011), a paradigm is a framework, viewpoint or worldview based on people's philosophies and assumptions about the social world and how material is viewed and interpreted. Mouton and Marais (1990) indicate that the paradigm perspective offers a framework within which research is conducted.

1.4.1 Relevant paradigms

1.4.1.1 Positivist research paradigm

This research can be categorised within the positivism research paradigm. Positivists maintain that an objective reality exists outside of personal experience that has demonstrable laws and mechanisms that can reveal significant relationships (De Vos et al., 2011). In the current study, the relationship between leaders' cognitive processes and their ability to manage complexity, and their Spiral Dynamics value systems is explored to determine whether there is a significant relationship among these constructs within a multinational leadership team. Furthermore, positivists maintain that phenomena should be observed through experience, direct observation, or indirectly through the use of instruments (De Vos et al., 2011). This research uses objective instruments to measure cognition and values in a multinational leadership team.

Generally, positivism contends that there is a reality in the world to be studied, captured and understood (De Vos et al., 2011). In this research, the relationship between leaders' cognitive skills, as measured by the CPP, and Spiral Dynamics value systems, as measured by the VO, is investigated within the positivism paradigm. Methodologically, cognitivism adopts a positivist paradigm, which can be explained by the use of measurement, instruments and scientific methods (De Vos et al., 2011) as applied in this study.

1.4.1.2 Industrial and Organisational Psychology

This research can be categorised within the cognitive psychology and psychometric discipline, both of which reside under the study of industrial and organisational psychology. The field of industrial and organisational psychology deals with a wide range of functions and

tasks within the world of work. A principal function within this field involves the management and development of human resources, human resource planning and organisational design (Weiten, 2012). This study contributes to an understanding of the cognitive functioning and Spiral Dynamics values systems of leaders working in a multinational organisation.

1.4.1.3 Cognitive Psychology

This research was conducted within the field of cognitive psychology. According to Das, Naglieri and Murphy (1995), cognitive psychology involves the development and representation of knowledge, and much interest is based on theories of information processing and problem solving. Hunt (2011) further pointed out that there is a need to understand individual differences in cognitive capability and what these differences mean in society.

The CPP is designed and based on both differential and information processing approaches (Prinsloo, 2001) and falls within the cognitive psychology field. Hunt (2011a) proposed that there is a need to study strategies for acquiring new information and to further the current understanding of how cognition is applied across different contexts, supporting the significance of this research. This study will be conducted within the context of a multinational leadership team.

1.4.1.4 Psychometrics

Psychometrics, a sub-field of industrial and organisational psychology, embodies the validity and reliability, as well as the body of theory of scientific measurement principles that are applied to the measurement of psychological characteristics evolving over time (Foxcroft & Roodt, 2009). The aim of psychometrics is to identify correlations of test results with external criteria, and to measure psychological characteristics with sufficient precision to enable the psychometrics model to be instantiated (Kline, 2000).

Psychometric tests have long been used in industrial and organisational settings to facilitate decision-making (Furnham, 2008). Hunt (2011a) argued that these assessments, and particularly cognitive tests, are probably the best indicators of future success currently available in the world of work. Psychometric tests are used to make important decisions on a daily basis within organisations (Bartram, 2004). Psychometrics, for example, provides input into decisions relating to suitability for a job or a field of study, the identification of individual strengths and development needs or informing an organisation's training and development plan (Foxcroft & Roodt, 2009). However, the multidimensional nature of assessments allows a wide array of data to be collected providing a rich, broad sample of behaviour on which to

base these important decisions (Foxcroft & Roodt, 2009). In this study the data was collected by means of the CPP as a measure of cognition in a multinational leadership team, and the VO as a measure of Spiral Dynamics value systems.

1.4.2 Relevant theories and models

Value systems as defined in this study are based on the theory of Spiral Dynamics, as outlined below. This is followed by a brief discussion of those theories of cognition applicable to this research, including a summary of the differential and information processing approaches. Cognition, as defined in this study, is based on these theories of cognition.

1.4.1.1 Spiral Dynamics

Clare Graves's initial research into the process of human development later formed the basis for Spiral Dynamics, a theory of human development introduced by Beck and Cowan (2006). Graves (in Beck & Cowan, 2006) outlined eight primary levels or waves of human existence, based on extensive research and data collected from more than 50 000 people in first, second and third world countries (Wilber, 2001). Each level of existence, constructed around a core value system, provides its own hierarchy of needs.

In the theory of Spiral Dynamics, human nature is not fixed, which suggests that it is possible for people, when life conditions change, to adapt to their environments by constructing new, more complex, conceptual models of the world that assist them in managing the new challenges (Wilber, 2001). However, effective adaptation to the environment requires insight into different situations – including insight into what one wants, as well as insight into what reality has to offer (Wilber, 2001). This implies that organisational leaders require the ability to understand the impact that situational and environmental variables have on each other and the organisation.

Du Preez and Nash (2008) stated that Spiral Dynamics value systems are similar to complex belief systems about what is desirable or important to an individual, and what is not. These value systems typically affect choices and guide decision-making.

1.4.1.2 Theories of cognition

The idea that intelligence and cognition influence success is accepted as a given among most theorists and researchers (Ackerman & Lohman, 2003). However, two constant concerns are what cognition is and how it can be measured.

Many different theories and factors of cognition have been developed and discussed, with a wide range of methods to measure it (Van Eeden & De Beer, 2009). Although each of these theories has added to researchers' understanding of, and the factors contributing to cognition, there are reasons to support, as well as criticise each of these theories (Van Eeden & De Beer, 2009). In this study, cognition is defined according to the differential and information processing theories of cognition.

a. Differential approach

Guthke (1993) pointed out that as early as 1924, Thorndike defined intelligence as the ability to learn. However, the first tests measuring cognitive ability focused purely on results and did not consider whether the individual's performance would improve when receiving guidance or feedback. Typically, static intelligence tests measure a person's general ability and do not necessarily predict the ability to learn (Das, 1987; Sternberg, 2011). These tests are implicitly based on the premise that the individuals completing the test had similar and comparable backgrounds and opportunities to acquire the knowledge and information required to perform well in the assessment (Campione & Brown, 1987; Sternberg, 2011). Bartholomew (2004) suggested that cognition is not a one-dimensional phenomenon, but rather a concept that has multiple facets that need to be considered from a number of points of view.

The primary purpose of theorists adhering to the differential approach (also known as the structural or psychometric approach) to intelligence was to identify and study the nature of cognition and to reveal the structure of the intellect (Prinsloo, 2005). The interest in this area focused mainly on identifying the number of dimensions, factors or abilities that are required to explain adequately the differences in individuals' performance on cognitive tests (Kubinger, Litzenberger & Mrakotsky, 2007).

b. Information processing approach

In 1977 Sternberg expanded on the theories of cognitive abilities by introducing the information processing approach, and his assertions have been supported more recently by other researchers (Kubinger, Litzenberger & Mrakotsky, 2007). In this approach to measuring cognitive skills (also known as the cognitive processing approach), intelligence consists of three different processes, which are attentional processes, information processes and planning processes (Van Eeden & De Beer, 2009).

According to Prinsloo (2005), the different information processing theories view the identification of cognitive processes as the primary research goal. Cognition is measured in this approach by focusing on functions such as sensory processing, coding strategies, memory, and other mental capacities involved in remembering and learning things. Prinsloo (2005) also maintained that the information processing theories present cognition in terms of mental representations, the processes underlying these representations, and the way in which these processes are combined. The focus in the information processing theory of intelligence relates to how people think and what their thinking processes are (Prinsloo, 2005).

Sternberg (2009) initially sought to understand the information processing origins of individual differences in the analytical aspect of human cognition. He found that, with componential analysis, it was possible to specify sources of individual differences underlying different factor scores (such as for inductive reasoning). Differences in individuals' cognition could consequently be determined by measuring cognitive processes.

Prinsloo (2005) argued that Sternberg attempted to integrate the differential and information processing approaches to intelligence. This was achieved by defining cognition in terms of the availability of mental components, the utility of rules for combining these components, the utility of component execution modes, the utility of orders in which components are executed, and the component values, for example, the degree of difficulty.

Hamers and Resing (1993) and Sternberg (2011) proposed that the information-processing view of human cognition describes how people collect and apply information in order to solve problems and acquire knowledge. The process of making decisions to solve existing problems and to set the future direction of an organisation at an executive level is closely related to this concept.

c. Complexity of work model

Jaques (1998) developed the Complexity of Work Model, which defines seven levels of complex thinking required by different jobs. These start from Level 1 work, which involves short time frames, concrete tasks and completing one task at a time, and progress to Level 7 work, which involves executive leadership of multinational organisations and work that includes understanding large-scale systems. These most complex jobs require the individual to make judgements and decisions about potential socio-political and economic trends based on many interlinked variables. Beck and Cowan (2006) argued that individuals who operate

effectively in these types of roles need to value working with complexity in a constantly changing environment, where the long-term viability of the organisation is a major factor to be considered.

In this study, cognition (the ability to manage complexity and cognitive processes) is investigated in relation to value systems at an executive level in a multinational organisation. The CPP is used to measure cognitive complexity and cognitive processes, while the VO, based primarily on the theory of Spiral Dynamics, is used to measure value systems.

1.4.3 Hypotheses

The following research hypotheses were posed and were tested empirically in this research:

H1: A statistically significant relationship exists between leaders' cognitive processes and their value systems.

H2: A statistically significant relationship exists between leaders' ability to manage complexity and their value systems.

1.5 RESEARCH DESIGN

The research consists of two parts. The first part consists of an exploratory literature review that conceptualises cognition and value systems, and investigates the theoretical relationship between these two constructs in a senior leadership team.

The second part of the research consists of empirical descriptive quantitative research, which, according to Leedy and Ormrod (2010), involves the exploration of possible correlations among two or more phenomena. These authors further suggest that this type of research yields quantitative information that can be summarised by means of statistical analysis. In this study, the objective is to determine whether there is a statistically significant relationship between cognition and Spiral Dynamics value systems within a senior leadership team in a multinational organisation. The variables, cognition and values, are explored through a correlational analysis. Cognition, specifically cognitive processes and cognitive complexity, is measured by means of the CPP; and value systems are measured by means of the VO.

1.5.1 Statistical procedure

The data was processed by means of statistical analyses, described below.

1.5.1.1 Descriptive statistics

Descriptive statistics describe a body of data (Leedy & Ormrod, 2010). In this section of the statistical analysis, the respondents were described according to their age, gender, ethnicity, educational level, nationality and preferred language. Furthermore, the mean, standard deviation, minimum scores, maximum scores and the Cronbach Alphas were calculated for the constructs measured by the CPP and the VO. Frequency distributions were calculated for the value systems, as well as for the cognitive complexity constructs.

1.5.1.2 Correlational statistics

Terre Blanche, Durrheim and Painter (2006) indicated that a correlation coefficient is an accurate method of representing the relationship between two variables. Correlation analysis was used to identify whether there was a relationship between the different variables, and, where there was a relationship, to determine the strength and statistical and practical significance of the correlation. The first set of correlational statistics analysed the relationship between the value systems and cognitive complexity constructs as measured by the VO and CPP respectively. The second set of correlations analysed the relationship between value systems and cognitive processes, measured by the VO and CPP. The Pearson coefficient (*r*) was calculated with the use of the Statistical Package for Social Sciences (SPSS) version 20.0 (Terre Blanche, et al., 2006).

1.5.2 Internal and external validity

The internal validity of a research study indicates the extent to which its design and the data it yields allow for the accurate drawing of conclusions about relationships within the data (Leedy & Ormrod, 2010). In this study, assessments were selected that have documented evidence of their reliability and validity.

The external validity of a research study is the extent to which its results apply to situations beyond the study itself (Leedy & Ormrod, 2010). The findings of this study are only based on data obtained from individuals working at an executive level within a particular multinational organisation. It will not be possible to generalise the findings across organisations, organisational levels or industries. However, the sample represents a diverse group in terms of ethnicity, language and nationality, and therefore can contribute to the available knowledge of leadership in a global context.

1.5.3 Ethical execution of the study

Specific measures were taken in this study to ensure the ethical execution of the research process. Leedy and Ormrod (2010), for instance, indicate that informed consent should be

obtained from all participants in a research study, and that the involvement of the latter in the study should be voluntary. All individuals participating in this study provided their informed consent in relation to:

- the nature of the study;
- what each individual was required to do during the course of the research study;
- information that was accessed during the course of the research study;
- the assurance that results will be kept confidential and anonymous;
- the assurance that their right to privacy will be respected at all times;
- the name and contact details of the researcher if they have any queries; and
- the accessibility of the summary of findings once the study is complete.

The participating organisation provided written consent for the study to be completed. Participants completed the assessments in a controlled assessment environment, and the process was supervised by trained test administrators. All respondents had the option to receive personal feedback on their assessment results.

1.6 RESEARCH METHOD

As pointed out earlier, the research study comprised two phases, namely the literature review and the empirical study, and these are discussed below.

1.6.1 Phase 1: Literature Review

The first phase of the study consisted of a literature review, the results of which will be detailed in Chapter 2. The focus is on theories of cognition and the impact of cognitive styles and cognitive processes on leadership effectiveness. Theories of cognition and intelligence, and developments in this area are reviewed and discussed. Furthermore, the theories underpinning value systems are reviewed and discussed in the work context. The relationships between cognition and values systems in a leadership context are explored. The contributions of relevant theorists, authors and researchers, both in South Africa and internationally, are considered and discussed within the context of this study.

1.6.2 Phase 2: Empirical study

The second phase of the research consists of an empirical study, the results of which are presented in Chapter 3 in the form of a research article. The background to the study and problem statement is outlined, and trends from the literature review are highlighted. The research design, including the research approach and research method, is explained and the results are presented. Following a discussion of the results of the study, the limitations

pertaining to the research are outlined, and recommendations for future research are made. Chapter 4 integrates the information contained in the literature review and the empirical study; and the conclusions of the study, the limitations and recommendations for future research are discussed.

1.7 CHAPTER LAYOUT

The chapters will be presented in the following manner.

Chapter 2 consists of a comprehensive literature review considering different theories of cognition and their development from a historical and theoretical perspective. Concepts such as cognition, cognitive processes, cognitive styles and cognitive complexity are explored. This chapter also includes a discussion of available literature pertaining to values theories. Furthermore, the practice of leadership is discussed in relation to realising human potential within the realms of cognitive abilities and value systems. An overview of previous research on the relationships between these concepts is provided and discussed.

Chapter 3 consists of the research article.

Chapter 4 includes an integration of results, conclusions and recommendations based on the research findings. Research limitations are discussed, as well as recommendations for future research.

1.8 CONCLUSION

In Chapter 1, the scientific overview of the research study was provided. This included the background and motivation for the study, the problem statement, the general and specific aims of the research, perspectives on paradigms, the research design, and the research method. Value systems were introduced according to the theory of Spiral Dynamics, while cognition was discussed according to the differential and information processing approaches. This study contributes towards the existing body of research on the relationship between cognition and value systems, by exploring this relationship within a multinational organisation's leadership team. It is envisaged that the findings of this study will inform future research opportunities to explore more effective means of attracting, selecting, developing and retaining organisational leaders in organisations with a global presence. The chapter concluded with the chapter layout and a summary of the study.

CHAPTER 2: LITERATURE REVIEW: THE RELATIONSHIP BETWEEN COGNITION AND VALUE SYSTEMS

In Chapter 2, a theoretical overview of the relevant literature on cognition and value systems in leadership teams in multinational organisations is provided. The first construct, namely cognition, is debated in terms of the differential and information processing approaches to cognition. Concepts such as intelligence, cognitive styles, cognitive processes and the management of complexity, will be explored. The second construct, namely value systems, is discussed in the context of Spiral Dynamics. Furthermore, the practice of leadership will be explored within the realms of cognitive abilities and value systems. The chapter concludes with an overview of previous research on the relationships between these concepts.

2.1 COGNITION

The term, cognition, is used in various ways. After reviewing multiple definitions, Van Heerden (2005) suggested that it generally refers to the mental processes of an individual, with particular emphasis on the idea that the mind is understood in terms of internal information processing. This differs from the concept of problem solving, which denotes the effort taken to change a specific state into a desired outcome (Prinsloo & Prinsloo, 2011).

Necka and Orzechowski (2005) agreed that cognition refers to regular information processing, which is directly responsible for the execution of cognitive tasks. This idea is further supported by Hunt (2011a), who suggested that cognition relates to two different information processing capacities: the first is the ability to control attention and use appropriate memory functions, and the second is the speed at which information is processed. However, Prinsloo (2012a) maintained that cognition consists of five information processes, also known as performance processes. These include: focusing, selecting and exploring; linking and analysis; structuring and integration; logical and lateral reasoning; as well as memory and retention of information. In essence, cognition is essential to all other mental operations.

2.1.1 Related cognitive constructs

Leaders in multinational organisations make decisions and solve problems on a daily basis and are reliant on their cognitive skills when doing so (Raghavendran & Rajagopala, 2011). Cognition and intelligence have been a topic of discussion in leadership research for decades, and there is a substantial body of findings that reflect the results of different types of intelligence tests and the impact these results have on leaders' decision-making and work performance (Prinsloo & Barrett, 2013). There are clearly different types of intelligence and related constructs that influence decision-making (Hunt, 2011b). A common theme in the theories of intelligence lies in the use of terms used to describe it, such as learning, problem

solving, memory, judgement, speed, complexity, cognitive styles and metacognition (Prinsloo & Barrett, 2013). Different terms and concepts have been used to describe constructs relating to cognition, and therefore it is important to clarify the definitions of these interrelated ideas. A few constructs related to cognition, namely intelligence, cognitive processes, cognitive styles, cognitive complexity and metacognition will now be briefly described.

Sternberg (2011) defined *intelligence,* at a very general level, as goal-directed behaviour. Necka and Orzechowski (2005) further suggested that intelligence is the ability to solve complex problems. They identify two essential aspects of human intelligence, namely the ability to adapt quickly to new situations, as well as the efficient solving of complex cognitive tasks. Nickerson (2011) referred to intelligence as the ability to learn, to reason well, to solve novel problems, and to deal effectively with the often unpredictable challenges that confront people on a daily basis. A common thread among these definitions is that some basic learning abilities, which may be defined in different ways, underlie intelligent functioning (Fagan, 2011).

Cognitive processes are the mental processes, by means of which a person is able to organise information to make it available for doing work (Jaques & Clement, 2006). Prinsloo and Prinsloo (2011) suggested that the mental activity, as a unit of thinking that results in a particular product, refers to a cognitive process. This differs from cognition, which is seen to be a collective term for a number of cognitive processes or dynamic operations. In this regard, intelligence or cognition is regarded as consisting of numerous cognitive processes, that work together to organise information, assisting in decision-making.

Penchova and Papazova (2006) suggested that *cognitive styles* represent dimensions of individual differences in the cognitive sphere, while Sternberg and Grigorenko (1997) referred to a cognitive style as the preferred manner in which people process information. These authors stated that a cognitive style is not an ability, but rather the preferred way in which one uses the ability one has. Necka and Orzechowski (2005) referred to the distinctive mode of dealing with a task, or group of tasks, as a cognitive strategy. It appears to be commonly accepted that a cognitive style (the manner in which cognitive tasks are performed and cognitive processes are used) is a preference, rather than an ability.

Cognitive complexity measures the structure of cognition and comprises two parts: differentiation (the number of dimensions used by individuals to perceive external stimuli) and integration (the complexity of rules used by individuals in organising the differentiated dimensions) (Wang & Chan, 1995). Jaques and Clement (2006) suggested that complexity relates to the number, ambiguity, rate of change, and interweaving of variables involved in a

problem. Individuals typically apply their preferred cognitive styles in different ways to manage tasks with differing levels of complexity.

The ability of individuals to manage complexity when solving problems at work, is reflected in how they manipulate and organise variables: some people seem able to collect, understand and manage large amounts of variables at the same time, while others cope with medium amounts, and some can only deal with a small number of variables before they become confused (Jaques & Clement, 2006). Prinsloo and Prinsloo (2011) agreed that complexity involves the number of elements (the quantitative aspect of cognition), the level of abstraction (how far the elements are removed from concrete reality) and the degree of interaction between the components or systems, which requires the ability to integrate information. As such, complexity refers to the nature of the information dealt with when completing tasks and solving problems, while cognitive styles deal with the way in which an individual chooses to manage tasks with different levels of complexity.

Necka and Orzechowski (2005) defined *metacognition* as the processes of monitoring and control, to ensure that regular cognitive processes are executed in the appropriate order and according to some superordinate rules. People who use their metacognition effectively are able to adapt their cognitive styles, and select the most appropriate cognitive processes according to the task requirements and level of complexity. Prinsloo and Prinsloo (2011) regarded metacognition as being at the heart of effective thinking. They argued that metacognition relates to self-awareness, self-monitoring and self-evaluation, and involves learning from mistakes and capitalising on using one's insight and intuition in a manner that is focused, directed and effective.

Despite ongoing research and discussion, the concept of cognition appears to be multifaceted and difficult to define. Historically, many researchers have proposed different ways of conceptualising and measuring intelligence.

2.1.2 Theories of cognition

As mentioned earlier, many different theories concerning, and factors of, cognition have been developed, as well as a wide range of methods to measure it. It is important to outline how models of cognition have evolved, as it is this history that provided the catalyst for the integrated approach to cognition used in this study. The contextual and developmental approaches to the study of cognition will be outlined, and their contribution to the understanding of intelligence will be discussed. The differential approach (also known as the structural or psychometric approach to the study of intelligence) and the information

processing approach to the study of cognition will be comprehensively discussed since they provide the principal theoretical basis of the cognitive assessment instrument used in this study.

2.1.2.1 The contextual approach

Contextual theorists highlight the need to link cognition to the environment in which people operate. In this approach, there is a strong belief that behaviour, which is considered intelligent in one environment, may not be regarded as such in a different setting. Theorists subscribing to this view seek to understand the environment, and an individual's interaction with it, to develop an appreciation of the constituents of intellectual thought and behaviour within a particular situation (Sternberg, 1986). In Sternberg's triarchic theory of successful intelligence, intelligence is defined as the balance of analytical, creative and practical abilities to achieve success within a specific socio-cultural context (Cianciolo & Sternberg, 2004; Kaufman & Plucker, 2011).

Hunt (2011b) pointed out that, taken individually, many of Sternberg's studies assessing analytic, creative and practical intelligence to support his theory, are fairly weak. Criticisms of Sternberg's studies include pre-selected samples of individuals already identified as having well-developed cognitive skills, and suggestions of exaggerated strength of the empirical support provided. However, Hunt (2011b) argued that Sternberg's studies collectively show that the augmentation of conventional tests, with relevant adaptations, could improve prediction capabilities. Therefore it is important to acknowledge the contribution of Sternberg to the existing understanding of cognition, and its measurement of different types of intelligence.

2.1.2.2 The developmental approach

Das (1995) maintained that, in the developmental approach to understanding cognition, the central concern of cognitive psychology is the development and representation of knowledge. Grigorenko and Sternberg (1998) argued that conventional measures of cognitive skills quantify only developed / learned abilities, which are influenced by variables such as educational levels, test-taking skills and socio-economic status, to name a few, rather than measuring latent skills. When focusing on developmental processes, such as those used in dynamic assessments, individuals learn simultaneously with being tested (Sternberg, 2004), and incorporate this training into the assessment process. This means that individuals' current ability is assessed, as well as their potential future ability (Van Eeden & De Beer, 2009).

Although other theorists have suggested that the ability to learn is strongly related to the concept of intelligence, Vygotsky largely received the credit for introducing the concept of dynamic testing (De Beer, 2006; Grigorenko & Sternberg, 1998). Dynamic assessments of intelligence measure a person's performance in various intelligence tests, both before and after a brief instructional intervention (Cianciolo & Sternberg, 2004). The levels of pre-test and post-test scores, as well as the difference between these two scores, are considered when indicating learning potential (De Beer, 2006). Vygotsky's theory of the Zone of Proximal Development (ZPD) focused on the process of development, and was viewed as a means of improving the testing of cognitive functioning. However, there appears to be limited empirical evidence supporting all his claims (De Beer, 2006).

Piaget is another theorist who did not focus on intelligence from the point of view of studying individual differences, but rather focused on intelligence as arising from cognitive schemas or structures. While Vygotsky focused on the role of interactions of individuals within the environment, Piaget concentrated on biological maturation in the development of intelligence (Sternberg & Pretz, 2005).

Piaget's theory places little emphasis on the processes involved in intelligent performance (Siegler & Richards, 1982). However, Hergenhahn (1992) argued that there is a close link between Piaget's theory of cognitive development and the information processing approach, since both emphasise the importance of cognitive structures or schemas, and the belief that these are adaptable.

Prinsloo and Barrett (2013) argued that an integrated model of cognition is required, which represents a systems approach as a basis for understanding both the structure and process of the intellect. The Differential and Information Processing approaches to the theory of cognition form the theoretical foundation of the CPP (the instrument used in the current study to measure cognitive processes and the ability to manage complexity). The Differential and Information Processing approaches to the theory of cognition are discussed in the following sections.

2.1.2.3 The differential approach

The primary purpose of theorists adhering to the differential approach to intelligence was to identify and study the nature of intelligence, and to reveal the structure of the intellect (Prinsloo, 2005; Taylor, 1994). Interest in this area focused mainly on identifying the number of dimensions, factors or abilities that are required to explain adequately the differences in individuals' performance on cognitive tests (Kubinger, Litzenberger & Mrakotsky, 2007).

Psychometric or differential theories of intelligence deal with the dimensions of individual ability that are thought to underlie performance on intelligence tests (Hunt, 2011b).

Simon and Binet were the first researchers to use cognitive tasks to measure cognitive abilities, and therefore they influenced most cognitive tests developed over the century (De Beer, 2006). However, there has been some disagreement with regards to the number of factors that influence performance on cognitive tasks (Taylor, 1994). Spearman maintained that there is one general factor (*g*) that underlies performance on all cognitive tasks, as well as a number of specific factors (*s*) that contribute to performance on particular activities (Taylor, 1994; Ubrina, 2011). Burt and Vernon expanded this theory by introducing a hierarchy, where *g* is at the top of the hierarchy, while more specific abilities are lower in the hierarchy (Cianciolo & Sternberg, 2004; Willis, Dumont & Kaufman, 2011). However, Guttman suggested that general intelligence, *g,* should be represented centrally, with specific skills and abilities grouped around *g* according to their degree of difficulty (Cianciolo & Sternberg, 2004).

Cattell was the first theorist to introduce the concepts of fluid and crystallised intelligence, splitting Spearman's concept of general intelligence (*g*) into two parts (Van Eeden & De Beer, 2009). Fluid ability refers to the flexibility of thought and abstract reasoning skills, while crystallised ability includes the accumulation of knowledge and skills (Cianciolo & Sternberg, 2004; Kline, 2000). Gardner (1983) proposed a theory of multiple intelligences (MI Theory), which claimed that there is no single, unified intelligence, but rather a set of seven relatively distinct, independent and modular multiple intelligences (Cianciolo & Sternberg, 2004; Sternberg, 2004). These intelligences include linguistic intelligence, logical-mathematical intelligence, spatial intelligence, musical intelligence, bodily-kinaesthetic intelligence, interpersonal intelligence and intrapersonal intelligence. Individuals draw on these intelligences, individually and collectively, to create products and solve problems relevant to their environment (Davis, Christodoulou, Seider & Gardener, 2011; Gardener, 1999). In the theory of successful intelligence outlined by Sternberg (2009), he argued that intelligence can be understood in terms of analytical, creative and practical intelligence. His theory emphasised the importance of the adaptive nature of intelligence (Sternberg, 2011).

Regardless of the number of abilities or intelligences identified, psychometric models of cognition treat factors of intelligence as stable, and do not account for the dynamics of development and the constructive processes by which people develop intelligent behaviour (Rose & Fischer, 2011). Factor models are inherently static in nature, and none of these approaches, not even the model of fluid and crystallised intelligence, cater for the flexibility and dynamic nature of cognition. For example, when a person practises working with visual-spatial

problems over time, tasks that began as indicators of fluid intelligence become crystallised, since, with practice, individuals can improve their performance (Rose & Fischer, 2011). Furthermore, the different processes of analysis can lead to many alternate models of the structure of the intellect, rather than acknowledging the dynamic nature of cognition (Rose & Fischer, 2011).

2.1.2.4 The information processing approach

The information-processing view of human intelligence describes how people collect and apply information, in order to solve problems and acquire knowledge (Hamers & Resing, 1993; Hunt, 2011b). Sternberg (1986) suggested that in the information processing approach, theorists attempt to develop an understanding of cognition by identifying the information processing components of intelligent performance. Performance on tasks is broken down into parts that, when taken together, form the real-time course of information processing in problem solving. The information processing approach enriches understanding of cognitive tests and the ability constructs, as put forward in the differential / structured / psychometric approach to cognition. This approach moves away from trait labels to more detailed models of thinking (Lohman, 2005).

The emergence of computers as a tool to assist human problem solving strongly influenced the development of the information processing approach (Taylor, 1994). In this approach (also known as the cognitive processing approach) to measuring cognitive skills, cognition is seen as based on three different processes; namely attentional processes, information processes and planning processes (Van Eeden & De Beer, 2009). Hunt (2011a) stated that intelligent action depends jointly on the ability to store information for short periods of time, the ability to process that information, and also the ability to focus on relevant information. Effective functioning requires these abilities to work together as a system. Hunt (2011a) argued that it is not possible to treat and understand these components separately, if one is to understand them properly.

While other theories of cognition focused on the process of breaking down a task into separate elements and then measure an individual's ability to perform each of these tasks, the information processing approach attempts to find the cognitive processes which underlie performance on a given conventional measure (such as verbal ability) (Taylor, 1994). The focus of information processing holds that the human information processing system contains one or more 'bottlenecks' that limit the flow of information. Individuals who are able to process this information more quickly at these points, are also more competent at problem solving and other tasks (Taylor, 1994). Cognition is measured in this approach by focusing on functions

such as sensory processing, coding strategies, memory and other mental capacities involved in remembering and learning things. The focus in the information processing theory of cognition relates to how people think and identifying the specific cognitive processes used in solving problems (Prinsloo, 2005).

After reviewing a number of processing variables and the relationship of measures of these variables to cognitive skills, Sen (1991) suggested that the fundamentals of mental abilities of people can be tapped by measuring information receiving, processing and retrieval speeds that would not be influenced by the availability of knowledge or other environmental variables. Sternberg (2009) sought to understand the information processing origins of individual differences in the analytical aspect of human intelligence. He found that, with componential analysis, it was possible to specify the sources of individual differences underlying the different factor scores (such as that for inductive reasoning). Differences in individuals' cognition could consequently be determined by measuring cognitive processes. Sternberg highlighted the adaptive nature of intelligence, using analytical, creative and practical cognitive processes when solving problems (Sternberg, 2011).

However, the information processing approach to cognition does not take into account the influences of affect (feeling) and conation (willingness) (Lohman, 2005). Metacognition, relating to self-awareness, self-monitoring and self-evaluation, and working in a focused, directed manner (Prinsloo & Prinsloo, 2011) is also not considered. Research shows that people who do well on ability tests expend effort differently from those who score poorly. Specifically, people adopting a constructive motivational orientation towards completing tasks and solving problems, tend to show more and better self-regulation than those who adopt a less constructive or even a defensive orientation (Lohman, 2005). Furthermore, as suggested by Snow (1994), aptitudes are reflected not only *in the mind*, but are also revealed in the adaptation of the individual to the particular demands and opportunities of a situation. Therefore, differences in individuals' problem solving abilities are measured by those skills applied in everyday contexts. The information processing approach to cognition does not incorporate the fact that cognition is dependent on different contexts and situations (Lohman, 2005).

As was evident earlier, there are reasons to support and criticise most theories of cognition. However, they have all made some contribution to developing a more comprehensive understanding of cognition (Van Eeden & De Beer, 2009). It is for this reason that Prinsloo and Barrett (2013) argued for a systems approach that is concerned with function as a basis for understanding the structure of the intellect, thereby accommodating more than one theory of

cognition. The theoretical foundations of the CPP, the assessment used to measure cognition in this study, are based on the developmental, differential and information processing theories of cognition. The CPP is discussed in more detail in the next section.

2.1.3 Cognitive Process Profile

The CPP was designed to provide an indication of an individual's thinking processes and styles. It further provides a reflection of a person's potential to develop particular thinking processes and to develop the ability to deal with complex and unstructured problems (Prinsloo, 2005).

The CPP is a self-administered, computer-based assessment that measures the way people think when solving problems, including their cognitive processes and the way in which they deal with information. It also assesses aspects of their potential for future cognitive development and growth (Prinsloo, 2005).

According to Prinsloo and Prinsloo (2011), the CPP measures a number of constructs in an integrated manner, including those set out below.

- **Cognitive styles** are defined as the person's general approach to problem solving, focusing in particular on their approach in new and unfamiliar situations. The CPP describes an individual's preferred cognitive styles (usually consisting of a combination of styles) that the individual uses when solving problems in novel situations. The CPP reports on 15 different cognitive styles, namely explorative, analytical, structured, holistic, intuitive, memory, integrative, logical reasoning, reflective, learning, random, impulsive, metaphoric, efficient / quick insight and a balanced profile.
- **Work-related processing aspects** indicate the levels of work complexity with which an individual is cognitively capable of dealing.
- **Cognitive processes / competencies** are described as the performance processes used to manage task material.
- **Learning potential**, which indicates an individual's ability to benefit from instruction or mediated learning.

The CPP monitors, at a very detailed level, approximately 10,000 cognitive processes which people apply as they work through eight exercises. During these exercises, respondents are required to interpret stories presented in symbols. They receive clues on how to interpret the stories and what each symbol means. When interpreting each story, respondents receive instructions that include both relevant and irrelevant information (Prinsloo & Prinsloo, 2011).

The manner in which respondents manage, sort and thereby make sense of the different types of information that they receive, is monitored and recorded by tracking the movements they make with the computer's mouse, while they organise the information provided to them (Nzama, De Beer & Visser, 2008). This information is then analysed according to a large number of algorithms to identify trends and tendencies in terms of respondents' cognitive functioning.

More than 30,000 individuals, distributed relatively equally across a number of biographical variables, such as age, race, gender, education, discipline and level of experience, completed the CPP, and its norm groups are based on this sample (Prinsloo, 2011). In the current study, levels of work (as a measure of leaders' ability to manage complexity), and also cognitive processes (the way in which leaders approach problem solving) were included in the data analysis. The following sections outline these constructs as measured by the CPP.

2.1.3.1 Levels of work

According to Jaques (1998), peoples' problem solving performance is related to their current ability to manage complex information, as well as their potential to improve their skills in this area. As mentioned previously, Jaques (1998) created the Complexity of Work Model, which defines seven levels of complex thinking required by different jobs. These range from the Level One work which involves short time frames, concrete tasks and completing one task at a time, and progress to Level Seven work which involves executive leadership of multinational organisations and work that includes understanding large-scale systems.

The seven levels of work described by Jaques (1998) are reduced in the CPP to five work environments, including 'purely operational', 'diagnostic accumulation', 'alternative paths/tactical strategy', 'parallel processing' and 'a purely strategic work environment'. The test developer contended that the definition of the purely strategic work environment in the CPP is sufficient to encompass the three highest levels of work outlined in the Complexity of Work Model (Prinsloo, 2011). The level of work is determined in the CPP by considering the person's stylistic preference and ability to manage complex information.

Table 2.1 summarises the nature and complexity of each of the five levels of work as measured by the CPP.

Table 2.1: Descriptions of the five levels of work as measured by the CPP (Prinsloo & Prinsloo, 2011, p.50)

	Level 1: Purely operational environment	Level 2: Diagnostic accumulation environment	Level 3: Tactical strategy / alternative paths environment	Level 4: Parallel processing environment	Level 5: Pure strategic environment
Structure	Clear, linear procedures, rules and policies are applied to complete tasks.	Parameters, frameworks and clear boundaries are applied to complete tasks.	Fuzzy, theoretical guidelines are applied to complete tasks.	Future scenarios, hypothesis generation and big picture thinking are applied to complete tasks.	Visions for long-term viability and big picture systems thinking are applied to complete tasks.
Focus	The focus of this environment is on routine, concrete tasks.	The focus of this environment is on a particular person, case, situation or problem.	The focus of this environment is on the whole system and tangible systems.	The focus is on future possibilities outside the paradigm and on intangible systems.	The focus is on the macro environment.
Time	The time frame of decisions is from one to three months.	The time frame of decisions is from three months to one year.	The time frame of decisions is from one to three years.	The time frame of decisions is from three to five years.	The time frame of decisions is in excess of five years.
Key capability	Key capabilities relate to sensory orientations, touch, feel and sight.	Key capabilities relate to accumulation of information and understanding needs.	The key capability is to make connections.	The key capabilities are modelling (creating a model of the future) and scenario planning.	The key capability is weaving.
Processes, operations performed	Individuals typically approach tasks in a reactive, step-by-step manner by overcoming one obstacle at a time.	Individuals typically approach tasks by analysing and generating solutions, customising to needs, troubleshooting, and predicting problems.	Individuals typically approach tasks by understanding and implementing strategies. They arrive at effective, efficient outcomes through refining processes, restructuring, considering tangible variables and make continuous improvement. They apply best	Individuals approach tasks by translating broad strategy, aligning the current system with future possibilities and working across silos.	Individuals approach tasks by considering long-term viability across macro contexts and considering the interplay of dynamics within / across macro contexts.

			practice and benchmarking processes, and they evaluate and implement systems.		
Excellence	Accuracy, precision, quality and minimising costs / waste are important in this environment.	Pre-empting potential obstacles and service orientation are important in this environment.	Optimising systems, continuous improvement and system efficiency are important in this environment.	The ability to see underlying patterns and dynamics, to suspend knowledge and be open to possibilities, and integrating broad strategies are important in this environment.	Awareness of emerging patterns, industry strategy and macro-economic environments are important in this environment.
Output	Outputs can be completely specified.	Outputs cannot be precisely specified e.g. problem-free functioning.	Outputs relate to understanding the strategy and making it work through the use of tactical strategies, budgets and work plans.	Outputs relate to aligning current systems with future possibilities and developing the business strategy.	Outputs relate to adapting to different macro-systems / environments, such as identifying new industries or integrating existing industries.

2.1.3.2 Cognitive processes / competencies

The CPP divides problem solving into six broad thinking processes, which are, in turn, broken down into functional categories, as set out below (Prinsloo & Prinsloo, 2011).

Exploration: this entails the investigation of situations to identify relevant information for further processing. The functions associated with this process include:

- pragmatic - discriminating between relevant and irrelevant information (relevance); and
- exploration - strategies for exploration and depth of investigation (focus).

Linking/analysis: this involves breaking up information into constituent parts, which are then compared, associations drawn between them and relationships identified. The main subcomponent functions are:

- analytical - clarification by means of interpreting, evaluating and prioritising information, precise and systematic orientation, need for precision; and

- rule-orientated - the application of a detailed, rule orientation, monitoring linking behaviour.

Structuring: this entails ordering of information, categorised and integrated, to make sense and create meaning. The individual moves beyond establishing mere relationships among elements by “putting together” meaningful wholes. The major subcomponents of this factor include:

- integration - combining information and developing a big picture view;
- categorisation - creating external order, categories and reminders, structuring tangibles; and
- complexity - strategies to manage complexity.

Transformation: this consists of changing and purposefully applying information structures, adapting and contextualising. It encompasses both logical and lateral thinking processes. The major subcomponents include:

- logical reasoning - following through, looking for logical evidence, monitoring of reasoning processes; and
- verbal abstraction - verbal and abstract conceptualisation skills, including lateral, creative thinking processes used when information structures need to be changed, restructured or adjusted to meet the requirements of the particular context in which they are needed.

Memory: involves storing and retrieving information. The main subcomponent functions are:

- use of memory - retention and recall; and
- effectiveness of memory - degree of memory use and the use of memory strategies.

Metacognition: is the crux of effective thinking. It deals with self-awareness, self-monitoring, self-evaluation, the planning of strategies, learning from feedback and mistakes, and capitalising on subconscious hunches and insights / intuition. The main subcomponent functions include:

- judgement - using judgement to clarify unstructured or vague information, use of intuition, awareness of own reasoning processes;
- learning 1 - quick insight learning, flexibility; and
- learning 2 - gradual improvement / experiential learning, using memory strategies.

2.1.3.3 Administering the CPP

The CPP is a computerised assessment tool that requires minimum supervision. It takes between one hour and three hours to complete, depending on the cognitive style of the test taker. A test administrator introduces the assessment verbally to the test taker. Once the test taker begins the computerised assessment, automated verbal and written instructions are provided throughout the assessment process. Test takers are required to formulate stories based on information provided to them on the computer monitor and type their stories in the space provided. There are eight stories, varying in length and complexity that need to be completed. Once completed, the test administrator e-mails the electronic files to the test developer/distributor, where the results are analysed and individual reports (up to twenty pages long) are generated against relevant norms (Nzama, De Beer & Visser, 2008; Prinsloo & Prinsloo, 2011; Van Heerden, 2005).

2.1.3.4 Psychometric properties of the CPP

The CPP measures people's learning and the ability to solve unfamiliar problems. Since it measures an individual's learning curve, it is not possible to determine internal consistency, as both the nature and level of complexity of the questions change over the course of the assessment. The test-retest measure of reliability is also not suitable for this measure, as it aims to measure the ability to deal with the unfamiliar. This means that the test taker does not have the same experience when completing the test for the second time. As consistency is the only way to measure reliability, the construct validity of the test has been used to determine whether the test is acceptable in terms of error rate (Prinsloo & Prinsloo, 2011).

Validity refers to the extent to which a test measures what it is supposed to measure (Prinsloo, 2011). The theoretical model of thinking processes developed by Prinsloo (1992) forms the basis of the CPP. This model has been tested using a multi-trait-multi-method research design and this involved the measurement of six categories of thinking processes by means of three types of tests. Linear structured equation modelling was used to assess the construct validity statically, including both convergent and discriminant validity of the constructs. Performance processes, focusing on task material, that met the validity requirements include: focusing and selecting (exploration); linking (analysis); structuring (categorisation and integration); transformation (logical and lateral reasoning); retention and recall; and metacognitive processes (self-awareness or focusing on own thinking processes) (Van Heerden, 2005; Prinsloo, 2013). The results of a confirmatory factor analysis of CPP processing competencies are summarised in Table 2.2.

Table 2.2: Confirmatory Factor Analysis of CPP processing competencies (n = 30,000) (Prinsloo, 2013)

Processing constructs	Comparative Fit Index (CFI)	Tucker Lewis Index (TLI)	Standardised Root Mean Residual (SRMR)
Exploration / Focusing and selecting	0.897	0.871	0.042
Analysis / Linking	0.817	0.765	0.070
Structuring and Integration	0.901	0.851	0.058
Transformation / Logical and lateral reasoning	0.961	0.949	0.045
Memory	0.961	0.953	0.040

The concurrent validity of the CPP was investigated by correlating CPP results with those of other cognitive tests, including the WAIS, 16PF and the CPA. In a correlational analysis comparing CPP results with the WAIS scores of 100 working adults in the corporate sector, using Spearman's rho statistical analysis, the correlations outlined in Table 2.3 were found.

Table 2.3: Correlations between the scores on the CPP and the WAIS (p = 0.01) (Prinsloo, 2011, p.19)

CPP Constructs	WAIS Verbal IQ	WAIS Non-verbal IQ	WAIS Total IQ
Focus and selectivity	0.63	0.42	0.52
Linking	0.67	0.41	0.60
Structuring	0.67	0.46	0.63
Transformation	0.69	0.46	0.64
Memory	0.59	0.41	0.57
Metacognitive awareness	0.68	0.46	0.64

Furthermore, using Spearman's rho statistical analysis, it was evident that the cognitive styles measured by the CPA and the CPP also correlate significantly (in a study of 83 corporate employees, $r = 0.45$, $p < 0.001$). In a different study where the sample consisted of 268 participants from the corporate environment, significant relationships at the 0.001 level were found between the current levels of work and processing constructs as measured by the CPP and the CPA (Prinsloo, 2011).

Concurrent validity was also established between the 16PF and the CPP. Factor B correlated significantly with a number of CPP dimensions ($r = 0.6$; $p < 0.001$) (Van Heerden, 2005). All in all, the CPP has been normed and validated on a large, diverse sample of individuals. In this study, the CPP is used to measure cognitive complexity and cognitive processes.

2.2 VALUES

Values research has been extensive and a common finding from classical Greece to contemporary social science is that values matter. However, despite the use of the term values in a variety of literature, little consensus exists on the definition of a value (Maksimainen, 2012). According to Maksimainen (2012), Rokeach attached values to beliefs, Super linked values to needs, Locke considered values according to criteria for choosing goals, Schwartz and Bilsky connected values to the goals themselves, while Eagly and Chaiken attached values to attitudes. Each of these, without doubt, contributed to an understanding of the functions and meaning of values.

Haralambos and Holburn (1994) defined values as a belief that something is good and desirable, and something that an individual believes is important, worthwhile and worth striving for. Hogan Assessment Systems (2011) suggested that values consist of the core motives, interests and beliefs that determine what people desire and strive to attain. Schreuder and Theron (2004) argued that values can be seen as orientations or dispositions that selectively determine modes of behaviour or life forms, including work behaviour.

Watkins (2010) further suggested that the role of values is to provide expression to human needs and to guide action and decision-making. Although values are seen to be unique in individuals, collectively, members of the same culture are likely to share similar values and priorities acquired during the socialisation process.

Individual value priorities are seen to be a result of both shared cultural beliefs and unique personal experiences (Schwartz, 1999), and these serve as guiding principles in people's lives by influencing the way they set goals and prioritise tasks (Watkins, 2010).

Schwartz and Bilsky (1990) generated a conceptual definition of values that incorporated five areas that recur in values literature. They suggested that values are (1) concepts or beliefs that (2) pertain to desirable end states or behaviours, (3) transcend specific situations, (4) guide the selection of evaluation of behaviour and events, and (5) are ordered according to relative importance.

2.2.1 Value systems

A value system is a way of conceptualising reality and includes a consistent set of values, beliefs and behaviours that are found in individuals. A value system develops primarily as a reaction to environmental challenges and threats (Van Marrewijk, 2004). Value systems are similar to complex belief systems about what is desired and what is seen to be important, and,

conversely, what is not. Value systems represent core intelligences that guide behaviour and influence life choices by acting as a decision-making framework. Value systems pertain to more than the content of one's thinking, and provide a structure for decision-making (Du Preez & Nash, 2008).

2.2.2 Spiral Dynamics

Beck and Cowan (2006) introduced the theory of Spiral Dynamics, a theory of human development, based on Clare Graves's research on the process of human development. However, Graves never explained the totality of his theory of levels of human existence. Beck and Cowan were students of Graves, and they further developed his ideas according to their understanding of his work (Kotze, 2009). Their theory of Spiral Dynamics is built on a combination of Graves's ideas, as well as the inclusion of new aspects, such as expanding on Graves's language and the utilisation of adapted terms (Prinsloo, 2012b).

Graves's approach was initially influenced by Abraham Maslow's hierarchy of needs (Rice, 2012). According to Maslow (1971), when individuals have a need or desire for something, they put effort into satisfying that need. The intensity of the need will determine the level of effort put into meeting it. Maslow outlined five levels of needs, which can be met at work or in one's personal life (Grobler, Warnich, Carrell, Elbert & Hatfield, 2006). Although Maslow's hierarchy is often depicted by means of a pyramid, he never used a pyramid to represent the different levels himself. His theory suggests that the most basic level of needs must be met before the individual will strive towards meeting the higher level needs (Grobler et al., 2006).

Graves, however, considered Maslow's hierarchy to be too limited and as not addressing issues such as why people are different and why some people change and others do not (Rosado, 2012). Graves (1970) argued that the nature of people is not set, and that it is a constantly emerging open system, instead of a closed system. Graves maintained that individual needs are constructed around a core value system with its own hierarchy of needs. According to Graves (in Prinsloo, 2012b), individuals respond to changes in life conditions by developing adaptive views and capacities referred to as levels of human existence. These adaptive responses can be grouped into value systems which permeate the culture of groups, organisations and individuals. These value systems provide a framework within which individuals interpret and respond to their experiences. In a study consisting of 176 South Africa adults conducted by Kotze and Mauer (2013), they found a significant relationship between Spiral Dynamics value systems and the Dogmatism scale. The Dogmatism scale was developed by Rokeach measuring the extent to which individuals assume their beliefs are correct.

Graves (in Beck & Cowan, 2006) outlined eight primary levels or waves of human existence, based on extensive research and data collected from more than 50,000 people in first, second and third world countries (Wilber, 2001). Each level of existence, constructed around a core value system, provides its own hierarchy of needs.

The Spiral Dynamics model is hierarchically organised, and consecutive levels both incorporate and transcend preceding value systems. There are eight general stages in the hierarchy, also known as memes or value systems. A meme is defined as a basic stage of development that can be expressed in any activity. Memes are not seen as rigid levels within the spiral, but can also overlap (Beck & Cowan, 2006; Prinsloo, 2012a; Wilber, 2001). Research based on a sample of 50,000 people, confirmed that all individuals have all the memes potentially available to them at any given time (Wilber, 2001). While Maslow suggested that an individual needs to meet the needs at each tier before moving to the next level, Spiral Dynamics acknowledges that individuals can move up and down the spiral as they search for meaning and make sense of their world, and live out concerns in their lives or existence (Kotze, 2009).

These eight value systems or memes can be divided into first and second tier levels within the spiral (Beck & Cowan, 2006, Du Preez & Nash, 2008; Wilber, 2001). The first six levels have been termed subsistence levels, or the first tier level of consciousness (Wilber, 2001) where the valuing systems tend to be emotionally driven, and do not take into account the existence of other valuing systems. Also seen as an *old management paradigm*, in this tier, the focus is on value systems that assure physiological satisfaction, provide a continuation of a way of life, promise survival and a future salvation and enable acceptance by others (Kotze, 2009). At each of these levels (beige, purple, red, blue, orange, green), people would assume that their worldview or value system is correct and may be very critical of the others' worldviews (Du Preez & Nash, 2008).

However, at the second tier level of consciousness (yellow and turquoise) there is an appreciation of the necessity of the various other valuing systems. Within the second tier in the spiral, there is an emphasis on thinking both vertically and horizontally, which suggests that there is an understanding of the entire spectrum of internal development, rather than focusing on one value system. At each level in the second tier, within each meme, there is an appreciation of the importance of the health of the overall spiral, rather than just one particular meme or valuing system (Wilber, 2001). Table 2.4 outlines the description, motives, characteristics and approach to decision-making associated with each meme/value system in the spiral.

Table 2.4: The value systems according to Spiral Dynamics. Adapted from Beck and Cowan (2006), Prinsloo and Prinsloo (2012)

Value System	Description	Motives	Characteristics	Approach to decision-making
BEIGE (survival)	Automatic, reflexive and instinctive responses are important and the focus is on physical survival.	Staying alive and satisfying physiological needs motivate action.	The beige value system centres on the satisfaction of one's physical needs to survive. Food, water, warmth, shelter, sex and safety have priority and individuals have limited impact or control over their environment.	Habits and instincts are used to survive.
PURPLE (safety)	In-group dependencies and traditions are important. There is often an "us-and-them" orientation and an avoidance of change.	Maintaining blood relationships, mysticism, striving for certainty and protection motivate action.	The purple value system centres on the need to be part of a close, warm group where they feel safe and protected. Allegiance and obedience to elders, custom and clan is important and there is comfort in familiarity and routine. Preserving sacred objects, places and events is often practiced and rites of passage and customs observed.	Custom and tradition, such as elders' counsel, signs or the shaman influence decisions.
RED (power)	Power, impulse, dominance, energy, action, achievement and leadership are prevalent in the red value system.	Enforcing dominance and power, gratifying impulses, demand for respect and avoiding shame motivate action.	In the red value system, the world is viewed as having limited resources – one has to fight for one's share. The world is full of threats and the strongest survive. Trusting others is difficult although there is a need for attention and respect. There is a tendency to cut loose from group values and to be fanatical and dogmatic (worry about consequences later).	Decisions are influenced by what the tough/powerful person dictates and what feels good now. The most powerful person typically grabs the spoils. Maximising profits and minimising displeasure and pain also influence decisions.
BLUE (truth)	Purpose, structure, truth, reliability and loyalty are important in the blue value system.	Belief in order and obedience in authority, self-discipline and definite views of what is right and wrong motivate action.	In the blue value system, security and caution, strong work ethics, laws, regulations and discipline are seen to build character and moral fibre. The focus is on controlling impulses and conforming to bureaucratic/hierarchical views or inflexible ideologies. Divine plans are seen to assign people to their places.	Decisions are influenced by orders from authority, what is seen as right and adherence to rules or tradition. The most righteous person earns the spoils.
ORANGE (prosperity)	Strategy, materialism, opportunism, freedom of	Thinking in terms of abundance, acting in self-	In the orange value system, optimism, practicality, risk-taking and self-reliance are important. People who take the initiative deserve success and prosperity	Decisions are influenced by bottom-line results, the opinions of

	choice, individualism and achievement are important in the orange value system.	interest, autonomy and manipulation motivate action.	is seen to be achieved through strategy, technology and competitiveness. Goal-setting, competence and tough-mindedness are needed to achieve results. Resources should be manipulated to create and spread around the good life.	experts and options are tested to maximise results. The most successful person wins the spoils.
GREEN (communitarian)	Sensitivity, humanism, emotions, theory and compassion are important in the green value system.	Peace with the inner self and others, and caring and unity in the community motivate action.	In the green value system, feelings, sensitivity and caring take priority over greed, materialism and divisiveness. Equal opportunities for all are valued and emphasis is placed on providing for the oppressed and there is typically genuine concern for others. However, people conforming to this view may be patronising and assume superiority, by taking away power and removing responsibility.	Decisions are taken by reaching consensus, everyone must collaborate and input from everyone must be accepted. There are communal spoils.
YELLOW (systematic)	Integration, learning, change and systems thinking are important in the yellow value system.	Living fully and responsibly while learning, considering the big picture and the contextualisation of issues motivates action.	In the yellow value system, the focus is on flexibility, functionality and spontaneity. Knowledge and competence supersedes rank, power and position and differences can be integrated into inter-dependent flows. Transformation is embraced and problem solving is characterised by innovation and viewing the situation holistically.	Decisions are based on principles, knowledge and resolved paradoxes. The most competent person gets the spoils.
TURQUOISE (holistic)	Holistic-global, spiritual-existential and philosophical factors are important in the turquoise value system.	Experiencing the wholeness of existence through mind and spirit, a natural and simplistic life style and environmental concerns motivate action.	In the turquoise value system, the world is a single, dynamic organism with its own collective mind and everything connects to everything else. Emphasis is placed on holistic, intuitive thinking and cooperative actions and broad interests. The focus is on planetary concerns, and could come across as too abstract and other-worldly to others.	Decisions are based on the blend of natural flows, looking up/down stream and planning for the long range. Life gets the spoils.

2.2.3 Depth of value systems

Cowan and Todorovic (2000) supported the suggestion made in Spiral Dynamics literature that it is necessary to understand the deep value systems, as these directly influence leaders' worldviews and the way they make decisions in the organisation. Deep value systems differ from surface value systems and hidden value systems. Hidden value systems underlie surface value systems, which are typically openly stated moral positions and behavioural rules (Cowan & Todorovic, 2000; Du Preez & Nash, 2008). Surface value systems are usually based in law,

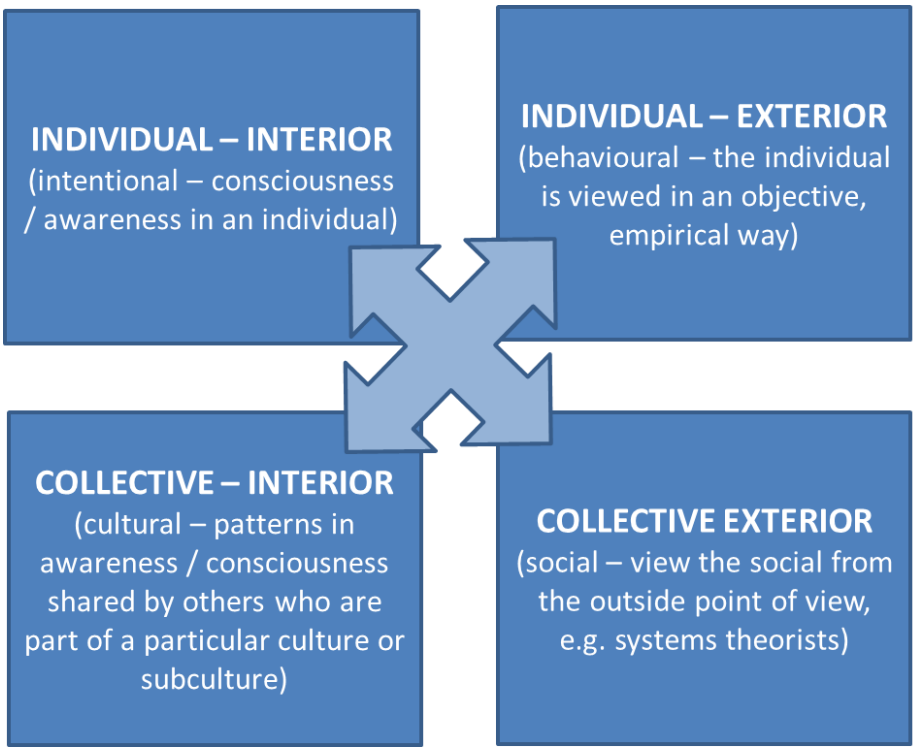
religion or common sense, and they set standards for individual and corporate behaviour (Cowan & Todorovic, 2000).

Hidden value systems are less visible than surface value systems, and are thought to underlie surface value systems (Du Preez & Nash, 2008). They are seen to provide the reasoning beneath surface value systems and expose why long-standing beliefs, attitudes and traditions exist in organisations (Cowan & Todorovic, 2000). Hidden value systems flow from deep value systems and reflect an individual's personality predispositions and sense of purpose. In this regard, they reflect an inner intuitive intelligence which could appear to be counter-productive to others given a person's personal circumstances (Du Preez & Nash, 2008). It has been argued that deep value systems influence leaders' worldviews and corporate mindsets, which should therefore influence leaders' decision-making. Understanding deep value systems according to Spiral Dynamics provides a basis for the analysis of individual behaviour and decision-making (Cowan & Todorovic, 2000).

Wilbur (2001) developed the integral approach to understanding human behaviour and elaborates on the theory of Spiral Dynamics. He incorporates Graves's views of human behaviour and development in his model which he called the All-Quadrants, All-Lines (AQAL). He views four dimensions in the world of human existence (interior and exterior; the individual and the collective) (Prinsloo & Prinsloo, 2012). These are outlined in Figure 2.1.

Wilbur (2001) argued that surface value systems and hidden value systems outlined in the theory of Spiral Dynamics are embedded in the collective. Surface value systems are openly stated in behavioural rules related to the laws of the country, or the moral codes developed within a religious institution. Hidden value systems are typically developed as a result of a person's socialisation process (through cultural norms or intrinsic organisational values) (Cowan & Todorovic, 2000). Deep value systems can be likened to those of the individual, as described by Wilbur (2001). Deep value systems are informed by the individuals' personality predisposition and sense of purpose (Du Preez & Nash, 2000).

Figure 2.1: Wilbur's Four Quadrants Model (Prinsloo & Prinsloo, 2012, p.35)



Cowan and Todorovic (2000) proposed that decisions with a long-term impact are best made by leaders who understand their individual value systems, as well as those of the organisation that are shared by the collective. When lacking a clear value system, leaders often shift between goals rather than keeping the overall objective in mind. The authors further argued that value systems that impact on important decisions are not necessarily focused on monetary gains or economic worth, but rather that effective leaders think in terms of the collective and focus on shared values, core values, and the traditional values that represent the people management factors influencing the organisation. The fact that these softer aspects of organisational effectiveness are receiving increased prominence on corporate websites and annual reports, suggests they influence leaders' decision-making. In the next section an overview of the role and influence of individual value systems is provided within the work and organisational contexts.

2.2.4 The role of value systems in an organisational context

Value systems advocated by executives within organisations arise from the application of personal values within the business context (Robinson, Goleby & Hosgood, 2006). Groenewald (2011) argued that effective leaders have a strong internal drive and passion to succeed and they want to achieve that which they value. The underlying value system of

leaders is likely to direct and guide their actions, behaviour and decision-making (Krishnan, 2001; Ng & Sears, 2012). The value system of managers and organisational leaders indeed determines the nature of many decisions that they will make (Graves, 1965).

Work values refer to the goals and objectives that people seek through their work and are regarded as expressions of more general human values within the work context. Schwartz (1999) suggested that values can be linked to work goals in the following way:

1. Intrinsic needs are often met through personal growth, autonomy, interest and creativity.
2. Extrinsic needs can be fulfilled through remuneration and job security.
3. Social needs can be met through contact with colleagues and clients and contribution to society.
4. A need for power can be achieved by prestige, authority and influence in the workplace.

Clawson (2012) therefore proposed that an understanding of values, assumptions, beliefs and expectations, and how these impact on behaviour, is essential to effective leadership. In the theory of Spiral Dynamics, a flexible framework is provided for assessing and reporting on individual value systems (Du Preez & Nash, 2012). In the current study, the relationship between individual value systems and cognition is explored within a leadership team within a multinational organisation. As was evident earlier, it is important to understand deep value systems, as they directly influence leaders' worldviews and the way they make decisions in the organisation.

2.2.5 Spiral Dynamics and leadership

Beck and Cowan (2006) categorised people who have special insight, powers and skills that transcend the skills of most others as *wizards*. They maintained that there are different types of wizards that seek to transform existing, stale systems into new opportunities, operating within one meme or across memes (Beck & Cowan, 2006; Prinsloo, 2012b).

Meme Wizards know how to operate within a particular meme or value system and act as guides or guardians for those who share their worldviews (Beck & Cowan, 2006). They understand the given value system and how to lead others who share these beliefs (Prinsloo, 2012b).

Wizards of Change understand the cusps between the memes or value systems and appreciate the transition between different memes or value systems (Prinsloo, 2012b). They typically have significant influence and impact because they intuitively understand that

effective leadership often combines elements of both individual (warm colours on the spiral) and collective (cool colours) memes or value systems. They will usually operate across two memes or value systems in the first tier of consciousness (Beck & Cowan, 2006).

Spiral Wizards consider a far broader spectrum of views than the Meme Wizards and the Wizards of Change. Spiral Wizards operate in the second tier of consciousness and are able to see patterns and connections not always obvious to those operating in the first tier (Beck & Cowan, 2006). Typically, they understand the entire spectrum of value systems and show an appreciation of a wide range of views. Furthermore, they often enjoy chaos and complexity (Prinsloo, 2012b).

Wilber (2001) maintained that less than 2% of the world's population is at second-tier thinking (only 0.1% at turquoise), which suggests it is relatively rare. He came to this conclusion after examining data collected from more than 50,000 people in first, second and third world countries. However, in the theory of Spiral Dynamics it is argued that human nature is not fixed, suggesting that people are able, when their life conditions change, to adapt to their environments by constructing new, more complex, conceptual models of the world that assist them in managing the new challenges (Wilber, 2001). With each new stage, a new worldview emerges with its associated preferences and motivations. The transition between value systems represents transformational changes, which suggests the capacity to adapt and respond to different life challenges (Graves, 1970; Kotze & Mauer, 2013; McDonald, 2011).

Beck and Cowan (2006) agreed that value systems are not necessarily stable through life and that they develop, adapt and respond to environmental factors and fluctuations in external situations. In fact, value systems almost never appear in isolation and most people have elements of several value systems which emerge in different situations (Cowan & Todorovic, 2000; Kotze & Mauer, 2013). As people's lives become more complex, they are prompted to develop higher, more complex thinking and behaviours to cope with, and make sense of their world (McDonald, 2011). This, in turn, impacts on decision-making and the factors that drive behaviour change as people's lives evolve and their situations change. People's value system will influence their decision-making as their worlds become more complex. Graves (1970) termed the second tier levels in the spiral as cognitive and intuitive levels, since individuals at these levels attach more importance to solving problems than to fulfilling a particular goal or selfish desire, and begin understanding that there is much that they will never know.

However, the question can be raised about what influence people's ability to effectively manage complex information or what effects their level of cognition has on decision-making,

and if there is a relationship between people's value systems and their cognitive skills – especially when their lives become more complex. The level of awareness associated with each value system provides a framework, worldview or type of intelligence by which an individual interprets and responds to his/her environment, his/her experiences and makes decisions (Prinsloo, 2012b).

2.2.6 The Value Orientations questionnaire

While several instruments have been developed in the international market by means of which to measure Spiral Dynamics value systems, none of them have been shown to possess adequate psychometric properties (Kotze & Mauer, 2013). The VO questionnaire was developed to try to rectify this situation and thus it was used in this study to measure value systems. The VO was developed by Prinsloo and Prinsloo (as cited in Prinsloo & Prinsloo, 2012) in South Africa to recognise and measure how value systems and high-level organising frameworks impact individuals' capability and personality at work (Prinsloo & Prinsloo, 2012).
The VO is a computerised questionnaire based on the work of a number of values theorists, including that of Clare Graves, Don Beck, Christopher Cowan and Ken Wilber. It is based on the constructs outlined in the Spiral Dynamics framework. The VO was designed for the purposes of matching people to jobs, job satisfaction, job effectiveness, team building, leadership effectiveness and conflict management (Prinsloo & Prinsloo, 2012).

The VO results reflect individuals' value systems, which reflect their worldviews, their assumptions about life and how they establish priorities (Prinsloo & Prinsloo, 2012). The valuing systems represent, what Prinsloo and Prinsloo (2012, p.1) term "core intelligences" that influence behaviour and the decision-making processes when making life choices.

Eight value systems are identified in the theory of Spiral Dynamics. The first value system, beige, is related to survival and subsistence. Since the VO was designed for the work environment, the test developer did not include this level in the questionnaire (Prinsloo & Prinsloo, 2012). The seven broad value systems assessed by the VO are identified (see Table 2.4), which, combined in different ways, reflect an individual's unique value orientation. The specific orientation is then translated into scenarios in terms of possible outcomes with regard to:

- worldview;
- behaviour;
- emotional manifestations;
- functioning in the organisational context; and

- implications for leadership.

The VO measures the individual's *preferred* value orientation, as well as identifying those value systems *rejected* by the individual. This means that the VO provides information not only about the value systems accepted by the person, but also about the value systems they may find unacceptable (Prinsloo & Prinsloo, 2012). Furthermore, the VO allows for individuals to both accept and reject certain value systems (in whole, or part thereof). Therefore it is possible for an individual to subscribe to conflicting views within one value system (Prinsloo & Prinsloo, 2012). In Table 2.5 descriptions are provided for accepting and rejecting each value system, as well as for their simultaneous acceptance and rejection.

Table 2.5: The VO constructs (Prinsloo & Prinsloo, 2012, p.18)

Value Orientations	Acceptance	Rejection	Conflict (simultaneous acceptance and rejection)
PURPLE (safety)	When accepting the purple value system, individuals value group belonging, find safety and security in the familiar, tend to be attached to traditions/customs and typically adopt the "us-versus-them" orientation.	When rejecting the purple value system, individuals question the tendency to be too reliant on in-groups, are not usually concerned with the preservation of traditions/customs and are often sceptical of the "us-versus-them" mentality.	When simultaneously accepting and rejecting the purple value systems, individuals value group belonging but are not dependent on group support. They typically value traditions/customs but will not necessarily resist change and may reject an "us-versus-them" mentality in others.
RED (power)	When accepting the red value system, energy, forcefulness, ego-centricity and impulsivity are often prevalent. Individuals want to be recognised and respected.	When rejecting the red value system, individuals typically reject a forceful, impulsive and dominant approach and do not see life as battle to secure their own share. Individuals often question self-centred behaviour.	When simultaneously accepting and rejecting the red value system, individuals can be forceful and dominant, but mindful of the possible negative consequences of self-centred behaviour. They may try to limit the tendency to react emotively to situations and will dislike being subjected to powerful others.
BLUE (truth)	When accepting the blue value system, individuals are typically controlled, value order and discipline and are dutiful and diligent. They usually want to do the "right" thing and will	When rejecting the blue value system, individuals are inclined to reject the overemphasis on conformity, order, discipline and authority, and will guard against absolutist and	When simultaneously accepting and rejecting the blue value system, individuals may adhere to the internalised code of conduct while rejecting externally imposed rules and

	value an ultimate truth.	judgmental inclinations.	regulations.
ORANGE (prosperity)	When accepting the orange value system, individuals are often achievement/ performance orientated and self-reliant. They usually value success and "the good life", work with perceptions and feel motivated by challenge and opportunity. They usually take calculated risks.	When rejecting the orange value system, individuals often reject an over-emphasis on personal achievement, status symbols, competition and material wealth. They may find the quest for "the good life" superficial and dislike manipulation.	When simultaneously accepting and rejecting the orange value system, individuals are not indifferent to the lure of personal achievement and "the good life", but will be careful not to see these values as ends in themselves. They will recognise the importance of perceptions, but will usually avoid manipulative behaviour.
GREEN (communitarian)	When accepting the green value system individuals are often humanistic, energised by interpersonal relationships, sensitive and compassionate. They are often philosophical, relativist, open-minded and idealistic.	When rejecting the green value system, individuals often question an over-emphasis on the human factor and are not energised by interpersonal relationships. They are not usually motivated by charitable endeavours, and are not gullible or over-accepting.	When simultaneously accepting and rejecting the green value system, individuals usually value interpersonal interaction, but their decisions are not determined by it. They are often people-orientated, but mindful of overly idealistic views on humanity.
YELLOW (systematic)	When accepting the yellow value system, individuals are typically individualistic, have an intellectual perspective and are often emotionally detached. They often have the capacity to deal with unstructured situations, apply systems thinking and focus on practical utility.	When rejecting the yellow value system, individuals are not particularly learning-orientated or comfortable with disorder and unstructured situations. They are not particularly individualistic or inclined to take a detached, intellectual stance.	When simultaneously accepting and rejecting the yellow value system, individuals may be intellectually capable of dealing with disorder and diversity, but they have an emotional need for structure. They can be emotionally detached, but may prefer a more emotionally involved approach.
TURQUOISE (holistic)	When accepting the turquoise value system, individuals are self-transcendent, reflective and holistic thinkers. They are often spiritual, guided by a higher consciousness and focus on experiencing life.	When rejecting the turquoise value system, individuals reject an essentially spiritual and abstract approach to life. They are not inclined to adopt a philosophical-existential view on reality and are not interested in the meta physical realm.	When simultaneously accepting and rejecting the turquoise value system, individuals may be collectively inclined, but they question a too abstract take on reality. They may experience difficulties with self-transcendence.

2.2.6.1 Administering the Value Orientations questionnaire

The VO is a self-report questionnaire consisting of 40 items and is completed on-line. Each item has four alternative value statements, to which the test taker attaches a weight (by means of a dial) indicating the degree of importance assigned to that particular value statement. It

takes approximately 30 – 45 minutes to complete the questionnaire. The data are scored using an automated computer programme and a report of approximately 10 pages is generated.

2.2.6.2 Reliability of the Value Orientations questionnaire

The reliability of a psychometric test refers to its freedom from unsystematic errors of measurement (Cascio & Agnuinis, 2011). Standardised personality tests should have a reliability of 0.80 to be considered reliable (Smit, 1996). As is evident in Tables 2.8 and 2.9, in a sample of 914 respondents, Cronbach Alpha reliability coefficients ranging from 0.71 to 0.85 were found for the constructs measured by the VO. The sample group represented both genders, all age groups, ethnic groups, career fields and educational levels (Prinsloo & Prinsloo, 2012).

Table 2.6: Reliabilities of the accepted value orientations using the VO (n=914) (Prinsloo & Prinsloo, 2012, p.90).

Accepted Value Orientations	N = Number of Items	Cronbach Alpha	Mean	Minimum	Maximum	Range	Inter-item Correlation
Purple	28	0.75	42.3	1.0	78.4	77.4	0.094
Red	34	0.83	57.1	15.1	86.8	71.7	0.132
Blue	36	0.83	57.9	15.0	86.7	71.7	0.129
Orange	36	0.84	55.9	1.8	84.2	82.4	0.120
Green	32	0.81	53.0	4.3	84.1	79.9	0.116
Yellow	31	0.75	49.8	2.0	84.2	82.0	0.081
Turquoise	26	0.71	33.5	3.6	68.8	65.2	0.074

Table 2.7: Reliabilities of the rejected value orientations using the VO (n=914) (Prinsloo & Prinsloo, 2012, p.90).

Rejected Value Orientations	N = Number of Items	Cronbach Alpha	Mean	Minimum	Maximum	Range	Inter-item Correlation
Purple	31	0.84	60.0	28.9	84.2	55.2	0.148
Red	31	0.80	45.5	4.7	78.0	73.3	0.110
Blue	34	0.79	45.9	4.7	84.0	79.2	0.097
Orange	34	0.79	49.9	5.3	81.3	75.9	0.096
Green	28	0.76	48.3	5.3	80.1	74.8	0.100
Yellow	36	0.84	55.9	1.8	84.2	82.4	0.120
Turquoise	21	0.71	50.5	15.1	80.1	65.1	0.107

2.2.6.3 Validity of the Value Orientations questionnaire

The validity of a measure concerns what the test measures and how well the test does this (Roodt, 2009). The validity of an assessment should be statistically significant between the 0.05 and 0.01 levels to be considered a valid measure (Smit, 1996) and validity coefficients of 0.30 are acceptable (Roodt, 2009).

The validity of the VO was investigated by comparing it to the Motivational Profile (based on similar principles to the VO) in a sample group of 213 individuals, who were primarily males in managerial roles. Statistically significant correlations (ranging between 0.39 and 0.46) were found between relevant constructs between the 0.05 and 0.001 levels of confidence (Prinsloo & Prinsloo, 2012).

Furthermore, in a study of 73 corporate employees, including both genders, a wide range of age groups, career fields and industries, statistically significant relationships (between 0.05 and 0.001 levels of confidence) were found where expected, between VO constructs and those measured by the MBTI. Relevant Pearson Correlations ranged between 0.362 and 0.460 on the constructs where significant relationships were expected to be found. In the same study, significant relationships were also found between VO measures and relevant Belbin Team roles. Significant Pearson Correlations ranged between 0.258 and 0.420 (Prinsloo & Prinsloo, 2012).

All in all, the VO measures valid dimensions closely aligned to those outlined in the theory of Spiral Dynamics, and the questionnaire was therefore deemed a valid and reliable method of measuring Spiral Dynamics value systems in this study.

2.3 COGNITION AND VALUE SYSTEMS IN ORGANISATIONAL LEADERSHIP

As was evident in Chapter 1, leadership can be defined as the process in which individuals exert influence on the goal achievement of others in an organisational context. However, strategic leadership also involves the ability to anticipate, envision, maintain flexibility, think strategically, and work with others to initiate changes that will create a viable future for the organisation (Johns & Saks, 2011). The concept of leadership, as defined by Prinsloo (2012a), refers to a process where initiative is taken to investigate a particular condition or situation; possible options are identified and weighed up; and a purposeful direction is conceptualised and communicated. Since authentic leaders know and act on their true values, beliefs and strengths, there is consistency among their value systems, beliefs and actions. However, this requires more than understanding their individual value systems. It necessitates, among other things, balanced processing (the objective analysis of relevant information before making a

decision) and an internalised moral perspective (values and morals that guide one's behaviour and decision-making) (Johns & Saks, 2011).

As pointed out earlier, the impact of globalisation has meant that organisations need to be adaptable, decisive and quick to change (Denton & Vloeberghs, 2003). This means that organisational leaders need to be able to process complex information quickly and make decisions that enable the organisation to adapt appropriately and remain sustainable in the long term (Jaques, 1998).

An understanding of the environment is essential for effective leadership (Day, Harrison & Halpin, 2009) and effective adaptation to the environment requires insight into different, rapidly changing situations (Wilber, 2001). This implies that organisational leaders require the ability to understand quickly how situational and environmental variables affect each other and the organisation. Effective leaders have a good understanding of their value systems, as well as the capacity to achieve business aims – and these should be aligned (Klenke, 2005).

One of the major reasons for studying cognition and intelligence is to understand how individual differences in cognitive competence are related to individual differences in behaviour (Hunt, 2011b). Although cognitive ability appears to be essential in making appropriate decisions (Jaques, 1998) and consequently adds to an understanding of individual differences, it may not be the only requirement for doing so. Cognition in isolation does not determine leadership success, and to gain a complete picture of requirements for such success, it is important to consider other factors such as motivational factors and individual value systems (Hunt, 2011b).

Finally, the most complex jobs, such as leading global organisations, require individuals to make judgements and decisions about potential socio-political and economic trends based on many interlinked variables (Jaques, 1998). Beck and Cowan (2006) asserted that individuals who operate effectively in these types of roles need to value working with complexity in a constantly changing environment where the long-term viability of the organisation is a major factor to be considered.

2.3.1 The relationship between cognition and Spiral Dynamics value systems in organisational leadership

Prinsloo (2012a) argued that Spiral Dynamics value systems determine the way in which personal characteristics and cognitive capability are implemented, and therefore influence the behaviour and decisions of organisational leaders. Prinsloo (2012a) maintained that cognitive

capacity remains a prerequisite, rather than a guarantee, of effectiveness. She suggests that cognitive capability needs to be applied according to Spiral Dynamics criteria to unlock its full potential.

In some instances, such as at higher levels of complexity and levels of work, certain value systems can derail cognitive competence. Prinsloo (2012a), for example, suggested that people at the lower levels of Spiral Dynamics, such as purple, red and blue, tend to be motivated by fear. Under conditions in which individuals feel threatened or working under acute pressure, they can show defensive behaviour. This may often overrule cognitive responses. However, according to Prinsloo (2012a), each of the value systems offers advantages, as well as disadvantages in terms of their influence on cognitive processes, as discussed below.

Purple: Congruent with the purple value system, is the tendency to show an external locus of control and, cognitively, to respond randomly to new situations. There is an inclination to focus on *us-versus-them* thinking, a reliance on in-group problem solving, and to blame the out-group when things go wrong. Typically, there is a strong dependency on leadership, which is usually supported uncritically and emotionally. Purple value systems do not seem to encourage the reliance on intellectual competence (rather adhering to group problem solving) and this often results in a less analytical, yet rule-bound approach to solving problems.

Red: People with a red value system are typically driven by fear of failure and therefore a loss of face. They tend to require recognition, and, in order to avoid feeling vulnerable, respond defensively to difficulties by retreating into egocentric behaviours, such as behaving in an aggressive manner, and by working harder and more rapidly (often at the expense of working more intelligently) to create a sense of achievement and identity.

Blue: The blue value system is characterised by stability, the pursuit of quality and depth of technical expertise. People who hold this value system typically create structure in their environments and avoid, or even actively oppose, change. People with this orientation, often respond in a rigid or inflexible manner to challenges, and tend to over-conform by focusing on rules.

Under less stressful, more familiar or less threatening situations, for those who embrace the purple, red or blue value systems, the impact of emotion on cognition can be greatly reduced. People with red and blue value systems can be highly intellectual, especially the values

associated with the blue value system of rationality, rigour and depth of analysis. People with these orientations typically provide for others who are close to them.

Orange: People with an orange value system usually apply a strong cognitive orientation towards goals that are important to them – such as value creation, strategic manipulation, professional application, people or market perception. This value system often manifests as flexible and resilient, and the cognitive abilities of these people are applied to innovate, reframe, conceptualise and persuade others.

Green: The green value system is characterised by an open-minded and accepting approach. Cognitively, people with this value system enjoy the world of ideas, are often theoretical, and try to understand viewpoints from multiple perspectives. Even those less intellectually sophisticated are usually open to ideas, compassionate and interested.

People with orange and green value systems are often still motivated by emotional and interpersonal factors, although they tend to focus on a broader population within their sphere of influence and concern than those with purple, red and blue value systems. The people close to them are important (such as family, close friends and immediate teams in the case of those with purple, red and blue outlooks), but they also consider the needs and expectations of larger groups, such as employees, markets and broader stakeholders. In the case of green, humanity as a whole is deemed important.

Yellow: The yellow value system is very flexible and adaptable and usually contextualises behaviour and solutions to meet specific requirements. Yellow is often associated with a desire to learn and experience new things, and people with this view usually cognitively apply a systems or holistic view of the world in which everything is connected. To implement a yellow value system effectively in a leadership role, a high level of cognitive capability is required.

Turquoise: The world of work currently has a predominantly commercial orientation, and, as such, leaders with a turquoise value system are not typically found in the corporate environment. Their value system is characterised by an integrated philosophical, existential and spiritual approach, and the focus tends to be on human experience and the proliferation of life. There is usually a heightened awareness of their responses, the environment and the depth of connectedness of the world.

Typically, those with yellow and turquoise value systems are not driven by emotional considerations and the need to perform according to predetermined criteria of success and

status. Cognitively, they are driven by the process of developing an understanding of principles, paradoxes and processes within a holistic and integrated world (Prinsloo, 2012a). Prinsloo (2012b) suggested that progressively inclusive worldviews, such as the yellow and turquoise value systems which, as second tier levels of consciousness appreciate and understand the necessity of the other valuing systems, require increasingly complex cognitive processing to be effective.

The views above as espoused by Prinsloo (2012a) suggested that there are more drivers behind the decision-making of leaders than mere cognition and intelligence. Sternberg (1986) proposed, in the contextualist approach to measuring intelligence and his theory of successful intelligence, that behaviour regarded as intelligent in one environment, may not be considered the same in a different situation. Sternberg (2011) focused on the adaptive nature of intelligence and defined intelligence as the ability to adapt to the environment and learn from experience. However, an aspect which Sternberg did not take into account is the influence of value systems and an individual's worldview on problem solving and his/her individual definition of intelligence and success that drives their behaviour.

Graves (as cited in Prinsloo, 2012a) suggested that there is no blueprint for leadership, since the way in which one views leadership depends on one's worldview, or the value system being utilised, as well as the particular context, which, in turn, differs in terms of complexity requirements. Graves's views about leadership vary for each value system and he emphasised the importance of the leaders' ability to understand the spectrum of valuing systems. The first four columns in Table 2.8 outline Graves's assumptions associated with each of the value systems. The last column shows the relationship between cognitive styles and each value system, as proposed by Prinsloo, (2012a).

Table 2.8: A Spiral Dynamics view of leadership assumptions, styles and cognition (adapted from Prinsloo, 2012a, p.5 and p.17)

Value System	Assumptions regarding people at work	Assumptions regarding work	Leadership style	Cognitive Style (approach to making sense of new information)
PURPLE	People seek a paternalistic environment and are bound to the group. In-group reciprocity is important.	The organisation is like a parent providing security and traditional ways are important.	Nepotism is accepted and it is self-sacrificial to promote group loyalty and coherence. In-group–out-group polarisation is common and the leader should come from the in-group.	There is reliance on groupthink and there is a rule-bound approach to problem solving. In the absence of clear rules, there is a tendency to respond randomly / emotionally to new

Value System	Assumptions regarding people at work	Assumptions regarding work	Leadership style	Cognitive Style (approach to making sense of new information)
				information. There is a strong reliance on leadership (which is supported uncritically or emotionally).
RED	People need to be coerced in order to perform and they need strong leadership. Nobody is to be trusted and people respond to the carrot-stick approach.	Work must provide for basic needs–then people will comply. People's natural goals are in conflict with those of the organisation.	Strong, directive leadership is prevalent, there is a clear pecking order and emphasis is on power and rank.	The focus is on working harder and more quickly (rather than more intelligently) when dealing with new information to avoid feeling vulnerable.
BLUE	People need structure and order and they need to be told to do things the right way. Being dutiful and correct provides meaning.	Duty is paramount and discipline is strict. Inequality is natural and for everyone there is a purpose or role. The organisation must provide order and security.	Higher authority rules by rightful compliance and there is avoidance of innovation and risk taking. Leadership is moralistic and prescriptive.	The focus is on creating structure, focussing on rules and pursuing quality through in-depth analysis and depth of technical expertise.
ORANGE	People are motivated by achievement and material rewards as well as by playing the game. Value-add has inherent motivational value and personal responsibility or accountability is important.	Competition is important for productivity and the first priority is the viability of the organisation.	Performance is evaluated continually and rewards are accorded to those who are most successful. Administration is pragmatic and appointments are according to objective criteria. Resilience and flexibility are important and the future can be created.	The focus is on innovation, flexibility, value creation and strategic manipulation.
GREEN	People are motivated by human contact and want to maintain harmonious relationships. Emotions need to be addressed and diversity is accommodated.	Sharing and participating are better than competition. The involvement and participation of everyone is valued and it is thought that diversity in approach enriches outputs.	Emphasis is on consensus and compromise. Leaders facilitate processes rather than directing them and open communication is stressed.	The focus is on being open-minded and accepting and applying a theoretical, ideas approach. They try to understand situations from various perspectives.
YELLOW	People need to do things that will provide self-actualisation. Learning and understanding is seen to be intrinsically rewarding.	Change in organisation is inevitable and organisation must capitalise on the diversity of the workforce. Contextualisation and functionality is focused on.	Emphasis is on access to knowledge, information and experience and an holistic approach is applied. There is an appreciation of simplicity after complexity.	The focus is on flexibility and adaptability, the contextualisation of behaviour, the desire to learn and applying a systems or holistic view of the world.

Value System	Assumptions regarding people at work	Assumptions regarding work	Leadership style	Cognitive Style (approach to making sense of new information)
TURQUOISE	All is interconnected and human connection is via spiritual and experiential bonds. There is an awareness that contextualised changes re important and personal purpose is highly regarded	Work must be meaningful to the overall health of all and emphasis is placed on the importance of enhancing Life (the principles of Life)	Social and environmental responsibility is emphasised and all previous approaches are integrated and transcended.	The focus is on an integrated philosophical, existential and spiritual approach to problem solving. Everything in the world is connected and an holistic view is applied.

Spiral dynamics value systems influence leaders' behaviour, both in the way they approach the management of others, as well as in the way they make decisions and solve problems (Prinsloo, 2012a). There appears to be a relationship between value systems and cognition in organisational leaders, which needs further exploration.

2.3.2 Research on the relationship between cognition and value systems

Lichtenstein (2012) suggested that personal value systems influence leaders by acting as a perceptual filter that shapes decisions and behaviour, and ultimately, organisational performance. Lichtenstein found that the values which executives held had a direct and significant impact on organisational performance, while factors such as their age, tenure, functional experience and level of education did not. He claimed that, while values have been identified as critical to strategy formulation and implementation, limited research has been done in this area. However, he did not consider the influence that cognition may have on shaping strategy preferences.

Prinsloo and Prinsloo (2011) argued that effective leadership requires a focus on processes and interactions, across operational systems, value-chains and the organisation's strategic direction, which suggests that cognition is an important factor in leadership. The relationship between the value systems of transactional and transformational leaders respectively has been investigated in previous research. Sarros and Santora (2001), for example, found in a study consisting of a sample 181 executives from the top 500 Australian companies, that the value systems leaders adhere to significantly affect organisational performance. A strong positive correlation among transformational leadership behaviours and values that encourage personal and professional development was found. Furthermore, Russell (2001) found that value systems influence personal and organisational decision-making significantly – he even argues that value systems serve as the essence of leadership. In a study of a sample of 95 pairs of leaders and subordinates of a non-profit organisation in the United States, Krishnan

(2001) observed that the value systems of transformational leaders differ from those of transactional leaders. Transformational leaders, for example, emphasised collective identity and encouraged followers to work towards broader organisational goals to a far larger extent than transactional leaders.

Findings such as the above highlight the role of values in effective leadership. However, although effective leadership appears to require an understanding of the value propositioning of the whole organisation, instead of the operational effectiveness of each subsystem, functional unit or department (Prinsloo & Prinsloo, 2011), this requirement frequently appears not to have been incorporated in studies exploring leadership.

In a study exploring the relationship between value systems and cognition, Halaby (2003) found that cognitive ability influenced values. Halaby based his research on the Miller-Swanson schema developed by Miller and Swanson in 1958 that distinguished between, what they termed, entrepreneurial and bureaucratic jobs. Entrepreneurial jobs encompass those roles that may promise great rewards, but in which there is an element of uncertainty and risk, while bureaucratic jobs are stable and guarantee future security, but only with modest reward levels. Halaby (2003) found that all coefficients for entrepreneurial job properties exceeded those for bureaucratic job properties. This suggested that adults who achieved higher IQ scores had a stronger preference for entrepreneurial jobs than those who obtained lower IQ scores. In fact, Halaby (2003) maintained that cognition is the most powerful source of variation in job values. He stated in his findings that there is a need to study the relationship between cognitive ability and job values in more detail. Despite the fact that he found cognitive ability to have a highly significant effect on job values, it is not considered in nearly all other studies of values and value systems (Halaby, 2003).

Although the above study produced interesting findings signifying a relationship between value systems and cognition, there appears to be some concern about the validity of the instruments used, which supports Halaby's (2003) view that more exploration is required. The measurement of cognition and intelligence has evolved significantly since 1957. Prinsloo (2012a) suggested that traditional IQ tests only measure diagnostic capability, as reflected in the Purely Operational and Diagnostic Accumulation work environments measured by the CPP. The systems applications of the more strategic work environments, such as the Tactical Strategy, Parallel Processing and Pure Strategic environments, are not accessed by means of traditional IQ tests. Furthermore, the values model used in Halaby's (2003) study was fairly restricted since it only differentiates between bureaucratic and entrepreneurial roles.

Prinsloo (2012a) made the following observations based on a database of data from approximately 180,000 individual assessments, consisting of individuals across educational, occupational and organisational levels, languages, nationalities, ethnic groups, genders and interests. This database contained assessment results including the CPP, personality profiles, emotional intelligence questionnaires, motivational profiles and team role preferences.

Firstly, people who were best suited to a Purely Operational environment as measured by the CPP, tended not to be interested in complexity and intellectual challenge. Typically, they preferred a structured environment where there was not much uncertainty and they were not exposed to significant levels of risk. These people usually relied on the guidance of others and preferred working as a team (Prinsloo, 2012a). People characterised by value systems of purple, red and blue also relied on others for direction in their decision-making. People with a purple orientation, for example, believed that customs, traditions and their elders assisted them in making decisions. Within a red paradigm the strongest one dictates; and people with a blue worldview typically obey orders originating from authority, and adhere closely to tradition and established systems and processes (Beck & Cowan, 2006).

Furthermore, Prinsloo (2012a) suggested that while those operating most effectively in a Diagnostic Accumulation environment were typically more analytical than those best suited to a Purely Operational environment, they still showed a need for structure – often in the form of technical guidelines. Prinsloo (2012a) found that people like these tended to apply technical assumptions in a non-critical manner and, hence, still looked to a large extent to others to guide their decision-making; particularly when faced with unfamiliar situations.

Almost 80% of the people assessed using the CPP showed a preference for functioning in a Purely Operational or Diagnostic Accumulation work environment (Prinsloo, 2012a). Similarly, Beck and Cowan (2006) estimated that approximately 70% of the world's population adopt the worldviews of purple, red and blue orientations. However, there seems to be a limited amount of available research that explores the relationship between cognition and value systems from this perspective.

Individuals who preferred to work at strategic levels of work, such as the Tactical Strategy, Parallel Processing and Purely Strategic environments, tended to focus on dynamic and interactive systems. Often, they enjoyed conceptualising ideas that supported broad strategy formulation in the business context, and they were inclined to question and critically evaluate technical assumptions. The focus was often on integration of information and learning (Prinsloo, 2012a). Across the second tier level of the spiral in the theory of Spiral Dynamics

(yellow and turquoise value systems), there was a stronger focus on systems, integration and viewing things holistically (Beck & Cowan, 2006). Wilber (2001) maintained that in fact, less than 2% of the world's population adopt a second tier worldview.

Effective functioning, for those who preferred a Purely Operational (level 1) environment and to some extent a Diagnostic Accumulation (Level 2) environment, was more influenced by first tier Spiral Dynamics value systems than by cognitive capability (Prinsloo (2012a). However, within Tactical Strategy, Parallel Processing and Purely Strategic environments, as well as at second tier Spiral Dynamics levels, cognitive capability became an increasingly important requirement for effective functioning.

There appears to be some interdependence between cognition and value systems. In a study consisting of a sample of 399 working adults, Ndiweni (2011) explored whether the value systems held by employees could be used to predict their preferred work environment or level of work as measured by the CPP. He found a significant relationship between a person's value systems and level of work, suggesting that there is indeed a relationship between value systems and cognition.

Kotze and Mauer (2013) found in a study including 176 South African adults, a significant relationship between Spiral Dynamics value systems and Rokeach's Dogmatism scale. Dogmatism relates to the state of closed-mindedness (Mouw, 1969) and the extent to which people assume their beliefs are correct (Kotze & Mauer, 2013). Interest in the relationship between belief systems and cognition has been evident since 1969, when Mouw found that open-minded individuals had an increased ability to perform unfamiliar cognitive tasks, more so than closed-minded people. Mouw (1969) suggested that closed minded individuals depend more directly on authority or some other established systems and processes to guide decision-making.

All in all, increasing complexity in organisations, both internally and externally that results from rapidly changing technology and globalisation, gives rise to serious challenges for leaders and their organisations. There is an escalating need for leaders to respond to these challenges by developing their capacity to make sense of complexity. Sense making requires a continuous and motivated effort to understand connections in an attempt to anticipate potential outcomes and respond appropriately and in a timely manner (Raghavendran & Rajagopalan, 2011). Although a considerable body of literature is available on those personal characteristics that are suitable for predicting individuals' ability to manage complexity, other possible variables that affect people's ability to process complicated, ambiguous, dynamic or novel information

(Wang & Chan, 1995), particularly within a leadership context, appear not to have been investigated extensively.

Acceptance of complexity and its contradictions describes a personal attitude towards the ambiguous and unpredictable nature of the global world of work (Jokinen, 2004), rather than being a purely cognitive/intellectual function. Existing research supports the contention that not only cognitive measures have a relationship with the ability to manage complexity. Other factors, such as personality (Bowler, Bowler & Philips, 2009), or a personal attitude (Jokinen, 2004), have also shown to relate significantly with the ability to manage complexity. Bowler, Bowler and Philips (2009), for example, found in a sample of 718 students at a south eastern American university that individuals who exhibited a high level of cognitive complexity appeared to have more complex personalities and demonstrated a wider variety of distinct personality factors than those who performed at a lower level of cognitive complexity. Furthermore, Winn and Bittner (2005) suggested that individuals with a higher level of cognitive complexity were more likely to review a wider range of options when making decisions than those who demonstrated lower levels of cognitive complexity.

Much more empirical research is needed to investigate the relationship between cognitive functioning, the ability to manage complexity and individual worldviews (Halaby, 2003; Jokinen, 2004). Therefore, in this research, cognition in relation to value systems is explored at an executive level.

2.4 CHAPTER SUMMARY

In Chapter 2, an overview of theories of cognition and the different approaches to defining and measuring cognition, including the theoretical underpinnings of the CPP as a measure of cognition, was presented. The constructs measured by the CPP and the psychometric properties were described. An outline of the literature pertaining to values and value systems, the theoretical underpinnings of Spiral Dynamics and the development of the VO questionnaire were also provided. From a discussion of their psychometric properties, it was evident that the CPP and the VO are valid and reliable measures of cognition and Spiral Dynamics value systems respectively. The theoretical relationship between cognition and values within a global leadership context was discussed. The chapter concluded with an overview of previous research exploring the relationships between leadership, cognition, managing complexity, and value systems in general, as well as value systems according to Spiral Dynamics.

CHAPTER 3: RESEARCH ARTICLE

Cognitive complexity, cognitive processes and value systems in a multinational leadership team

ABSTRACT

Orientation: Globalisation had a major impact on the way organisations operate. Access to information and innovative technology connote that organisational leaders need to make timely decisions while considering a range of rapidly changing variables. They need to understand the long-term impact of these decisions on the organisation as a whole, as well as the broad environment. Leaders of global organisations need to make sense of complex information and anticipate the long-term outcomes of making different decisions. This requires highly developed cognitive skills. However, cognitive skills are not the only factor influencing strategic decisions. Values and individual preferences also affect the choices organisational leaders make. Limited existing research has investigated the relationship between values and cognition within organisational leadership.

Research purpose: The aim of this study was to investigate the relationship between cognitive complexity, cognitive processes and individual values at a senior management level in a multinational company. Cognition is explored in terms of cognitive processes and levels of work (as measured by the Cognitive Process Profile), and values are explored in terms of value systems (as measured by the Value Orientations questionnaire).

Motivation for the study: Previous research on organisational leadership suggested that both cognition and values influence decision-making. However, little research appears to have been done to determine whether there is a relationship between values and cognition at this level. This research should contribute to the existing body of knowledge on leadership within a multinational context from a cognitive and value systems perspective.

Research design, approach and method: The study is based on a quantitative research design, where a sample of 265 executives, senior managers and directors employed at a multinational organisation completed the assessments.

Main findings: The empirical study (N = 265) yielded some weak, yet statistically significant, relationships between cognition and value systems among organisational leaders in a multinational organisation.

Practical implications in terms of industrial/organisational psychology practices: An understanding of the relationship between cognitive complexity, cognitive processes and value systems among global leaders could contribute to the existing body of knowledge on the way in which strategic decisions are made. The findings of this study could inform future research exploring improved means of attracting, selecting, developing and retaining organisational leaders in global organisations. Future research could explore the relationship between cognitive abilities and values across industries and organisational levels.

Contribution/value-add: A number of significant relationships were found between cognitive abilities and certain value systems, suggesting there is a relationship between cognition and value systems. This research should contribute to the existing body of knowledge on leadership from a cognitive and value systems perspective – particularly as it has been conducted in a global organisation. The findings should add value to the field of organisational psychology, cognitive psychology, personnel psychology and psychometric assessment of leaders of global organisations.

Keywords: cognition, cognitive complexity, cognitive processes, Cognitive Process Profile, levels of work, Spiral Dynamics, values, Value Orientations questionnaire, value systems.

INTRODUCTION

In Chapter 3, the background and key focus of the study is revised. This includes reviewing the literature, and the objectives and value added by the study are discussed. The research design is outlined, which consists of the research approach, the research method and the results of the study. This chapter concludes with the conclusions drawn, the limitations of this study and recommendations for future research.

Problem statement

Key focus of the study

The purpose of the study was to explore the relationship between cognition and value systems within the leadership team of a multinational organisation. Cognition is explored in terms of cognitive processes and levels of work as measured by the Cognitive Process Profile (CPP), and values are investigated in terms of value systems as measured by the Value Orientations questionnaire (VO).

Background to the study

Globalisation has had a major impact on corporate leadership (Denton & Vloeberghs, 2003). Some of the factors that contribute to a rapidly changing environment include increased

access to information and innovative technology. Adaptability has therefore become the key to success; organisations have to be flexible, responsive, decisive and quick to change to remain competitive in a global economy (Denton & Vloeberghs, 2003). Organisational leaders and corporate executives need to be able to process complex information quickly and make decisions that enable the organisation to adapt appropriately and remain sustainable in the long term (Jaques, 1998).

The information available to leaders is usually limited and their understanding of this data is often influenced by the individual's fundamental assumptions about the world, beliefs and values, as well as the ability to reason with, and make sense of, this information. An understanding of the environment is essential in effective leadership. Knowing, understanding and adapting to what is happening currently, anticipating future events, and being able to identify appropriate actions to shape these events is important for effective leadership at any organisational level (Day, Harrison & Halpin, 2009).

The most complex jobs, such as leading global organisations, require individuals to make judgements and decisions about potential socio-political and economic trends based on many interlinked variables. Jaques (1998) argued that individuals need to manage complexity and solve problems at work. Their performance and ability to do so effectively is related to their current as well as their potential level of work, as outlined in his Complexity of Work Model. This model defined seven levels of complex thinking required by different jobs. These ranged from level one work which involved short-time frames, concrete tasks and completing one task at a time, to level seven work which involved executive leadership of multinational organisations and work that included understanding large-scale systems.

Research purpose

One of the major reasons for studying cognition and intelligence is to understand how individual differences in cognitive competence are related to individual differences in behaviour (Hunt, 2011b). Although cognitive ability appears to be essential in making appropriate decisions (Jaques, 1998) and consequently adding to an understanding of individual differences, it may not be the only requirement for doing so. Cognition in isolation does not determine leadership success, and, to gain a complete picture of requirements for such success, additional factors such as motivational factors and individual value systems need to be considered (Hunt, 2011b).

Prinsloo (2012a) argued that value systems, and their underlying energies, determine the way in which personal characteristics and cognitive capability are implemented, and thereby

influence the behaviour and decisions of organisational leaders. Prinsloo (2012a) maintained that cognitive capacity remains a prerequisite, rather than a guarantee, of effectiveness. She suggested that cognitive capability needs to be applied according to Spiral Dynamics criteria to unlock its full potential. Information quantifying the relationship between cognitive abilities and Spiral Dynamics value systems should contribute to a better understanding of leadership behaviour. The purpose of this study is to add to the knowledge of the quantitative nature of this relationship.

Trends from the research literature

Significant relationships between cognitive ability and personality, and between personality and tolerance for managing complexity, as well as between motivation and intelligence have been identified (Carr & Dweck, 2011, Grace, 1997). It, however, appears as if the relationship between cognitive ability and value systems has not been investigated extensively. Lichtenstein (2012) found that the values held by executives had a direct and significant impact on organisational performance. Nevertheless, he acknowledges that, although values have been identified as critical to strategy formulation and implementation, limited research has been done to quantify the relationship between cognition and values.

Halaby (2003) found, in a study exploring the relationship between values and cognition, that a significant relationship does in fact exist between these constructs. Specifically he found that adults who achieve higher IQ scores had a stronger preference for jobs where there was more uncertainty and risk, but promised greater rewards. Yet, people with lower IQ scores placed higher value on jobs that are stable and guarantee future security. He indeed stated that cognition is the most powerful source of variation in value systems.

Similarly, based on a study of more than 180,000 individual assessment results, encompassing cognitive, personality, motivational and value systems assessment results, Prinsloo (2012a) observed that people, who were best suited to a purely operational environment as measured by the CPP, tended not to be interested in, or placed value on, complexity and intellectual challenge. Furthermore, she noticed that individuals who showed the cognitive abilities to work with higher levels of complexity, usually enjoyed conceptualising ideas that supported broad strategy formulation in the business context. Overall, Prinsloo (2012a) found that those who are better suited to working in environments with lower levels of complexity as measured by the CPP, were more influenced by first tier Spiral Dynamics value systems, than by cognitive capability. However, people whose value systems were characterised by second tier Spiral Dynamics value systems, were typically able to manage higher levels of cognitive complexity in the work environment.

Furthermore, Ndiweni (2011) explored the relationship between value systems and various cognitive measures such as the level of work measured by the CPP. He found a statistically significant relationship between value systems and levels of work, but these relationships appeared to be fairly weak and only the relationship between value systems and levels of work was investigated.

In the current study, the aim is to expand on the above research by exploring the relationship between Spiral Dynamics value systems and cognition at a leadership level.

Objectives

Previous research on organisational leadership suggests that both cognition and values influence decision-making (Lichtenstein, 2012). Beck and Cowan (2006) argued that individuals who operate effectively in work environments that require higher levels of complexity need to value working with complexity in a constantly changing environment where the long-term viability of the organisation is a major factor to be considered. Organisations need a better understanding of the relationship between the cognitive skills and value systems of global leaders in order to attract, retain, develop and reward executives effectively in a rapidly changing environment.

Limited research exists which explores the relationship between value systems and cognition at an executive or senior management level. In the current research, cognition, specifically in terms of the ability to manage complexity and cognitive processes, is investigated in relation to value systems at an executive level within a multinational organisation.

Contribution to the field

Leadership as a concept is central to the practice of industrial psychology and psychometrics, the purpose of which involves the realisation of human potential and ensuring that the organisation's culture supports, enhances, integrates and evolves within the organisation's system and overall functioning (Prinsloo, 2012a). Globalisation has had a major impact on corporate leadership and there is increasing interest in the way global leaders make decisions in complex, multi-cultural work environments to ensure competitiveness and sustainability. In a global environment, leaders have to react to rapidly changing variables and understand the long-term impact of their decisions on the organisation and the environment in which it operates (Denton & Vloeberghs, 2003). This requires highly developed cognitive skills and the ability to make sense of large amounts of complex information (Jaques & Clement, 2006). Yet, cognitive skills are not the only factor

influencing strategic decisions. Value systems and individual preferences also affect the choices organisational leaders make (Cowan & Todorovic, 2000). In this study, the results should contribute to the understanding of the relationship between cognition (including measures of cognitive complexity and cognitive processes) and Spiral Dynamics value systems within a global leadership team.

Trends from the research literature

Dominant trends in the literature review will now be discussed in relation to cognition, value systems and their relationship to effective leadership.

Cognition

Cognition is a term that is used in various ways. After reviewing multiple definitions, Van Heerden (2005) suggested that it generally refers to the mental processes of an individual with particular emphasis on the idea that the mind is understood in terms of internal information processing. This differs from the concept of problem solving, which denotes the effort taken to change a specific state into a desired outcome (Prinsloo & Prinsloo, 2011). A common thread among different definitions of intelligence is that some basic learning abilities, which may be defined in different ways, underlie intelligent functioning (Fagan, 2011).

Related cognitive terms

Cognition and intelligence have been a topic of discussion in leadership for decades and researcher have identified different types of intelligence and related constructs that influence decision-making to describe their findings (Hunt, 2011b). Many terms, such as cognitive processes, cognitive styles and cognitive complexity have been used in a variety of different contexts (Prinsloo & Barrett, 2013). For the purpose of this study, these terms are defined below.

Cognitive processes are the mental processes by means of which a person is able to organise information to make it available for doing work (Jaques & Clement, 2006). Prinsloo and Prinsloo (2011) suggested that the mental activity, as a unit of thinking that results in a particular product, is referred to as a cognitive process. This differs from cognition, which is seen to be a collective term for a number of cognitive processes or dynamic operations. In this regard, intelligence or cognition is considered to consist of numerous cognitive processes that work together to organise information, assisting in decision-making.

Penchova and Papazova (2006) suggested that *cognitive styles* represent dimensions of individual differences in the cognitive sphere, while Sternberg and Grigorenko (1997) referred to a cognitive style as the preferred manner in which people process information. The authors state that a cognitive style is not an ability, but rather the preferred way in which one uses the ability one has. Necka and Orzechowski (2005) referred to the distinctive mode of dealing with a task or group of tasks as a cognitive strategy. It appears to be commonly accepted that a cognitive style is a preference (the manner in which cognitive tasks are performed and cognitive processes are used), rather than an ability.

Cognitive complexity measures the structure of cognition and comprises two parts: differentiation (the number of dimensions used by individuals to perceive external stimuli); and integration (the complexity of rules used by individuals in organising the differentiated dimensions) (Wang & Chan, 1995). Jaques and Clement (2006) suggested that complexity relates to the number, ambiguity, rate of change, and interweaving of variables involved in a problem. Individuals typically apply their preferred cognitive styles in different ways to manage tasks with differing levels of complexity.

The ability of individuals to manage complexity when solving problems at work is reflected in how they manipulate and organise variables: some people seem able to gather and manage large numbers of variables at the same time, while others cope with medium numbers, and some can only deal with a small number of variables before they become confused (Jaques & Clement, 2006). Prinsloo and Prinsloo (2011) agreed that complexity involves the number of elements (the quantitative aspect of cognition), the level of abstraction (how far the elements are removed from concrete reality) and the degree of interaction between the components or systems, which requires the ability to integrate information. As such, complexity refers to the nature of the information dealt with when completing tasks and solving problems, while cognitive styles deal with the way in which an individual chooses to manage tasks with different levels of complexity.

Theories of cognition

The differential and information processing theories of cognition provide the theoretical basis of the cognitive assessment instrument (the CPP) used in this study.

The primary purpose of theorists adhering to the differential approach (also known as the structural or psychometric approach) to intelligence was to identify and study the nature of intelligence and to reveal the structure of the intellect (Prinsloo, 2005). The interest in this area focused mainly on identifying the number of dimensions, factors or abilities that are

required to explain properly the differences in individuals' performance on cognitive tests (Kubinger, Litzenberger & Mrakotsky, 2007). Although there is some disagreement in terms of how many factors or abilities influence intelligence, theorists supporting the differential approach consistently view intelligence as stable and do not necessarily cater for the flexibility and dynamic nature of cognition (Rose & Fischer, 2011).

In 1977, Sternberg expanded on cognitive theories by introducing the information processing approach, and other researchers have supported many of his findings (Kubinger, Litzenberger & Mrakotsky, 2007). According to Prinsloo (2005), the different information processing theories view the identification of cognitive processes as a primary research goal. Intelligence is measured in this approach by focusing on functions such as sensory processing, coding strategies, memory and other mental capacities involved in remembering and learning things. Prinsloo (2005) also maintained that the information processing theories investigate intelligence in terms of mental representations, the processes underlying these representations and the way in which these processes are combined. The focus in the information processing theory of intelligence relates to how people think and what their thinking processes are (Prinsloo, 2005).

Sternberg (2009) initially sought to understand the information processing origins of individual differences in the analytical aspect of human intelligence. He found that, with componential analysis, it was possible to specify sources of individual differences underlying different factor scores (such as for inductive reasoning). Differences in individuals' intelligence could consequently be determined by measuring cognitive processes.

Sternberg attempted to integrate the differential and information processing approaches to intelligence and he defined intelligence in terms of the availability of mental components, the utility of rules for combining these components, the utility of component execution modes, the utility of orders in which components are executed, and the component values, for example, the degree of difficulty (Prinsloo, 2005; Sternberg, 2009; Sternberg, 2011).

Hamers and Resing (1993) proposed that the information-processing view of human intelligence describes how people collect and apply information to solve problems and acquire knowledge. The process of making decisions to solve existing problems and to set the future direction of an organisation at an executive level is closely related to this concept.

Values

Human values are defined in various ways. Haralambos and Holburn (1994) defined values as a belief that something is good and desirable, and something that an individual believes is important, worthwhile and worth striving for. Hogan Assessment Systems (2011) suggested that values consist of the core motives, interests and beliefs that determine what people desire and strive to attain. Schreuder and Theron (2004) argued that values can be seen as orientations or dispositions that selectively determine modes of behaviour or life forms, including work behaviour.

Schwartz and Bilsky (1990) generated a conceptual definition of values that incorporated five areas that recur in values literature. They suggested that values are: (1) concepts or beliefs that (2) pertain to desirable end states or behaviours, (3) transcend specific situations, (4) guide selection of evaluation of behaviour and events, and (5) are ordered according to relative importance.

Individual value priorities are seen to be a result of both shared cultural beliefs and unique personal experiences (Schwartz, 1999); serve as a guiding principle in people's lives; and influence individual goal-setting and prioritising (Watkins, 2010).

Value systems

A value system is a way of conceptualising reality and includes a consistent set of values, beliefs and behaviours that are found in individuals. A value system develops primarily as a reaction to environmental challenges and threats (Van Marrewijk, 2004).

Value systems are similar to complex belief systems about what is desired and what is seen to be important, and, conversely, what is not. Value systems represent core intelligences that guide behaviour and impact life choices by acting as a decision-making framework. Value systems pertain to more than the content of one's thinking, and provide a structure for decision-making (Du Preez & Nash, 2008).

Spiral Dynamics

A fairly recent theory of value systems, Spiral Dynamics, views human development as proceeding through eight general stages, also known as memes or value systems. A meme or value system is a way of conceptualising reality, and encompasses a consistent set of values, beliefs and corresponding behaviour found in individuals as well as organisations or societies (Beck & Cowan, 2006; Van Marrewijk, 2010; Wilber, 2001). The theory contends that all people have all the value systems outlined in Spiral Dynamics potentially available to

them at any given time (Beck & Cowan, 2006; Prinsloo, 2012a; Prinsloo, 2012b; Van Marrewijk, 2010; Wilber, 2001).

These eight value systems or memes can be broadly divided into first and second tier levels of consciousness (Du Preez & Nash, 2008; Wilber, 2001). The first six levels have been termed subsistence levels, or the first tier level of consciousness (Wilber, 2001) where the valuing systems tend to be emotionally driven and do not typically consider the existence of other valuing systems. This means that at each of these levels (beige, purple, red, blue, orange, green), people would assume that their worldview is correct and may be very critical of others' worldviews (Du Preez & Nash, 2008).

However, at the second tier level of consciousness (yellow and turquoise) there is an appreciation of the necessity of the various other valuing systems. With second-tier consciousness, there is an understanding of the entire spectrum of internal development, rather than focusing on one valuing system. At each level in the second tier, within each meme or value system, there is an appreciation that all value systems are important and have a role to play, rather than just one particular meme or valuing system (Wilber, 2001). Table 3.1 outlines the description, motives, characteristics and approach to decision-making associated with each value system in the spiral.

Table 3.1: Description, motives, characteristics and approach to decision-making associated with each value according to Spiral Dynamics. (Beck & Cowan, 2006; Prinsloo & Prinsloo, 2012))

Value System	Description	Motives	Characteristics	Approach to decision-making
BEIGE (survival)	Automatic, reflexive and instinctive responses are important and the focus is on physical survival.	Staying alive and satisfying physiological needs motivate action.	The beige value system centres on the satisfaction of one's physical needs to survive. Food, water, warmth, shelter, sex and safety have priority and individuals have limited impact or control over their environment.	Habits and instincts are used to survive.
PURPLE (safety)	In-group dependencies and traditions are important. There is often an "us-and-them" orientation and an avoidance of	Maintaining blood relationships, mysticism, striving for certainty and protection motivate action.	The purple value system centres on the need to be part of a close, warm group where they feel safe and protected. Allegiance and obedience to elders, custom and clan is important and there is comfort in familiarity and routine. Preserving sacred objects, places and events is often practiced and rites of	Custom and tradition, such as elders' counsel, signs or the shaman influence decisions.

	change.		passage and customs observed.	
RED (power)	Power, impulse, dominance, energy, action, achievement and leadership are prevalent in the red value system.	Enforcing dominance and power, gratifying impulses, demand for respect and avoiding shame motivate action.	In the red value system, the world is viewed as having limited resources – one has to fight for one's share. The world is full of threats and the strongest survive. Trusting others is difficult although there is a need for attention and respect. There is a tendency to cut loose from group values and to be fanatical and dogmatic (worry about consequences later).	Decisions are influenced by what the tough/powerful person dictates and what feels good now. The most powerful person typically grabs the spoils. Maximising profits and minimising displeasure and pain also influence decisions.
BLUE (truth)	Purpose, structure, truth, reliability and loyalty are important in the blue value system.	Belief in order and obedience in authority, self-discipline and definite views of what is right and wrong motivate action.	In the blue value system, security and caution, strong work ethics, laws, regulations and discipline are seen to build character and moral fibre. The focus is on controlling impulses and conforming to bureaucratic/hierarchical views or inflexible ideologies. Divine plans are seen to assign people to their places.	Decisions are influenced by orders from authority, what is seen as right and adherence to rules or tradition. The most righteous person earns the spoils.
ORANGE (prosperity)	Strategy, materialism, opportunism, freedom of choice, individualism and achievement are important in the orange value system.	Thinking in terms of abundance, acting in self-interest, autonomy and manipulation motivate action.	In the orange value system, optimism, practicality, risk-taking and self-reliance are important. People who take the initiative deserve success and prosperity is seen to be achieved through strategy, technology and competitiveness. Goal-setting, competence and tough-mindedness are needed to achieve results. Resources should be manipulated to create and spread around the good life.	Decisions are influenced by bottom-line results, the opinions of experts and options are tested to maximise results. The most successful person wins the spoils.
GREEN (communitarian)	Sensitivity, humanism, emotions, theory and compassion are important in the green value system.	Peace with the inner self and others, and caring and unity in the community motivate action.	In the green value system, feelings, sensitivity and caring take priority over greed, materialism and divisiveness. Equal opportunities for all are valued and emphasis is placed on providing for the oppressed and there is typically genuine concern for others. However, people conforming to this view may be patronising and assume superiority, by taking away power and removing responsibility.	Decisions are taken by reaching consensus, everyone must collaborate and input from everyone must be accepted. There are communal spoils.
YELLOW (systematic)	Integration, learning, change and systems thinking are	Living fully and responsibly while learning, considering the	In the yellow value system, the focus is on flexibility, functionality and spontaneity. Knowledge and competence supersedes rank, power	Decisions are based on principles, knowledge and resolved paradoxes.

	important in the yellow value system.	big picture and the contextualisation of issues motivates action.	and position and differences can be integrated into inter-dependent flows. Transformation is embraced and problem solving is characterised by innovation and viewing the situation holistically.	The most competent person gets the spoils.
TURQUOISE (holistic)	Holistic-global, spiritual-existential and philosophical factors are important in the turquoise value system.	Experiencing the wholeness of existence through mind and spirit, a natural and simplistic life style and environmental concerns motivate action.	In the turquoise value system, the world is a single, dynamic organism with its own collective mind and everything connects to everything else. Emphasis is placed on holistic, intuitive thinking and cooperative actions and broad interests. The focus is on planetary concerns, and could come across as too abstract and other-worldly to others.	Decisions are based on the blend of natural flows, looking up/down stream and planning for the long range. Life gets the spoils.

The relationship between cognition and value systems in an organisational context

In some instances, such as at higher levels of complexity and levels of work, certain value systems can derail cognitive competence. Prinsloo (2012a), for example, suggested that people at the lower levels of Spiral Dynamics, such as purple, red and blue, tend to be motivated by fear. Under conditions in which individuals feel threatened or working under acute pressure, they can show defensive behaviour. Often, this may overrule cognitive responses. However, according to Prinsloo (2012a), each of the value systems offer certain advantages, as well as disadvantages in terms of their influence over cognitive processes, as follows.

Purple: People characterised by the purple value system tend to show an external locus of control and, cognitively, to respond without purpose to new situations. They are inclined to focus on *us-versus-them* thinking, rely on in-group problem solving, and blame the out-group when things go wrong. This value system does not seem to encourage the reliance on intellectual competence (rather adhering to group problem solving) and often results in the adoption of a less analytical, yet rule-bound approach to solving problems.

Red: People with a red value system are typically driven by fear of failure and therefore, a loss of face. They tend to require recognition, and, in order to avoid feeling vulnerable, respond defensively to difficulties by retreating into egocentric behaviours, such as behaving in an aggressive manner, and by working harder and more quickly (often at the expense of working more intelligently) to create a sense of achievement and identity.

Blue: People showing a blue value system are typically characterised by stability, the pursuit of quality and depth of technical expertise. People who hold this worldview typically create structure in their environments and avoid or even actively oppose change. People with this orientation often respond in a rigid or inflexible manner to challenges, and tend to over-conform by focusing on rules.

Under less stressful, more familiar or less threatening situations, for those who embrace the purple, red or blue worldviews, the impact of emotion on cognition can be greatly reduced. People with red and blue orientations can be highly intellectual, especially the values associated with the blue worldview of rationality, rigour and depth of analysis.

Orange: People with an orange value system usually apply a strong cognitive orientation towards goals that are important to them – such as value creation, strategic manipulation, professional application, people or market perception. This value system often manifests as flexible and resilient, and their cognitive abilities are applied to innovate, reframe, conceptualise and persuade others.

Green: People with the green value system are characterised by an open-minded and accepting approach. Cognitively, people with this orientation enjoy the world of ideas, are often theoretical, and try to understand viewpoints from multiple perspectives. Even those less intellectually sophisticated are usually open to ideas, as well as being compassionate and interested.

People with orange and green value systems are often still motivated by emotional and interpersonal factors, although they tend to focus on a broader population within their sphere of influence and concern than those with purple, red and blue perspectives.

Yellow: People with the yellow value system are very flexible and adaptable and usually contextualise behaviour and solutions to meet specific requirements. Yellow is often associated with a desire to learn and experience new things, and people with this value system usually cognitively apply a systems or holistic view of the world in which everything is connected. To implement a yellow value system effectively in a leadership role, a high level of cognitive capability is required.

Turquoise: The world of work currently has a predominantly commercial orientation, and, as such, leaders with a turquoise value system are not typically found in the corporate

environment. Their orientation is characterised by an integrated philosophical, existential and spiritual approach, and the focus tends to be on human experience and the proliferation of life. There is usually a heightened awareness of their responses, the environment and the depth of connectedness of the world.

Typically, those with yellow and turquoise value systems are not driven by emotional considerations and the need to perform according to predetermined criteria of success and status. Cognitively, they are driven by the process of developing an understanding of principles, paradoxes and practices within a holistic and integrated world (Prinsloo, 2012a). Prinsloo (2012b) suggested that progressively inclusive value systems, such as the yellow and turquoise value systems which, at the second tier level in the spiral, appreciate and understand the necessity of the other valuing systems, require increasingly complex cognitive processing to be effective.

Leadership decision-making and dealing with complexity

Prinsloo's (2012a) views as espoused above, suggested that there are more drivers behind the decision-making of leaders than mere cognition and intelligence. In the contextualist approach to measuring cognition, Sternberg (2009) suggested that intelligence is a complex construct that should not be explored in isolation, but rather in more detail using other variables simultaneously. The use of contextualised methods provides an ideal opportunity to examine a broader range of variables in relation to intelligence (Sternberg, 2009).

The knowledge era and the complexities of the modern world in which corporates currently operate are characterised by the forces of globalisation, technology, deregulation and democratisation, collectively developing a new competitive environment. In this environment, learning, flexibility and innovation are essential for organisations to maintain a competitive advantage (Brown, 2011). Systemic thinking and the ability to manage complexity is essential in effectively leading an organisation in this environment (Senge, 1990).

From a theoretical perspective, value systems are recognised as tools for decision-making (Pencheva & Papazova, 2006). Value systems are groups of values that guide the decision-making process and enable leaders to decide between alternative goals and actions (Rokeach, 1979). Lichtenstein (2012) suggested that value systems influence leaders by acting as a perceptual filter that shapes decisions and behaviour, and ultimately, organisational performance. Lichtenstein (2012) found in an earlier study that the values which executives held had a direct and significant impact on organisational performance.

Lichtenstein (2012) argued that although values have been identified as critical to strategy formulation and implementation, limited research has investigated this relationship.

Prinsloo and Prinsloo (2011) maintained that effective leaders need to focus on processes and interactions, across operational systems, value-chains and the organisation's strategic direction, which suggests that cognition is an important factor in leadership. The relationship between the value systems of transactional and transformational leaders respectively, has been investigated in previous research. Sarros and Santora (2001), for example, found in a study consisting of a sample 181 executives from the top 500 Australian companies, that the values leaders hold significantly affect organisational performance. Furthermore, Russell (2001) found that values influence personal and organisational decision-making significantly, and he argued that values serve as the essence of leadership. In a study incorporating a sample of 95 pairs of leaders and subordinates of a non-profit organisation in the United States, Krishnan (2001) observed that the value systems of transformational leaders differ from those of transactional leaders. Transformational leaders, for example, emphasised collective identity and encouraged followers to work towards broader organisational goals to a much larger extent than transactional leaders.

Findings such as the above highlight the role of value systems in effective leadership. However, although leadership appears to require an understanding of the value proposition of the whole organisation, instead of the operational effectiveness of each subsystem, functional unit or department (Prinsloo & Prinsloo, 2011), it seems that this requirement has not been incorporated in studies exploring effective leadership. The relationship between value systems and cognitive abilities does not seem to have been empirically investigated in previous studies.

Prinsloo and Prinsloo (2012) suggested that values, as high level organising frameworks, impact on the way in which individuals utilise their capability and personality. Ryan, Emmerling and Spencer (2009) further argued that there is a growing level of dissatisfaction with traditional measures of cognition and personality constructs, as these measures do not explain all the variance in job performance at an executive level. Although several studies found a correlation between cognitive ability and personality, as well as a significant relationship between personality and tolerance for managing complexity (Grace, 1997), it appears as if the relationship between cognitive ability and values has not been investigated extensively.

In a study exploring the relationship between values and cognition, Halaby (2003) found that a relationship between cognitive ability and values exists. Adults who achieved higher IQ scores had a stronger preference for jobs characterised by uncertainty and higher levels of risk than those who obtained lower IQ scores. In fact, Halaby (2003) argued that cognition as the most powerful source of variation in job values.

In a study consisting of a sample of 399 working adults Ndiweni (2011) explored whether the value systems held by employees could be used to predict their preferred work environment or level of work as measured by the CPP. He found a significant relationship between a person's values and level of work, supporting the idea that there is indeed is a relationship between values and cognition.

An increasing body of literature suggests that personality and attitudes influence individuals' ability to manage complexity (Bowler, Bowler & Philips, 2009; Halaby, 2003; Jokinen, 2004; Lichtenstein, 2012; Ndiweni, 2011; Prinsloo, 2012a; Prinsloo & Prinsloo, 2011; Russell, 2001; Wang & Chan, 1995; Winn & Bittner, 2005). However, the relationship between other variables, such as value systems, and the ability to process complicated, ambiguous, dynamic or novel information, particularly within a leadership context, appear not to be investigated extensively.

Winn and Bittner (2005) suggested that individuals with a higher level of cognitive complexity are more likely to consider a wider range of options when making decisions than those who demonstrate lower levels of cognitive complexity. Acceptance of complexity and its contradictions describes a personal attitude towards the ambiguous and unpredictable nature of the global world of work (Jokinen, 2004), rather than being a purely cognitive/intellectual function.

Jokinen (2004) suggested that the acceptance of complexity describes an approach towards making sense of ambiguous and unpredictable work environments, rather than a cognitive function. While cognitive ability plays a role in understanding complexity, accepting this phenomenon appears to require a certain attitude. Cognitive skills influence the way in which the environment is experienced and interpreted, while value systems affect the decisions made based on cognitive interpretation.

All in all, work-related problems are increasingly diffuse and complex in the global environment, and organisational leaders should have divergent thinking skills and be able to switch their focus quickly between concepts. The acceptance of complexity, the

consideration of differing value systems across countries and cultures, and the ability to make appropriate decisions within this diverse environment, are all essential for leaders in multinational organisations. There appears to be interdependence between cognition and values (Prinsloo, 2012a), but far more empirical research is needed to investigate the relationship between cognitive functioning and individual value systems (Jokinen, 2004).

RESEARCH DESIGN

In this section, the research approach and research method are outlined and the research participants described. Information about the measuring instruments, the CPP and VO is provided.

Research approach

In this study, an empirical descriptive quantitative research design is employed, in which the correlation between cognition and values was explored. Quantitative data collected from the results of psychometric tests was statistically analysed to determine whether a relationship existed between the constructs they measure.

Research method

The first part of the study consisted of a literature review, in which cognition, cognitive processes, cognitive complexity and value systems were conceptualised. In the literature review an investigation into the theoretical relationship between cognition and values was also included. In the second section of the study, outlined below, empirical research to quantify the relationship between cognition and values in a global leadership team was provided. The research participants, research procedure and statistical analysis will be described in the next section.

Research participants

The population used in the study included chief executive officers, executive vice presidents, vice presidents, chief information officers, chief financial officers, general managers and directors employed within a multinational organisation. The sample consisted of all individuals (N=265) who had completed the CPP and the VO by 30 October 2012 and for whom assessment data was available.

The mean age of the sample was 49.81 years (SD = 7.60) and the majority 243 (91.60%) were male, while 22 (8.40%) were female. In the sample, individuals represented 26 different nationalities, of which the largest proportion (35 participants) was from the United States (13.2%). Participants from other nationalities included Brazil (10.6%), Canada (9.8%), France

(9.4%), India (18.7%), Belgium (5.7%), United Kingdom (4.2%), South Africa (3.0%) and Luxembourg (2.6%), while each of Afghanistan, Albania, Antigua and Barbuda, Argentina, Austria, Australia, Italy, Kazakhstan, Mexico, the Netherlands, Poland, Romania and the Ukraine represented less than 2% of the sample group. Fifty seven (21.5%) participants did not indicate their nationality when completing the assessments.

Almost half the group (118 participants / 44.5%) indicated that English was their preferred language, while 19.6% of the sample specified that French was their language of choice and 10.2% of the group indicated Portuguese as their preferred language. The rest of the group was split among 27 additional languages.

From an ethnicity perspective, 123 (46.4%) participants indicated that they were white Europeans, 57 (21.6%) were of Afro-Caribbean ethnicity, 28 (10.6%) were of Indian descent and 22 (8.3%) indicated they were of Outro ethnicity. The remainder of the group was split between being of Black African, Middle Eastern and Pakistani ethnicities, or they did not specify their ethnicity.

Of the sample group, 64 (24.2%) indicated they had 10 – 12 years of schooling, 19 (7.2%) indicated that a diploma or certificate was their highest qualification, 45 (17.0%) had a university degree, 128 (48.3%) had a postgraduate qualification or were in possession of multiple degrees, while 7 (2.6%) had a doctorate degree. One person did not indicate his/her level of qualification.

Measuring instruments

The independent variable, values, was measured by means of the Value Orientations (VO) questionnaire, while data pertaining to the dependent variable, cognition, was collected by means of the Cognitive Process Profile (CPP).

Cognitive Process Profile (CPP)

The CPP is designed to provide an indication of an individual's cognitive processes, cognitive styles and the individual's current and potential level of work. It further provides an indication of a person's potential to develop particular thinking processes and to develop the ability to deal with complex and unstructured problems (Prinsloo, 2005).

The CPP is a self-administered, computer-based assessment that measures the respondents' cognitive styles, cognitive processes and their ability to manage complexity when solving problems. Cognitive styles reflect the stylistic approaches/response tendencies

that are applied in new and different situations. The CPP differentiates between fifteen cognitive styles (Prinsloo & Prinsloo, 2011). Cognitive processes are defined as the processes used by the respondent to manage task material.

The CPP takes the form of a simulation exercise which has been developed to lower test bias, and enhance fairness in application in cross-cultural environments. A study conducted on a group of 752 professionals from an accounting environment found no significant differences between ethnic race groups regarding the Level of Work preferences and capabilities as measured by the CPP (Prinsloo, 2007). Similarly, no studies comparing the results of individuals from different language groups found significant differences in their performance (Prinsloo, 2007).

The CPP divides problem solving into six broad thinking processes, which are, in turn, broken down into functional categories, as summarised below (Prinsloo & Prinsloo, 2011).

Exploration entails the investigation of situations with the purpose of identifying relevant information for further processing. The functions associated with this process include:

- pragmatic - discriminating between relevant and irrelevant information (relevance); and
- exploration - strategies for exploration and depth of investigation (focus).

Linking / analysis involves breaking up information into constituent parts, which are then compared, associations drawn between them and relationships identified. The main subcomponent functions are:

- analytical - clarification by means of interpreting, evaluating and prioritising information, precise and systematic orientation, need for precision; and
- Rule orientated - the application of a detailed, rule orientation, monitoring linking behaviour.

Structuring entails ordering of information, categorised and integrated to make sense and create meaning. The individual moves beyond establishing mere relationships among elements by “putting together” meaningful wholes. Major subcomponents include:

- integration - integration and big picture view;
- categorisation - creating external order, categories and reminders, structuring tangibles; and
- complexity - strategies to manage complexity.

Transformation consists of changing and purposefully applying information structures, adapting and contextualising. It encompasses both logical and lateral thinking processes. The major subcomponents include:

- logical reasoning - following through, looking for logical evidence, monitoring of reasoning processes; and
- verbal abstraction - verbal and abstract conceptualisation skills, including lateral, creative thinking processes used when information structures need to be changed, restructured or adjusted to meet the requirements of the particular context in which they are needed.

Memory involves storing and retrieving information. The main subcomponent functions are:

- use of memory - retention and recall; and
- effectiveness of memory - degree of memory use and the use of memory strategies.

Metacognition is the crux of effective thinking. It deals with self-awareness, self-monitoring, self-evaluation, the planning of strategies, learning from feedback and mistakes, capitalising on subconscious hunches and insights / intuition. The main subcomponent functions include:

- judgement - using judgement to clarify unstructured or vague information, use of intuition, awareness of own reasoning processes;
- learning 1: quick insight learning, flexibility; and
- learning 2: gradual improvement / experiential learning, using memory strategies.

The ability to manage complexity is measured according to levels of work, which is based on the Stratified Systems Theory put forward by Jaques (in Prinsloo & Prinsloo, 2011). Complexity is measured according to the number of elements, the level of abstraction and the degree of interaction between the components with which the respondent is able to work when solving problems (Prinsloo & Prinsloo, 2011).

The seven levels of work described by Jaques (1998) are reduced in the CPP to five work environments, including 'purely operational', 'diagnostic accumulation', 'alternative paths/tactical strategy', 'parallel processing' and 'a purely strategic work environment'. These are outlined in Table 3.2. The test developer contended that the definition of the purely strategic work environment in the CPP is sufficient to encompass the three highest levels of work outlined in the Complexity of Work Model (Prinsloo, 2011). The level of work is determined in the CPP by considering the person's stylistic preference and ability to manage complex information.

Table 3.2: Descriptions of the five levels of work (Prinsloo & Prinsloo, 2011, p.50)

	Level 1: Purely operational environment	Level 2: Diagnostic accumulation environment	Level 3: Tactical strategy / alternative paths environment	Level 4: Parallel processing environment	Level 5: Pure strategic environment
Structure	Clear, linear procedures, rules and policies are applied to complete tasks.	Parameters, frameworks and clear boundaries are applied to complete tasks.	Fuzzy, theoretical guidelines are applied to complete tasks.	Future scenarios, hypothesis generation and big picture thinking are applied to complete tasks.	Visions for long-term viability and big picture systems thinking are applied to complete tasks.
Focus	The focus of this environment is on routine, concrete tasks.	The focus of this environment is on a particular person , case, situation or problem,	The focus of this environment is on the whole system and tangible systems.	The focus is on future possibilities outside the paradigm and on intangible systems	The focus is on the macro environment.
Time	The time frame of decisions is from one to three months.	The time frame of decisions is from three months to one year.	The time frame of decisions is from one to three years.	The time frame of decisions is from three to five years.	The time frame of decisions is in excess of five years.
Key capability	Key capabilities relate to sensory orientations, touch, feel and sight.	Key capabilities relate to accumulation of information and understanding needs.	The key capability is to make connections.	The key capabilities are modelling (creating a model of the future) and scenario planning.	The key capability is weaving.
Processes, operations performed	Individuals typically approach tasks in a reactive, step-by-step manner by overcoming one obstacle at a time.	Individuals typically approach tasks by analysing and generating solutions, customising to needs, troubleshooting, and predicting problems.	Individuals typically approach tasks by understanding and implementing strategies. They arrive at effective, efficient outcomes through refining processes, restructuring, considering tangible variables and make continuous improvement. They apply best practice and	Individuals approach tasks by translating broad strategy, aligning the current system with future possibilities and working across silos.	Individuals approach tasks by considering long-term viability across macro contexts and considering the interplay of dynamics within / across macro contexts.

			benchmarking processes, and they evaluate and implement systems.		
Excellence	Accuracy, precision, quality and minimising costs / waste are important in this environment.	Pre-empting potential obstacles and service orientation are important in this environment.	Optimising systems, continuous improvement and system efficiency are important in this environment.	The ability to see underlying patterns and dynamics, to suspend knowledge and be open to possibilities, and integrating broad strategies are important in this environment.	Awareness of emerging patterns, industry strategy and macro-economic environments are important in this environment.
Output	Outputs can be completely specified.	Outputs cannot be precisely specified e.g. problem-free functioning.	Outputs relate to understanding the strategy and making it work through the use of tactical strategies, budgets and work plans.	Outputs relate to aligning current systems with future possibilities and developing the business strategy.	Outputs relate to adapting to different macro-systems / environments, such as identifying new industries or integrating existing industries.

The CPP also assesses aspects of potential for future development and growth by providing instructions and feedback while completing the assessment (Prinsloo, 2005). The CPP monitors, at a very detailed level, approximately 10,000 cognitive processes that people apply as they work through eight exercises. During these exercises, test takers have to interpret stories written in symbols. They receive clues on how to interpret the stories and what each symbol means. When interpreting each story, respondents receive instructions including both relevant and irrelevant information (Prinsloo & Prinsloo, 2011). The manner in which test takers manage, sort and make sense of different types of information that they receive is monitored and recorded by tracking the movements they make with the computer's mouse, while they organise the information that they receive (Nzama, De Beer & Visser, 2008). This data is then analysed according to a large number of algorithms to identify trends and tendencies in terms of test takers' cognitive functioning.

More than 12,000 individuals, distributed relatively equally across a number of biographical variables, such as age, race, gender, education, discipline and level of experience, have completed the CPP, and its norm groups are based on this sample (Prinsloo, 2005). The CPP measures peoples' learning and the ability to solve unfamiliar problems. Since it

measures an individual's learning curve, it is not possible to determine internal consistency, as the nature and level of complexity of the questions change over the course of the assessment. The test-retest measure of reliability is also not suitable for this measure, as it aims to measure the ability to deal with the unfamiliar. This means that the test taker does not have the same experience when completing the test for the second time. As consistency is the only way to measure reliability, the construct validity of the test has been used to determine whether the test is acceptable in terms of error rate (Prinsloo & Prinsloo, 2011).

The theoretical model of thinking processes developed by Prinsloo (1992) forms the basis of the CPP. This model has been tested using a multi-trait-multi-method research design and involved the measurement of six categories of thinking processes by means of three types of tests. Linear structured equation modelling was used to assess the construct validity statically – including both convergent and discriminant validity of the constructs. Performance processes, focusing on task material, that met the validity requirements include: focusing and selecting (exploration); linking (analysis); structuring (categorisation and integration); transformation (logical and lateral reasoning); retention and recall, and metacognitive processes (self-awareness or focusing on own thinking processes) (Van Heerden, 2005; Prinsloo, 2013). The results of a confirmatory factor analysis of CPP processing competencies are detailed in Table 3.3.

Table 3.3: Confirmatory Factor Analysis of CPP processing competencies (n = 30,000) (Prinsloo, 2013)

Processing constructs	CFI	TLI	SRMR
Exploration / Focusing and selecting	0.897	0.871	0.042
Analysis / Linking	0.817	0.765	0.070
Structuring and Integration	0.901	0.851	0.058
Transformation / Logical and lateral reasoning	0.961	0.949	0.045
Memory	0.961	0.953	0.040

The concurrent validity of the CPP was investigated by correlating CPP results with those of other cognitive measures, including the WAIS and the CPA. In a study correlating the CPP results with the WAIS scores of 100 working adults in the corporate sector, using Spearman's rho statistical analysis, significant correlations between 0.59 and 0.69 ($p<0.01$) were found between the relevant CPP constructs and the WAIS Verbal IQ scores, while correlations ranging from 0.52 and 0.64 ($p<0.01$) were found between the CPP constructs and the WAIS Total IQ scores (Prinsloo, 2011).

Furthermore, using Spearman's rho statistical analysis, it was evident that the cognitive styles measured by the CPA and the CPP also correlated significantly ($r = 0.45$, $p < 0.001$) in a study of 83 corporate employees. In a different study where the sample consisted of 268 participants from the corporate environment, significant relationships at the 0.001 level were found between the current levels of work and processing constructs as measured by the CPP and the CPA (Prinsloo, 2011).

All in all, the CPP has been normed and validated on a large, diverse sample of individuals.

Value Orientations (VO)

Prinsloo and Prinsloo (in Prinsloo & Prinsloo, 2012) developed the VO to measure the impact of value systems on the way that individuals utilise their capability and personality. The VO is a computerised questionnaire based on the work of a number of consciousness theorists, including those of Clare Graves, Don Beck, Christopher Cowan, Mary May, Ken Wilber and Caroline Myss (Prinsloo & Prinsloo, 2012).

The VO results reflect individuals' value systems, their assumptions about life and how they establish priorities (Prinsloo & Prinsloo, 2012). The valuing systems represent what Prinsloo and Prinsloo (2012; p.1) termed "core intelligences" that influence behaviour and the decision-making processes when making life choices. Prinsloo and Prinsloo (2012) argued that these value systems also serve as a structure for thinking and decision-making and provide a mechanism to assist individuals to organise their thinking and approach to adapting to the world around them.

Eight value systems are identified in the theory of Spiral Dynamics. The first value system, beige, is related to survival and subsistence. The VO was designed for the work environment and therefore the test developer did not include this level in the VO (Prinsloo & Prinsloo, 2012). Seven broad valuing systems assessed by the VO are identified (see Table 3.4), which, combined in different ways, reflect an individual's unique value system. The specific orientation is then translated into scenarios in terms of possible outcomes with regard to worldview, behaviour, emotional manifestations, functioning in the organisational context and implications for leadership.

The VO measures the individual's *preferred* value system, as well as identifying those valuing systems *rejected* by the individual. This means that the VO provides information not only about the value systems accepted by the person, but also about the value systems they may find unacceptable (Prinsloo & Prinsloo, 2012). Furthermore, the VO allows for

individuals to both accept and reject certain value systems (wholly, or partially). Therefore it is possible for an individual to subscribe to conflicting views within one value system (Prinsloo & Prinsloo, 2012). In Table 3.4 descriptions are provided for accepting and rejecting each value system, as well as for its simultaneous acceptance and rejection.

Table 3.4: The VO constructs (Prinsloo & Prinsloo, 2012, p.18)

Value Orientations	Acceptance	Rejection	Conflict (simultaneous acceptance and rejection)
PURPLE (safety)	When accepting the purple value system, individuals value group belonging, find safety and security in the familiar, tend to be attached to traditions/customs and typically adopt the "us-versus-them" orientation.	When rejecting the purple value system, individuals question the tendency to be too reliant on in-groups, are not usually concerned with the preservation of traditions/customs and are often sceptical of the "us-versus-them" mentality.	When simultaneously accepting and rejecting the purple value systems, individuals value group belonging but are not dependent on group support. They typically value traditions/customs but will not necessarily resist change and may reject an "us-versus-them" mentality in others.
RED (power)	When accepting the red value system, energy, forcefulness, ego-centricity and impulsivity are often prevalent. Individuals want to be recognised and respected.	When rejecting the red value system, individuals typically reject a forceful, impulsive and dominant approach and do not see life as battle to secure their own share. Individuals often question self-centred behaviour.	When simultaneously accepting and rejecting the red value system, individuals can be forceful and dominant, but mindful of the possible negative consequences of self-centred behaviour. They may try to limit the tendency to react emotively to situations and will dislike being subjected to powerful others.
BLUE (truth)	When accepting the blue value system, individuals are typically controlled, value order and discipline and are dutiful and diligent. They usually want to do the "right" thing and will value an ultimate truth.	When rejecting the blue value system, individuals are inclined to reject the overemphasis on conformity, order, discipline and authority, and will guard against absolutist and judgmental inclinations.	When simultaneously accepting and rejecting the blue value system, individuals may adhere to the internalised code of conduct while rejecting externally imposed rules and regulations.
ORANGE (prosperity)	When accepting the orange value system, individuals are often achievement/ performance orientated and self-reliant. They usually value success and "the good life", work with perceptions and feel	When rejecting the orange value system, individuals often reject an over-emphasis on personal achievement, status symbols, competition and material wealth. They may find the quest for "the good life"	When simultaneously accepting and rejecting the orange value system, individuals are not indifferent to the lure of personal achievement and "the good life", but will be careful not to

	motivated by challenge and opportunity. They usually take calculated risks.	superficial and dislike manipulation.	see these values as ends in themselves. They will recognise the importance of perceptions, but will usually avoid manipulative behaviour.
GREEN (communitarian)	When accepting the green value system individuals are often humanistic, energised by interpersonal relationships, sensitive and compassionate. They are often philosophical, relativist, open-minded and idealistic.	When rejecting the green value system, individuals often question an over-emphasis on the human factor and are not energised by interpersonal relationships. They are not usually motivated by charitable endeavours, and are not gullible or over-accepting.	When simultaneously accepting and rejecting the green value system, individuals usually value interpersonal interaction, but their decisions are not determined by it. They are often people-orientated, but mindful of overly idealistic views on humanity.
YELLOW (systematic)	When accepting the yellow value system, individuals are typically individualistic, have an intellectual perspective and are often emotionally detached. They often have the capacity to deal with unstructured situations, apply systems thinking and focus on practical utility.	When rejecting the yellow value system, individuals are not particularly learning-orientated or comfortable with disorder and unstructured situations. They are not particularly individualistic or inclined to take a detached, intellectual stance.	When simultaneously accepting and rejecting the yellow value system, individuals may be intellectually capable of dealing with disorder and diversity, but they have an emotional need for structure. They can be emotionally detached, but may prefer a more emotionally involved approach.
TURQUOISE (holistic)	When accepting the turquoise value system, individuals are self-transcendent, reflective and holistic thinkers. They are often spiritual, guided by a higher consciousness and focus on experiencing life.	When rejecting the turquoise value system, individuals reject an essentially spiritual and abstract approach to life. They are not inclined to adopt a philosophical-existential view on reality and are not interested in the meta physical realm.	When simultaneously accepting and rejecting the turquoise value system, individuals may be collectively inclined, but they question a too abstract take on reality. They may experience difficulties with self-transcendence.

Reliability of a psychometric test refers to its freedom from unsystematic errors of measurement (Cascio & Agnuinis, 2011). Standardised personality tests should have a reliability of 0.80 to be considered reliable (Smit, 1996). In a sample of 914 respondents, Cronbach Alpha reliability coefficients ranging from 0.71 to 0.85 were found for the constructs measured by the VO. The sample group represented genders, all age groups, ethnic groups, career fields and educational levels (Prinsloo & Prinsloo, 2012).

The validity of a measure concerns what the test measures and how well the test does this (Roodt, 2009). The validity of an assessment should be statistically significant, ranging between the 0.05 and 0.01 levels to be considered a valid measure (Smit, 1996), and validity coefficients of 0.30 are acceptable (Roodt, 2009).

The validity of the VO was investigated by comparing it to the Motivational Profile in a sample group of 213 individuals, who were primarily males in managerial roles. Statistically significant correlations (ranging between 0.39 and 0.46) were found between relevant constructs between the 0.05 and 0.001 levels of confidence (Prinsloo & Prinsloo, 2012).

Furthermore, in a study of 73 corporate employees, including both genders, a wide range of age groups, career fields and industries, statistically significant relationships (between 0.05 and 0.001 levels of confidence) were found between VO constructs and those measured by the MBTI. Relevant Pearson Correlations ranged between 0.36 and 0.46 on the constructs where significant relationships were expected to be found. In the same study, significant relationships were also found between VO measures and relevant Belbin Team roles. Significant Pearson Correlations ranged between 0.26 and 0.42 (Prinsloo & Prinsloo, 2012).

Research procedure

Cognitive data was gathered by means of the CPP and values data was collected using the VO. Both these assessment tools are available electronically and were administered by trained HR professionals in the organisation. Due to the varied geographic locations of the organisation's multinational offices, respondents completed the assessments individually. Magellan Consulting, the test developer, analysed the data and developed standardised reports for each individual. These reports were made available to the researcher.

Statistical analysis

The data in the study was analysed using the Statistical Package for Social Sciences (SPSS version 20, 2012). Firstly, the respondents were described according to age, gender, ethnicity, educational level, nationality and preferred language. Secondly, descriptive statistics for each construct measured in both the VO and the CPP were calculated, including the mean, standard deviation, as well as the minimum and maximum scores. The Cronbach Alphas were calculated for each construct measured in the VO. The Cronbach Alpha was then calculated for each broad thinking process (each of which consisted of two or three functional categories or variables) measured in the CPP.

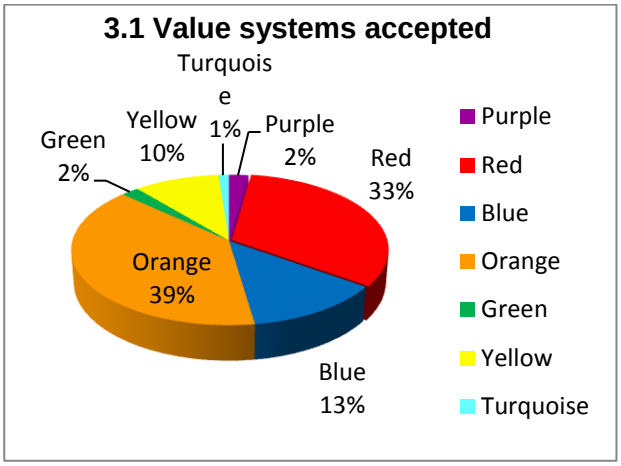
The third analysis consisted of identifying the frequency distributions of the value systems accepted and rejected by the group as measured by the VO, as well as the respondents' current and potential levels of work as measured by the CPP. Fourthly, Pearson Correlation Coefficients were calculated for each value system construct, as measured by the VO, and the current and potential levels of work, as measured by the CPP. Finally, Pearson

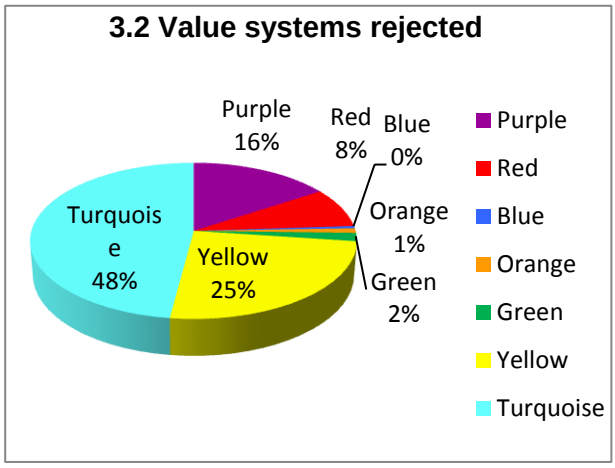
Correlation Coefficients were calculated for each value system construct, as measured by the VO, and cognitive processes, as measured by the CPP.

RESULTS

The first step in the analyses involved the computation of descriptive statistics for the sample group. From a values perspective, the group as a whole seemed to accept orange and/or red, while the majority of the group rejected either turquoise or yellow. Interestingly, nearly half (43.92%) of the group accepted both red and orange value systems, indicating the homogenous nature of the group from a value systems perspective.

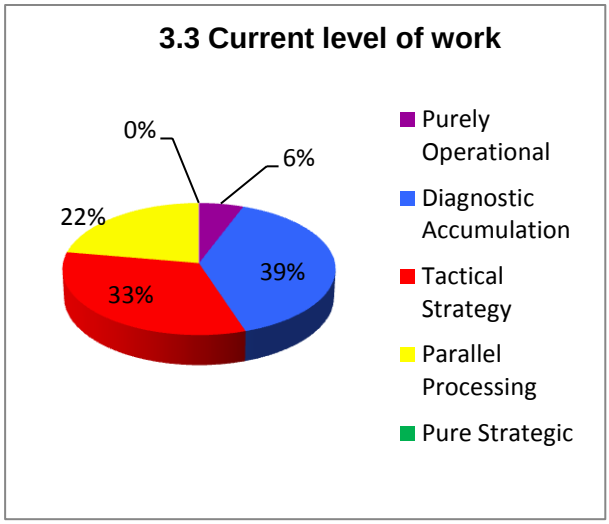
Figures 3.1 and 3.2: representation of percentages of the sample groups accepting and rejecting various value systems (N = 265)





In terms of the cognitive profile, 72% of the group were best suited to either a diagnostic accumulation or tactical strategy level of work, and 76% of the group demonstrated the potential to work within tactical strategy or parallel processing work environments.

Figures 3.3 and 3.4: representation of percentages of the sample group's current and potential levels of work (N = 265)



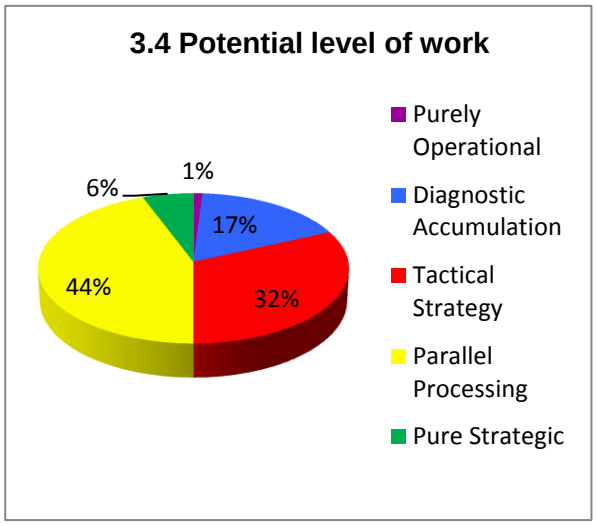


Table 3.5 outlines the descriptive statistics for the cognitive and value systems variables. This includes the mean, standard deviation, minimum and maximum scores, as well as the Cronbach Alpha for the values systems constructs.

Table 3.5 Average level of work per value system (N = 265)

Value Systems	Average current level of work	Average potential level of work
Purple Accept	2.46	3.23
Purple Reject	2.89	3.53
Red Accept	2.76	3.43
Red Reject	2.62	3.32
Blue Accept	2.38	3.03
Blue Reject	3.50	4.50
Orange Accept	2.72	3.37
Orange Reject	1.75	2.50
Green Accept	2.75	3.42
Green Reject	3.00	4.00
Yellow Accept	2.74	3.44
Yellow Reject	2.60	3.23
Turquoise Accept	2.71	3.14
Turquoise Reject	2.83	3.48

In Table 3.5, the average current and potential levels of work are shown for each value system. As is evident from the table, people in the sample group rejecting orange as a value system and those accepting blue as a value system appear to have the lowest average current and potential levels of work. Respondents rejecting a blue value system and

individuals rejecting a green value system present the highest average current and potential levels of work.

Table 3.6: Descriptive statistics

Variables						
Cognition	**N**	**Mean (M)**	**Standard Deviation (SD)**	**Minimum**	**Maximum**	
Pragmatism	265	46.6	13.0	15	80	
Exploration	265	52.8	14.9	22	80	
Analysis	265	48.8	27.5	0	96	
Rule Orientation	265	50.1	15.3	16	89	
Categorisation	265	51.1	12.7	13	77	
Integration	265	44.3	11.7	23	65	
Complexity	265	48.8	17.7	20	81	
Logical Reasoning	265	47.8	25.4	3	92	
Verbal Abstraction	265	35.1	14.7	11	58	
Use of Memory	265	55.0	12.5	27	93	
Memory Strategies	265	49.6	15.7	21	82	
Judgement	265	48.0	21.6	13	84	
Quick Insight Learning (Learning 1)	265	57.6	13.7	34	86	
Gradual Improvement / Experiential Learning (Learning 2)	265	48.7	15.7	16	78	
Value Systems	**N**	**Mean (M)**	**Standard Deviation (SD)**	**Minimum**	**Maximum**	**Cronbach Alpha**
Purple Accept	265	-14.8	19.8	-63	34	0.76
Purple Reject	265	-0.8	19.5	-44	38	0.72
Red Accept	265	31.4	22.1	-21	71	0.83
Red Reject	265	-11.3	34.9	-79	81	0.73
Blue Accept	265	12.7	19.8	-43	48	0.80
Blue Reject	265	-37.0	21.7	-88	20	0.70
Orange Accept	265	33.2	23.8	-36	73	0.80
Orange Reject	265	-20.3	28.9	-72	76	0.73
Green Accept	265	-18.1	19.7	-18	23	0.82
Green Reject	265	-13.7	27.0	-74	42	0.67
Yellow Accept	265	5.1	23.5	-59	68	0.80
Yellow Reject	265	22.9	25.1	-47	95	0.72
Turquoise Accept	265	-30.0	22.6	-78	32	0.80
Turquoise Reject	265	27.7	21.3	-27	68	0.63

As indicated previously, the CPP measures an individual's learning curve and, as the nature and complexity of the questions change over the course of the assessment, determining internal consistency is difficult (Prinsloo, 2007). The CPP divides problem solving into six broad processing dimensions, which are, in turn, broken down into functional categories (Prinsloo & Prinsloo, 2011). The Cronbach Alpha determining the degree of consistency between the scores of each functional category within the processing dimension is presented in Table 3.7.

Table 3.7: CPP Internal Consistency

Processing Dimensions	Cronbach Alpha
Exploration	0.767
Analysis / Linking	0.838
Structuring	0.822
Transformation / Logical and Lateral Reasoning	0.853
Memory	0.653
Metacognition	0.933

The SPSS data analysis package was used to compute the Pearson Correlation coefficient. The results are provided in Tables 3.8 and 3.9.

Table 3.8: **Correlation statistics between value systems and levels of work (N = 265)**

Value systems		Current level of work	Potential level of work
Purple Accept	Pearson Correlation (r)	-.067	-.040
	p-value	.498	.666
Purple Reject	Pearson Correlation (r)	.158	.063
	p-value	****.027**	.497
Red Accept	Pearson Correlation (r)	.121	.127
	p-value	.096	.081
Red Reject	Pearson Correlation (r)	.020	.049
	p-value	.828	.597
Blue Accept	Pearson Correlation (r)	-.217	-.247
	p-value	****.019**	****.007**
Blue Reject	Pearson Correlation (r)	.183	.184
	p-value	****.006**	****.007**
Orange Accept	Pearson Correlation (r)	.030	.001
	p-value	.746	.891
Orange Reject	Pearson Correlation (r)	-.229	-.195
	p-value	****.002**	****.003**
Green Accept	Pearson Correlation (r)	.144	.197
	p-value	.119	****.033**
Green Reject	Pearson Correlation (r)	-.022	-.057
	p-value	.813	.541
Yellow Accept	Pearson Correlation (r)	.253	.198
	p-value	****.007**	****.035**
Yellow Reject	Pearson Correlation (r)	-.249	-.239
	p-value	****.008**	****.007**
Turquoise Accept	Pearson Correlation (r)	-.144	-.174
	p-value	****.048**	****.025**
Turquoise Reject	Pearson Correlation (r)	-.080	-.092
	p-value	.387	.321

** Significant relationship with level of work with 95% level of confidence (p<0.05)

The value systems that showed the strongest relationship to participants' level of work were the blue and yellow systems. Participants who accepted a yellow value system were found to have a significantly positive relationship with both current ($r = 0.253$; $p = 0.007$) and potential ($r = 0.198$; $p = 0.035$) levels of work. Individuals rejecting a yellow value system were found to have a negative relationship with both current ($r = -0.249$; $p = 0.008$) and potential ($r = -0.239$; $p = 0.007$) levels of work. Conversely, a negative correlation was found between the blue (accept) value system and both the current ($r = -0.217$; $p = 0.019$) and potential ($r = -0.247$; $p = 0.007$) levels of work, and a positive relationship was evident between the blue (reject) value system and both current ($r = 0.183$; $p = 0.006$) and potential ($r = 0.184$; $p = 0.007$) levels of work. Leedy and Ormrod (2010) suggest that correlation coefficients less than 0.4 are real, but relatively weak, and Goodwin and Leech (2006) indicate in some instances a coefficient of 0.3 or even 0.2 could be acceptable. Therefore, statistically significant relationships have been found, but these can be described as weak.

There was no statistically significant relationship between the orange (accept) value system and levels of work, while a significant negative correlation was found between the orange (reject) values and both current ($r = -0.229$; $p = 0.002$) and potential ($r = -0.195$; $p = 0.003$) levels of work. Furthermore, the only statistically significant correlation found in the purple value system is a positive relationship between purple (reject) values and the current level of work ($r = 0.158$; $p = 0.027$).

Surprisingly, statistically significant negative correlations were identified between accepting turquoise values and both current ($r = -0.144$; $p = 0.048$) and potential ($r = -0.174$; $p = 0.025$) levels of work. However, considering only 1% of the group accepted the turquoise value system, this does not seem to represent a practically significant finding.

Although no significant relationships were determined between green (reject) value systems, a significant correlation was found between green (accept) and potential level of work ($r = 0.197$; $p = 0.033$).

No significant correlations were found between red value systems and respondents' levels of work. This applied to both the acceptance and rejection of these value systems, as well as for both current and potential levels of work.

Table 3.9 Correlation statistics value systems and cognitive processes (N = 265)

Value systems		Pragmatic	Exploration	Analytical	Rule Orientated	Categorisation	Integration	Complexity	Logical Reasoning	Verbal Abstraction	Use of Memory	Memory strategies	Judgement	Learning 1	Learning 2
Purple accept	Pearson Correlation (r)	-.018	-.098	-.123	-.030	.005	-.179	-.137	-.118	-.105	.109	-.002	-.111	-.060	-.180
	p-value	.849	.291	.185	.750	.955	***.019**	***.048**	.204	.258	.241	.979	.230	.519	.051
Purple reject	Pearson Correlation (r)	.137	.101	.061	.100	.042	.193	.068	.104	.183	-.061	.106	.065	.091	.109
	p-value	.139	.279	.511	.280	.651	***.003**	.466	.261	***.009**	.511	.252	.482	.328	.240
Red accept	Pearson Correlation (r)	.044	.022	.010	.035	.101	.092	-.005	.029	.117	.039	.043	.018	.027	.026
	p-value	.639	.814	.917	.705	.276	.324	.956	.754	.206	.677	.646	.846	.774	.779
Red reject	Pearson Correlation (r)	-.020	.040	.070	.041	-.026	-.030	.053	.045	-.024	.032	-.049	.036	.021	.044
	p-value	.826	.670	.448	.659	.780	.747	.572	.629	.800	.732	.598	.700	.823	.638
Blue accept	Pearson Correlation (r)	-.260	-.281	-.213	-.270	-.184	-.204	-.222	-.197	-.151	-.201	-.237	-.208	-.241	-.152
	p-value	***.005**	***.002**	***.021**	***.003**	***.046**	***.027**	***.016**	***.032**	***.028**	***.003**	***.010**	***.024**	***.009**	.099
Blue reject	Pearson Correlation (r)	.149	.156	.143	.165	-.008	.235	.193	.117	.184	.120	.154	.157	.198	.172
	p-value	***.028**	***.023**	***.033**	***.018**	.902	***.001**	***.004**	.207	***.005**	.071	***.021**	***.022**	***.004**	.063
Orange accept	Pearson Correlation (r)	.138	.078	.053	.106	.066	.174	.051	.083	.100	-.124	.107	.075	.144	.060
	p-value	.137	.403	.568	.253	.478	***.019**	.580	.370	.280	.180	.250	.417	***.038**	.518
Orange reject	Pearson Correlation (r)	-.159	-.145	-.143	-.153	-.131	-.268	-.163	-.139	-.242	-.122	-.196	-.128	-.178	-.019
	p-value	***.028**	***.029**	.063	***.042**	.158	***.001**	***.021**	.059	***.003**	.090	***.016**	.079	***.009**	.786
Green accept	Pearson Correlation (r)	.049	.158	.166	.172	.082	.116	.205	.211	.166	.126	.089	.189	.180	.186
	p-value	.108	.087	.073	.063	.375	.213	***.026**	***.022**	.073	.174	.338	***.040**	.052	***.044**
Green reject	Pearson Correlation (r)	-.045	-.080	-.077	-.043	.061	-.032	-.073	-.036	.002	.027	-.010	-.058	-.038	-.088
	p-value	.630	.390	.410	.645	.514	.734	.430	.698	.986	.768	.917	.534	.687	.342
Yellow accept	Pearson Correlation (r)	.231	.271	.235	.261	.159	.219	.216	.222	.192	.121	.211	.207	.213	.194
	p-value	***.012**	***.003**	***.012**	***.004**	.085	***.017**	***.019**	***.016**	***.038**	.069	***.022**	***.025**	***.021**	***.035**
Yellow reject	Pearson Correlation (r)	-.175	-.295	-.274	-.292	-.168	-.294	-.245	-.257	-.272	-.065	-.262	-.247	-.248	-.278
	p-value	.058	***.001**	***.003**	***.001**	.070	***.001**	***.007**	***.005**	***.003**	.487	***.004**	***.007**	***.007**	***.002**
Turquoise accept	Pearson Correlation (r)	-.210	-.158	-.114	-.162	-.190	-.231	-.141	-.157	-.209	-.139	-.222	-.153	-.205	-.110
	p-value	***.022**	.088	.219	.081	***.039**	***.012**	***.042**	.090	***.023**	***.048**	***.159**	.099	***.026**	.234
Turquoise reject	Pearson Correlation (r)	.022	-.085	-.101	-.087	-.016	-.044	-.109	-.071	-.012	-.057	-.057	-.76	-.081	-.073
	p-value	.812	.362	.277	.350	.861	.634	.241	.443	.894	.537	.537	.411	.381	.433

* Significant relationship with level of work with 95% level of confidence (p<0.05)

The correlation between value systems and cognitive processes showed a range of statistically significant findings. Even though approximately a third of the group seemed to accept red as a value system, no statistically significant relationship was found between the red value systems, and any of the twelve cognitive processing competencies. A few statistically significant correlations were found between the green and purple value systems

and the various cognitive processing competencies. However, preferences for the green and purple value systems were not particularly apparent in the group.

Only a few statistically significant correlations were found between the cognitive processing competencies of categorisation, use of memory and learning 2/gradual improvement learning and the value systems measured as by means of the VO. This suggests that the cognitive processing competencies relating to creating external order (categorisation), retention and recall of information (use of memory) and gradual improvement/experiential learning (learning 2) do not have significant relationships with a person's value system.

However, integration and complexity seemed to correlate significantly with various value systems. Integration and complexity, as cognitive processing competencies, relate to the structuring of information when making sense of and creating meaning from unfamiliar information. Integration, dealing specifically with developing a big picture view of problems, related significantly to purple (accept and reject), blue (accept and reject), orange (accept and reject), yellow (accept and reject) and turquoise (reject). The only value systems with which integration did not correlate significantly were red (accept and reject), green (accept and reject) and turquoise (reject). Complexity, relating to developing strategies to deal effectively with complex information, was found to correlate significantly to purple (accept), blue (accept and reject), orange (reject), green (accept), yellow (accept and reject) and turquoise (accept). This finding suggests that the processing competencies relating to making sense of complexity and creating meaning from different sources of information, has a significant relationship with value systems

Furthermore, factors relating to the red value system (accept and reject), green (reject) and turquoise (reject) did not show a statistically significant correlation with any cognitive processing competencies. Limited significant relationships were found between purple (accept and reject), orange (accept) and green (accept) value systems and cognitive processing competencies.

Nevertheless, there were statistically significant relationships between many of the cognitive processing competencies and the yellow and blue value systems. When participants accepted yellow as a value, significant correlations were found with twelve of the fourteen cognitive processing competencies, namely pragmatic ($r = 0.231$; $p = 0.012$), exploration ($r = 0.271$; $p = 0.003$), analytical ($r = 0.235$; $p = 0.012$), rule orientation ($r = 0.261$; $p = 0.004$), integration ($r = 0.219$; $p = 0.017$), complexity ($r = 0.216$; $p = 0.019$), logical reasoning ($r = 0.222$; $p = 0.016$), verbal abstraction ($r = 0.192$; $p = 0.038$), memory strategies ($r = 0.211$; $p =$

0.022), judgement (r = 0.207; p = 0.025), learning 1/quick insight learning (r = 0.213; p = 0.021), and learning 2/gradual improvement learning (r = 0.194; p = 0.035).

Although the above relationships are not particularly strong (the Pearson correlation ranges between 0.192 and 0.271), they are nevertheless statistically significant. From a practical perspective, the relationship between the variables, however, is weak and difficult to define. The only cognitive processing competencies that did not show a significant relationship to accepting the yellow value system were categorisation and the use of memory.

Furthermore, participants rejecting yellow as a value system were found to have statistically significantly negative correlations with eleven of the fourteen cognitive processing competencies. These include exploration (r = -0.295; p = 0.001), analytical (r = -0.274; p = 0.003), rule orientation (r = -0.292; p = 0.001), integration (r = -0.294; p = 0.001), complexity (r = -0.245; p = 0.007), logical reasoning (r = -0.257; p = 0.005), verbal abstraction (r = -0.272; p = 0.003), memory strategies (r = -0.262; p = 0.004), judgement (r = -0.247; p = 007), learning 1/quick insight learning (r = -0.248; p = 0.007), and learning 2/gradual improvement learning (r = -0.278; p = 0.002).

Accepting or rejecting blue as a value system appears to have a statistically significant relationship with many of the cognitive processing competencies. When participants accepted blue as a value system, all the cognitive processing competencies had a statistically significant correlation. The only exception was for learning 2/gradual improvement learning. Blue as a value system was found to have statistically significant correlations with the largest number of cognitive processing competencies measured in this study. However, the statistically significant relationships found between blue (accept) and these cognitive processing competencies correlation coefficients ranged between 0.151 and 0.281, which indicates fairly weak correlations at a 95% level of confidence.

The scores related to blue (reject) as a value were found to correlate significantly with ten of the fourteen cognitive processing competencies measured. All cognitive processing competencies were found to have a statistically significant positive correlation with blue (reject), except for categorisation, logical reasoning, use of memory and learning 2 / gradual improvement learning, which were not significantly correlated to blue (reject). The remaining cognitive processing competencies all showed a statistically significant, yet weak, correlation with blue (reject), with p-values ranging from p = 0.001 to p = 0.033, while r values fluctuated between 0.143 and 0.235.

Eight of the fourteen cognitive processing competencies were found to correlate negatively with orange (reject) at a significant level. Specifically, pragmatic ($r = -0.159$; $p = 0.028$), exploration ($r = -0.145$; $p = 0.029$), rule orientation ($r = -0.153$; $p = 0.042$), integration ($r = -0.268$; $p = 0.001$), complexity ($r = -0.163$; $p = 0.021$), verbal abstraction ($r = -0.242$; $p = 0.003$), memory strategies ($r = -0.196$; $p = 0.016$) and learning 1/quick insight learning ($r = -0.178$; $p = 0.009$), all seemed to be significantly related, although weakly.

Turquoise (accept) was also found to correlate negatively with eight of the fourteen cognitive processing competencies. Once again, these relationships were relatively weak (r ranges between -0.139 and -0.231).

In summary, significant relationships were not established between all the valuing systems measured by the VO and levels of work and cognitive processing competencies measured by the CPP, but many significant, yet weak, relationships were found in this study.

ETHICAL CONSIDERATIONS

In this section, the potential benefits and hazards prevalent in the study are identified, and the process for selecting the sample and the process of obtaining informed consent is described.

Potential benefits and hazards and data protection

No specific physical or psychological hazards were identified during this study. Confidentiality of results was assured, as the researcher did not have access to participants' names. The data was analysed for the group as a whole, rather than at an individual level.

Recruitment procedures

The population used in this study included executives, senior managers, general managers and directors employed within a multinational organisation. They had all completed the CPP and VO as part of a broader assessment battery for the purpose of talent management and succession planning prior to the commencement of the research project.

Informed consent

The VP of Human Resources of the participating organisation provided written consent for the study to be completed and the developer and distributer of the assessment tools used in the study was directly involved in the collection of the data. Individuals completed the assessments in a controlled environment and the process was supervised by trained test

administrators. All respondents agreed to the use of their assessment data for research purposes and had the option to receive personal feedback on their assessment results.

TRUSTWORTHINESS

Matters surrounding the reliability and validity of the study are summarised in this section.

Reliability

The internal validity of a research study indicates the extent to which its design and the data it yields allow the accurate drawing of conclusions about relationships within the data (Leedy & Ormrod, 2010). In this study, assessments were selected that have documented evidence of their reliability and validity.

Validity

The external validity of a research study is the extent to which its results apply to situations beyond the study itself (Leedy & Ormrod, 2010). The findings of this study are only based on data obtained from individuals working at an executive level within a particular mining and steel organisation. It will not be possible to generalise the findings across organisations, organisational levels or industries. However, the sample represents a diverse group in relation to ethnicity, language and nationality, and therefore can contribute to the available knowledge of leadership in a global context.

DISCUSSION

The aim of this study was to explore the relationship between value systems and cognition within a leadership team in a multinational organisation. The results suggest that when individuals accept or reject power as a value system, there is not a significant correlation with any of the leaders' cognitive measures. However, significant relationships were found between cognitive competencies and value systems when accepting or rejecting structure and reliability as a value system, as well as when accepting or rejecting learning and open-mindedness as a value system. Although significant relationships were found between a number of the value systems and the leaders' cognitive measures, it is important to note that, while the majority of the group seemed to accept value systems relating to power and/or prosperity, mixed correlations were found between these value systems and the various cognitive measures. The value of power (represented by the red value system) does not seem to have any relationship to cognitive measures.

An interesting finding relates to the cognitive processes of integration and complexity. Both these cognitive processes showed statistically significant relationships with various value

systems in this study. Both cognitive processes relate to the ordering and making sense of information when solving problems. Integration specifically involves the ability to understand how different types of information fit together to create an understanding of the bigger picture (Prinsloo & Prinsloo, 2011). Integration correlated significantly with all the value systems, except those relating to power (accept and reject), harmonious relationships (accept and reject) and spiritualism and existentialism (reject).

Complexity relates to the strategies that an individual uses to make sense of large amounts of ambiguous, vague and unfamiliar information (Prinsloo & Prinsloo, 2011). Complexity correlated significantly with the value systems relating to safety (accept), structure and reliability (accept and reject), prosperity (reject), harmonious relationships (accept), learning and open-mindedness (accept and reject) and spiritualism and existentialism (accept). This suggests that integration skills and the ability to manage complexity either influence, or are influenced by, value systems to some extent at a leadership level. Although the relationships between many of the variables are weak, they are nonetheless significant. Considering that relationships between these cognitive processes were found with many leaders' value systems, there is a strong case for investigating these relationships in more detail, to better understand the nature and direction of the relationship.

Although a significant relationship was not identified between the value system relating to prosperity (accept) and leaders' levels of work, a significant negative correlation was found between this value system when it is rejected and levels of work. While it seems that when leaders accept prosperity, success and achievement, there is no relationship with levels of work, the results show that there is a connection, even though weak, when this value system is rejected. If they rejected prosperity and achievement, leaders therefore did not demonstrate the cognitive skills required for understanding and developing long-term business strategies and identifying future possibilities in the work environment. In fact, when respondents rejected prosperity as a value system, the average current and potential levels of work were lower than for any other value system.

A negative relationship further was evident between the value system relating to prosperity (reject) and many of the cognitive processes measured. Specifically, the most noticeable of these findings suggest that leaders who reject power as a value system, are less effective in their ability to distinguish between relevant and irrelevant information and apply rules effectively when making sense of unfamiliar information. Furthermore, their ability to see the bigger picture and develop strategies to manage complexity appears less developed. Although these correlations have a statistically weak (negative) relationship between these

cognitive processes and the power (reject) value system, they are nevertheless significant, and further exploration is required to identify the exact nature of these relationships.

Halaby (2003) found that people who were able to manage higher levels of complexity had a stronger preference for jobs with risk and more uncertainty. He maintained that cognition is the most powerful source of variation in job values. In this study, the significant relationships found between value systems relating to structure and reliability, as well as those relating to learning and open-mindedness, and leaders' cognitive skills support this view.

The yellow value system is characterised by learning, systems thinking, embracing transformation and innovative problem solving (Beck & Cowan, 2006; Prinsloo & Prinsloo, 2012). In the current study, a positive correlation was evident between this value system and leaders' ability to manage complexity, effectively analyse and integrate information, apply quick insight learning and the capacity to think in a logical manner. Participants who accepted learning and open-mindedness as a value system showed the capacity to operate at a higher level of work than those who rejected these preferences.

The blue (accept) value system is congruent with placing value on control, reliability, structure and discipline in an environment where security and cautiousness is seen as important (Prinsloo & Prinsloo, 2012). In this study, a negative relationship was found between this value system and leaders' ability to manage complexity, explore, link and integrate information, effectively utilise memory strategies and apply quick insight learning. This suggests that in the absence of adequate structure, order and boundaries in the work environment, leaders who accepted structure and reliability as a value system, became cognitively less effective. In fact, respondents who accepted structure and reliability as a value system obtained one of the lowest average current and potential levels of work in comparison to those achieved by the other value systems. Prinsloo (2012a) has found that people who value structure and reliability are less comfortable with change and uncertainty and frequently respond in an inflexible manner to new challenges. This often negatively influences their overall problem solving performance. Halaby's (2003) contention that people found to have lower levels of cognitive ability, favour bureaucratic values over entrepreneurial ones supports these findings.

Although significant relationships were not found between all the value systems measured and participants' level of work, many statistically significant, but weak, correlations were found in this study. Similarly, Ndiweni (2011) identified a significant relationship between value systems and levels of work in a study consisting of 399 working adults. These findings

suggest that there is indeed a relationship between value systems and levels of work; however, the exact nature and extent of this relationship still needs further clarification.

The value system relating to learning and open-mindedness (both accept and reject) were found to correlate significantly with leaders' levels of work, which is consistent with Ndiweni's (2011) findings. When leaders accepted learning and open-mindedness as a value system, this relationship was found to be positive. This value system is characterised by systems thinking, continuous learning and innovative problem solving (Beck & Cowan, 2006; Prinsloo & Prinsloo, 2012), suggesting that people who subscribe to this value system are better able to work effectively with whole systems, identify future possibilities and understand the macro environment as characterised by higher levels of work. Conversely, when rejecting this value system, a negative relationship was found with participants' levels of work. Although only 10% of the group accepted learning and open-mindedness as a value system, approximately 25% of the group were found to reject it as a value system, suggesting that this finding has some significance. Furthermore, the group of participants who were found to accept learning and open-mindedness as a value system were also found to have average current and potential levels of work higher than those who rejected this value system. As pointed out previously, Halaby (2003) found that cognitive ability was the most powerful source of variation in job values. He suggested that, although more research is required, people with stronger cognitive abilities were more comfortable dealing with uncertainty and innovation. Conversely, people who showed lower levels of cognitive skills did not incorporate these factors into their value systems. This view is supported in this study.

Similarly, both the acceptance and rejection of structure and reliability as value systems were found to correlate significantly with participants' current and potential work environments. Ndiweni (2011) reported corresponding findings. People characterised by a value system focused on structure and reliability typically placed emphasis on accepting direction from those in authority and adhered to rules, regulations and policies (Beck & Cowan, 2006; Prinsloo & Prinsloo, 2012). Approximately 13% of the group accepted this as a value system. When accepting this value system, the relationships with current and potential levels of work were negative, and average current and potential levels of work achieved for this group was lower than for most other value systems. This suggests that these leaders were less effective when dealing with issues of strategy and working with whole systems when directions and rules were more vague, ambiguous and unfamiliar to the individual.

Statistically significant, but weak relationships were also found between the values systems relating to safety (reject), prosperity (reject), harmonious relationships (accept) and

spiritualism and existentialism (accept), and the participants' levels of work. Similarly, Ndiweni (2011) found statistically significant relationships between current levels of work and the value systems relating to safety (accept and reject), structure and reliability (accept and reject), prosperity (accept and reject), as well as learning and open-mindedness (accept and reject). This further supports the view that there is a relationship between cognition and value systems.

Jokinen (2004) maintained that the acceptance of complexity describes an attitude towards ambiguity in unpredictable work environments, rather than a purely cognitive function. The results of this research support this view. Although the lower levels of cognitive variance attributed to values suggest that there may be other variables that influence cognitive functioning, there is sufficient evidence to suggest that there is in fact some relationship between values and cognition.

A primary aim of this research was to determine whether or not a relationship exists between leaders' cognitive skills (based on the level of work and cognitive processing competency measures of the CPP) and their individual value systems (based on the value systems identified using the VO). Statistically significant correlations were found between many of the cognitive measures and value systems suggesting that there indeed is a relationship. In many instances the relationship, however, was weak and the nature of this relationship therefore needs further exploration.

Limitations of the study

This study was limited to a sample of participants. The data was gathered from only one organisation in the mining and steel industry and most participants were employed at the highest organisational levels. The mean age for the sample was 49.81 years, more than 90% of the group was male and almost half the group indicated that they were white Europeans. Furthermore, almost 70% of the sample had at least a university degree in terms of their level of education. Although the sample was fairly diverse across nationalities and language, the homogenous nature of the group in terms of age, gender, education and ethnicity limits the ability to generalise the findings to other relevant groups.

The sample further consisted only of senior managers and executives within a global organisation. Hunt (2011b) maintained that there is a positive relationship between occupational success and cognitive measures. Therefore, leaders in this study probably operate at the highest levels of work and complexity and have largely reached their cognitive potential. This suggests there could be a built-in restriction of range with regards to the

cognitive measures. Zimmerman and Williams (2000) proposed that the correlation between two variables depends on the range of possible values of the measured variables. They maintain that in psychology, restriction of range typically reduces the correlation that exists in an unrestricted population. Although the correlations found appear to be fairly weak, the built-in restriction of range may have restricted these correlations more than would be the case with a more diverse sample.

The research design was exploratory in nature and, as such, it is not possible to draw any conclusions with regards to causation. These findings need to be replicated with more diverse samples across organisational levels, age, gender, ethnicity and levels of education before further conclusions can be drawn.

Furthermore, although there was a wide range of significant relationships, most of these relationships were weak. However, the fact that many correlations were identified and correlated with the findings of Ndiweni (2011) suggests that there is a relationship between levels of work and value systems. In addition, the relationship identified between the yellow and blue value systems and most of the cognitive measures, as well as between the cognitive processes of integration and complexity and many of the value systems measured, suggests that there is a relationship between these variables.

Recommendations for future research

Findings consistently show that there is a statistically significant relationship between cognition and value systems of the leadership team participating in the study, even if the correlations are relatively weak. More research is needed to determine the nature, direction and strength of these relationships.

As pointed out above, the sample group used in this study was fairly homogenous. Future research should incorporate a more diverse group so that findings can be more generalisable. Specifically, it is suggested that future studies include various organisational levels and industries to enhance an understanding of the relationship between cognition and value systems in organisations. A more diverse sample across organisational levels could reduce the built-in effects of the restriction of range that may have resulted from the sample of senior managers and executives who already operate at a high level of work and complexity in this study.

Individual value systems are seen to be a result of both shared culture and unique personal experiences (Schwartz, 1999); serve as a guiding principle in people's lives; and influence

individual goal-setting and prioritising (Watkins, 2010). Schwartz (1999) argued that when values are shared, individuals in social institutions and organisations can draw on these values to select socially appropriate behaviours and often use them to justify their behavioural choices and decisions to others. The influence of organisational culture was not considered in this study. Therefore, it is important to conduct research in different organisations and industries with divergent value systems to obtain a more complete picture of the relationship between value systems and cognition.

CHAPTER SUMMARY

In Chapter 3, the key focus and background of the study was reviewed and trends in the literature review were discussed. The research design, including the research approach, method and study participants, was explained. The results of the empirical study focused on quantifying the relationship between cognitive processes, cognitive complexity and values were provided. Chapter 3 concluded with a discussion of the results, and the limitations of the study, as well as recommendations for future research.

CHAPTER 4: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

In this chapter, conclusions based on the results of the literature review and the empirical study will be presented in relation to the research aims. The limitations of the study will be outlined and recommendations for future research will be highlighted.

4.1 CONCLUSIONS

The conclusions regarding both the literature review and empirical study will now be discussed.

4.1.1 Conclusions regarding the literature review

A detailed literature review was conducted to conceptualise cognition, cognitive processes, cognitive complexity and value systems, and to establish whether any theoretical relationships exist between cognition and value systems. This information was used to support the purpose of the study and the empirical findings.

4.1.1.1 The first aim: Conceptualise cognition, cognitive processes and cognitive complexity

Various definitions of cognition can be found. After reviewing multiple definitions, Van Heerden (2005) suggested that it generally refers to the mental processes of an individual with particular emphasis on the concept that the mind is understood in terms of internal information processing. Necka and Orzechowski (2005) agreed that cognition refers to regular information processing, which is directly responsible for the execution of cognitive tasks. This definition is further supported by Grabowski and Jonassen (1993) who suggested that cognition relates to the awareness, recognition, comprehension or elementary understanding of information, which means that cognition is essential to all other mental operations. Intelligence seems not to be a one-dimensional phenomenon, but rather a concept that has multiple facets that should be considered from various points of view (Bartholomew, 2004).

Cognitive processes are the mental processes by means of which a person is able to organise information to make it available for doing work (Jaques & Clement, 2006). Prinsloo and Prinsloo (2011) suggested that the mental activity, as a unit of thinking that results in a particular product, is referred to as a cognitive process. This differs from cognition, which is a collective term for a number of cognitive processes or dynamic operations. In this regard, intelligence or cognition is considered to consist of numerous cognitive processes that work together to organise information, assisting in decision-making.

Cognitive processes are the processes used by individuals to manage task material, which can be divided into six broad thinking processes, which are, in turn, broken down into functional categories, as summarised below (Prinsloo & Prinsloo, 2011).

Exploration entails the investigation of situations with the purpose of identifying relevant information for further processing. The functions associated with this process include:

- pragmatic - discriminating between relevant and irrelevant information (relevance); and
- exploration - strategies for exploration and depth of investigation (focus).

Linking / analysis involves breaking up information into constituent parts, which are then compared, associations drawn between them and relationships identified. The main subcomponent functions are:

- analytical - clarification by means of interpreting, evaluating and prioritising information, precise and systematic orientation, need for precision; and
- rule orientated - the application of a detailed, rule orientation, monitoring linking behaviour.

Structuring entails ordering of information, categorised and integrated to make sense and create meaning. The individual moves beyond establishing mere relationships among elements by "putting together" meaningful wholes. Major subcomponents include:

- integration - integration and big picture view;
- categorisation - creating external order, categories and reminders, structuring tangibles; and
- complexity - strategies to manage complexity.

Transformation consists of changing and purposefully applying information structures, adapting and contextualising. It encompasses both logical and lateral thinking processes. The major subcomponents include:

- logical reasoning - following through, looking for logical evidence, monitoring of reasoning processes; and
- verbal abstraction - verbal and abstract conceptualisation skills, including lateral, creative thinking processes used when information structures need to be changed, restructured or adjusted to meet the requirements of the particular context in which they are needed.

Memory involves storing and retrieving information. The main subcomponent functions are:

- use of memory - retention and recall; and
- effectiveness of memory - degree of memory use and the use of memory strategies.

Metacognition is the crux of effective thinking. It is about self-awareness, self-monitoring, self-evaluation, the planning of strategies, learning from feedback and mistakes, capitalising on subconscious hunches and insights / intuition. The main subcomponent functions include:

- judgement - using judgement to clarify unstructured or vague information, use of intuition, awareness of own reasoning processes;
- learning 1 - quick insight learning, flexibility; and
- learning 2 - gradual improvement / experiential learning, using memory strategies.

Cognitive complexity measures the structure of cognition and comprises two parts. The one is differentiation (the number of dimensions used by individuals to perceive external stimuli) and the other is integration (the complexity of rules used by individuals in organising the differentiated dimensions) (Wang & Chan, 1995). The ability of individuals to manage complexity when solving problems at work is reflected in how they manipulate and organise variables; some people seem able to gather and manage large numbers of variables at the same time, while others cope with medium numbers, and some can only deal with a small number of variables before they become confused (Jaques & Clement, 2006). Complexity refers to the nature of the information dealt with when completing tasks and solving problems, while cognitive styles deal with the way in which an individual chooses to manage tasks with different levels of complexity.

The most complex jobs, such as leading global organisations, require individuals to make judgements and decisions about potential socio-political and economic trends based on many interlinked variables (Jaques, 1998). Jaques (1998) argued that individuals need to manage complexity and solve problems at work. Their performance and ability to do so effectively is related to their current, as well as the potential, level of work. Jaques (1998) created the Complexity of Work Model, which defines seven levels of complex thinking required by different jobs. These start from level one work which involves short-time frames, concrete tasks and completing one task at a time, and progress to level seven work which involves executive leadership of multinational organisations, and work that includes understanding large-scale systems (Jaques, 1998).

Complexity is measured according to the number of elements, the level of abstraction and the degree of interaction between the components with which people are able to work when solving problems (Prinsloo & Prinsloo, 2011).

The seven levels of work described by Jaques (1998) are reduced in the CPP to five work environments, including 'purely operational', 'diagnostic accumulation', 'alternative paths/tactical strategy', 'parallel processing' and 'a purely strategic work environment'. The test developer contended that the definition of the purely strategic work environment in the CPP is sufficient to encompass the three highest levels of work outlined in the Complexity of Work Model (Prinsloo, 2011).

Table 4.1: Descriptions of the five levels of work (Prinsloo & Prinsloo, 2011, p.50)

	Purely operational environment	**Diagnostic accumulation environment**	**Tactical strategy / alternative paths environment**	**Parallel processing environment**	**Pure strategic environment**
Structure	Clear, linear procedures, rules and policies are applied to complete tasks.	Parameters, frameworks and clear boundaries are applied to complete tasks.	Fuzzy, theoretical guidelines are applied to complete tasks.	Future scenarios, hypothesis generation and big picture thinking are applied to complete tasks.	Visions for long-term viability and big picture systems thinking are applied to complete tasks.
Focus	The focus of this environment is on routine, concrete tasks.	The focus of this environment is on a particular person, case, situation or problem.	The focus of this environment is on the whole system and tangible systems.	The focus is on future possibilities outside the paradigm and on intangible systems.	The focus is on the macro environment.
Time	The time frame of decisions is from one to three months.	The time frame of decisions is from three months to one year.	The time frame of decisions is from one to three years.	The time frame of decisions is from three to five years.	The time frame of decisions is in excess of five years.
Key capability	Key capabilities relate to sensory orientations, touch, feel and sight.	Key capabilities relate to accumulation of information and understanding needs.	The key capability is to make connections.	The key capabilities are modelling (creating a model of the future) and scenario planning.	The key capability is weaving.
Processes, operations performed	Individuals typically approach tasks in a reactive, step-by-step manner by overcoming one obstacle at a time.	Individuals typically approach tasks by analysing and generating solutions, customising to needs, troubleshooting, and predicting	Individuals typically approach tasks by understanding and implementing strategies. They arrive at effective, efficient outcomes through refining	Individuals approach tasks by translating broad strategy, aligning the current system with future possibilities and working across silos.	Individuals approach tasks by considering long-term viability across macro contexts and considering the interplay of dynamics within /

		problems.	processes, restructuring, considering tangible variables and make continuous improvement. They apply best practice and benchmarking processes, and they evaluate and implement systems.		across macro contexts.
Excellence	Accuracy, precision, quality and minimising costs / waste are important in this environment.	Pre-empting potential obstacles and service orientation are important in this environment.	Optimising systems, continuous improvement and system efficiency are important in this environment.	The ability to see underlying patterns and dynamics, to suspend knowledge and be open to possibilities, and integrating broad strategies are important in this environment.	Awareness of emerging patterns, industry strategy and macro-economic environments are important in this environment.
Output	Outputs can be completely specified.	Outputs cannot be precisely specified e.g. problem-free functioning.	Outputs relate to understanding the strategy and making it work through the use of tactical strategies, budgets and work plans.	Outputs relate to aligning current systems with future possibilities and developing the business strategy.	Outputs relate to adapting to different macro-systems / environments, such as identifying new industries or integrating existing industries.

The CPP, based on a combination of differential and information processing approaches to the theory of intelligence (Prinsloo, 2005), was regarded the most effective measure of cognition in this study since it provides quantitative data pertaining to both cognitive complexity, as well as cognitive processes (Prinsloo, 2005).

4.1.1.2 The second aim: Conceptualise values and value systems

Schwartz and Bilsky (1990) generated a conceptual definition of values that incorporated five areas that recurred in values literature. They suggested that values are: (1) concepts or beliefs that (2) pertain to desirable end states or behaviours, (3) transcend specific situations, (4)

guide selection of evaluation of behaviour and events, and (5) are ordered according to relative importance.

A value system is a way of conceptualising reality and includes a consistent set of values, beliefs and behaviours that are found in individuals. A value system develops primarily as a reaction to environmental challenges and threats (Van Marrewijk, 2004). Individual value priorities serve as a guiding principle in people's lives and influence individual goal-setting and prioritising (Watkins, 2010). Value systems represent core intelligences that guide behaviour and influence life choices by acting as a decision-making framework. It seems that value systems pertain to more than the content of one's thinking, but provide a structure for decision-making (Du Preez & Nash, 2008).

Value systems were approached from the Spiral Dynamics perspective, which is a theory of human development, based on Clare Graves's research on the process of human development (Beck & Cowan, 2006). Spiral Dynamics views human development as proceeding through eight general stages, also known as memes or value systems. A meme is defined as a basic stage of development that can be expressed in any activity. Memes are not seen as rigid levels within the spiral, but can overlap (Beck & Cowan, 2006; Wilber, 2001). The theory contends that that all people have all the memes potentially available to them at any given time (Beck & Cowan, 2006; Prinsloo, 2012a; Prinsloo, 2012b; Van Marrewijk, 2010; Wilber, 2001).

Table 4.2: The value systems according to Spiral Dynamics. Adapted from Beck and Cowan (2006), Prinsloo and Prinsloo (2012).

Value System	Description	Motives	Characteristics	Approach to decision-making
BEIGE (survival)	Automatic, reflexive and instinctive responses are important and the focus is on physical survival.	Staying alive and satisfying physiological needs motivate action.	The beige value system centres on the satisfaction of one's physical needs to survive. Food, water, warmth, shelter, sex and safety have priority and individuals have limited impact or control over their environment.	Habits and instincts are used to survive.
PURPLE (safety)	In-group dependencies and traditions are important. There is often an "us-and-them"	Maintaining blood relationships, mysticism, striving for certainty and	The purple value system centres on the need to be part of a close, warm group where they feel safe and protected. Allegiance and obedience to elders, custom and clan is important and there is comfort in familiarity and routine.	Custom and tradition, such as elders' counsel, signs or the shaman influence decisions.

	orientation and an avoidance of change.	protection motivate action.	Preserving sacred objects, places and events is often practiced and rites of passage and customs observed.	
RED (power)	Power, impulse, dominance, energy, action, achievement and leadership are prevalent in the red value system.	Enforcing dominance and power, gratifying impulses, demand for respect and avoiding shame motivate action.	In the red value system, the world is viewed as having limited resources – one has to fight for one's share. The world is full of threats and the strongest survive. Trusting others is difficult although there is a need for attention and respect. There is a tendency to cut loose from group values and to be fanatical and dogmatic (worry about consequences later).	Decisions are influenced by what the tough/powerful person dictates and what feels good now. The most powerful person typically grabs the spoils. Maximising profits and minimising displeasure and pain also influence decisions.
BLUE (truth)	Purpose, structure, truth, reliability and loyalty are important in the blue value system.	Belief in order and obedience in authority, self-discipline and definite views of what is right and wrong motivate action.	In the blue value system, security and caution, strong work ethics, laws, regulations and discipline are seen to build character and moral fibre. The focus is on controlling impulses and conforming to bureaucratic/hierarchical views or inflexible ideologies. Divine plans are seen to assign people to their places.	Decisions are influenced by orders from authority, what is seen as right and adherence to rules or tradition. The most righteous person earns the spoils.
ORANGE (prosperity)	Strategy, materialism, opportunism, freedom of choice, individualism and achievement are important in the orange value system.	Thinking in terms of abundance, acting in self-interest, autonomy and manipulation motivate action.	In the orange value system, optimism, practicality, risk-taking and self-reliance are important. People who take the initiative deserve success and prosperity is seen to be achieved through strategy, technology and competitiveness. Goal-setting, competence and tough-mindedness are needed to achieve results. Resources should be manipulated to create and spread around the good life.	Decisions are influenced by bottom-line results, the opinions of experts and options are tested to maximise results. The most successful person wins the spoils.
GREEN (communitarian)	Sensitivity, humanism, emotions, theory and compassion are important in the green value system.	Peace with the inner self and others, and caring and unity in the community motivate action.	In the green value system, feelings, sensitivity and caring take priority over greed, materialism and divisiveness. Equal opportunities for all are valued and emphasis is placed on providing for the oppressed and there is typically genuine concern for others. However, people conforming to this view may be patronising and assume superiority, by taking away power and removing responsibility.	Decisions are taken by reaching consensus, everyone must collaborate and input from everyone must be accepted. There are communal spoils.
YELLOW	Integration, learning, change	Living fully and responsibly	In the yellow value system, the focus is on flexibility, functionality and	Decisions are based on principles,

(systematic)	and systems thinking are important in the yellow value system.	while learning, considering the big picture and the contextualisation of issues motivates action.	spontaneity. Knowledge and competence supersedes rank, power and position and differences can be integrated into inter-dependent flows. Transformation is embraced and problem solving is characterised by innovation and viewing the situation holistically.	knowledge and resolved paradoxes. The most competent person gets the spoils.
TURQUOISE (holistic)	Holistic-global, spiritual-existential and philosophical factors are important in the turquoise value system.	Experiencing the wholeness of existence through mind and spirit, a natural and simplistic life style and environmental concerns motivate action.	In the turquoise value system, the world is a single, dynamic organism with its own collective mind and everything connects to everything else. Emphasis is placed on holistic, intuitive thinking and cooperative actions and broad interests. The focus is on planetary concerns, and could come across as too abstract and other-worldly to others.	Decisions are based on the blend of natural flows, looking up/down stream and planning for the long range. Life gets the spoils.

The VO, designed to recognise and measure the effect that value systems as high-level organising frameworks have on the way that individuals utilise their capability and personality at work (Prinsloo & Prinsloo, 2012), was put forward as the most effective assessment instrument to measure value systems in this research.

4.1.1.3 The third aim: Exploring the theoretical relationships between cognition and values within an organisational context

Prinsloo (2012a) argued that Spiral Dynamics value systems, and their underlying energies, determine the way in which personal characteristics and cognitive capability are implemented, and therefore influence the behaviour and decisions of organisational leaders. Prinsloo (2012a) maintained that cognitive capacity remains a prerequisite, rather than a guarantee, of effectiveness.

Prinsloo (2012a) suggested that there are more drivers behind the decision-making of leaders than mere cognition and intelligence. In some instances, such as at higher levels of complexity and levels of work, certain value systems can derail cognitive competence. Prinsloo (2012a), for example, suggested that people at the lower levels of Spiral Dynamics, tend to be motivated by fear. Under conditions in which individuals feel threatened or are working under acute pressure, they can show defensive behaviour and become less effective from a cognitive perspective. Acceptance of complexity and its contradictions describes a personal attitude towards the ambiguous and unpredictable nature of the global world of work (Jokinen, 2004), rather than being a purely cognitive / intellectual function. Prinsloo (2012a) suggested

that cognitive capability needs to be applied according to Spiral Dynamics criteria to unlock its full potential. These are outlined below.

Purple: Congruent with the purple value system, is the tendency to show an external locus of control and, cognitively, to respond randomly to new situations. There is an inclination to focus on *us-versus-them* thinking, a reliance on in-group problem solving, and to blame the out-group when things go wrong. Typically, there is a strong dependency on leadership, which is usually supported uncritically and emotionally. Purple values do not seem to encourage the reliance on intellectual competence (rather adhering to group problem solving) and this often results in a less analytical, yet rule-bound approach to solving problems.

Red: People with a red value system are typically driven by fear of failure and therefore a loss of face. They tend to need recognition, and, in order to avoid feeling vulnerable, respond defensively to difficulties by retreating into egocentric behaviours, such as behaving in an aggressive manner, and by working harder and more quickly (often at the expense of working more intelligently) to create a sense of achievement and identity.

Blue: The blue value system is characterised by stability, the pursuit of quality and depth of technical expertise. People who hold this value system typically create structure in their environments and avoid, or even, actively oppose change. People with this orientation often respond in a rigid or inflexible manner to challenges, and tend to over-conform by focusing on rules.

Under less stressful, more familiar or less threatening situations, for those who embrace the purple, red or blue value systems, the impact of emotion on cognition can be greatly reduced. People with red and blue value systems can be highly intellectual, especially the values associated with the blue value system of rationality, rigour and depth of analysis. People with these orientations typically provide for others who are close to them.

Orange: People with an orange value system usually apply a strong cognitive orientation towards goals that are important to them – such as value creation, strategic manipulation, professional application, people or market perception. People characterised by this value system often are flexible and resilient, and their cognitive abilities are applied in order to innovate, reframe, conceptualise and persuade others.

Green: The green value system is characterised by an open-minded and accepting approach. Cognitively, people with this value system enjoy the world of ideas, are often theoretical, and

try to understand viewpoints from multiple perspectives. Even those less intellectually sophisticated are usually open to ideas, and they are compassionate and interested.

People with orange and green value systems are often still motivated by emotional and interpersonal factors, although they tend to focus on a broader population within their sphere of influence and concern than do those with purple, red and blue value systems. The people close to them are important (such as family, close friends and immediate teams in the case of those with purple, red and blue outlooks), but they also consider the needs and expectations of larger groups, such as employees, markets and broader stakeholders. In the case of green, humanity as a whole is deemed important.

Yellow: People adhering to the yellow value system are very flexible and adaptable and usually contextualise behaviour and solutions to meet specific requirements. Yellow is often associated with a desire to learn and experience new things, and people with this view, usually cognitively, apply a systems or holistic view of the world in which everything is connected. To implement a yellow value system effectively in a leadership role, a high level of cognitive capability is required.

Turquoise: The world of work currently has a predominantly commercial orientation, and, as such, leaders with a turquoise value system are not typically found in the corporate environment. Their value system is characterised by an integrated philosophical, existential and spiritual approach and the focus tends to be on human experience and the proliferation of life. There is usually a heightened awareness of their responses, the environment and the depth of connectedness of the world.

Typically, those with yellow and turquoise value systems are not driven by emotional considerations and the need to perform according to predetermined criteria of success and status. Cognitively, they are driven by the process of developing an understanding of principles, paradoxes and processes within a holistic and integrated world (Prinsloo, 2012a). Prinsloo (2012b) suggested that progressively inclusive worldviews, such as the yellow and turquoise value systems which, as second tier levels of consciousness appreciate and understand the necessity of the other valuing systems, require increasingly complex cognitive processing to be effective.

To summarise, the researcher concluded that there appears to be a theoretical relationship between cognitive processes, the ability to manage complexity and value systems.

4.1.2 Conclusions regarding the empirical study

The specific aims relating to the empirical study are set out and discussed below.

4.1.2.1 First aim: Determine whether a relationship exists between a leader's ability to manage complexity and value systems in a multinational organisation

Although the results in this area were mixed, it can be concluded that there are statistically significant, weak correlations between cognitive complexity, as measured by the CPP and value systems as measured by the VO. Although significant relationships were not found between all the value systems and leaders' levels of work, weak correlations were found between approximately half the variables measured. These findings suggest that there is indeed a relationship between value systems and levels of work; however, the exact nature and extent of this relationship still needs further exploration.

Statistically positive correlations were found between purple (reject) and current level of work, blue (reject) and current and potential levels of work, green (accept) and potential level of work, as well as between yellow (accept and reject) and current and potential levels of work. Statistically negative correlations were identified between blue (accept) and current and potential levels of work, orange (reject) and current and potential levels of work, yellow (accept and reject) and current and potential levels of work, as well as between turquoise (accept) and current and potential levels of work. This suggests a relationship between levels of work and value systems was found among leaders.

However, the value of power (represented by the red value system) does not seem to have any relationship to cognitive measures. When leaders accepted prosperity, success and achievement, there was no relationship with levels of work. When rejecting prosperity and achievement (represented by the orange value system), the group did not demonstrate the cognitive skills required for understanding and developing long-term business strategies and identifying future possibilities in the work environment. Furthermore, accepting and rejecting the blue value system was found to correlate significantly with leaders' current and potential work environments. People characterised by a blue value system typically place emphasis on accepting direction from those in authority and adhering to rules, regulations and policies (Beck & Cowan, 2006; Prinsloo & Prinsloo, 2012).

The yellow value systems (both accept and reject) were found to correlate significantly with leaders' levels of work. The yellow value system is characterised by learning, systems thinking, embracing transformation and innovative problem solving (Beck & Cowan, 2006;

Prinsloo & Prinsloo, 2012). Leaders who accepted yellow values showed the capacity to operate at a higher level of work than those who rejected these preferences.

Leaders are responsible for ensuring that the organisation is sustainable in the long term, which requires them to make judgements about a wide range of inter-related variables that have a long-term impact on the organisation and its employees (Jaques, 1998). Prinsloo and Prinsloo (2012) suggested that values, as high level organising frameworks, impact on the way in which individuals utilise their capability and personality. Jokinen (2004) maintained that the acceptance of complexity describes an attitude towards ambiguity in unpredictable work environments, rather than a purely cognitive function.

The results of this research support the above views. Although the lower levels of cognitive variance attributed to value systems suggest that it may not be the only variable affecting cognition in organisational leaders, the evidence suggests that there indeed is a relationship between value systems and cognition. The findings of this research confirm that there is a relationship between Spiral Dynamics value systems and the ability to manage complexity, particularly when accepting or rejecting the yellow and blue value systems.

4.1.2.2 Second aim: Determine whether or not a relationship exists between leaders' cognitive processes and value systems in a multinational organisation

Based on the findings of this study, it can be concluded that there are statistically significant, although weak, correlations between cognitive processes, as measured by the CPP, and value systems, as measured by the VO.

Organisational strategies are often not realised because they are not aligned to organisational and individual values. When setting strategies, the leadership team needs to have the cognitive ability to perform the analysis that underpins the strategy, as well as to ensure that the organisation's employees implement it (Cowan & Todorovic, 2000). If an ability to understand and adapt to changes in the business environment is lacking, other factors affecting leadership are less effective (Raghavendran & Rajagopalan, 2011). Furthermore, if a person values something, he/she will pursue doing it (Jaques & Clement, 2006). As such, for leaders to realise organisational strategies, they need to have the cognitive skills to understand what underpins the strategy, and their value systems need to support the cognitive processes required to implement that strategy (Cowan & Todorovic, 2000).

This study established statistically significant correlations between the purple value system and integration, complexity and verbal abstraction. Statistically significant correlations were found between the blue value system and pragmatism, exploration, analytical, rule orientation, categorisation, integration, complexity, logical reasoning, verbal abstraction, the use of memory, memory strategies, judgement and quick insight learning. Statistically significant correlations were found between the orange value system and pragmatism, exploration, rule orientation, integration, complexity, verbal abstraction, memory strategies and quick insight learning. Statistically significant correlations were found between the green value system and complexity, logical reasoning, judgement and gradual improvement learning. Statistically significant correlations were found between the yellow value system and pragmatism, exploration, analytical, rule orientation, integration, complexity, logical reasoning, verbal abstraction, memory strategies, judgement, quick insight learning and gradual improvement learning. Statistically significant correlations were found between the turquoise value system and pragmatism, categorisation, integration, complexity, verbal abstraction, the use of memory, memory strategies, and quick insight learning.

In particular, the cognitive processes of integration and complexity were found to have significant relationships with various value systems in this study. Both these cognitive processes relate to the ordering and making sense of information when solving problems. Integration specifically involves the ability to understand how different types of information fit together to create an understanding of the bigger picture (Prinsloo & Prinsloo, 2011). Integration correlated significantly with all the value systems, except red (accept and reject), green (accept and reject) and turquoise (reject).

Complexity relates to the strategies that an individual uses to make sense of large amounts of ambiguous, vague and unfamiliar information (Prinsloo & Prinsloo, 2011). Complexity correlated significantly with the value systems of purple (accept), blue (accept and reject), orange (reject), green (accept), yellow (accept and reject) and turquoise (accept). This suggests that integration skills and the ability to manage complexity have a relationship with value systems to some extent. Although the relationships between many of the variables are weak, they are nonetheless significant. Considering that relationships between these cognitive processes were found with many of the value systems, there is a strong case for supporting the assertion that there is a relationship between cognitive processes and value systems.

It was further evident that there is a negative relationship between the orange value system (reject) with many of the cognitive processes measured. Specifically, the most noticeable of

these findings suggest that leaders who reject the orange value system, are less effective in their ability to distinguish between relevant and irrelevant information and apply rules effectively when making sense of unfamiliar information. Furthermore, their ability to see the broader picture and develop strategies to manage complexity appears less developed.

The relationship found between cognition processes and value systems confirms that it is not only cognitive skills that have a relationship with leadership decision-making. Increased understanding of the relationship between leaders' value systems and cognitive skills could enable organisations to explore better and more effective means of attracting, selecting, developing and retaining their leaders.

4.1.3 Conclusions regarding the central hypothesis

Based on the results of this study, there appear to be statistically significant (both positive and negative) weak correlations between cognition (relating specifically to cognitive complexity and cognitive processes) and value systems in a multinational organisation's leadership team.

4.2 LIMITATIONS

The limitations in the literature review and the empirical study will now be discussed.

4.2.1 Limitations pertaining to the literature review

There appears to be limited published research that investigates the relationship between cognition and value systems in an organisational context. Although there is a considerable body of literature available on cognition and value systems studied separately, not much literature that links the two concepts could be identified.

Several studies found a correlation between cognitive ability and personality, as well as a significant relationship between personality and tolerance for managing complexity (Grace, 1997). However, it appears as if the relationship between cognitive ability and value systems has not been investigated extensively. Other possible variables that affect people's ability to process complicated, ambiguous, dynamic or novel information (Wang & Chan, 1995), particularly in a leadership context, appear not to have been investigated comprehensively. In light of this, limited published research could be found against which to compare findings and results.

4.2.2 Limitations pertaining to the empirical study

The mean age of the sample was 49.81 years. More than 90% of the group was male and almost half the group were white Europeans. Furthermore, almost 70% of the sample had at least a university degree in terms of their level of education. Although the sample was fairly diverse in terms of nationalities and language, the homogenous nature of the group in terms of age, gender, education and ethnicity meant that it was not possible to generalise the findings to other groups.

From a cognitive perspective, there could be a built-in restriction of range. The sample consisted only of senior managers and executives within a global organisation and therefore it could be argued that the sample group already operate at the highest levels of work and complexity, and may have reached their cognitive potential (Hunt, 2011b). Zimmerman and Williams (2000) maintained that in psychology, restriction of range typically reduces the correlation that exists in an unrestricted population. Although the correlations found appear to be fairly weak, the built-in restriction of range could have reduced these correlations further than would be the case with a more diverse sample.

From a values perspective, the group was relatively homogenous. More than 70% of the group accepted red and/or orange value systems, which relate to power and prosperity. Individual value systems are seen to be a result of both shared culture and unique personal experiences (Schwartz, 1999); serve as a guiding principle in people's lives; and influence individual goal-setting and prioritising (Watkins, 2010). The influence of organisational culture was not taken into account in this study. Schwartz (1999) argued that when values are shared, individuals in social institutions and organisations can draw on these values to select socially appropriate behaviours, and they often use them to justify their behavioural choices and decisions to others. Therefore, it is important to conduct research across different organisations and industries, with divergent value systems to gain a more complete picture of the relationship between value systems and cognition to gain a more holistic perspective.

4.3 RECOMMENDATIONS

Further research exploring the relationship between cognition and value systems appears warranted. The literature review suggests that individuals who operate effectively in work environments that require higher levels of complexity, should value working with complexity in a constantly changing environment (Beck & Cowan, 2006). Value systems, and their underlying energies, determine the way in which personal characteristics and cognitive capability are implemented, and thereby influence the behaviour and decisions of people at work (Prinsloo, 2012a). This study confirms that cognitive processes specifically relating to

integration and complexity, as well as the levels of work measured by the CPP, correlate significantly with approximately half of the value systems investigated in this study. However, the established relationships, although statistically significant, were not strong and were not identified between all the cognitive measures and value systems investigated. Future research should investigate these constructs in more detail to develop an in-depth understanding of their relationship.

The sample group was fairly homogenous in relation to the values that they accepted. The majority of respondents accepted values relating to power and achievement. Furthermore, participants were quite homogeneous in terms of their age, gender education levels, organisational level and ethnicity. Research employing more diverse samples should enhance an understanding of the relationship between value systems and cognition. The possible built-in restriction of range in the cognitive variables suggests that research across more organisational levels would also add to an understanding of this relationship.

Future research should also take into account the influence of the broader organisational and national cultures on individual leaders' value systems and decision-making. The value systems prevalent within a particular organisation, country or industry within which an organisation operates may impact on the value systems presented by study participants.

Currently there seems to be limited information available on the effect of value systems and cognitive abilities on the performance of leaders within global organisations. Future research into the relationship between value systems and cognition of organisational leaders could investigate the relationship between these variables and organisational, as well as individual performance. This could assist organisations in exploring better and more effective ways of attracting, selecting, developing and retaining organisational leaders.

4.4 INTEGRATION OF THE STUDY

The objective of the study was to explore the relationship between cognition and value systems within a leadership team of a multinational organisation. The CPP was used as a measure of cognitive complexity (levels of work) and cognitive processes, and the VO was used as a measure of value systems.

Cognitive complexity and cognitive processes were investigated in detail in the literature review according to the information processing and the differential/psychometric theories of cognition, while value systems were explored within the parameters of the theory of Spiral

Dynamics. The theory of Spiral Dynamics was developed by Cowan and Beck. This theory is based on Clare Graves's research on understanding human behaviour.

A leadership team within a multinational organisation was selected for this study, due to the worldwide presence of the organisation and a growing need to better understand the cognitive and value systems requirements of leadership at a global level. Globalisation has had a major impact on corporate leadership (Denton & Vloeberghs, 2003). Organisational leaders and corporate executives need to be able to process complex information quickly and make decisions that enable the organisation to adapt appropriately and remain sustainable in the long term (Jaques, 1998).

It was evident from the literature review that there is a belief that cognition and value systems are related (Halamby, 2003; Ndiweni, 2011; Prinsloo, 2012a). However, the nature and extent of this relationship seems to be unclear. Limited research directly exploring the relationship between cognition and value systems appears to be available.

The empirical study commenced with a correlational analysis between measures of cognitive complexity, based on the levels of work data measured by the CPP, and value systems measured by the VO. Statistically significant, although weak, relationships were found between approximately half of the value systems and levels of work measured.

The empirical study also included a correlational analysis between cognitive processes, as measured by the CPP, and value systems measured using the VO. Statistically significant, yet weak, correlations were found between many of the cognitive processes and value systems. This suggested that that there is a relationship between cognitive complexity and value systems, as well as between the cognitive processes and value systems of the leadership team who participated in the study.

4.5 CHAPTER SUMMARY

In Chapter 4, an overview of the results of both the literature review and the empirical study was provided. The findings, conclusions and limitations were outlined, and recommendations for future research were made.

REFERENCES

Ackerman, P.L. & Lohman, D.F. (2003). Education and g. In H. Nyborg (Ed.), *The scientific study of general intelligence: Tribute to Arthur R. Jensen*, (pp. 275 – 292). Boston: Pergamon.

Bartholomew, D.J. (2004). *Measuring intelligence: Facts and fallacies*. Cambridge: Cambridge University Press.

Bartram, D. (2004). Assessment in organisations. *Applied Psychology: An International Review*, *53* (2), 237 – 259.

Beck, D.E. & Cowan, C.C. (2006). *Spiral dynamics: Mastering values, leadership and change.* Malden: Blackwell Publishing.

Bowler, B.C., Bowler, J.L. & Phillips, B.C. (2009). The big 5+/-2? The impact of cognitive complexity on the factor structure of the five-factor model. *Personality and individual differences, 47,* 979 – 984.

Brown, B.C. (2011). Complexity leadership: An overview and key limitations. *Integral Leadership Review, 11* (5). Retrieved May 18, 2013 from http://integralleadershipreview.com/3962-learner-paper-complexity-leadership/

Burke, R. (2008). Leadership and spirituality. *Foresight, 8* (6), 14 – 25.

Campione, J.C., Brown, A.L. & Ferrara, A. (1982). Mental retardation and intelligence. In R.J. Sternberg (Ed.), *Handbook of human intelligence.* Cambridge: Cambridge University Press.

Campione, J.C. & Brown, A.L. (1987). Linking dynamic assessment with school achievement. In C. Schneider Lidz (Ed.), *Dynamic assessment: an interactional approach to evaluating learning potential*. New York: The Guilford Press.

Carr, P.B. & Dweck, C.S. (2011). Intelligence and Motivation. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Cascio, W.F. & Aguinis, H. (2011). *Applied psychology in human resource management* (7th ed.). Upper Saddle River, New Jersey: Prentice Hall.

Cianciolo, A.T. & Sternberg, R.J. (2004). *Intelligence: A brief history.* Malden, MA: Blackwell Publishing.

Clawson, J.G. (2012). *Level three leadership: Getting below the surface* (5th ed.). Upper Saddle River, N.J.: Prentice Hall.

Cowan, C.C. & Todorovic, N. (2000). Spiral dynamics: The layers of human values in strategy. *Strategy and Leadership, 28* (1), 4 – 11.

Das, J.P. (1987). Foreword. In C. Schneider Lidz (Ed.), *Dynamic assessment: An interactional approach to evaluating learning potential*, (pp. vii – xi). New York: The Guilford Press.

Das, J.P. (1995). Some thoughts on two aspects of Vygotsky's work. *Educational Psychologist, 30* (2), 93 – 97.

Das, J.P., Naglieri, J.A. & Murphy, D.B. (1995). Individual differences in cognitive processes of planning: a personality variable? *The Psychological Record, 45* (3), 355 – 372.

Davis, K., Christodoulou, J., Seider, S. & Gardener, H. (2011). The theory of multiple intelligences. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Day. D.V., Harrison, M.M. & Halpin, S.M. (2009). *An integrative approach to leader development: Connecting adult development, identity and expertise.* New York: Psychology Press, Taylor and Francis Group.

De Beer, M. (2006). Dynamic testing: Practical solutions to some concerns. *South African Journal of Industrial Psychology, 32* (4), 8 – 14.

De Bruin, G.P. & De Bruin, K. (2009). Career counselling assessment. In C. Foxcroft & G. Roodt (Eds), *Introduction to psychological assessment in the South African context*. Cape Town: Oxford University Press.

De Vos, A.S., Strydom, H., Fouche, C.B. & Delport, C.S.L. (2011). *Research at grass roots: For the social sciences and human service professions* (4th ed.). Pretoria: Van Schaik Publishers.

Denton, M. & Vloeberghs, D. (2003). Leadership challenges for organisation in the New South Africa. *Leadership and Organisation Development Journal, 24* (2), 84 – 95.

Du Preez, M. & Nash, K. (2008). *Personal value systems and organisational culture: The importance for hiring and team development.* Paper presented at the IBAM conference, Orlando.

Fagan, J.F. (2011). Intelligence in infancy. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Foxcroft, C. & Roodt, G. (2009). What the future holds for psychological assessment. In C. Foxcroft & G. Roodt (Eds), *Introduction to psychological assessment in the South African context*. Cape Town: Oxford University Press.

Furnham, A. (2008). *Personality and intelligence at work.* London: Routledge.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gardner, H. (1999). *The disciplined mind: What all students should understand.* New York: Simon and Schuster.

Grabowski, B.L. & Jonassen, D.H. (1993). *Handbook of individual differences, learning and instruction.* Hillsdale, N.J.: Lawrence Erlbaum Associates.

Grace, C. (1997). Personality type, tolerance of ambiguity and vocabulary recall in CALL. *Calico Journal, 15 (1),* 19 – 45.

Graves, C.W. (1965). *Value systems and their relation to managerial controls and organisational viability*. Paper presented to the College of Management Philosophy, San Francisco.

Graves, C.W. (1970). Levels of existence: An open systems theory of values. *Journal of Humanistic Psychology, 10* (2), 131 – 155.

Grigorenko, E.L. & Stermberg, R.J. (1998). Dynamic testing. *Psychological Bulletin, 124* (1), 75 – 111.

Grobler, P., Warnich, S., Carrell, M.R., Elbert, N.F. & Hatfield, R.D. (2006). *Human resource management in South Africa* (3rd ed.). London: Thomson Learning.

Grobler, S.W. (2005). *Organisational structure and Elliot Jaques' Stratified Systems Theory.* Unpublished Master's thesis: University of South Africa, Pretoria.

Groenewald, A. (2011). Developing extraordinary leaders. In I. Boninelli & T. Meyer (Eds), *Human capital trends: Building a sustainable organisation*. Randburg: Knowres Publishing.

Guthke, J. (1993). Current trends in theories and assessment of intelligence. In J.H.M. Hamers, K. Sijtsma, & A.J.J.M Ruijssenaars, (Eds), *Learning potential assessment: theoretical, methodological and practical issues,* (pp. 13 – 18). Amsterdam: Swets and Zeitlinger.

Halaby, C.N. (2003). Where job values come from: Family and schooling background, cognitive ability, and gender. *American Sociological Review, 68* (2), 251- 278.

Hamers, J.H.M & Resing, W.C.M. (1993). Learning potential in assessment introduction. In J.H.M. Hamers, K. Sijtsma, & A.J.J.M Ruijssenaars, (Eds), *Learning potential assessment: theoretical, methodological and practical issues*, (pp. 23 – 42). Amsterdam: Swets and Zeitlinger.

Haralambos, M & Holburn, M. (1994). *Sociology: Themes and perspectives.* London: Collins Educational.

Hergenhahn, B.R. (1992). *An introduction to the history of psychology* (2nd ed.). Pacific Grove, CA: Brooks Cole.

Hogan Assessment Systems (2011). *The value of values: Using values assessment to create a more engaged, more productive workforce.* Tulsa, Oklahoma: Hogan Assessment Systems, Incorporated.

Hunt, E. (2011a). Reflections on the current and future state of research on intelligence. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence*. New York: Cambridge University Press.

Hunt, E. (2011b). *Human intelligence.* New York: Cambridge University Press.

Jaques, E. (1998). *Requisite organisation: A total system for effective managerial organisation and managerial leadership for the 21st Century.* Arlington, VA: Cason Hall.

Jaques, E. & Clement, S.D. (2006). *Executive leadership: A practical guide to managing complexity*. Malden, MA: Blackwell Publishing.

Johns, G. & Saks, A.M. (2011). *Organisational behaviour: Understanding and managing life at work (8th Ed.).* Toronto: Pearson Prentice Hall.

Jokinen, T. (2004). Global leadership competencies: A review and discussion. *Journal of European Industrial Training, 29* (3), 199 – 216.

Kaufman, J.C. & Plucker, J.A. (2011). Intelligence and creativity. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence*. New York: Cambridge University Press.

Klenke, K. (2005). Corporate values as multi-level, multi-domain antecedents of leader behaviours. *International Journal of Manpower, 26* (1), 50 -66.

Kline, P. (2000). *Handbook of psychological testing* (2nd ed.).London: Routledge.

Kotze, I.K. (2009). *Spiral dynamics: An expression of world views.* Unpublished D.Phil dissertation. University of Pretoria.

Kotze, K. & Mauer, K.F. (2013). *Administration and technical manual: Lens VQ.* Unpublished manuscript. Johannesburg: Al-Q-Mie.

Krishnan, V.R. (2001). Value systems of transformational leaders. *Leadership and Organisation Development Journal, 22* (3), 126 – 131.

Kubinger, K.D., Litzenberger, M. & Mrakotsky, C. (2007). A new perspective of traditional intelligence theories through modern test conceptualisation. *Studia Psychologica, 49* (4)*,* 295 – 312.

Leedy, P.D. & Ormrod, J.E. (2010). *Practical research: Planning and design* (9th ed.).Boston: Pearson.

Lichtenstein, S. (2012). The role of values in leadership: How leaders' values shape value creation. *Integral Leadership Review, 12* (3). Retrieved May 18, 2013 from http://integralleadershipreview.com/6176-the-role-of-values-in-leadership-how-leaders-values-shape-value-creation/

Lohman, D. F. (2005). Reasoning abilities. In R.J. Sternberg & J.E. Pretz (Eds), *Cognition and intelligence: Identifying the mechanisms of the mind.* Cambridge: Cambridge University Press.

Maksimainen, J. (2012). Content-based approach in exploring the cognitive structure of values. *Asian Social Science, 8* (6), 26 – 35.

Maslow, A.H. (1971). *The farther reaches of human nature.* New York: Viking Press.

McDonald, S. (2011). Dr. Clare Graves: Spiral dynamics – human evolution – who are we becoming? *Entheogenesis Australis, 3*, 1 – 7.

Milliman, J., Ferguson, J., Trickett, D. & Condemi, B. (1999). Spirit and community at Southwest Airlines: An investigation of a spiritual values-based model. *Journal of*

Organisational Change Management, 12 (3), 221 -233.

Mouton, J. & Marais, H.C. (1990). *Basic concepts in the methodology of the behavioural sciences.* Pretoria: Human Sciences Research Council.

Mouw, J.T. (1969). Effect of dogmatism on levels of cognitive processes. *Journal of Educational Psychology, 60* (6), 365 – 369.

Ndiweni, Q. (2011). *Jaques' levels of work theory: Do employee personal values matter?* Saarbrucken: Lambert Academic Publishing.

Necka, E. & Orzechowski, J. (2005). Higher-order cognition and intelligence. In R.J. Sternberg & J.E. Pretz (Eds), *Cognition and intelligence: Identifying the mechanisms of the mind,* (pp. 122 – 141). Cambridge: Cambridge University Press.

Ng, E.S. & Sears, G.J. (2012). CEO leadership styles and the implementations of organisational diversity practices: Moderating effects of social values and age. *Journal of Business Ethics, 105*, 41-52.

Nickerson, R.S. (2011). Developing intelligence through instruction. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence,* (pp. 107 – 129). New York: Cambridge University Press.

Nzama, L., De Beer, M. & Visser, D. (2008). Predicting work performance through selection interview ratings and psychological assessment. *South African Journal of Industrial Psychology, 34* (3), 39 – 47.

Pencheva, E.S. & Papazova, E.B. (2006, January). *Cognitive style and values*. Paper presented at the Psychological Type and Culture – East & West: A Multicultural Research Conference, Honolulu, Hawaii.

Pretz, J.E. & Sternberg, R.J. (2005). Unifying the field. In R.J. Sternberg & J.E. Pretz (Eds), *Cognition and intelligence: Identifying the mechanisms of the mind.* Cambridge: Cambridge University Press.

Prinsloo, M. (1992). *A theoretical model and empirical technique for the study of problem solving processes.* Unpublished PhD thesis: Rand Afrikaans University, Johannesburg.

Prinsloo, M. (2005). *Cognitive processing profile*. Training manual. Unpublished manuscript, Johannesburg: Magellan Consulting.

Prinsloo, M. (2007). *Metric properties of the CPP.* Unpublished manuscript, Johannesburg: Magellan Consulting.

Prinsloo, M. (2011). *CPP research manual.* Unpublished manuscript. Johannesburg: Magellan Consulting.

Prinsloo, M. (2012a). Towards an integrated assessment of leadership potential. *Integral Leadership Review, 12* (1). Retrieved May 18, 2013 from http://integralleadershipreview.com/6340-towards-an-integrated-assessment-of-leadership-potential/

Prinsloo, M. (2012b). Consciousness models in action: Comparisons. *Integral Leadership Review, 12* (3). Retrieved May 18, 2013 from http://integralleadershipreview.com/7166-consciousness-models-in-action-comparisons/

Prinsloo, M. (2013). *CPP research manual (updated).* Unpublished manuscript. Johannesburg: Magellan Consulting.

Prinsloo, M. & Barrett, P. (2013). Cognition: Theory, measurement, implications. *Integral Leadership Review, 13* (3). Retrieved November 15, 2013 from http://integralleadershipreview.com/9270-cognition-theory-measurement-implications/

Prinsloo, M. & Prinsloo, R. (2011). *Cognitive process profile.* Harrow Middlesex: Cognadev UK.

Prinsloo, M. & Prinsloo, R. (2012). *Value orientations.* Harrow Middlesex: Cognadev UK.

Raghavendran, S. & Rajagopalan, P.S. (2011). Sensemaking and complexity: Leadership in financial services. *Journal of Business Strategy, 32* (3), 19 – 28.

Rice, K.E. (2012). *Memes of spiral dynamics.* Retrieved June 13, 2012 from http://www.integratedsociopsychology.net/vmemes.html.

Robinson, D.A., Goleby, M. & Hosgood, N. (2006). *Entrepreneurship as a values and leadership paradigm*. Unpublished conference paper, Queensland: University of Technology.

Rokeach, M. (1979). *Understanding human values: Individual and societal.* New York: The Free Press.

Roodt, G. (2009). Validity: Basic concepts and measures. In C. Foxcroft & G. Roodt (Eds), *Introduction to psychological assessment in the South African context*. Cape Town: Oxford University Press.

Rosado, C. (2012). *An explanation of spiral dynamics.* Retrieved June 13, 2012 from http://www.edu-cyberpg.com/.

Rose, L.T. & Fischer, K.W. (2011). Intelligence in childhood. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Russell, R.F. (2001). The role of values in servant leadership. *Leadership and Organisation Development Journal, 22* (2), 76 – 83.

Ryan, G., Emmerling, R.J. & Spencer, L.M. (2009). Distinguishing high-performing European executives: The role of emotional, social and cognitive competencies. *Journal of Management Development, 28* (9), 859 – 875.

Sarros, J.C. & Santora, J.C. (2001). Leaders and values: A cross-cultural study. *Leadership and Organisation Development Journal, 22* (5), 243 – 248.

Schreuder, A.M.G. & Theron, A.L. (2004). *Careers: An organisational perspective* (2nd ed.). Cape Town: Juta & Co. Ltd.

Schwartz, S. (1999). A theory of cultural values and some implications for work. *Applied Psychology: An International Review, 48* (1), 23 – 47.

Schwartz, S. & Bilsky, W. (1990). Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. *Journal of Personality and Social Psychology, 58* (5), 878 – 891.

Sen, A. (1991). Alternative to psychological testing. *Psychology in Developing Societies, 3* (2), 203-220.

Senge, P.M. (1990). *The fifth discipline: The art and practice of the learning organisation.* New York: Doubleday/Currency.

Siegler, R.S. & Richards, D.D. (1982). The development of intelligence. In R.J. Sternberg (Ed.), *Handbook of human intelligence.* Cambridge: Cambridge University Press.

Smit, G.J. (1996). *Psychometrics: Aspects of measurement.* Pretoria: Kagiso.

Snow, R.E. (1994). Abilities in academic tasks. In R.J. Sternberg & R.K. Wagner (Eds), *Mind in context: Interactionist perspectives on human intelligence.* Cambridge: Cambridge University Press.

Sternberg, R.J. (1986). Geneces: A framework for intellectual abilities and theories of them. *Intelligence, 10*, 239 – 250.

Sternberg, R.J. (2004). North American approaches to intelligence. In R.J. Sternberg (Ed.), *International Handbook of Intelligence.* Cambridge: Cambridge University Press.

Sternberg, R.J. (2009). The theory of successful intelligence. In J.C. Kaufman & E.L. Grigorenko (Eds), *The essential Sternberg: Essays of intelligence, psychology and education*. New York: Springer Publishing Company, LLC.

Sternberg, R.J. (2011). The theory of successful intelligence. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Sternberg, R.J. & Grigorenko, E.L. (1997). Are cognitive styles still in style? *American Psychologist, 52* (7), 700 – 712.

Sternberg, R.J. & Pretz, J.E. (2005). Preface. In R.J. Sternberg & J.E. Pretz (Eds), *Cognition and intelligence: Identifying the mechanisms of the mind.* Cambridge: Cambridge University Press.

Taylor, T.R. (1994). A review of three approaches to cognitive assessment, and a proposed integrated approach based on a unifying theoretical framework. *South African Journal of Psychology, 24* (4), 184 – 193.

Terre Blanche, M., Durrheim, K. & Painter, D. (2006). *Research in practice: Applied methods for the social sciences* (2nd ed.). Cape Town: UCT Press.

Ubrina, S. (2011). Tests of intelligence. In R.J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Van Eeden, R. & De Beer, M. (2009). Assessment of cognitive functioning. In C. Foxcroft & G. Roodt (Eds) *Introduction to psychological assessment in the South African context*. Cape Town: Oxford University Press.

Van Heerden, G. (2005). *The relationship between the Cognitive Process Profile and the Myers-Briggs Type Inventory.* Unpublished Master's thesis: University of South Africa, Pretoria.

Van Marrewijk, M. (2004). A value based approach to organisation types: Towards a coherent set of stakeholder-oriented management tools. *Journal of Business Ethics, 55*, 147 – 158.

Van Marrewijk, M. (2010). The Cubrix, an integral framework for managing performance improvement and organisational development. *Technology and Investment 1*, 1-13.

Wang, P. & Chan, P.S. (1995). Top management perception of strategic information processing in a turbulent environment. *Leadership and Organisation Development Journal, 16* (7), 33 – 45.

Watkins, L. (2010). The cross-cultural appropriateness of survey-based value(s) research: A review of methodological issues and suggestion of alternative methodology. *International Marketing Review, 27* (6), 694 – 716.

Weiten, W. (2012). *Psychology themes and variations* (9th ed.). Belmont: Wadsworth Cengage Learning.

Wilber, K. (2001). *A theory of everything: An integral vision for business, politics, science and spirituality*. Boston: Shambhala.

Willis, J.O., Dumont, R. & Kaufman, A.S. (2011). Factor-analytic models of intelligence. In .J. Sternberg & S.B. Kaufman (Eds), *The Cambridge handbook of intelligence.* New York: Cambridge University Press.

Winn, F. & Bittner, A. (2005). Extended framework for older worker competence: Effects of cognitive complexity on performance. *International Congress Series 1280,* 35- 40.

Winsborough, D.L. & Sambath, V. (2013). Not like us: An investigation into the personalities of New Zealand CEOs. *Consulting Psychology Journal: Practice and Research, 65* (2), 87 – 107.

Zimmerman, D.W., & Williams, R.H. (2000). Restriction of range and correlation in outlier-prone distributions. *Applied Psychological Measurement, 24*, 267-280.