A CROSS-CULTURAL STUDY OF PARENTS' ESTIMATES OF THEIR OWN AND THEIR CHILDREN'S INTELLIGENCE IN A SAMPLE OF BLACK AND INDIAN SOUTH AFRICANS

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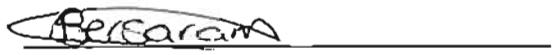
DECLARATIONS

Unless specifically stated to the contrary in the text, this thesis is the original work of the undersigned.



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I hereby declare that this thesis has been submitted for examination with my approval.

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ABSTRACT

This study investigated Black and Indian South African's estimates of their own intelligence and that of their first two children. Parents gave estimates for seven types of intelligence (Gardner's theory of multiple intelligences) and overall intelligence. The purpose of this study was to establish if gender and/or cultural differences existed in the estimates of intelligence. The participants were asked to complete a brief one-page questionnaire, the 'estimates of intelligence' questionnaire, which has been used in previous studies in this field (Furnham *et al.*, 2004; Furnham *et al.*, 2002a; Furnham & Mkhize, 2002; Furnham, 2000; Furnham *et al.*, 1999; Furnham & Baguma, 1999, Furnham & Gasson, 1998).

The results indicated that Indian South Africans gave higher estimates of intelligence than Black South Africans for their own intelligence and that of their children (first and second-born children). In addition, mothers were found to give higher self-estimates for musical intelligence than their male counterparts. No gender differences were found for parents' estimates of their first and second-born children. In comparing parents' estimates of their own intelligence as compared to their children, parents gave higher estimates of their own intelligence. The predictors of overall intelligence were also explored. Parents were also asked to answer six close-ended questions, which investigated their views of intelligence and intelligence tests.

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CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND TO THE RESEARCH

To contextualise this study an overview follows of explicit and implicit theories of intelligence, together with a brief summary of the research done in the field of estimates of intelligence. This chapter includes a statement of the research problem, as well as the research questions and hypotheses which will be investigated in this research. The justification for the research is discussed, which entails briefly exploring previous research in the field and the limitations of this research. The methodology section in this chapter gives the reader a preview of the research methods employed. This is followed by an outline of this report. To ensure consistency in the understanding of intelligence, race and culture, definitions of each of these concepts are highlighted. Finally, the chapter concludes by exploring the delimitations of this study.

1.1.1. Theories of Intelligence

Sternberg (1990 as cited in Furnham, 2001) distinguished between explicit and implicit theories of intelligence. He argued that explicit theories of intelligence are constructed by psychologists or other scientists and are based on data that are collected from individuals who perform tasks that are presumed to measure intellectual functioning. Implicit theories of intelligence are understood to be constructions of intelligence made by the lay community: these theories reside in individuals' minds. Implicit theories of intelligence have been investigated over the past 50 years. Furnham (2001) argues that implicit theories of

intelligence are useful to investigate in order to establish if there is regularity in lay communities' evaluations of themselves and psychologists' and other scientists' evaluations. In addition, it is argued that implicit theories may serve to complement or change explicit theories of intelligence. This study will investigate implicit theories of intelligence in the Indian and Black South African communities.

1.1.2. Estimates of Intelligence

Over the past decade, various studies (e.g. Furnham & Baguma, 1999; Furnham, Clark & Bailey, 1999, Furnham, 2000; Furnham, 2001; Furnham, Rakow & Mak, 2002b; Furnham & Mkhize, 2003) have been conducted on the estimates of intelligence. These studies began by investigating self-estimates and have broadened the scope of study by also investigating participants' estimates of their parents, grandparents, siblings, children, partners and famous people. The focus of the research conducted in this area has been on gender differences and, more recently, cross-cultural and generational differences as well.

The studies done thus far have found that females tend to underestimate their intelligence while males tend to overestimate their intelligence. This effect has been referred to as the 'male hubris and female humility effect' (Furnham, 2001; Furnham, Hosoe & Tang, 2002a). In addition, cross-cultural differences have also been found (Furnham & Baguma, 1999; Furnham *et al.*, 2002a). For example, Furnham and Baguma (1999) found that American students gave the highest self-estimates of intelligence, followed by African students and then British students. Further studies have established a generational effect whereby parents estimate their children's intelligence as being higher than their own (Furnham, 2001, Furnham *et al.*, 2002b).

1.2. RESEARCH PROBLEM

This study will investigate the existence or non-existence of gender and cultural differences in the estimates of intelligence in a sample of Indian and Black South Africans. As mentioned earlier, a consistent finding from most of the research in this field has indicated that males tend to overestimate their intelligence and females underestimate their intelligence. This study will serve to gather evidence in support or against this argument. A cultural comparison will also be investigated to establish if Indian or Black South Africans give higher estimates of intelligence. A possible generational effect in the estimates of intelligence will also be investigated.

1.2.1. Research Questions

The following research questions will be explored.

- Are there 'race' differences in the estimates of multiple intelligences?
- Are there gender differences evident in the estimates of multiple intelligences?
- Does a generational effect exist in the estimates of multiple intelligences?
- What are the best predictors of overall intelligence?

1.2.2. Hypotheses

The hypotheses made in this study are based on previous research findings in this field.

H1: Males (fathers) estimate their own overall, mathematical and spatial intelligence higher than females (mothers).

H2: Parents estimate their children's intelligence higher than their own.

H3: Parents rate the intelligence of their sons higher than that of their daughters.

H4: The best predictors of overall intelligence are mathematical and spatial intelligence.

1.3. JUSTIFICATION FOR THE RESEARCH

The justification for conducting this study is discussed by, firstly, exploring the rationale for investigating self-estimates of intelligence and, secondly, by discussing how individuals' positive perceptions of themselves can affect their mental health. Parental estimates of their children's intelligence are explored, highlighting the possible effects that these estimates have on children's performance. Finally, this section concludes by discussing the limitations in previous research and, therefore, the rationale for the present research.

1.3.1. Self-estimates of Intelligence

What is the purpose of investigating self-estimates of intelligence? Furnham *et al.* (2002b) suggest that self-estimates are not only important as these estimates explore lay theories of intelligence but this research also helps to understand "the possible self-fulfilling nature of self-evaluations of ability" (p.13). Beyer (1996 cited in Furnham *et al.*, 2002b) argues that self-evaluations affect an individual's expectations of success and failure and, therefore, his or her performance. Self-evaluations impose limitations on what individuals perceive they can accomplish, which has a direct effect on their education, socialization, employment and their life satisfaction.

An under estimation of intelligence can have serious implications for individuals' self-confidence and their psychological health (Furnham, 2001). While it is assumed that under-estimating intelligence can be harmful, over estimation can be just as damaging. Believing that one is of superior intelligence to others may lead to "arrogance and complacency" (Furnham, 2001, p.1382). This arrogance may further result in decreased effort, which may serve as a disadvantage to that individual (Furnham, 2001).

1.3.2. Positive Perceptions and Mental Health

Different perspectives exist on the theoretical understanding of mental health. Whereas some theorists conclude that mental health is due to an accurate perception of oneself and the world, other theorists have found that mental health is due to positive perceptions. These positive perceptions have been understood to include "unrealistically positive views of the self, exaggerated perceptions of personal control and unrealistic optimism" (Taylor & Brown, 1988, p.194). Positive perceptions appear to be mildly inflated thoughts of one's capabilities. Although some have argued that positive perceptions may serve as a disadvantage to individuals, this argument has been dismissed by the contradictory finding that positive perceptions are limited in leading the individual astray from reality due to the feedback he or she receives from others. Taylor and Amor (1996) argue that positive perceptions "are adaptive in most cultures, but that the specific form they assume is culturally dependent" (p. 892).

1.3.3. Parental Estimates of Intelligence

Parental estimates of their children's intelligence affects the manner in which they educate their children and children's self-perceptions of their intellectual ability. Growing up with the assumption of being less intelligent than other children can have huge repercussions to a child. These repercussions are often manifested in children's behaviour. An example of parents' estimates limiting their children's potential is the belief that their sons are more competent in mathematical and spatial intelligence than their daughters (Furnham *et al.*, 2002a). This belief may result in parents discouraging their daughters from venturing into these fields. This argument also applies to ethnic groups where some groups may erroneously classify themselves as less or more intelligent than others. This erroneous belief may affect individuals' expectations and evaluations of themselves, which may further affect their performance (Furnham, 2001).

Frome and Eccles (1998) investigated parents' influence on children's achievement related perceptions and found that parents' perceptions were more influential on children's perceptions of their ability than children's grades were. This finding supports the "prediction that parents' perceptions influence children's self concepts of ability and perceptions of task difficulty" (p.446). Mothers' perceptions of their children's intelligence were found to be influenced by 'gender-role stereotypic views', whereas fathers' perceptions were not.

1.3.4. Limitations in Previous Research

Most previous research in this field has been conducted in Western countries. South Africa is a country with deep-rooted inequalities due to the Apartheid era. To assume that the research

conducted in other countries is generalizable to South Africa is inappropriate. The only studies to date, which were conducted in South Africa, appear to be those of Furnham and Mkhize (2003) and Furnham, Mkhize and Mndaweni (2004). Mpofu (2002) argues that there are very few psychologists who are interested in investigating implicit theories of intelligence in sub-Saharan Africa. The limited number of psychologists in sub-Saharan Africa further decreases the research being conducted. In addition, the training that psychologists undergo is based on Western culture. More studies need to be conducted to better understand the Indian and African populations, hence the reason for this study. This research is aimed at replicating the study done by Furnham *et al.* (2004). The study will concentrate on investigating the cross-cultural differences in estimates of intelligence in a sample of Black and Indian South Africans, and will serve to expand the research done in the South African context.

Most of the research done thus far uses a sample consisting of university students, which limits the generalizability of the research. This research serves to broaden the understanding of the estimates of intelligence by using a broader sample of the population. The sample in the present study includes university staff members and the lay community (which formed the majority of the sample).

1.4. METHODOLOGY

A quantitative approach has been adopted in this research. The survey technique was used for data collection, where a sample of Indian and Black South Africans living in Pietermaritzburg were given a questionnaire to complete. The information gained from this questionnaire was coded and entered into SPSS. Thereafter, this information was analysed

using multiple analyses of variance, paired sample t-tests, chi-square and multiple regression. The methodology and analysis of the study will be explored further in Chapters Three and Four.

1.5. OUTLINE OF THIS REPORT

This thesis is divided into six chapters. Chapter One gives the reader a background to the research and a rationale for conducting the research. The research problem being investigated is discussed, together with the research questions and hypotheses. A brief overview of the methodology of the research is also discussed. Chapter One concludes with definitions of intelligence, race and culture.

Chapter Two is a critical appraisal of the literature in the field of intelligence, multiple intelligences and estimates of intelligence. Chapter Three elaborates on the methodology that has been used in this study. The research design is discussed. Demographic information of the sample and the "estimates of intelligence" questionnaire, the data collection instrument, are discussed. The chapter concludes by explaining the data collection procedure and the data analysis procedure.

Chapter Four reports the results that have been found using the hypotheses as a guide. Chapter Five expands on chapter four by reviewing the results in the context of previous research that has been conducted in the field. Consistencies and inconsistencies within the results are noted and possible explanations given. Chapter Six explores the possible implications of the findings to policy, further research and practice. A discussion of the limitations of this research is included, together with recommendations for future research.

1.6. DEFINITIONS OF TERMS

To establish uniformity in the understanding of intelligence, culture and race, these terms are defined based on the context in which they are used in this research.

1.6.1. Intelligence

This thesis is guided by Gardner's understanding of intelligence where intelligence is understood to be "human cognitive competence that can be described as a set of abilities, talents and mental skills" (Gardner, 1993, p. 15). In addition, intelligence is seen as the ability to solve problems with respect to an individual's cultural background or community. Intelligence is, therefore, understood as being a combination of an individual's intellectual competencies that have been developed by societal structures. In effect, intelligence is not seen to be the result yielded from an intelligence test (which mostly tests linguistic and logical intelligence) but intelligence is seen as an individual's capabilities, which have been developed based on the demands of his or her community.

Gardner (1993) postulates that "intelligence is a biopsychological potential" (p.51). He argues that intelligence is the combination of genetic inheritance and psychological factors. These psychological factors range from the individual's cognitive attributes to his or her personality disposition.

Gardner's definition of intelligence incorporates the elements above, where he defines intelligence as "a biopsychological potential to process information in certain ways, in order to solve problems or fashion products that are valued in a culture or community" (Gardner,

1993a as cited in Shearer, 2004, p.3). In this definition of intelligence Gardner highlights three facets of intelligence. Firstly, intelligence is the ability to solve problems. Secondly, intelligence is not limited to logical problem solving and convergent thinking and, finally, intelligence is not isolated to one's head: the materials and values of the situation also inform how thinking occurs (Shearer, 2004).

1.6.2. Culture and Race

Different definitions of culture exist based on the context in which it is used. D'Andrade (1995 as cited in Cole, 1996) argues that culture is "the entire content of a group's heritage, including both its cultural schemas and models and its material artefacts and cultural practices" (p. 129). Edward Hutchins (1995 as cited in Cole, 1996) argues that culture is a process rather than a "collection of things, whether tangible or abstract" (p. 129). He further argues, "culture is a human cognitive process that takes place both inside and outside the minds of people. It is the process in which our everyday cultural practices are enacted" (p.129). Swartz (1998) defines culture as being about "the process of being and becoming a social being, about the rules of society and the ways in which these are enacted, experienced, and transmitted" (p. 7).

Race in the biological sense is understood to be "a group of individuals or populations which form a recognizable sub-division of the species. The group is identified by the fact that the individuals within it share characteristics which distinguish them from other sub-groups of the species" (Bodmer, 1972, p. 83).

Given the background of South Africa, namely the Apartheid Era resulting in the segregation of races, the views of people from different racial groups is seen to be a crucial concept to investigate in this context. The Indian and Black South African populations are hypothesised to share similar values and beliefs and hence the interest to investigate the views of these cultural groups. The hypothesis of the Indian and Black South Africans being similar is made based on both these races having a collectivistic culture. The above definitions of culture are used as the basis for this thesis. Culture in this thesis is understood to be a set of beliefs and values shared by a group of people. These beliefs are carried through from one generation to the next by the learning process. Race is used to make the distinction between the Black and Indian populations in South Africa.

1.7. DELIMITATIONS OF SCOPE AND KEY ASSUMPTIONS

This study was conducted using a sample of Black and Indian South Africans from KwaZulu-Natal, in the Pietermaritzburg area. The rationale for conducting the research in this sample was to explore the similarities and differences in the Black and Indian communities. Since the study has been conducted with a sample of Indian and Black South Africans, the research findings can only be generalised to the Indian and Black South African community. The bulk of the research participants have been English and *IsiZulu* speaking. Therefore, the study is potentially generalizable to these communities.

1.8. CONCLUSION

In this chapter a background to the research has been discussed, together with the rationale for conducting this study. The research problem and questions are stipulated. A brief section

is included on the methodology of the research. Intelligence, race and culture are defined to ensure that the reader has an understanding of the manner in which these terms are understood in the study. The chapter also includes an outline of the chapters so that the reader gets a quick overview of what follows.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL BASE

The review that follows begins with a critical appraisal of traditional approaches to intelligence. Theoretical contributions highlighted in this appraisal include Sir Francis Galton, Alfred Binet, Charles Spearman and Jean Piaget. Biological approaches to intelligence, particularly the nature-nurture debate, are also discussed. The 'symbol systems' approach, which is an alternative to the above approaches, is explored. Thereafter, Gardner's theory of multiple intelligences is explored highlighting the theory's strengths and areas of development. The assessment of multiple intelligences and the implementation of this theory in educational settings are discussed. The theory of multiple intelligences and learning styles is explored. Differences between these theories are examined, concluding with the prospect of the theory of multiple intelligences and learning styles complementing each other.

The latter part of this review discusses estimates of intelligence by focusing on the research that has been done investigating gender differences, cross-cultural differences and generational differences in the estimates of intelligence. Possible explanations for these differences are considered. Studies that have been conducted in South Africa are also explored. This review is intended to explore the gaps in the research currently done and thereby further highlight the rationale for this study.

2.1. TRADITIONAL APPROACHES TO INTELLIGENCE

Early efforts of psychology were initially focused on the "principles of human information processing" (Gardner, 1983, p.15). These included the study of functions such as attention,

memory, perception and learning. Individual differences in abilities were also explored. Sir Francis Galton developed statistical methods to categorize individuals in terms of their physical and intellectual capacities. Soon thereafter Alfred Binet and his colleagues developed the first intelligence test to compare individuals' scores (Gardner, 1983). Charles Spearman, inspired by Galton's work, established a two-factor theory of intelligence (Gardner, Kornhaber & Wake, 1996).

2.1.1. Charles Spearman's Two-Factor Theory of Intelligence

The first factor in Charles Spearman's theory was known as general intelligence or 'g', and the second factor as specific intelligence or 's'. Spearman (as cited in Gardner *et al.*, 1996) argued that general intelligence was "used to some extent in all intellectual tasks" while specific intelligence was "whatever ability was unique to carrying out a given task and that such factors were unrelated across tasks" (p.60). Spearman's argument was based on the assumption that there was "a single, physiological based entity" which he termed 'g' that explains intellectual performances of various types (p.66). In addition, Spearman further argued that 'g' was used to measure a neurologically based 'power' that drives an individual's ability to do intellectual work. These conclusions were arrived at statistically by correlating tests of different abilities. Spearman found these tests to correlate positively with each other and concluded that there must be one common factor to all these tasks (Gardner *et al.*, 1996).

Although Spearman firmly believed in his hypothesis, he met with some criticism. These criticisms centred around two aspects. The first criticism involved whether 'g' actually existed. This criticism was based on the fact that Spearman's findings showed no evidence of

"an underlying entity in the nervous system" (Gardner *et al.*, 1996, p.66). The tests were shown to measure a mixture of different underlying processes rather than one process. The second criticism questioned the number of entities or factors that should represent intelligence. Using factor analysis, some critics argued that there were other factors of equal importance to 'g' that needed to be considered. Other critics argued that although 'g' was at the top of the hierarchy there were other factors as well (Gardner *et al.*, 1996).

Gardner (1993) argued that the tests that were used as evidence for 'g' were mostly tests that measured linguistic and logical intelligence. He further argued that although these tests may be useful to predict success in school, these tests were not a good indicator of success outside school. In addition, although Gardner agreed with the criticism that there exists more than one factor with regard to intelligence, he disagreed with the method of factor analysis to establish these factors. Gardner argued that the output received from factor analysis is based on mathematical assumptions and that factor analysis is no different from the items used in intelligence tests.

2.1.2. Piaget's Contribution

Jean Piaget, a Swiss psychologist, became interested in the reasoning behind children's incorrect answers in intelligence tests. He put more emphasis on the process rather than the end result. Piaget made a remarkable and different contribution to the understanding of human cognition. He understood human cognition from the standpoint of individuals trying to make sense of the world. He further argued that individuals developed hypotheses in efforts to understand the world. Piaget developed a theory of cognitive development where

he explained the different developmental stages that an individual encounters at different periods in his or her life (Gardner, 1983).

2.1.2.1. Piaget's Theory of Cognitive Development

Piaget's theory of cognitive development included four stages namely the *sensorimotor stage* (birth to 2 years), the *stage of preoperational thought* (2 to 7 years), the *stage of concrete operations* (7 to 11 years) and the *stage of formal operations* (11 years through to the end of adolescence). Piaget argued that each stage of cognitive development is a precondition for the next one. The rate at which children progress through the stages is dependent on cultural and environmental factors (Kaplan & Sadock, 1998).

In the *sensorimotor stage* infants acquire information through sensory observation and develop control of their motor functions through their interaction with the environment. Infants initial movements are reflexive, "for example, infants are born with a sucking reflex" (Kaplan & Sadock, 1998, p.140). Thereafter infants' movements become more planned as they interact with the environment. For example, an infant may crawl behind the couch for a hidden toy. The main task of the sensorimotor stage, which the infant has to achieve, is object permanence. Object permanence refers to the infant's understanding that an object exists even when that object is not in the infant's presence (Bukatko & Daehler, 1995).

The *stage of preoperational thought* involves children using symbolic representation and language. At this stage of development children acquire information without the use of reasoning. They are, therefore, unable to see a cause and effect relationship. In addition, children do not understand the principle of conservation. The principle of conservation is the

child's ability to recognise that objects remain the same based on other characteristics even though the shape changes. During this stage, due to the child's not being able to understand the principle of conservation, if a child sees an individual pouring the same amount of water from a narrow long container to a wide short container the child will argue that the quantity has changed. Children at this stage of cognitive development appear to be egocentric. Life is seen from the child's perspective and the child assumes that others see life from their perspective as well (Kaplan & Sadock, 1998; Bukatko & Daehler, 1995).

In the *stage of concrete operations* children develop the ability to see things from the perspective of others. This stage is so named as "children operate and act on the concrete, real and perceivable world of objects and events" (Kaplan & Sadock, 1998, p.142). Children develop the understanding of two important concepts during this stage: the principle of conservation and reversibility. A child in this stage will, therefore, be able to understand the conservation of liquid task, as explained in the preoperational stage, whereby the shape of the object changes but the quantity of the liquid remains the same. The principle of reversibility refers to the child's ability to understand that objects have the capacity to be transformed and that object transformation can be undone (Kaplan & Sadock, 1998).

In the final stage of development, the *stage of formal operations*, children operate in a "highly logical, systematic and symbolic manner" (Kaplan & Sadock, 1998, p.142). Children begin to think abstractly, whereby their interest broadens to a variety of topics, such as religion, philosophy and ethics. In addition, children begin to reason deductively where they make hypotheses and test them against reality. Piaget argues that not all adolescents proceed to the stage of formal operations. Piaget further argues that progress to this stage is

dependent on an adolescent's biological predisposition and environmental factors (Kaplan & Sadock, 1998).

2.1.2.2. Critical Overview of Piaget's Theory

Although Piaget's contribution to the understanding of human cognition has been valuable, there also exist some limitations to his theory. Piaget has been criticised for his stages of development being rigid, as it has been hypothesised that these stages are more continuous and gradual. In addition, although the tasks that Piaget set out for children to achieve in each stage are more complex than those set out in intelligence tests, these stages are still not reflective of the tasks that individuals are expected to perform in their daily lives. The instruments used in Piaget's tasks are not instruments that individuals use in their daily lives. This is particularly the case for non-Western cultures (Gardner, 1983).

Piaget has also been criticised for devising tests to assess different tasks based on Western culture. Kamara and Easley (1977) argue that an interviewer assessing the tasks set out by Piaget in non-Western cultures should be attuned to that particular culture and language. Physical transformations of the conservation task into substances that are used by individuals on a daily basis are encouraged. Kamara (1971 as cited in Kamara & Easley, 1977), for example, used plasticine balls in the study investigating the concept of conservation in Themne families. Plasticine was used as it resembled the texture of rice flour cakes, which are used in this culture. Another cross-cultural barrier that needs to be considered entails the manner in which children relate to adults, based on their culture. Even if one is familiar with the culture, this may be overlooked or difficult to overcome (Kamara & Easley, 1977).

It has been further argued that although Piaget criticises the notion of an I.Q. for being embedded in language, his tasks are mostly conveyed verbally as well (Gardner, 1983). This results in his tasks not being cross-culturally applicable unless the tasks are translated into different languages and the meanings and goals of the initial tasks are ensured. Translating tasks into a different language may be problematic, as the literal translation from one language to the next does not necessarily ensure effective communication and the same meaning. In the Themne culture, for example, the literal translation for "it must be the same" sounds ambiguous and awkward. Therefore, this statement is translated as "one of us cannot have more than the other" (Kamara & Easley, 1977, p.37).

Piaget's theory of cognitive development has also been criticised for being too individualistic: children are seen to construct information through their actions in the world. His theory, therefore, seems to underestimate the importance of culture and the environment on intelligence (Cole and Wertsch, 1996). The importance of culture was emphasised in the study on conservation done by Kamara (1971 as cited in Kamara & Easley, 1977) in Themne families. When asked who would have more rice cakes (after the plasticine balls were adjusted from initially being equal) the children answered based on the other children's age. If the child they were paired with was older, the child reported that the other child would have more and if the child they were paired with was younger, the child reported that the other child would have less. On further investigation it was established that in the Themne culture older children receive a larger share.

Sutherland (1992) argues that Piaget does not take individual differences into account, such as a child's personality, gender and intelligence. He argues that a child who is an introvert, for example, may progress through the stages of cognitive development faster than a child

who is an extrovert. Sutherland (1980 as cited in Sutherland, 1992) found no significant gender differences in the achievement of the stages of concrete and formal operations. He does argue, however, that these results may not be representative as a small sample was used (Sutherland, 1992).

Piaget argues that his theory is universal irrespective of cultural background. He advocates that every child will undergo the same "structure and sequence of the stages of development" (Brown & Desforges, 1979, p.61). Cross-cultural studies have been done to investigate this hypothesis. Formal operations thinking has been found to be 'absent' in certain societies. Watson and Johson-Laird (1972 as cited in Brown & Desforges, 1979) found that the stage of formal operations was not evident in highly educated Western students. In addition, the stage of concrete operations did not seem to be present in all human beings. A 'developmental lag' has also been evident in some societies. These societies appear to be slower in development when compared to Western societies (Brown & Desforges, 1979). This may not necessarily be a 'developmental lag', however, as some societies have different conceptions of intelligence, rendering the standard assessment methods inappropriate

The cross-cultural studies that have been conducted are not without methodological problems. As already mentioned, these refer to the language difficulty and not being certain that the meanings of concepts are the same across languages. Cross-cultural studies also need to make use of culture fair tasks, even though such tasks appear to be difficult to establish. Different cultures seem to interpret tasks differently, which makes meaningful cross-cultural comparisons difficult. The claims made by Piaget, therefore, are difficult to investigate in cross-cultural communities (Brown & Desforges, 1979). The research already done in the

area suggests, however, that children of different cultures learn to think in different ways (Cohen, 1983).

Kamara (1971 as cited in Kamara & Easley, 1977) seems to have overcome some of the above difficulties. In his study investigating the concept of conservation in Themne families, Kamara was a native speaker of Themne (therefore overcoming the language barrier) and he made use of culture-fair tasks, such as plasticine balls to represent rice cakes, as mentioned above. Kamara (1971 as cited in Kamara & Easley, 1977) found that "conservation of substance appears a year earlier in Geneva among the Themne schooled children, and conservation of weight and volume appears a year later" (p.38). From this study it does seem apparent that culture-fair tasks are possible and provide valuable information.

2.1.3. Criticisms of the above Theories of Intelligence

The overarching criticisms of the above theories of intelligence have been that these theories focus on logical and/or linguistic problem solving; they ignore biological foundations of intelligence; they do not account for creativity and are also insensitive to societal contributions to intelligence (Gardner, 1983). Different cultures may encourage different competencies based on their societal needs, which are usually based on subsistence demands (Ogbu, 1995). Barry *et al.* (1959 as cited in Ogbu, 1995) provides an example of this by discussing the characteristics that are valued in high-food-accumulation societies. Individuals who are "conscientious, compliant, responsible and conservative" are valued in high-food-accumulation societies (p. 255). These qualities are valued as the food supply needs to be protected and the high accumulation of food needs to be maintained throughout the year (Ogbu, 1995).

Societal needs are governed by cultural beliefs based on age and gender-appropriate behaviour. This may, therefore, result in parents adapting their childrearing practices to suit the needs of their society. Childrearing practices are usually established based on trial and error. Once appropriate childrearing practices are established these practices are shared in the community and evolve through the generations. Cohen (1965 as cited in Ogbu, 1995) investigated the Kanuri tribe of Nigeria, which provides an example of the manner in which childrearing practices are tailored to suit the society's needs. In the Kanuri tribe loyalty, obedience and servility are valued. These behaviours are rewarded in relationships that children have during childhood, namely parent-child and teacher-learner relationships, to ensure that children learn to behave appropriately (Ogbu, 1995).

2.1.4. Intelligence: The Nature-Nurture Debate

Gardner (1983) argues that human growth is flexible, especially in the early months of life. This flexibility, however, is limited by the genetic predispositions of individuals, which seem to guide their development along certain paths. The flexibility of human growth, with its restrictions, is applied to intellectual development, particularly when human beings are faced with intellectual challenges. Work in neurobiology suggests that there exist functional units in the nervous system whereby different parts of the nervous system are responsible for different intellectual competencies. This suggests a biological foundation for different types of intelligence (Gardner, 1983).

While some argue that genetic influences shape intelligence, others postulate that environmental factors play a role as well. This has led to the longstanding nature-nurture debate. The nature-nurture debate has periodically shifted from the nature standpoint, where

intelligence is argued to be genetically based, to the nurture standpoint, where intelligence is seen to be environmentally based. Efforts have been made to investigate the effects of genetics and environmental factors on intelligence. This research has been done by investigating the intellectual differences of identical and fraternal twins reared together and apart. It should be noted that most research has relied on I.Q. testing, which may not be the best indicator of intelligence. In addition, methodological difficulties have also been experienced during the research (Bukatko & Daehler, 1995). As Cohen (1999) argues, research in the nature-nurture field is not truly experimental. This is a result of twins and adoptive children not being randomly assigned to different rearing environments, which would be ideal to establish the conclusive results regarding the effects of genetics and the environment. Most twins, for example, are usually reared by the same parents. In addition, due to the screening process involved when adopting a child, adoptive children are generally placed with parents who are emotionally secure and who are of above average intelligence.

Bearing the above difficulties in mind, research has found that genetic and environmental factors have made an equal contribution to the field of intelligence. From the research, "individuals who were reared together showed higher correlations than those with the same genetic relationship but reared apart" (Bukatko & Daehler, 1995, p. 107). In addition, genetic influences were also shown, as correlations increased as the similarity in genotype increased (Bukatko & Daehler, 1995). Nichols (1978 as cited in Scarr & Carter-Saltzman, 1982) compared the intelligence of monozygotic and dizygotic twins. He found a higher correlation between monozygotic twins than dizygotic twins. He further established that "being genetically related and reared as twins in the same family" were determinants of individual differences in intelligence (p. 827).

Newman, Freeman and Holzinger (1937 as cited in Scarr & Carter-Saltzman, 1982) and Shields (1962 as cited in Scarr & Carter-Saltzman, 1982) investigated the intelligence of monozygotic twins reared apart for most of their growing lives. These twins, however, were "not entirely separated and not reared in uncorrelated environments" (p. 833). The average I.Q. correlation of the monozygotic twins reared apart was higher than that for the dizygotic twins reared together. These results highlight the importance of genetics in intelligence. Scarr & Weinberg (1976 as cited in Scarr & Carter-Saltzman, 1982) investigated transracial adoption and the effects on intelligence with a sample of Black and interracial children being reared by White families. The results showed that the adopted children's I.Q. scores were higher when compared to children reared in the Black community. Scarr & Weinberg (1976 as cited in Scarr & Carter-Saltzman, 1982) therefore concluded that "(a) genetic racial differences do not account for a major portion of the I.Q. or academic test performance difference between racial groups, and (b) black and interracial children reared in the culture of the tests and the schools perform as well as white adopted children in similar families" (p. 853).

Cohen (1999) investigated parental influences on their children's intelligence. Cohen (1999) reported that parental intelligence was found to predict children's academic achievement. This was found in research where childrearing – therefore parenting styles – was held constant and using a sample of parents with variations in intelligence. A possible social explanation for this finding is that intellectual parents provide more stimulation for their children. Contrary to this, however, Cohen (1999) argues that parental intelligence may predict children's academic achievement due to parents transmitting their genetic potential to their children.

Cohen (1999) further argues that parenting has a very limited influence on intelligence. Cohen (1999) gives the example of a pair of twins who lived with their father and stepmother in extremely abusive conditions for approximately seven years. After being removed from the abusive environment, the children were placed with another family. When assessed during adolescence the children had an average intelligence, which Cohen (1999) attributes to his hypothesis that the Czech population (the children were Czech) have an average intelligence, the children's parents having an average intelligence and due to the children not showing evidence of brain damage. Cohen (1999) argues that once a child's stress is withdrawn or the child is placed into a caring environment, the child's previous dispositions will appear, which is a result of the child being resilient. Although Cohen (1999) does make minimal reference to a caring environment being beneficial to the child, he does not explore this influence in any great depth. In the case given above, for example, Cohen does not explore the new environmental and family contributions that may have accounted for the children's average intelligence.

The longstanding nature-nurture debate appears to be a debate that will continue in the field of psychology. What seems to be known thus far is that both genetic and environmental factors influence intellectual development even though it is not known with certainty the exact influence that each of these factors have on intelligence (Bukatko & Daehler, 1995).

2.1.5. The "Symbol Systems" Approach

The "symbol systems" approach adopts an alternative point of view to the above theories. This approach shifts away from the focus of external behaviour to a focus on the human mind. Human thought is examined by focusing on the symbolic vehicles used to

communicate these thoughts, such as language, music and mathematics. David Feldman (as cited in Gardner, 1983) postulated that some symbolic systems, such as language, are universal whereas others, like music, are restricted or encouraged by the individual's culture. Scholars of the symbolic systems approach advocate that the preschool years (i.e. two to approximately seven years) are the years when children are tasked to master the symbolic systems in their culture. Children are expected to master three central aspects of symbols in order to use them. These are the syntax, semantics and pragmatics of the symbolic systems. Syntax refers to "the rules that govern the ordering and organisation of the symbol system", semantics refers to the "meaning of the symbols" and pragmatics refers to "the functions of the symbols" (Gardner, 1991, p. 57). Symbolic systems seem to be independent of each other and as such progress in one symbolic system does not indicate progress in others. This appears to be a result of the different syntactic properties inherent in each symbolic system. For example, Gardner (1991) explains that the syntactic properties of music are "the organisation of tonal pitch structure – the appreciation that there exists a basic, organising key and that certain tones occupy privileged positions within that tonal structure" (p. 73). Progress in the understanding of music does not seem to have any relationship to progress in other symbol systems. The semantics of symbolic systems, however, begin in one symbolic system and thereafter are carried across to other systems. For example, at the age of approximately three years old the child is able to make a topographical map of objects. If asked to draw a cat, the child will draw two circles, one on top of the other, illustrating that the top circle is the head and the bottom circle is the body. This mapping is transferred to other symbolic systems. For example, if a child is learning a song that has various changes in pitch, the child will convert the song to sharp changes in high and low pitch only (Gardner, 1991).

At the same time at which the child learns to master symbolic systems he or she simultaneously uses these symbolic systems to make sense of the world (Gardner, 1991). At the age of approximately six, Gardner (1982 as cited in Gardner, 1993) argues that children should be able "to create and understand stories, works of music, drawings, and simple scientific explanations" (p. 168). First-order symbolic systems are distinguished from second-order symbolic systems. First-order symbolic systems refers to the practical knowledge that children acquire before school, based on their culture. Second-order symbolic systems refers to the notational systems such as writing and numbers that children are required to master at school. Children may find the second-order symbolic systems problematic to master even though they experienced no problems with the first-order symbolic systems. The difficulty with this is that formal testing is limited to testing second-order symbolic systems, which disadvantages individuals who have not mastered these systems (Bamberger, 1982, Gardner, 1986, Resnick, 1987 as cited in Gardner, 1993).

2.2. THE THEORY OF MULTIPLE INTELLIGENCES

Gardner's (1993) theory of multiple intelligences stems from "dissatisfaction with the concept of I.Q. (Intelligence Quotient) and with unitary views of intelligence (e.g. Spearman's 'g')" (p. 7). Gardner argued that unitary views of intelligence are one-dimensional. He further argued that traditional views of intelligence only focused on logical-mathematical intelligence and linguistic intelligence. Gardner suggested a total shift from tests and correlations among tests "to more naturalistic sources of information about how people around the world develop skills important to their way of life" (p. 7).

These sources of information included

> knowledge about normal development and development in gifted individuals, information about the breakdown of cognitive skills under conditions of brain damage, studies of exceptional populations, and data about the evolution of cognition, cross cultural accounts of cognition, psychometric studies and psychological training studies (Sternberg & Wagner, 1986, p. 166).

After considerable research Gardner (1993) proposed a list of seven preliminary types of intelligence. These types of intelligence were based on skills that are universal to human beings. Although the different types of intelligence are discussed separately, a combination of these types is often used to execute a task. There has been evidence to suggest, however, that these multiple intelligences are independent of each other. This suggests that losing a particular skill due to brain damage, for example, does not imply loss of all skills (Sternberg & Wagner, 1986). Gardner (1983) noted that his theory of multiple intelligences might not be exhaustive. He further explained that not all researchers may ascribe to his theory. However, his theory does contribute to a further understanding of human intelligence.

2.2.1. Gardner's Criteria of Intelligence

Gardner's theory emerged from previous psychological studies (Gardner, 1983, Gardner, 1999, Sternberg, 1998 as cited in Denig, 2004). Although he does advocate the following criteria of intelligence, Gardner does admit that his theory lacks experimental research (Denig, 2004). Gardner postulates that an ability may be considered an intelligence only if the following criteria are met (Denig, 2004):

- The ability must emanate in the brain so that injury to the brain may deny an individual that specific ability, for example, a strike to the head resulting in the loss of mathematical ability.
- The ability must stem from our evolutionary history whereby early ancestors displayed this ability.
- There must be core operations that are associated with that ability. For example, pitch and rhythm are core operations of musical ability.
- The ability must be predisposed to be encoded in symbols. For example, mathematical ability can be symbolically represented.
- The ability should have a distinctive developmental path for an individual to become an expert in that skill, for example, the developmental path experienced to achieve linguistic ability.
- The ability is characterised by the existence of idiot savants, prodigies and other remarkable people.
- Evidence exists from experimental psychology that this ability is independent of other abilities. For example, an individual can write and talk concurrently as these involve two different types of abilities – linguistic ability and bodily-kinaesthetic ability.
- The ability has been supported by psychometric findings. For example, a violinist may score high in musical ability but low in mathematical ability.

2.2.2. Gardner's Seven Types of Intelligence

Based on the above criteria of intelligence being met, Gardner (1993) initially proposed seven types of intelligence. Highlighting that the initial list was a preliminary one, Gardner later added three more types of intelligence. Each type of intelligence is discussed below:

- **Linguistic intelligence** - the ability to be sensitive to spoken and written language and to learn languages (Gardner, 1993). In addition, individuals who have high linguistic intelligence are able to argue, persuade and instruct effectively through word usage (Goldman & Schmalz, 2003).

- **Logical/mathematical intelligence** - as the name suggests, the capacity to analyse problems logically, to solve mathematical problems and to be scientifically minded (Gardner, 1993). Possessing this type of intelligence includes having the ability to "reason, sequence, think in terms of cause and effect, create hypotheses and enjoy a generally rational outlook on life" (Goldman & Schmalz, 2003, p. 87).

- **Spatial intelligence** - the ability to form a mental image of an environment and to be able to use that image to move around (Gardner, 1993). In addition to forming a mental image, this type of intelligence also entails thinking in pictures and images (Goldman & Schmalz, 2003).

- **Musical intelligence** - having the skill to perform, compose and appreciate musical patterns (Gardner, 1993).

- **Bodily-kinaesthetic intelligence** - the ability to use one's whole body or parts of the body to solve problems (Gardner, 1993). This intelligence involves "good tactile sensitivity", the need to move around frequently and the need to get 'gut reactions' to things (Goldman & Schmalz, 2003, p. 88).

- **Interpersonal intelligence** - the ability to understand and notice differences among people with regard to individuals' mood states and temperaments (Gardner, 1993).

- **Intra-personal intelligence** - the capacity to understand one's emotions and the ability to use this understanding to guide one's own behaviour (Gardner, 1993).

Furnham, Tang, Lester, O' Connor and Montgomery (2002d) mention that Gardner later added three more types of intelligence, which were:

- **Naturalist intelligence** - the ability to understand one's environment – the flora and the fauna.
- **Spiritual intelligence** - the ability to master concepts about being, but also the craft of altering one's consciousness in attaining a certain state of being.
- **Existential intelligence** - being able to locate oneself with respect to existential features of the human condition.

The additional three types of intelligence, mentioned above, will not be investigated in this study.

2.2.3. Criticisms of Gardner's Theory of Multiple Intelligences

Like Spearman's theory, Gardner's account of intelligence has also been criticised. Morgan (1996, as cited in Furnham *et al.*, 2002d) argues that Gardner "did not discover new intelligences but rather reframed and renamed cognitive styles" (p. 3). There have been doubts as to whether Gardner's different types of intelligence are "truly independent or even

meaningful" (Furnham *et al.*, 2002d, p. 3). The factor analytic work that has been done on the various types of intelligence has not reproduced the structure of Gardner's theory. This factor analytic work has found evidence of three factors. These factors are verbal (which consists of linguistic, intra-personal and interpersonal intelligence), numerical (which consists of mathematical and spatial intelligence) and cultural (which consists of musical and bodily-kinaesthetic intelligence) (Furnham *et al.*, 2002d).

Gardner's theory has also been criticised on the grounds that it has not been subjected to any meticulous experimental tests. It has, therefore, been argued that this theory has no explicit or implicit validity (Furnham *et al.*, 2002d). Further, others have questioned whether Gardner's 'theory' of multiple intelligences should be considered a theory at all. This argument is based on the premise that Gardner's theory has not been confirmed by experiments; therefore, the theory cannot be contrasted with competing theories (Sternberg & Wagner, 1986). The theory of multiple intelligences has also been criticised for relying heavily on evidence from individuals with exceptional abilities. In addition, Klein (2003) argues that Gardner is not able to attribute a single neurological structure to the different types of intelligence. This serves as a criticism as it is in contrast to theories of cognitive structure that support the finding that various psychological functions are carried out in different areas of the brain.

2.2.4. Strengths of Gardner's Theory

Despite the above-mentioned criticisms Gardner's (1993) theory of multiple intelligences has gained vast popularity. This may be attributed to the fact that it is based on lay theories of intelligence and is, therefore, understandable to the layperson. Furnham *et al.* (2002d) have

argued that the popularity of Gardner's work may also be attributed to the fact that his theory makes intelligence less male normative. Educators have found merit in his dimensions of intelligence, as they are helpful in highlighting learners' strengths and weaknesses with a particular focus on enhancing learners' strengths (Denig, 2004).

Denig (2004) further argues that Gardner's theory's strength also lies in the fact that it is child-centred. The theory of multiple intelligences is aimed at establishing children's innate ability and developing these abilities rather than requiring them to learn academic information that is irrelevant to their context. Although traditional curriculum courses do have merit (for example, they may enable individuals to gain entry into tertiary institutions) not all individuals have linguistic and mathematical abilities. If a child, for example, is inclined to sing and understand music, this child will be encouraged to study music rather than one of the traditional curriculum courses, like English and Mathematics. In addition, Denig (2004) argues that this theory encourages children to enhance their capacity to become responsible human beings. This is accomplished by focusing on the child's strengths. Finally, this theory challenges educators to find different means of imparting knowledge to different learners based on the learner's innate abilities. For example, if a learner's innate ability is inclined towards spatial intelligence the educator should explain information to the learner in diagrammatic form, thereby ensuring that it is easy for the learner to understand.

2.2.5. Assessment of Multiple Intelligences

After the theory of multiple intelligences was developed, interest arose to establish assessment tools to test the different forms of intelligence. Gardner (1993) was aware of the need to develop a fair means of assessment and not retreat to the logical and linguistic

domain. Gardner (1993) defines assessment as a means to obtain "information about the skills and potentials of individuals, with the dual goals of providing useful feedback to the individuals and useful data to the surrounding community" (p. 174). He distinguishes assessment from testing by arguing that testing uses formal instruments that are administered in "neutral, decontextualised settings" (p. 174). Gardner (1993) proposes that assessment, however, should take place in an environment that is familiar to the individual and with tasks or projects that the individual is regularly engaged in. Experimental evidence has established that assessment materials designed for one audience cannot be directly used in another cultural setting (Gardner, 1993).

Gardner's (1993) aim was to use different assessment tools to assess different forms of intelligence. Gardner (1993) argued that the materials used to articulate the different forms of intelligence should be used to assess them. For example, bodily-kinaesthetic intelligence should be assessed by how an individual learns and remembers a physical exercise. Gardner (1993) further postulated that efforts should be made to establish intelligence-fair assessments whereby the type of intelligence should be assessed directly rather than indirectly through the traditional linguistic and logical domains.

Gardner (1993) further argued that the context of an individual influences the types of intelligence that are enhanced. For example, parents who would like their son to be athletic (bodily-kinaesthetic intelligence) would encourage the child to play sport. An individual's context should, therefore, be considered during assessment. Sternberg (2002) argues that different contexts can be very influential on an individual's performance. Sternberg (2002) illustrates this point by giving the example of the study done by Carraher, Carraher and Schliemann (1985 as cited in Sternberg, 2002). Carraher, Carraher and Schliemann (1985)

found that Brazilian street children who were very capable of managing mathematics in their street business found mathematics difficult when it was removed from their real life context.

Gardner (1993) argued that interaction should be encouraged during assessment. Sternberg *et al.* (2002) highlight this point in the study done in Tanzania using dynamic testing. Dynamic testing involves individuals being tested and inferences being made. In addition to this, individuals are also given feedback that is aimed at assisting them to improve their scores. Sternberg *et al.* (2002) administered pre- and post-testing. Tests were administered to the Tanzanian children and thereafter the children were given brief feedback (5-10 minutes). After the feedback the tests were re-administered. In comparison to a control group (who were not given feedback but to whom the pre-test and post-test were administered) significant differences were found. Sternberg *et al.* (2002) found that children who were given feedback showed statistically greater differences on the pre-test as compared to the post-test.

Gardner's hypothesis of the importance of interaction during assessment is conceptualised by Vygotsky (1978) by means of the concept of the zone of proximal development. The zone of proximal development "is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). The child's actual developmental level refers to those functions that a child has developed and can execute independently. The zone of proximal development refers to those functions that a child has not yet developed. These functions are at the beginning stage of development and it is assumed that these functions will develop with assistance. Vygotsky (1978) argues that the functions that are in the zone of proximal development will move to the actual development level. Vygotsky (1978) states "what a

child can do with assistance today she will be able to do by herself tomorrow" (p.87). This is achieved through the child internalising the functions observed through interaction with others (Vygotsky, 1978).

Feuerstein, Rand and Hoffman (1979) have been instrumental in using the concept of the zone of proximal development and developing different assessment procedures. Feuerstein *et al.* (1979) propose that assessments should establish the individual's potential to benefit from learning and, therefore, can only be established through an interactional process. Following from this hypothesis, Gardner (1993) postulates that instead of using assessment to place individuals into categories based on their intellectual performance and possibly limiting their growth, assessments should be used to focus on an individual's "adult end state" that is valued by his or her community.

Feuerstein *et al.* (1979) developed the Learning Potential Assessment Device (LPAD). In this assessment the examinee is presented with a task and given the required training to solve this task. After the examinee successfully completes this task he or she is given more complex tasks to complete based on the initial task. Different modalities of presenting the tasks are used to establish the examinee's preferred modality. These modalities include logical-verbal, spatial, numerical, pictorial-concrete, verbal, figural, etc. Feuerstein's use of different modalities can be linked to Gardner's theory of multiple intelligences whereby Gardner challenges educators to use different means of imparting knowledge to learners based on the child's innate ability.

Like Feuerstein *et al.* (1979), Gardner also places emphasis on the interaction between the educator and the learner during assessment, which Feuerstein *et al.* (1979) term a "mediated

learning experience" (p. 95). Feuerstein (1980 as cited in Shayer, 1997) argues that a mediated learning experience is one in which "various mediating agents – parents, siblings and other caregivers – frame and organise the environment for the child, in such a way that the child not only learns more efficiently, but also comes to believe more in his own capacity to learn" (p.46). Feuerstein (1980 as cited in Shayer, 1997) further argues that the more exposure a child has to a 'mediated learning experience' the more able the child becomes to deal with stimuli independently.

Following from Feuerstein's (1980 as cited in Shayer, 1997) argument, Rogoff (1995) argues that developmental research focuses on the separate contributions made by the individual and the environment. Rogoff (1995) argues that the individual and the environment should be seen as being interdependent. He postulates, therefore, that the individual and the environment should not be separated as each is involved in the definition of the other. Rogoff (1995) argues that individuals contribute to society in the same respect as society contributes to an individual's development. He further argues that it is an injustice to see development as being unidirectional. Therefore, a parent contributes to a child's development and a child may also contribute to his or her parent's development. This is a result of the child participating in the activity. Rogoff (1995) argues that "participation involves creative efforts to understand and contribute to social activity, which by its very nature involves bridging between several ways of understanding a situation" (p. 153). Participation, therefore, involves ongoing development for all individuals involved (Rogoff, 1995).

Feuerstein's LPAD model may be a useful tool in assessing Gardner's multiple intelligences. This is due to the fact that Feuerstein *et al.* (1979) allow for flexibility in the model and the

use of different modalities to teach the individual. In the LPAD model, Feuerstein *et al.* (1979) argue that changes can be made to the cognitive operations and/or the objects or situation and/or the relationship between the cognitive operations and the objects or situation.

Gardner (1993) and Feuerstein *et al.* (1979) seem to share similar views with regard to motivation and interest of learners during assessment. Both these theorists believe that examinees generally have low motivation and lack interest during assessment as a result of the situation not being appealing to them. An examinee's low motivation may be the result of perceived failure and their lack of interest due to the examinee's perceiving the examiner as being disinterested due to the examiner's neutral, distant stance. Feuerstein *et al.* (1979) argue that motivation should be increased by focusing on the examiner-examinee relationship. They argue that the examiner should be more active and cooperative. Feuerstein *et al.* (1979) further argue that assessment should be an interactive process between the examiner and examinee. Building rapport seems to be crucial to increase motivation. Gardner (1993) argues that more effort needs to be focused on devising assessment instruments that are more motivating and interesting. He further argues that examinees should be given problem-solving tasks that engage them.

Feuerstein, Rand and Rynders (1988) share the same dissatisfaction as Gardner (1993) regarding the concept of the I.Q. Feuerstein *et al.* (1988) argue that the I.Q., which is based on the performance of an individual on a given day under specific circumstances, is misused to make predictions of the individual's success in later life under different circumstances. The difference evident in the conceptualisations by Feuerstein and Gardner however appear to be evident in Feuerstein's *et al.* (1988) strong emphasis on cognitive modifiability by the

LPAD model, whereas Gardner focuses on establishing the individual's innate abilities that have been encouraged by society (Denig, 2004).

In summary, Gardner's (1993) conceptualisation of assessment is aimed at demystifying it by incorporating assessment into individuals' daily lives. Assessment should be aimed at individuals' strengths and weaknesses. In addition, assessment should focus on providing the individual with constructive feedback. Assessment, therefore, should be seen as a learning experience that benefits individuals (Gardner, 1993).

2.2.6. Culture and Intelligence

Sternberg (2002) argues that cross-cultural studies suggest that intelligence should not be seen as being limited to I.Q. or the 'g' factor. From the studies done on lay conceptions of intelligence, Sternberg (2002) concludes that the lay community views intelligence as being broader than psychologists' conceptions of intelligence. The lay community views intelligence as comprising of "practical problem solving, verbal, and social competence abilities" (p.7). Mpofu (2002) argues that in sub-Saharan Africa, intelligence is seen as comprising of both social and cognitive components, whereas in Western cultures intelligence only comprises of cognitive components.

Wober (1974 as cited in Mpofu, 2002) established that the Ugandan community views intelligence as being socially constructed and therefore an individual's intelligence is seen as a means of benefiting his or her society. Serpell (1991 as cited in Mpofu, 2002) and Grigorenko and others (1999, 2001 as cited in Mpofu, 2002) investigated the views of intelligence in the Chewa community of North Eastern Zambia and the Luo community of

Kenya. From their findings it was established that both the Chewa and the Luo community view intelligence as being unrelated to school achievement. In contrast to this finding, the Shona community does view school achievement as a defining feature of intelligence. Serpell (1991 as cited in Mpofu, 2002) argues that the differences in the views of school achievement may be due to the Shona community having more access to formal education as compared to the Chewa and the Luo community. Serpell (1991 as cited in Mpofu, 2002) further argues that the Chewa and Luo communities' views of school achievement may change if their access to formal education is increased.

To further expand on the understanding of different cultural views of intelligence, Mpofu (2002) investigated implicit theories of intelligence of individuals living in Zimbabwe and having a Shona cultural background. From this study, Mpofu (2002) concluded that native Zimbabweans consider interpersonal relationships and formal education as being key components of intelligence. In addition, academic qualifications in the Zimbabwean community seem to be indicative of superior intelligence. This view seems to be a result of formal education increasing the rate of success in the employment sector.

Based on the premise that different cultures are not necessarily in agreement as to what constitutes intelligent behaviour, Cole (n.d.) argued that the idea of culture-free intelligence testing is an illusion. Cole (n.d.) further argued that intelligence tests are very dependent on culture-specific constructions of intelligence. Cole (n.d.) illustrates his argument by discussing how Binet and his colleagues developed the first intelligence test. Binet and his colleagues were tasked with assessing learners' ability to succeed or fail at elementary school. This led to the development of the first intelligence test and the construction of the intelligence quotient (I.Q.). Binet and his colleagues set out to establish the tasks that

learners were required to perform at school to assist them in establishing the tasks they needed to assess. Binet's test was established by sampling the activities expected by individuals in a given culture and by comparing children's performance to establish the activities that were mastered. Binet's test seemed to be reasonable within the domains that he had devised the test to be administered. His test, however, began to be used to establish an overall sense of individuals' problem-solving ability which was not what the test was established to assess. Binet's test being used in inapplicable contexts resulted in much criticism. These criticisms mostly centred on the test not being culture-fair (Cole, n.d.).

Cole (1996) discusses the Kpelle culture and the misunderstanding that this culture is not mathematically inclined. Cole's (1996) discussion on the misunderstanding of the Kpelle culture illustrates the cultural inapplicability of using tasks developed in one culture to assess other cultures. The Kpelle tribe was found to have difficulty in mathematical tasks at school and it was, therefore, concluded that this tribe did not possess mathematical skills. Through ethnographic investigation, however, it was later established that the Kpelle tribe did possess good mathematical ability. Using a commodity that the Kpelle tribe were familiar with, namely rice, this tribe's mathematical ability was assessed and they were found to perform well on these tasks. Cole (1996) argues "people would develop cultural tools and associated cognitive skills in domains of life where such tools and skills were of central importance" (p. 76). In the Kpelle culture, rice is of central importance as it is sold to ensure survival. In efforts to manage the selling and buying of rice mathematical ability is essential and, therefore, an ability that is learned.

Just as the Kpelle tribe fared poorly on the mathematical tasks developed in Western cultures so, too, would urban-American and European individuals fair poorly on tasks implemented in

rural Africa, for example the ability to distinguish various plants (Cole, 1996). Cole, Gay, Glick and Sharp (1971 as cited in Cole, 1996) conclude that "cultural differences in cognition reside more in the situations to which particular cognitive processes are applied than in the existence of a process in one cultural group and its absence in another" (p. 80).

Fagan (2000) argues that culture-fair intelligence testing may be possible if intelligence is understood as processing. Understanding intelligence as processing refers to exploring how well an individual processes information rather than looking at how much information an individual has acquired, which is what Fagan (2000) argues is explored during I.Q. testing. Fagan (2000) further argues that if intelligence is seen as processing, childhood I.Q. can be predicted during infancy. Therefore, when assessed during infancy, if an infant is a good processor, that child will be expected to know more (i.e. have a high I.Q. score) during childhood.

Fagan and Shepherd (1992 as cited in Fagan, 2000) developed a screening device called the Fagan Test of Infant Intelligence to assess infants' selective attention to novelty. Assessment of infants' selective attention to novelty is based on Fagan's (1970, 1990 as cited in Fagan, 2000) argument that human beings attend more to novel stimuli rather than previously exposed stimuli. Fagan (2000) argues, "if a new target can be differentiated from a previously exposed target, information processing has taken place" (p. 169). Fagan (2000) argues that the Fagan Test of Infant Intelligence, is culture-fair as it defines intelligence as the manner in which infants process information rather than defining intelligence as the knowledge that individuals acquire. Using the Fagan Test of Infant Intelligence, Fagan *et al.* (1991 as cited in Fagan, 2000) compared the results from this assessment of four different cultural groups. No significant differences were found in the means of attention to novelty

between the four cultural groups. This highlights the possibility of culture-fair intelligence tests if intelligence is defined as processing. Fagan (2000) concludes, "tests of processing based on selective attention to novelty, at least with infants, have proved to be culture-fair" (p. 177).

Despite the evidence from previous research that were conducted in Western countries (Jensen, 1985; Fagan & Montie, 1988; Peoples, Fagan & Drotar, 1995 as cited in Fagan, 2000) that suggest that there is a significant I.Q. difference between the Black and White population, Fagan (2000) argues that the Black population are as intelligent as the White population. Fagan (2000) makes this argument based on his finding that there are no spontaneous processing differences between the Black and White populations. Fagan (2000) concludes that individual's "from different cultures may differ in what they believe their children should be taught" (p. 175). Fagan (2000) attributes the I.Q. differences between the White and Black population to be a result of cultural differences.

2.2.7. Implementation of the Theory of Multiple Intelligences in Educational Settings

Cuban (2004) argues that although Gardner's theory "has had great influence on educators' beliefs about the intellectual differences in children, (and) moderate to high influence on formal curriculum and instructional materials," the theory has had little "influence on mainstream teaching and assessment practices" (p. 141). Cuban (2004) attributes this to the fact that, firstly, policy talk does not inevitably lead to policy adoption and policy implementation. Secondly, he postulates that Gardner's theory, like many other theories, does not take institutional norms and structures into consideration. Institutions tend to tailor the new policies/theories to suit their current practices (Cuban, 2004).

Kornhaber (2004) further argues that the minimal implementation of Gardner's theory is due to Gardner's not providing supportive human resources for its implementation and to the lack of evaluation. Kornhaber (2004) further argues that information and structure for the implementation of Gardner's theory is absent in the theory. Findings from Gail Hickey (as cited in Shearer, 2004) seem to suggest that there are several important ingredients that are necessary for implementation. These include "administrative support, student choice in planning, and patience and persistence in working through initial resistance to multiple intelligence activities by both students and colleagues" (p. 11).

Although there has been minimal implementation of this theory, for reasons discussed above, there still exists some implementation of the theory in educational settings. Kornhaber (2004) investigates why Gardner's theory has been adopted. His research suggests that the theory of multiple intelligences has been adopted, firstly, due to the fact that it validates what educators already know. This is with regard to educators being aware that individuals learn in different ways. Secondly, it complements educators pre-existing beliefs that "children learn through activity" (Kornhaber, 2004, p. 69). In addition, Gardner's theory highlights the fact that education should focus on the whole child. Since Gardner's theory emphasises that every child possesses strengths in at least one area, efforts should be made to establish and enhance this area. Thirdly, educators already implement some of the practices advocated by this theory. For example, educators encourage practical hands-on learning and project-based tasks. Finally, this theory helps organise and extend educators' practices. Apart from being skilled in a specific area, educators also possess information that they use intuitively. The theory of intelligences aids educators to categorise the information that they possess. This assists educators in establishing their gaps in knowledge thereby highlighting the information they need to expand on (Kornhaber, 2004).

An example of the implementation of Gardner's theory is summarised by Diaz-Lefebvre (2004). This initiative, which took place at the Glendale Community College (USA), began as a pilot study in the psychology department. Due to its success, it has been implemented in various other departments and has continued to be implemented at the Glendale Community College for the past nine years. The premise for implementing this theory was, firstly, to move away from the traditional idea of focusing on linguistic and mathematical intelligence and to implement learning options based on the theory of multiple intelligences. Secondly, this initiative focused on the fact that learners need to gain understanding of what they are taught and, therefore, to move away from the focus on rote learning. This theory was implemented by giving learners tasks to complete and allowing them to choose their preferred method of completing the tasks. The methods included "acting/role playing, creative dance, collage, mime, book report, poetry, drawing, computer simulation, sculpture, interview, creative journal writing, musical application and traditional" methods (p. 52). This approach served to motivate learners by allowing them to be creative based on their innate abilities and by simultaneously broadening their knowledge. The program was evaluated by asking students to reflect on their learning and by asking staff to reflect on their teaching and learning. Both staff and students responded favourably to the program and felt that it could be implemented in other courses. In addition students felt that this approach enhanced their learning (Diaz-Lefebvre, 2004).

2.2.8. The Difference between Multiple Intelligences and Learning Styles

In contrast to Gardner's belief that individuals possess innate potentials, the Dunn and Dunn (1993 as cited in Denig, 2004) Learning Styles Model advocates that individuals are not necessarily intelligent due to their innate ability but rather due to the "manner in which they

perceive, comprehend, adapt to new situations, learn from experience, seize the essential factors of a complex matter, demonstrate mastery over complexity, solve problems, critically analyze, and make productive decisions" (Denig, 2004, p.100). This model postulates twenty-one elements, which are classified into five factors, namely, environmental, emotional, sociological, physiological and psychological factors. It is argued that not all twenty-one elements may influence a child but that children are influenced by six to fourteen elements.

The five factors are described as follows:

- Environmental – sound, light, temperature and design.
- Emotional – motivation, persistence, responsibility and structure.
- Sociological – self, pair, peers, team, adult and varied.
- Physiological – perceptual, intake, time and mobility.
- Psychological – global-analytic processors, hemisphericity and impulse-reflective.

An example of a learning style would be an environment which is quiet and has formal seating (table and chair); the learner is motivated by studying difficult tasks initially and may prefer to develop his or her own structure to complete the task. This learner may prefer to study alone and by reading the material (visual). In addition, he or she is able to concentrate most effectively when he or she studies in the morning. Dunn and Dunn (1993 as cited in Denig, 2004) advocate that each child has a primary and secondary learning style and that a child's intellectual development is enhanced if he or she capitalises on his or her primary or secondary learning style (Denig, 2004).

Although both the theory of multiple intelligences and the learning styles model advocate instructional change by educators, the purpose of this change differs. Gardner advocates instructional change so that learners' abilities can be enhanced, whereas Dunn and Dunn (1993 as cited in Denig, 2004) advocate instructional change so that learners learning styles can be enhanced. In addition, Gardner argues that learners learn intuitively, whereas Dunn and Dunn (1993 as cited in Denig, 2004) argue that only some learners learn intuitively whereas most learners require structure and supervision.

Denig (2004) maintains that although multiple intelligences and learning styles are different they are complementary. He further argues that research on both these approaches can be used as a research base to increase student learning.

2.2.9. The Theory of Multiple Intelligences after 20 Years

The theory of multiple intelligences was first published in 1983 by Howard Gardner. Through its twenty years of existence this theory has gained a huge amount of interest regarding its strengths and weaknesses. Of striking interest in this theory is the shift away from the unitary concept of general intelligence ('g'). From Gardner's initial conceptualisation of seven distinct forms of intelligence this idea has fluctuated throughout the years and at present there seem to be eight forms of intelligence. These are: linguistic, logical-mathematical, visual-spatial, kinaesthetic, musical, naturalist, interpersonal and intrapersonal intelligence (Shearer, 2004).

2.3. ESTIMATES OF INTELLIGENCE

The theory of multiple intelligences, as mentioned above, has gained popularity in the lay community. Due to this, researchers have used the theory to further their knowledge about the views of the lay community regarding gender differences, generational differences and cross-cultural differences in the estimates of intelligence.

2.3.1. Gender Differences in the Estimates of Intelligence

Furnham *et al.* (1999) reported on two studies that investigated gender differences in the estimates of intelligence. The first study used a sample of British adults and the second study used a sample of undergraduate students. The first study found that males rated their mathematical intelligence higher than that of females. In the second study males rated their mathematical, spatial and musical intelligence higher than females.

In studies investigating gender differences in the estimates of intelligence, it was found that overall males gave higher estimates than females (Furnham & Gasson, 1998; Furnham, 2001). On closer investigation, it was established that gender differences were only significant with regard to spatial and mathematical intelligence. In these two dimensions of intelligence males rated themselves higher than females (Furnham *et al.*, 1999; Furnham, 2000; Furnham *et al.*, 2002a, Furnham *et al.*, 2002b). Mathematical and spatial intelligence were found to be at the 'heart of intelligence' as it correlated best with overall (general) intelligence. It was, therefore, concluded that intelligence is considered to be male normative; the skills that males are thought to be best at, namely mathematical and spatial reasoning, are what most people consider to be the core of intelligence. In addition, most

individuals did not consider musical, intra-personal and interpersonal skills as components of the concept of intelligence (Furnham, 2000; Furnham, 2001).

Furnham *et al.* (2002b) investigated parents' beliefs about their children's intelligence in Hong Kong and their results were inconsistent with the above findings. Chinese parents did not seem to believe that the intelligence of their children was gender based. Furnham *et al.* (2002b) attribute this finding to cultural beliefs in this community where intelligence is thought to be a result of personal effort rather than ability.

In the majority of the research done thus far it has been established that males tend to over-estimate their overall intelligence whereas females under-estimate their intelligence. This has been referred to as the male hubris and the female humility effect (Furnham, 2001; Furnham *et al.*, 2002a). Females appear to have a "self-degrading bias" and males have a "self-enhancing bias" (Furnham *et al.*, 2002a, p.102). This bias seems to be due to the socialization of males and females. As Kleinke (1978) states:

> Because our society has not traditionally associated achievement with femininity, women find their motives for achievement and femininity in conflict. Some undesirable outcomes of this conflict are women's fear of success and other compensatory reactions by women such as concealing accomplishments and playing dumb or overemphasising their commitment to valued feminine qualities related to physical appearance, pleasant personalities and domestic activities. (p.163)

An aspect of socialisation that informs different perceptions by males and females is the different expectations by parents of their daughters and sons. Parents are inclined to have

higher expectations of their sons than their daughters even though their sons and daughters may have the same level of intelligence. Therefore, although females may outperform males, females are socialised to believe that they are less competent than males which results in them retreating from achievement related challenges. As Peterson (1989 as cited in Labouvie-Vief, Orwoll & Manion, 1995) states, for males emotional problems are associated with poor academic performance. In contrast, however, for females, "higher academic performance predicts emotional problems" (p. 245).

An illustration of the different expectations of males and females is seen in the study done by Nevo and Bin Khader (1995). Singaporean mothers' conceptions of their children's intelligences were investigated. Intelligent boys are "expected to be playful, active and independent" whereas intelligent girls are "expected to have good habits, to behave in public, to like to read, and to write well" (p. 516).

In the Indian and Black societies in South Africa there appear to be very traditional conservative views of women. The traditional role of women is that of domestication, i.e. women are responsible for household chores and child rearing and restrictions are placed on them to remain in the domestic arena (Sarkar, 1997; Morrell, 2002). According to Manish (1995), in the Indian community women who are given the opportunity to educate themselves are required to downplay their intelligence so that men are always seen as the more intelligent gender. These institutional barriers set by males serve to further entrench the view that males are superior to females due to the underlying fear of men that educated women pose a threat to them.

In South Africa, gender discrimination is abundantly evident in the educational sector. As a result of socialization males and females are encouraged to pursue different educational paths. Females are encouraged to pursue the Arts field and males are encouraged to pursue the Science field. Since education is one of the factors that decide an individual's career prospects and the sciences are more marketable, males pursue more promising careers and females are left to pursue careers with minimal career advances. This serves to further entrench women's oppression (Meena, 1992).

Gender inequality and the perception of different views of intelligence of males and females are evident in all societies. A more detailed enquiry into the perceptions of Indian and Black South Africans, which is set out in this present study, is necessary to explore how the traditional views of these cultures influence their perceptions of intelligence. Based on the male gender bias in these cultures it is hypothesised that males will be perceived as having higher intelligence than females. The apparent similarities of the Black and Indian cultures make this present study significant as it sets out to investigate the differences that may be evident between these two cultures.

2.3.2. Generational Effects on the Estimates of Intelligence

In research investigating the estimates of intelligence, participants have also been asked to estimate the intelligence of their parents, grandparents, siblings and children. In these studies gender differences were also evident. Parents estimated their sons as being more intelligent than their daughters (Furnham & Gasson, 1998). Furnham (2000) found that fathers rated their mathematical and spatial intelligence higher than mothers did. In addition, both parents rated their sons higher on mathematical and spatial intelligence than their daughters.

Furnham (2001) in examining previous research in the field concluded that parents see their children as more intelligence than themselves and they see themselves as more intelligent than their parents. This suggests a generational effect whereby intelligence increases per generation. Furnham *et al.* (2002b) argued that the generational effect may be attributed to an increase in the level of education in each generation.

2.3.3. Cross-cultural Differences in the Estimates of Intelligence

Furnham, Shahidi and Baluch (2002c) investigated the estimated multiple intelligences of British and Iranian students. Iranian students gave higher self-estimates for spatial, musical and intra-personal intelligence than the British students. The British students gave higher self-estimates for mathematical intelligence than the Iranian students. No gender differences were found in the Iranian sample except for males rating their overall intelligence higher than females. Furnham *et al.* (2002c), in comparison with other cross-cultural studies, concluded that poorer societies tend to give higher self-estimates than do individuals of richer societies. This conclusion may not necessarily be the case due to this finding not being consistent across all the research conducted in this field.

In contrast to the above finding by Furnham *et al.* (2002c), Furnham and Baguma (1999) did a similar study with British, American and Ugandan (African) students on their self-estimates of intelligence. The American students gave the highest self-estimates of intelligence followed by the African and then the British students. The American students gave the highest estimates for numerical (mathematical and spatial) and cultural (musical and bodily-kinaesthetic) intelligence. The African students, however, gave the highest estimates of their overall intelligence. This finding suggests that further exploration needs to be done to

explore the hypothesis that poorer societies give higher estimates of intelligence. Furnham and Baguma (1999) hypothesise that the results may be due to "American and to some extent, African hubris or British self-deprecation" (p. 76).

The results of the study by Furnham and Baguma (1999) are questionable with regard to their being a true reflection of the African culture, as the participants were university students. As university students these individuals may have been exposed to a culture of independence, which may influence their views. Markus and Kitayama (1991) argue that individual views of cognition, emotion and motivation are influenced by the independent or interdependent construals of the self. Markus and Kitayama (1991) further argue that in respect of cognition, individuals from interdependent cultures will consider the social context and the reactions of others. Interdependent selves, therefore, engage in cognitive activities by taking into consideration the specific context in which the activity occurs and the individual/s involved with regard to their relationship to the self. In addition, interdependent selves are sensitive to others, therefore, when categorising the self this is always done as the self in relation to others. Due to there always being reference to the self in relation to the other, effort is made by interdependent selves to acquire information about the other. In interdependent cultures the self and the other co-constitute each other (Markus & Kitayama, 1991).

Whereas the British and American cultures adopt an individualistic or independent stance, African cultures generally tend to be collectivistic. Individualistic cultures value independence and competitiveness, hence the high estimates of intelligence given by the American students. Collectivistic communities value interpersonal relationships. Individuals are seen within their social context and take on various roles within their society. People from collectivistic cultures are likely to estimate their intelligence in relation to others

in the community. Hence their estimates are hypothesised to be more conservative (Mota, 1997).

Another cross-cultural study was done by Furnham *et al.* (2002a) to investigate the difference between American, British and Japanese students' estimates of their own, parental and sibling multiple intelligences. American students rated themselves the highest followed by the British and then the Japanese. These findings have been attributed to Japanese humility (Furnham *et al.*, 2002a). In the Japanese culture self-enhancement is seen negatively. This is due to their cultural understanding of self and cognition. The self is seen as interdependent (i.e. the self in relation to others). The task of the interdependent self is to maintain harmony and social cohesion. Contrary to Western culture's emphasis on independence and, therefore, having a self-enhancement bias, the Japanese culture values humility in efforts to maintain social integration (Markus & Kitayama, 1991). A humility effect was also seen in the study done by Furnham *et al.* (2002c). Here Asian students from Iran gave low estimates of their mathematical intelligence even though "mathematical education and abilities are more renowned in Iran" (p. 279). Like the Japanese culture, the Asian community values interdependence and modesty, thereby explaining the findings of this study (Markus & Kitayama, 1991).

2.3.4. South African Research Investigating the Estimates of Intelligence

Furnham and Mkhize (2003) investigated *IsiZulu* mothers' estimates of their own and their children's intelligence. Mathematical and spatial intelligence were the best predictors of overall intelligence. Mothers seemed to perceive their children as being more intelligent than themselves. This finding is consistent with previous research (Furnham, 2001, Furnham *et*

al., 2002b) in the field. These mothers, however, seem to perceive their own spatial, interpersonal and intra-personal intelligence as higher than their children's. Contrary to other studies (Furnham & Gasson, 1998; Furnham, 2000; Furnham, 2001) in the field, in this study Furnham and Mkhize (2003) found very few sex differences in *IsiZulu* mothers' estimates of their children's intelligence. These authors attribute this finding to the cultural differences between their sample of Third World mothers compared to Western mothers. Western mothers seem to perceive intelligence as being male normative (Furnham, 2000), which does not seem to be the case for Third World mothers.

As mentioned previously this present research will replicate the study done by Furnham *et al.* (2004). Furnham *et al.* (2004) investigated Indian and *IsiZulu*-speaking South African parents' estimates of their own and their children's intelligence. The sample used in this study were Indian and *IsiZulu*-speaking South African parents living in the Ladysmith area. Furnham *et al.* (2004) found that Indian parents gave higher self-estimates and higher estimates of their children's intelligence than *IsiZulu*-speaking parents. In addition, males rated themselves higher than females, which is a consistent finding in previous research (Furnham & Gasson, 1998; Furnham, 2000; Furnham, 2001). A significant gender difference was found for the first-born child: male children were given higher estimates for verbal intelligence than female children. A significant gender difference was also evident for the second-born child for interpersonal intelligence. Parents were found to give higher estimates of their children's intelligence than their own, which is also a consistent finding in previous research (Furnham, 2001; Furnham *et al.*, 2002b).

With regard to the six questions that were put to the participants, four of these questions were found to be significant. "More Indian than *IsiZulu*-speaking parents had taken an intelligence

test; both groups tended to believe that intelligence tests were valid; Indians, more than *IsiZulu*-speakers, believed that males were more intelligent than females; and the former more than the latter, also believed that intelligence is inherited" (Furnham *et al.*, 2004, p. 377).

2.4. CONCLUSION

Intelligence was initially understood to be a unitary construct. Further investigation, however, expanded the view of intelligence to consist of various domains or types. In the above literature review effort has been made to track the developments that have been made in the field of intelligence. Owing to the theory of multiple intelligences gaining popularity in the lay community, research has focused on investigating this theory in the lay community. This research, however, is not without methodological weaknesses. Firstly, there seems to be an increased focus on investigations in Western communities. Although effort has been made there still exists an increased need to conduct more research in non-Western cultures. A minority of research has been conducted in Sub-Saharan Africa creating a gap in research and a limited understanding of this community. Secondly, the bulk of the research that has been conducted investigates the student population, who may not be representative of the general population. Therefore, generalisations cannot be made.

The focus of the present research is to use the theory of multiple intelligences to understand a sample of the Black and Indian communities in South Africa. In the present study effort is also made to use a broad sample and not limit the sample to the university population. Based on the above research, males have been found to give higher estimates of intelligence than their female counterparts. In addition, parents seem to estimate their intelligence as being

lower than their children's. Inconsistent findings seem to exist with regard to poorer versus richer societies giving higher self-estimates of intelligence. This research serves to further expand on the existing research with regard to the societal characteristics governing the estimates of intelligence.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This chapter begins by describing the sample used. The biographical details of the participants are described. A quantitative approach has been adopted in this study and included in this chapter is the rationale for and purpose of using such an approach. The "Estimates of Intelligence" questionnaire is discussed, together with the reliability and validity of this instrument. The data collection procedure follows from the discussion of the research instrument. This chapter concludes by exploring the manner in which the data was processed and analysed.

3.1. THE SAMPLE

"Sampling is a process of systematically selecting cases for inclusion in a research project" (Neuman, 1997, p. 201). The purpose of sampling is to analyse variables on the selected sample and generalise the results accurately to the population (Neuman, 1997). Non-random sampling was used in this study based on the availability of the participants. The reason for employing non-random sampling was due to time constraints and to target those individuals who would be keen to participate in the study. It should be noted, however, that this limits the generalizability of this study. Although random sampling is ideal for research, it is difficult to obtain.

This study was conducted using the Black and Indian populations in the Pietermaritzburg area. The number of participants that participated in this study was two hundred and three (203). 59.1 % of the participants were female and 40.1 % of the participants were male

(Figure 1). 51.2 % of the participants were Black and 48.8 % of the participants were Indian (Figure 2). Race and gender were seen as important variables to establish if there were any significant differences in perceived intelligence.

Figure 1: Gender Breakdown of Participants

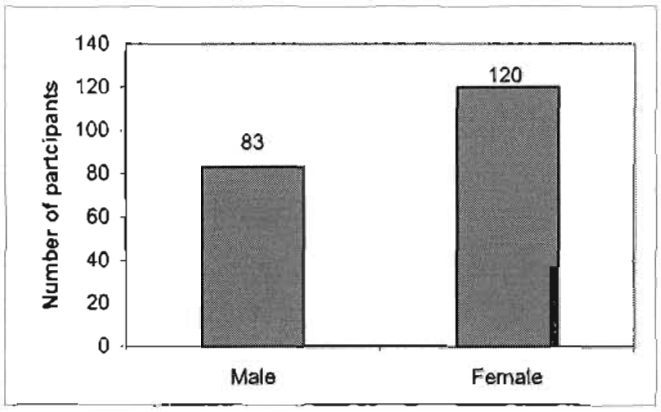
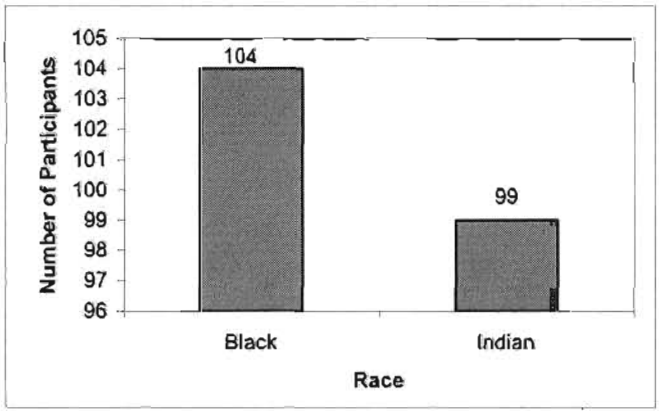


Figure 2: Race (cultural) Breakdown of Participants



The targeted population was Black and Indian individuals who have children. These participants' ages ranged from 19 to 71 years with a mean age of 38 years. There was a significant age difference for gender ($F_{1,199} = 14.82$, $p = 0.000$) and race ($F_{1,199} = 11.44$, $p = 0.001$). The mean age for males (42 years, sd = 10.59) was higher than the mean age for females (35.62 years, sd = 10.87). In addition, Indian South African's mean age (41.08 years, sd = 11.24) was higher than Black South African's mean age (35.51 years, sd = 10.47). The

participants included university staff members (some lecturers and the cleaning staff) and the lay community (individuals were approached in a shopping centre). The majority of the participants (39.9 %) obtained a senior secondary educational qualification while 4.4 % of the participants did not receive any formal education (see Figure 3). Overall, there were no significant gender differences for participants' educational qualifications. A significant cultural (race) difference was found. Indian South Africans had a mean educational level of 11.04 years (sd = 3.01) while Black South Africans had a mean educational level of 8.27 years (sd = 4.5).

Although this sample was restricted to parents, the number of children that the participants had was not restricted. The number of children that the participants had ranged from 1 child to 5 children with a considerable percentage of the participants (41, 9 %) having 2 children. (See Table 1). Analysis will be done for the first two children because too few participants had three or more children, thus leading to a significant reduction in sample size.

Figure 3: Participants' Educational Level

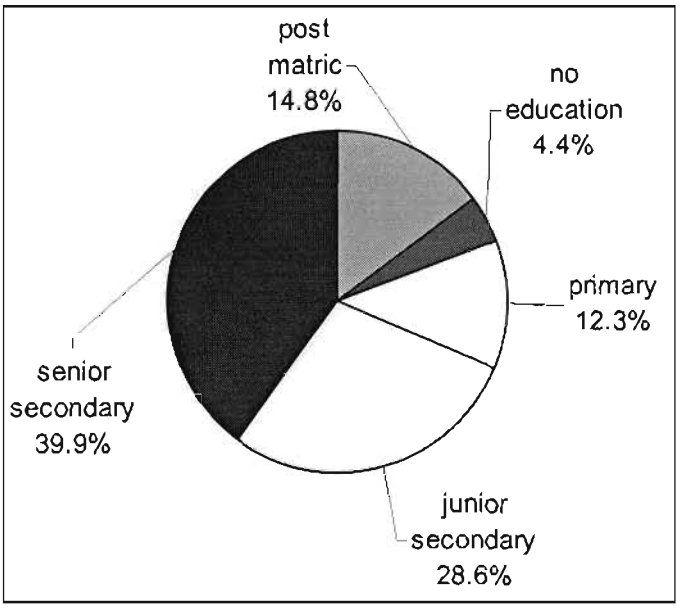


Table 1: Number of Children

Number of children	Number of participants	% of sample
1 child	49 participants	24.1
2 children	85 participants	41.9
3 children	43 participants	21.2
4 children	20 participants	9.85
5 children	6 participants	2.95
Total number of participants = 203		

3.2. THE RESEARCH DESIGN

A cross-sectional design was used to conduct this study. This study aims to compare the perceptions of intelligence of African and Indian South Africans. It should be noted that a disadvantage of a cross-sectional design is that it does not capture social processes and change (Neuman, 1997). This was not the intent of this study and, therefore, a cross sectional design was used. A quantitative approach was employed. The independent variables in this study are gender and "culture" (race) and the dependent variables are the seven types of multiple intelligence.

3.3. THE PURPOSE AND RATIONALE FOR USING THE QUANTITATIVE APPROACH

Creswell (2003) defines a quantitative approach as one where the researcher "uses post-positivist claims for developing knowledge, employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data" (p. 18). A quantitative approach was adopted in this research as the researcher sought to investigate the hypotheses made based on Gardner's theory of multiple intelligences.

In this quantitative study a survey design was used. The purpose of a survey design is to generalise from the sample to the population and to make inferences about the perceptions of the population. As noted above, in this study sampling was not random and, therefore, the results obtained cannot be generalised to the population. The rationale for choosing this approach was due to the fact that this design is economical and data collection tends to be rapid (Creswell, 2003).

3.4. INSTRUMENT: THE "ESTIMATES OF INTELLIGENCE" QUESTIONNAIRE

In this study the data was collected using a brief questionnaire developed for this purpose. The questionnaire is based on the one developed by Furnham and Gasson (1998). This questionnaire (see Appendix A) has been used in numerous other studies investigating self-estimates of intelligence (Furnham *et al.*, 2004; Furnham *et al.*, 2002a; Furnham & Mkhize, 2002; Furnham, 2000; Furnham *et al.*, 1999; Furnham & Baguma, 1999, Furnham & Gasson, 1998).

The questionnaire shows a normal distribution, with standard deviations, I.Q. scores and a description of each score (see Appendix A). The scores are in intervals of 15, starting at 55 and ending at 145. A score of 55 indicates mild retardation, 70 – borderline retardation, 85 – low average, 100 – average, 115 – high average, 130 – superior and 145 – gifted. Thereafter there is a grid made up of eight rows and three columns. The rows start with overall intelligence and thereafter list the seven types of intelligence, which were taken from Gardner (1983). These types of intelligence are Verbal, Mathematical, Spatial, Musical, Body Kinaesthetic, Interpersonal and Intra-personal. Each type of intelligence is followed by a

short description. The columns allow participants to fill in their own estimated intelligence and their children's estimated intelligence, giving the age and sex of their children as well.

Thereafter there are six closed ended questions, which the participants are expected to give "Yes/No" responses to. These questions were initially used by Furnham *et al.* (1999). The questions pertain to the participants' opinions about intelligence tests and intelligence. Finally, participants are expected to fill in their sex, date of birth and highest educational qualification.

The six questions that the participants were asked are:

1. Have you ever taken an intelligence test?
2. Do you believe they measure intelligence fairly well?
3. Do you believe males are on average more intelligent than females?
4. Do you believe intelligence is primarily inherited?
5. Do you believe I.Q. tests are useful in educational settings?
6. Do you believe some races are more intelligent than others?

This questionnaire has been used extensively in almost all the studies conducted in this field. The main reason for its popularity is due to it being simple and understandable to the layperson. The six questions included in the questionnaire, however, may be criticised for being too sensitive to social desirability responding.

The English questionnaire was also translated into *IsiZulu* and used for the *IsiZulu* participants (see Appendix B). The translation of the questionnaire was done during the research conducted by Furnham and Mkhize (2003). During this research (Furnham &

Mkhize, 2003), a bilingual postgraduate psychology student translated the questionnaire from English to *IsiZulu*. Another bilingual graduate student translated the *IsiZulu* version of the questionnaire back into English. A small committee was set to review the questionnaires and some changes were made. The *IsiZulu* version of the questionnaire was piloted on a sample of ten participants. Thereafter the questionnaire was used in the study done by Furnham and Mkhize (2003) and Furnham *et al.* (2004). A possible limitation of the *IsiZulu* questionnaire is the absence of the normal distribution curve that was used as a guide in the English version. This absence however may have been due to the hypothesis that the normal distribution curve may have caused confusion to individuals not familiar with graphs.

3.4.1. Reliability and Validity of the "Estimates of Intelligence" Questionnaire

Reliability refers to the instruments "dependability and consistency" (Neuman, 1997, p. 138). It can be noted from the extensive use of this questionnaire (Furnham *et al.,* 2004; Furnham *et al.,* 2002a; Furnham & Mkhize, 2002; Furnham, 2000; Furnham *et al.,* 1999; Furnham & Baguma, 1999, Furnham & Gasson, 1998) and the consistent findings (namely gender differences, cross-cultural differences and a generational effect) that this questionnaire is reliable. In studies investigating gender differences in the estimates of intelligence, it was found that overall males gave higher estimates than females (Furnham & Gasson, 1998; Furnham, 2001). Furnham (2001) examined previous research in the field and concluded that parents see their children as more intelligence than themselves and parents see themselves as more intelligent than their parents. This suggests a generational effect whereby intelligence increases per generation. The consistent cross-cultural difference that has been found in previous research is that cultures valuing collectivism underestimate their intelligence due to the humility effect and cultures that value individualism over-estimate their intelligence due

to their self-enhancement bias (Furnham *et al.*, 2002a; Markus & Kitayama, 1991; Mota, 1997).

The validity of an instrument refers to the degree to which the instrument is able to capture the meaning of the construct being investigated (Neuman, 1997). In the previous research that has used this instrument explicit mention is made of the different types of intelligence. A statement follows each type of intelligence explaining the meaning of the different types of intelligence. The meaning of each type of intelligence in the instrument is based on the seven types of intelligence that Gardner (1983) established. Content validity refers to the instrument capturing the full definition of a construct (Newman, 1997). In the "estimates of intelligence" questionnaire, the definitions of the types of intelligence do seem to be captured by the explicit mention of the definitions of the different types of intelligences. Construct validity refers to the degree to which the instrument is able to capture the theoretical concept being investigated. Two sub-categories exist for construct validity. These are convergent validity and discriminant validity. Convergent validity refers to the relationship between measures of the same construct and discriminant validity refers to the lack of relationship or negative relationship between measures of a construct (Neuman, 1997). Factorial validity is also considered to be a type of construct validity. Constructs are factor analysed to establish whether a common variance is shared thereby investigating the same underlying construct (Gerbig, 1999). The "estimates of intelligence" questionnaire seems to possess construct validity and more specifically factorial validity. This is seen in various factor-analytic studies (Furnham, 2000; Furnham & Baguma, 1999; Furnham *et al.*, 1999) that have found evidence for the seven types of intelligence being factored into three factors. The three factors have been labelled **verbal** (verbal, interpersonal and intra-personal intelligence), **numerical**

(mathematical and spatial intelligence) and **cultural** (musical and bodily-kinaesthetic intelligence).

3.5. DATA COLLECTION PROCEDURE

The participants were approached at their homes, in a shopping centre or at the university and informed about the study and asked if they would like to fill out a questionnaire. Those individuals who wanted to fill out the questionnaire were given the option to fill it out independently or with the assistance of the researcher. The *IsiZulu*-speaking participants were given the option of completing the English or the *IsiZulu* version questionnaire. After each participant completed the questionnaire they were thanked and asked if they would like the results of the research forwarded to them. Each participant took approximately 20 minutes to complete the questionnaire.

3.6. DATA PROCESSING AND ANALYSIS

The data was coded and entered into SPSS to be analysed. Descriptive statistics were computed to summarise the data. These consisted of graphical and numerical techniques such as pie charts, bar graphs and frequencies (Burns, 2000). Multiple Analyses of Variance (to determine gender and cultural differences across the dimensions of intelligence) and regression analyses (to determine which of the seven dimensions of intelligence is the best predictor of overall intelligence) were run on the data. The results of these analyses are presented in Chapter Four.

3.7. CONCLUSION

This chapter sets the foundation for the results chapter that follows. An overview of the sample, research design and methodology is discussed. This is done by informing the reader of the design and methodology that was used and by explaining the rationale for implementing such techniques. The chapter concludes with a brief summary of the data processing and analysis procedures used. The results of these analyses follow in Chapter Four.

CHAPTER FOUR

RESULTS

This chapter explores the results of the study that have been computed using statistical analysis. The data were investigated for gender and race (cultural) differences of parents' own estimates and for their estimates of their children. Investigations also focused on whether there exists a generational effect in the data whereby parents would estimate their children's intelligence as higher than their own. The best predictor of overall intelligence is also explored. Thereafter analysis is done using the responses given for the six questions included in the questionnaire. This chapter aims to report on the results found.

4.1. GENDER DIFFERENCES: PARENTS

Both fathers and mothers were required to give self-estimates of their overall intelligence and the seven types of intelligences. The first hypothesis made was that fathers would estimate their own overall, mathematical and spatial intelligence higher than mothers. A multiple analysis of variance was performed with gender as the independent variable and the 8 types of intelligence as the dependent variables. The MANOVA overall test of the null hypothesis indicated an overall gender effect ($F_{8,188} = 3.428$, $p = 0.001$). To establish the source of this effect univariate tests were performed. In view of the fact that 8 comparisons were being made and in order to avoid family-wise error, the level of significance (0.05) was divided by 8 (the number of comparisons), thus yielding $p = 0.006$. This analysis yielded significant differences for musical intelligence ($F_{1,195} = 21.07$, $p = 0.000$). Mothers gave higher self-estimates than fathers with a mean score of 102.13 (s.d. = 12.14) for mothers and a mean score of 93.66 (s.d. = 17.03) for fathers (refer to Table 2). Hypothesis 1 is, therefore,

rejected, as fathers did not estimate their own overall, mathematical and spatial intelligence higher than mothers.

The above results should be interpreted with caution, as the assumption of homogeneity of covariances was not met. The Box M statistical test was found to be significant. The Levene's homogeneity of variance test indicates that the variances between the two groups differ for overall intelligence, mathematical intelligence, interpersonal intelligence and intra-personal intelligence. The variances between the two groups were equal for verbal intelligence, spatial intelligence, musical intelligence and bodily-kinaesthetic intelligence.

Table 2: Fathers' and Mothers' Self Estimates of Multiple Intelligences

	Fathers		**Mothers**			
Types of intelligences	**Mean**	**Std**	**Mean**	**Std**	**F**	**p.**
Overall intelligence	101.84	12.04	101.96	11.46	0.83	0.364
Verbal intelligence	102.71	12.25	103.82	10.89	1.25	0.264
Mathematical intelligence	100.35	17.01	97.46	13.36	0.56	0.456
Spatial intelligence	104.19	14.53	104.08	12.68	0.18	0.672
Musical intelligence	93.66	17.03	102.13	12.14	21.07	0.000
Bodily-kinaesthetic intelligence	96.56	16.55	99.91	11.85	5.11	0.025
Interpersonal intelligence	103.85	15.13	104.40	13.86	1.54	0.216
Intra-personal intelligence	102.50	15.24	103.94	14.00	2.32	0.129

4.2. RACE DIFFERENCES: PARENTS

Race (cultural) differences were investigated to establish which race group would give higher estimates than the other. A multiple analysis of variance was performed with race as the independent variable and the 8 types of intelligence as the dependent variables. The

MANOVA overall test of the null hypothesis indicated an overall race effect ($F_{8,188} = 10.74$, $p = 0.000$). To establish the source of this effect univariate tests were performed. In view of the fact that 8 comparisons were being made and in order to avoid family-wise error, the level of significance (0.05) was divided by 8 (the number of comparisons), thus yielding $p = 0.006$. This analysis yielded significant differences for all 8 types of intelligence (overall intelligence – $F_{1,195} = 50.31$, $p = 0.000$; verbal intelligence – $F_{1,195} = 13.98$, $p = 0.000$; mathematical intelligence – $F_{1,195} = 33.05$, $p = 0.000$; spatial intelligence – $F_{1,195} = 17.70$, $p = 0.000$; musical intelligence – $F_{1,195} = 12.13$, $p = 0.001$; bodily-kinaesthetic intelligence – $F_{1,195} = 20.40$, $p = 0.000$; interpersonal intelligence – $F_{1,195} = 64.29$, $p = 0.000$; intra-personal intelligence– $F_{1,195} = 43.51$, $p = 0.000$). Indian South Africans gave higher estimates of intelligence than Black South Africans (refer to Table 3).

The above results should be interpreted with caution, as the assumption of homogeneity of covariances was not met. The Box M statistical test was found to be significant. The Levene's homogeneity of variance test indicates that the variances between the two groups differ for overall intelligence, mathematical intelligence, interpersonal intelligence and intra-personal intelligence. The variances between the two groups were equal for verbal intelligence, spatial intelligence, musical intelligence and bodily-kinaesthetic intelligence.

Table 3: Black and Indian South Africans Self Estimates of Multiple Intelligences

	Black		Indian			
Types of intelligences	**Mean**	**Std**	**Mean**	**Std**	**F**	**p.**
Overall intelligence	96.68	9.78	107.30	11.03	50.31	0.000
Verbal intelligence	100.49	9.31	106.35	12.65	13.98	0.000
Mathematical intelligence	93.03	12.98	104.39	14.73	33.05	0.000
Spatial intelligence	100.04	10.18	108.34	15.01	17.70	0.000
Musical intelligence	95.67	10.48	101.88	17.83	12.13	0.001
Bodily-kinaesthetic intelligence	94.67	11.94	102.57	14.85	20.40	0.000
Interpersonal intelligence	97.08	10.90	111.50	13.82	64.29	0.000
Intra-personal intelligence	97.17	13.11	109.74	13.05	43.51	0.000

4.3. GENDER AND RACE (CULTURAL) DIFFERENCES: FIRST-BORN CHILDREN

To establish if gender and cultural differences existed in parents' estimates of their first-born children's intelligence, a multiple analysis of variance was performed with gender and race as the independent variables and the 8 types of intelligence as the dependent variables. The MANOVA overall test of the null hypothesis indicated an overall race effect ($F_{8,182} = 10.435$, $p = 0.000$). Univariate tests were performed to establish the source of this effect. In view of the fact that 8 comparisons were being made and in order to avoid family-wise error, the level of significance (0.05) was divided by 8 (the number of comparisons), thus yielding $p = 0.006$. This analysis yielded significant differences for all 8 types of intelligence (overall intelligence – $F_{1,189} = 56.36$, $p = 0.000$; verbal intelligence – $F_{1,189} = 29.67$, $p = 0.000$; mathematical intelligence – $F_{1,189} = 52.42$, $p = 0.000$; spatial intelligence – $F_{1,189} = 39.47$, $p = 0.000$; musical intelligence – $F_{1,189} = 36.53$, $p = 0.000$; bodily-kinaesthetic intelligence – $F_{1,189} = 47.22$, $p = 0.000$; interpersonal intelligence – $F_{1,189} = 66.59$, $p = 0.000$; intra-personal

intelligence– $F_{1,189} = 62.96$, $p = 0.000$). Indian South Africans rated their first-born children's intelligence higher than Black South Africans (refer to Table 4).

A gender effect was not found in the above MANOVA overall test ($F_{8,182} = 1.008$, $p = 0.432$). This indicates that children's gender did not have a significant effect on parents' estimates of their first-born children's intelligence. Parents' estimates for their sons, therefore, were not higher than their estimates for their daughters (refer to Table 4).

The above results should be interpreted with caution, as the assumption of homogeneity of covariances was not met. The Box M statistical test was found to be significant. The Levene's homogeneity of variance test indicates that the variances between the two groups differ for all the types of intelligences except for mathematical intelligence.

4.3.1. Second-born Children

A MANOVA was performed to establish if gender and (race) cultural differences existed for parents' estimates of their second-born children's intelligence. Gender and race were the independent variables and the 8 types of intelligence were the dependent variables. The MANOVA overall test of the null hypothesis indicated an overall race effect ($F_{8,135} = 9.73$, $p = 0.000$). Univariate tests were performed to establish the source of this effect. In view of the fact that 8 comparisons were being made and in order to avoid family-wise error, the level of significance (0.05) was divided by 8 (the number of comparisons), thus yielding $p = 0.006$. This analysis yielded significant differences for all 8 types of intelligence (overall intelligence – $F_{1,142} = 46.02$, $p = 0.000$; verbal intelligence – $F_{1,142} = 18.58$, $p = 0.000$; mathematical intelligence – $F_{1,142} = 45.32$, $p = 0.000$; spatial intelligence – $F_{1,142} = 40.80$, p

= 0.000; musical intelligence – $F_{1,142} = 20.72$, $p = 0.000$; bodily-kinaesthetic intelligence – $F_{1,142} = 38.38$, $p = 0.000$; interpersonal intelligence – $F_{1,142} = 57.33$, $p = 0.000$; intra-personal intelligence – $F_{1,142} = 52.17$, $p = 0.000$). Indian South Africans rated their second-born children's intelligence higher than Black South Africans (refer to Table 5).

Similar to first-born children, a gender effect was not found in the MANOVA overall test ($F_{8,135} = 0.909$, $p = 0.511$). Children's gender did not have a significant effect on parents' estimates of their second-born children's intelligence (refer to Table 5). Hypothesis 3 is rejected as parents' estimates for their sons for both their first and second-born children were not higher than those for their daughters

The above results should be interpreted with caution, as the assumption of homogeneity of covariances was not met. The Box M statistical test was found to be significant. The Levene's homogeneity of variance test indicates that the variances between the two groups differed for all types of intelligence except for bodily-kinaesthetic intelligence.

Table 4: Parents' Estimates of their First-born Children's Multiple Intelligence

		Black		Indian					
Types of intelligences		**Mean**	**Std**	**Mean**	**Std**	**F gender)**	**p. (gender)**	**F (race)**	**p. (race)**
Overall intelligence	Female	92.98	12.83	105.80	10.06	0.056	0.813	56.363	0.000
	Male	92.40	14.40	107.25	13.20				
Verbal intelligence	Female	95.62	14.18	107.05	11.27	0.208	0.649	29.670	0.000
	Male	95.42	13.32	105.45	15.24				
Mathematical intelligence	Female	89.36	14.84	102.39	11.84	0.542	0.462	52.419	0.000
	Male	87.19	17.23	108.00	19.43				
Spatial intelligence	Female	91.54	15.42	103.75	11.42	0.077	0.781	39.465	0.000
	Male	90.10	15.93	106.45	18.86				
Musical intelligence	Female	93.52	16.65	106.36	13.99	1.916	0.168	36.528	0.000
	Male	89.06	12.36	104.37	20.06				
Bodily-kinaesthetic intelligence	Female	92.64	15.55	107.16	11.93	0.265	0.607	47.221	0.000
	Male	90.31	15.72	107.14	18.81				
Interpersonal intelligence	Female	90.46	16.99	106.93	12.77	0.351	0.554	66.586	0.000
	Male	86.67	17.45	107.98	16.29				
Intra-personal intelligence	Female	87.98	15.43	104.32	11.99	0.214	0.644	62.956	0.000
	Male	87.60	17.81	106.76	15.96				

Table 5: Parents' Estimates of their Second-born Children's Multiple Intelligence

		Black		Indian					
Types of intelligences		**Mean**	**Std**	**Mean**	**Std**	**F (gender)**	**p. (gender)**	**F (race)**	**p. (race)**
Overall intelligence	Female	88.54	13.42	104.23	11.84	0.757	0.386	46.022	0.000
	Male	91.17	12.78	105.45	14.78				
Verbal intelligence	Female	93.95	13.91	102.56	13.02	0.166	0.684	18.582	0.000
	Male	93.47	10.51	104.95	17.10				
Mathematical intelligence	Female	84.38	16.26	101.79	15.11	0.765	0.383	45.318	0.000
	Male	86.83	13.55	103.82	15.92				
Spatial intelligence	Female	88.15	14.77	101.54	14.43	0.612	0.435	40.803	0.000
	Male	87.57	10.99	106.03	18.09				
Musical intelligence	Female	93.13	15.55	104.23	15.20	0.024	0.877	20.715	0.000
	Male	91.47	16.11	105.05	18.15				
Bodily-kinaesthetic intelligence	Female	91.05	17.04	106.31	14.93	1.303	0.256	38.383	0.000
	Male	87.43	10.59	104.05	17.34				
Interpersonal intelligence	Female	87.28	15.65	104.62	13.54	0.155	0.694	57.333	0.000
	Male	86.63	12.56	107.24	17.46				
Intra-personal intelligence	Female	85.87	16.75	105.51	14.77	0.078	0.780	52.168	0.000
	Male	86.63	13.74	103.34	14.71				

4.4. COMPARISON OF PARENT-CHILD ESTIMATES: FIRST-BORN CHILDREN

In efforts to investigate if parents would estimate their children's intelligence higher than their own a series of parent-child paired t-tests were computed for each type of intelligence. For the first-born children's estimates in comparison to parents' estimates of their own intelligence five types of intelligence were significant. These types of intelligence were overall intelligence ($t_{200} = 2.89$, $p = 0.004$); verbal intelligence ($t_{202} = 3.69$, $p = 0.000$); spatial intelligence ($t_{202} = 6.10$, $p = 0.000$); interpersonal intelligence ($t_{200} = 6.54$, $p = 0.000$) and intra-personal intelligence ($t_{200} = 7.34$, $p = 0.000$). In these paired sample t-tests parents gave higher estimates of their own intelligence than their children's intelligence (see Table 6).

Table 6: Differences between Parents' Estimates and their First-born Children's Estimates

	Parent		**Child1**			
	Mean	**Std**	**Mean**	**Std**	**t.**	**p.**
Overall intelligence	101.74	11.73	99.10	14.48	2.89	0.004
Verbal intelligence	103.23	11.50	100.12	14.93	3.69	0.000
Mathematical intelligence	98.50	15.02	96.53	18.20	1.73	0.085
Spatial intelligence	104.02	14.09	97.47	17.88	6.10	0.000
Musical intelligence	98.75	14.79	98.42	18.28	0.31	0.760
Bodily-kinaesthetic intelligence	98.62	14.41	99.02	18.04	-0.36	0.722
Interpersonal intelligence	104.14	14.28	97.49	18.49	6.54	0.000
Intra-personal intelligence	103.50	14.84	96.14	17.74	7.34	0.000

4.4.1. Second-born Children

Paired t-tests were also computed for parent's estimates of their own intelligence as compared to their estimates of their second-born children's intelligence. Significant differences were found for six types of intelligence. These differences were for overall intelligence ($t_{152} = 3.86$, $p = 0.000$); verbal intelligence ($t_{153} = 4.54$, $p = 0.000$); mathematical intelligence ($t_{153} = 3.70$, $p = 0.000$); spatial intelligence ($t_{153} = 7.34$, $p = 0.000$); interpersonal intelligence ($t_{152} = 7.53$, $p = 0.000$) and intra-personal intelligence ($t_{152} = 7.04$, $p = 0.000$). Parents' self estimates were higher than their estimates for their second-born children (see Table 7). Hypothesis 2 is rejected, as parents did not give higher estimates for their children's intelligence as compared to their own.

Table 7: Differences between Parents' Estimates and their Second-born Children's Estimates

	Parent		**Child2**			
	Mean	**Std**	**Mean**	**Std**	**t.**	**p.**
Overall intelligence	101.27	11.31	97.03	15.44	3.86	0.000
Verbal intelligence	103.10	11.72	97.67	15.78	4.54	0.000
Mathematical intelligence	98.74	15.21	93.61	18.06	3.70	0.000
Spatial intelligence	105.06	14.18	95.19	17.57	7.34	0.000
Musical intelligence	98.74	14.80	98.33	17.39	0.29	0.776
Bodily-kinaesthetic intelligence	98.81	15.00	97.04	17.62	1.34	0.183
Interpersonal intelligence	104.80	14.59	95.80	18.39	7.53	0.000
Intra-personal intelligence	104.05	15.13	94.84	17.95	7.04	0.000

4.5. PREDICTORS OF OVERALL INTELLIGENCE: PARENTS

A regression analysis was performed to determine the best predictor of overall intelligence for parents. Overall intelligence was the dependent variable and parents' age, educational qualification, gender, race and the 7 types of intelligence were the independent/predictor variables used in the regression analysis. From the shape of the histogram and the P-P plot it was established that the assumption of normality was not violated. The variables accounted for 54% of the total variance of overall intelligence (Adjusted R square = 0.540). The total regression model had a significant effect ($F_{11,187} = 22.089$, $p = 0.000$). The specific variables that provided this effect and, therefore, the predictors of overall intelligence were verbal intelligence ($t = 4.06$, $p = 0.000$, Beta = 0.25); spatial intelligence ($t = 3.45$, $p = 0.001$, Beta = 0.23); race ($t = 3.13$, $p = 0.002$, Beta = 0.18) and parents' educational qualification ($t = 3.40$, $p = 0.001$, Beta = 0.21). The contribution of each variable is shown in Table 8.

With reference to the hypothesis made that the best predictors of overall intelligence would be mathematical and spatial intelligence, for parents spatial intelligence was found to be a predictor of overall intelligence and mathematical intelligence, although not significant, did appear to approach significance ($t = 1.89$, $p = 0.061$, Beta = 0.13). As noted above, however, verbal intelligence, race and parents' educational qualification were also found to be predictors of intelligence.

Table 8: Predictors of Overall Intelligence for Parents

Variables	Std Beta	t.	p.
Verbal intelligence	0.254	4.061	0.000
Mathematical intelligence	0.127	1.888	0.061
Spatial intelligence	0.225	3.447	0.001
Musical intelligence	0.017	0.276	0.783
Bodily- kinaesthetic intelligence	-0.033	-0.518	0.605
Interpersonal intelligence	0.028	0.319	0.750
Intra-personal intelligence	0.036	0.434	0.665
Parents' Age	-0.016	-0.306	0.760
Educational qualification	0.210	3.401	0.001
Parents' Gender	-0.017	-0.317	0.751
Parents' Race	0.184	3.131	0.002

4.5.1. First-born Children

A regression analysis was performed to determine the best predictor of overall intelligence for first-born children. Overall intelligence was the dependent variable and children's age, gender, race and the 7 types of intelligence were the independent/predictor variables used in the regression analysis. From the shape of the histogram and the P-P plot it was established that the assumption of normality was not violated. The variables accounted for 69% of the total variance of overall intelligence (Adjusted R square = 0.688). The total regression model had a significant effect ($F_{10,182} = 43.279$, $p = 0.000$). The specific variables that provided this effect and, therefore, the predictors of overall intelligence were mathematical intelligence ($t = 5.35$, $p = 0.000$, Beta = 0.36), spatial intelligence ($t = 3.91$, $p = 0.000$, Beta = 0.31) and intra-personal intelligence ($t = 1.97$, $p = 0.05$, Beta = 0.19). The contribution of each variable is shown in Table 9. Hypothesis 4 for first-born children is accepted, as

mathematical and spatial intelligence were the best predictors of overall intelligence. As mentioned above, however, intra-personal intelligence was also a predictor of overall intelligence.

Table 9: Predictors of Overall Intelligence for First-born Children

Variables	Std Beta	t.	p.
Verbal intelligence	0.092	1.474	0.142
Mathematical intelligence	0.358	5.346	0.000
Spatial intelligence	0.308	3.911	0.000
Musical intelligence	-0.055	-0.865	0.388
Bodily- kinaesthetic intelligence	-0.005	-0.067	0.946
Interpersonal intelligence	-0.002	-0.016	0.987
Intra-personal intelligence	0,187	1.973	0.050
Child's Age	-0.021	-0.461	0.645
Child's Gender	-0.015	-0.375	0.708
Child's Race	0.087	1,807	0.072

4.5.2. Second-born Children

A regression analysis was performed to determine the best predictor of overall intelligence for second-born children. Overall intelligence was the dependent variable and children's age, gender, race and the 7 types of intelligence were the independent/predictor variables used in the regression analysis. From the shape of the histogram and the P-P plot it was established that the assumption of normality was not violated. The variables accounted for 71% of the total variance of overall intelligence (Adjusted R square = 0.708). The total regression model had a significant effect ($F_{10,135} = 36.074$, $p = 0.000$). The specific variables that provided this effect and, therefore, the predictors of overall intelligence were verbal

intelligence (t = 2.92, p = 0.004, Beta = 0.23), mathematical intelligence (t = 4.39, p = 0.000, Beta = 0.37) and intra-personal intelligence (t = 2.16, p = 0.03, Beta = 0.22). The contribution of each variable is shown in Table 10. Hypothesis 4 for second-born children is partially accepted: while mathematical intelligence was a predictor of overall intelligence, spatial intelligence was not.

Table 10: Predictors of Overall Intelligence for Second-born Children

Variables	Std Beta	t.	p.
Verbal intelligence	0.226	2.921	0.004
Mathematical intelligence	0.367	4.394	0.000
Spatial intelligence	0.128	1.337	0.183
Musical intelligence	0.043	0.649	0.518
Bodily- kinaesthetic intelligence	0.002	0.020	0.984
Interpersonal intelligence	-0.075	-0.670	0.504
Intra-personal intelligence	0.218	2.163	0.032
Child's Age	-0.035	-0.636	0.526
Child's Gender	0.031	0.663	0.509
Child's Race	0.096	1.719	0.088

4.6. ANALYSIS OF SIX QUESTIONS

Chi-square tests were computed for each of the six questions, which required yes or no answers. This was done to establish if there were any differences in Indian and Black South Africans' views of intelligence and intelligence tests. A significant difference was found for question 5 (Do you believe I.Q. tests are useful in educational settings? $X^2 = 23.485$, p = 0.000). While a majority of Indian South Africans (68%) believed that I.Q. tests are useful in educational settings, a majority of Black South Africans disagreed (66%) (refer to Figure 4). More Black South Africans (58%) than Indian South Africans (45%) reported that they had

taken an intelligence test. 63% of Black South Africans and 57% of Indian South Africans believed that intelligence tests do not measure intelligence fairly well. Both cultural groups tended to believe that males are not more intelligent than females (86% - Black South Africans; 83% - Indian South Africans). In addition, both cultural groups did not believe that some races are more intelligent than others (86% - Black South Africans; 78% - Indian South Africans). 59% of Black South Africans and 58% of Indian South Africans did not believe that intelligence was primarily inherited. Refer to Table 11 for a further breakdown.

Figure 4: Question 5 – Do you believe I.Q. tests are useful in Educational Settings?

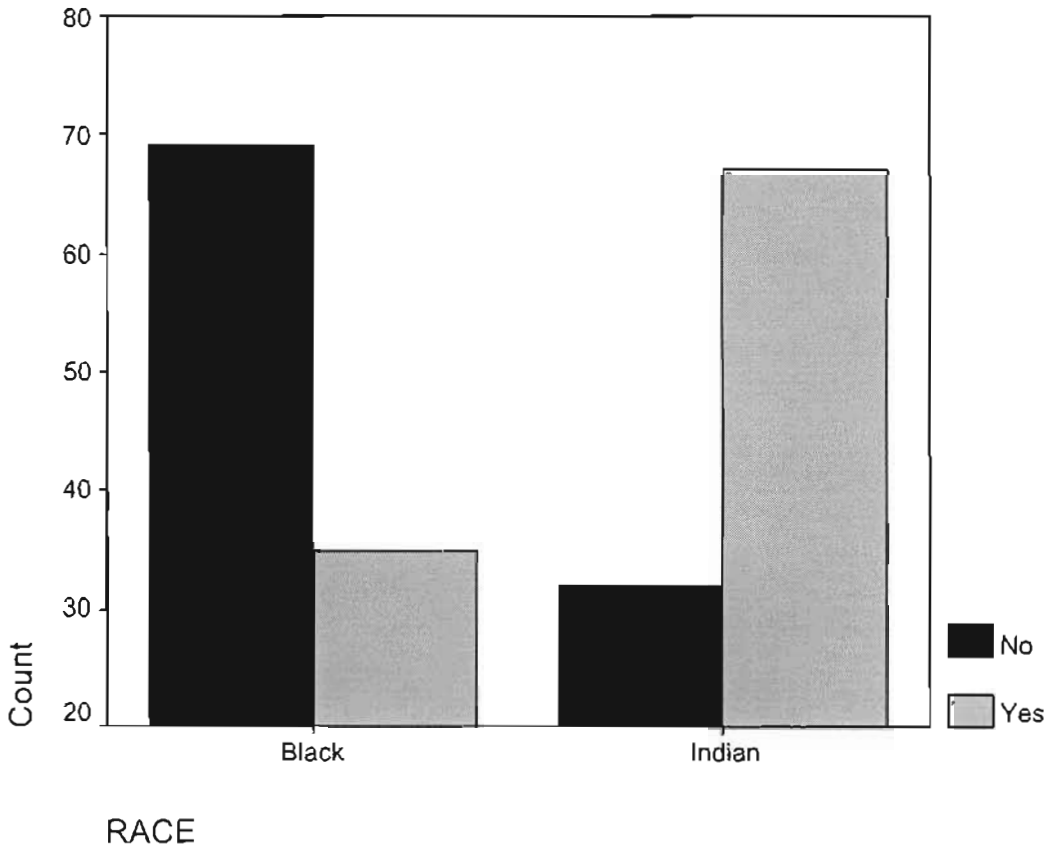


Table 11: Chi-square Analysis of Six Questions

Questions		Black	Indian	Chi-square	p.
1. Have you ever taken an intelligence test?	Y	60	45	3.042	0.054
	N	44	54		
2. Do you believe they measure intelligence fairly well?	Y	38	43	1.006	0.195
	N	66	56		
3. Do you believe males are on average more intelligent than females?	Y	15	17	0.289	0.365
	N	89	82		
4. Do you believe intelligence is primarily inherited?	Y	43	42	0.024	0.495
	N	61	57		
5. Do you believe I.Q. tests are useful in educational settings?	Y	35	67	23.485	0.000
	N	69	32		
6. Do you believe some races are more intelligent than others?	Y	15	22	2.070	0.104
	N	89	77		

4.7. CONCLUSION

From the findings of this study it is established that in this sample no gender differences existed for parents' estimates of their own intelligence and their children's intelligence. Race (cultural) differences were found for parents' estimates of their own intelligence and that of their children's intelligence. Indian South Africans were found to give higher estimates of intelligence than Black South Africans. In investigating the predictors of overall intelligence for parents, verbal intelligence, spatial intelligence, race and parents' educational qualification were found to be the best predictors. Mathematical intelligence was found to be close to significance. For first-born children mathematical intelligence, spatial intelligence

and intra-personal intelligence were found to be the best predictors of overall intelligence and for second-born children verbal intelligence, mathematical intelligence and intra-personal intelligence were found to be the best predictors of overall intelligence. Analysis of the six questions yielded a significant difference for one of the six questions. This difference was shown in the majority of the Indian South Africans believing that I.Q. tests are useful in educational settings while Black South Africans believed that I.Q. tests were not useful in educational settings. Chapter Five discusses these results within the context of other literature in the field.

CHAPTER FIVE

DISCUSSION

The purpose of this chapter is to explore the results of this study in the context of previous research conducted in this field. The present findings will be discussed with regard to whether the findings are consistent or inconsistent with previous research. Possible explanations for the findings will be explored.

5.1. GENDER DIFFERENCES: PARENTS' SELF ESTIMATES

In the present study no gender differences were found, except for mothers giving higher self-estimates for musical intelligence than fathers. This research finding is inconsistent with the findings by Furnham and Gasson (1998); Furnham *et al.* (1999); Furnham (2000); Furnham *et al.* (2002a) and Furnham *et al.* (2002b) which found that males would give higher estimates of intelligence than females. Furnham and Gasson (1998) asked participants to rate their I.Q. No differentiation was made with regard to the different types of intelligence. Furnham *et al. (*1999); Furnham (2000) Furnham *et al.* (2002a) and Furnham *et al.* (2002b) found significant gender differences for spatial and mathematical intelligence.

A possible explanation for the discrepancy in findings may be a result of the present research being conducted in South Africa, in contrast to Furnham *et al.* (1999), Furnham *et al.* (2002a) and Furnham *et al.* (2002b) who conducted their studies in Western countries. As a result of socialisation cross-cultural differences exist in these two societies. Western countries seem to perceive intelligence to be more male-normative than Southern societies. Labouvie-Vief *et al.* (1995) argue that Western theories of the mind validate the existence of two polarities of

mental functioning: the rational pole and the non-rational pole. The rational pole is stereotypically believed to be masculine and the non-rational pole is stereotypically believed to be feminine. Women's minds are devalued and their intellectual strivings are silenced. Achievement has been traditionally viewed as masculine. Feminine achievement has been traditionally perceived to be a "biological impossibility" (Labouvie-Vief *et al.*, 1995, p. 244). From the argument made by Labouvie-Vief *et al.* (1995) and in light of the present findings, male gender bias appears to be more evident in Western societies than in the Indian and Black communities that were investigated in this study.

Furnham *et al.* (2002a) and Furnham and Baguma (1999) used a sample of university students, which may also account for the inconsistency in findings. As a university student one is exposed to different life experiences as compared to the lay community and, therefore, one constructs one's views differently. Due to different life experiences and the university community's being more exposed to different cultures, university students may not reflect the views of the lay community of their culture. University students may perceive intelligence to be gendered due to their exposure to the views of Western societies and, as already mentioned, Western societies view intelligence to be gendered. Their exposure to Western societies' views may be through receiving a formal education. As already mentioned, formal education is based on Western cognitive values and attitudes (Mpofu, 2002).

Intelligence appears to be conceived differently across generations. Younger participants seem to view intelligence to be gender based whereas older participants disagree. This hypothesis is made by comparing the findings of this study to that of previous research. The present study did not do an analysis by age and therefore the hypothesis was made as there are no concrete findings. In addition, it should be noted that the younger participants were

from Western countries and the older participants are from an African context. In the present study the mean age of the participants is 38 years whereas the mean age of the participants in the studies done by Furnham *et al.* (2002a) and Furnham and Baguma (1999) were 22 years and 24 years respectively. Whereas the present study found no gender differences, Furnham *et al.* (2002a) and Furnham and Baguma (1999) did find gender differences. The age difference could possibly account for the discrepancy in findings. Lowenthal *et al.* (1975 as cited in Labouvie-Vief *et al.*, 1995) argue that as males become older they tend to be more accommodating of what is traditionally perceived to be feminine attributes. In addition, they argue that as females age they tend to move away from their traditional sex roles by increasing their independence and intellectuality (Cooper & Gutmann, 1987; Helson & Wink, 1992 as cited in Labouvie *et al.*, 1995). This argument explains the present findings of no gender differences by concluding that due to the different gender views evident in males and females as a result of age, gender biases become less pronounced.

The present research is inconsistent with the study done by Furnham *et al.* (2004), which was conducted in South Africa and in which males were found to give higher estimates than females. This inconsistency may be a result of the limitations of this research, which will be explained in Chapter Six.

5.1.1. Parents' Estimates of their Children's Intelligence

No gender differences were found for parents' estimates of their first and second-born children. Furnham and Mkhize (2003) found similar results in their study investigating *IsiZulu* mothers' estimates of their children's intelligence. Furnham and Mkhize (2003) found only two significant differences whereby daughters were rated higher on interpersonal

intelligence than sons and sons were rated higher on bodily-kinaesthetic intelligence than daughters. This study is consistent with the findings by Furnham *et al.* (2002b) where no gender differences were found in a sample of participants from Hong Kong.

The majority of research in this field (Furnham *et al.*2004; Furnham, 2000 and Furnham and Gasson, 1998) has found gender differences in parents' estimates of their children's intelligence. Furnham *et al.* (2004) found that for first-born children parents gave higher estimates of verbal intelligence for their sons as compared to their daughters. For second-born children parents gave higher estimates of interpersonal intelligence for sons as compared to daughters. Furnham (2000) found that for first-born children parents gave higher estimates of their son's intelligence than that of their daughters. For second-born children parents estimated their daughters as being more intelligent than their sons. Furnham and Gasson (1998) found that for both first and second-born children sons were given higher estimates of intelligence than daughters.

The finding of no gender differences in the estimates of intelligence in this study may be attributed to cultural differences. It would appear from this study that Black and Indian South Africans share the same views of their children's estimates of intelligence as Chinese participants. The grouping of Indian South Africans, Black South Africans and the Chinese community is a result of their similarity in cultural views. Hofstede (1980 as cited in Brew, Hesketh & Taylor, 2001) argues based on empirical research that Australia and other Western countries are clustered toward the individualist domain whereas countries such as Taiwan, Japan, Hong Kong and other Asian countries are clustered toward the collectivist domain. Western cultures value individualism and, therefore, competitiveness. People from Western cultures are, therefore, more likely to focus on individual differences due to their

competitiveness rather than people from collectivistic cultures where social cohesion is valued.

The inconsistency in the results of the present study, as compared to the findings by Furnham *et al.* (2004) may be a result of the researcher being female which may have resulted in female participants being more trusting of the researcher and male participants being more modest in their responses. Furnham *et al.* (2004) used two researchers, one male and one female, which possibly alleviated this difficulty. The gender division of the participants was 59.1 % female and 40.1 % male as compared to a 15% difference for the study by Furnham *et al.* (2004), which may also have attributed to no gender differences.

The existence or non-existence of gender differences in intelligence is a longstanding debate. Contrary views exist that support and reject the existence of gender differences. Lynn (1999) argues that gender differences do exist in intelligence. This argument is based on the findings by Ankney and Rushton (1992 as cited in Lynn, 1999) who states that males have a larger brain size than females. Since brain size is known to be associated with intelligence, males are expected to have a higher intelligence than females. Taking a developmental approach Lynn (1999) argues "girls mature more rapidly in brain size and neurological development than boys up to the age of 15 years" (p. 1). Due to the fast maturation of girls and the larger brain size of boys this should result in no or minimal gender differences until the age of 15 years. From 16 years to adulthood however a gender difference is hypothesised and found whereby males are found to have a 4-point higher I.Q. than females owing to their larger brain size. Contrary to this view, however, gender differences in the estimates of intelligence may be a result of social expectations rather than brain size. American Association of University Women (1992) and Yee and Eccles (1988 as cited in Labouvie-Vief *et al.* 1995) argue that females in early childhood show a steady decline in self-esteem and by high school withdraw from achievement-related challenges. Kerr (1987 as cited in Labouvie-Vief *et al.*, 1995) argues that females may decide not to perform well due to the

social costs that may result from their high performance. Males are socialised to overestimate their performance and females are socialised to underestimate their performance based on the feedback they receive from their parents and educators.

Mackintosh (1996, 1998 as cited in Lynn, 1999) disputes the hypothesis of gender differences in intelligence arguing that a larger brain size does not imply that males have a higher I.Q. than females. Males having a higher I.Q. is argued to be a result of intelligence being defined as comprising of verbal comprehension, reasoning and spatial abilities. Mackintosh (1996, 1998 as cited in Lynn, 1999) argues that intelligence should be defined as fluid or reasoning ability. Aluja-Fabregat, Colom, Abad and Juan-Espinosa (2000) investigated gender differences in general intelligence (g) among young adolescents. A battery of scholastic and ability tests were administered to the participants. The results yielded negligible gender differences. Aluja-Fabregat *et al.* (2000) hypothesise that gender differences in raw performance scores may be a result of factors external to general intelligence. Colom, Juan-Espinosa, Abad and Garcia (2000) also found a negligible gender difference in general intelligence. This study used the largest sample on which gender differences have been investigated. Colom *et al.* (2000) discount Lynn's (1999) findings of a 4 I.Q. point advantage for males, arguing that Lynn (1999) bases his argument on a small difference in brain size and by using the WAIS I.Q. In addition, Colom *et al.* (2000) argue that 88 percent of the 4 I.Q. point difference found between the sexes are a result of males having a high performance in reasoning and spatial tests.

The inconsistency in the finding of no gender differences in this study, as compared to the finding of gender differences in the majority of previous studies in the field, lends itself to the above inconsistency in findings as to whether there exist gender differences in intelligence.

Similar to experts debating the existence of gender differences there seems to be the same debate in existence in the lay community. The consistent finding between the lay community and experts seems to be the finding of gender differences in mathematical and spatial abilities.

5.2. RACE DIFFERENCES

In investigating race differences for parents' estimates of their own intelligence and their first and second-born children, Indian South Africans were found to give higher estimates of intelligence than Black South Africans. This is a consistent finding with the study done by Furnham *et al.* (2004). A possible explanation for this finding as Furnham *et al.* (2004) note may be due to the significant educational difference whereby Indian South Africans had a higher educational level than Black South Africans. In the present study a statistically significant educational difference was also found whereby Indian South Africans had a higher educational level than Black South Africans. Indian South Africans may have equated their educational level with their intelligence.

Another possible explanation may be a result of the hubris-humility effect whereby Black South Africans may have been conservative in their responses and Indian South Africans may have been boastful. As Markus and Kitayama (1991) explain when the self is seen as interdependent, social cohesion is valued and, therefore, responses are modest or conservative due to feedback about oneself in relation to others. Self–enhancement is seen negatively as it does not consider others and isolates the self from others. From the results of this study Black South Africans appear to be more humble in their responses.

Black South Africans giving lower estimates of intelligence may also be a result of their viewing intelligence differently. Mpofu (2002) argues that individuals from Sub-Saharan Africa view intelligence as having social and cognitive components. Western cultures view intelligence as having cognitive components only. Mpofu (2002) reports that the conceptions of intelligence of individuals living in Sub-Saharan Africa vary in the importance they place on school activities. He also reports that school activities are based on Western cognitive values and attitudes. The Chewa of Zambia and the Luo of Kenya place less emphasis on school activities in defining intelligence whereas the Shona of Zimbabwe place more emphasis on the role of school activities. Like the Chewa and the Luo community, Black South Africans' lower estimates may be due to their placing less emphasis on cognitive aspects of intelligence. Sternberg (2002) and Mpofu (2002) argue that an individual's context influences his or her understanding of what constitutes intelligent behaviour. Indian South Africans giving higher estimates of intelligence than Black South Africans may be explained by the fact that Indian South Africans have had more exposure to school and the work environment than Black South Africans. This has allowed Indian South Africans more exposure to surroundings where competitiveness is related to achievement and success, possibly resulting in independence despite traditional views of interdependence.

5.3. COMPARISON OF PARENT-CHILD ESTIMATES

Parents gave higher estimates of their own intelligence as compared to their children's (first and second-born children) intelligence. A possible explanation for the high self-estimates for spatial, interpersonal and intra-personal intelligence may be a result of parents attributing these types of intelligence to be related to one's life experience thereby suggesting that age influences these types of intelligence. Being older suggests that parents have been exposed to

more interpersonal relationships, have had more opportunity to be exposed to different environments and have had more time to understand themselves. More experience due to age implies more understanding and, therefore, results in higher ratings for themselves. High estimates of interpersonal intelligence would be expected given the value it is given in both the Indian and Black South African communities. As mentioned previously, since the Indian and Black South African communities value collectivism and social cohesion, interpersonal skills are seen positively (Markus & Kitayama, 1991; Mpofu, 2002).

For second-born children, as noted above, parents also gave higher estimates for themselves as compared to their estimates of their children. This finding is inconsistent with the findings by Furnham *et al.* (2004); Furmham and Mkhize (2003); Furnham *et al.* (2002b); Furnham (2001) and Furnham and Gasson (1998) whereby parents gave higher estimates of their children's intelligence as compared to their own.

Furnham *et al.* (2004) found five significant differences for first-born children, namely, verbal intelligence, mathematical intelligence, spatial intelligence, bodily-kinaesthetic intelligence and musical intelligence. For second-born children significant differences were found for mathematical intelligence, spatial intelligence, bodily-kinaesthetic intelligence and musical intelligence. Although Furnham and Mkhize (2003) found that *IsiZulu* mothers perceived their children as being more intelligent than themselves, these mothers rated their own spatial, interpersonal and intra-personal intelligence as higher than their children's, which is similar to the findings in this study. The consistent findings in both these studies indicate that a percentage of South Africans seem to view spatial, interpersonal and intra-personal intelligence as being related to one's life experience and, therefore, age. Given that these types of intelligence are not school-related and the fact that the majority of the older

Indian and Black South Africans have had minimal exposure to school, they seem to have focused their attention on spatial, interpersonal and intra-personal intelligence. Interpersonal and intra-personal intelligence are important to these cultures as a result of the value placed on social cohesion and interdependence.

I.Q. differences have been found to rise dramatically per generation. This finding has been established through extensive research by James Flynn, and hence the reference to the rise in I.Q. as the Flynn effect. While some researchers (e.g. Mingroni, 2004 as cited in Kanaya, Ceci and Scullin, 2005) argue that the rise may be due to genetics and cognitive ability, Flynn (1987, 1996 and 1998 as cited in Kanaya, Ceci and Scullin, 2005) argues that the rise in I.Q. is a result of environmental changes. From the above findings it would be hypothesised that parents would estimate their children's intelligence as higher than their own. As already explained, however, the opposite was found in the present study.

5.4. PREDICTORS OF OVERALL INTELLIGENCE

Verbal intelligence, spatial intelligence, race and parents' educational qualification were found to be the best predictors of intelligence for parents' self-estimates. For first-born children the predictors of overall intelligence were mathematical intelligence, spatial intelligence and intra-personal intelligence. For second-born children the predictors of overall intelligence were verbal intelligence, mathematical intelligence and intra-personal intelligence.

Furnham *et al.* (2002b) found that for first-born children their age and parental self-estimates were predictors of their estimates of intelligence. Older children, therefore, would receive

higher estimates than younger children. In addition, parents who gave high self-estimates were found to give high estimates of their first-born children as well. For parents their educational level predicted their self-estimates whereby the higher their educational level the higher they would estimate their intelligence. Similar to first-born children, for second-born children parents' self-estimates predicted children's estimates. Second-born children's age, however, was not a significant predictor of their estimates.

Furnham and Gasson (1998) found that parents' age and gender were predictors of their estimates. Younger parents and males gave higher self-estimates. For both first and second-born children the child's gender was the best predictor of estimates of intelligence. Furnham and Mkhize (2003) found that the best predictors of overall intelligence for parents were mathematical and spatial intelligence. This finding is consistent with previous findings (Furnham, 2000). For first-born children, all the independent variables used (gender, age of parent and child and parent's estimated intelligence) were not found to be significant. For second-born children *IsiZulu* mothers' self-estimates were found to be a significant predictor of children's overall intelligence. Furnham (2000) and Furnham and Mkhize (2003) noted that mathematical and spatial intelligence were the best predictors of overall intelligence. In the present study verbal intelligence, mathematical intelligence, spatial intelligence, intra-personal intelligence, race and parents' educational qualifications were found to be the predictors of overall intelligence.

Similar to the findings by Furnham *et al.* (2002b) parents' educational qualifications were found to be a predictor of overall intelligence for parents' self-estimates. This can be explained due to overall intelligence or 'g' being associated with school-related tasks. Intelligence tests initially developed by Alfred Binet and his colleagues were designed to

assess children's ability to succeed or fail at school. These tests have been erroneously used to assess overall intellectual functioning (Cole, n.d.). As Gardner (1993) argues, 'g' is limited to measuring linguistic (verbal) and logical (mathematical and spatial) intelligence and, therefore, is a good predictor of success in school. As seen in the present study verbal, mathematical and spatial intelligence have been found to be predictors of intelligence. Due to intelligence tests assessing school-related tasks, overall intelligence has become equated with success in these tasks. Despite the fact that the Black and Indian South African communities may have a broader understanding of intelligence, linguistic and logical intelligence still seem to be seen as critical domains of intelligence owing to the traditional view of intelligence.

An unexpected finding in the present study is intra-personal and not interpersonal intelligence found to be a predictor of children's overall intelligence. Interpersonal intelligence more than intra-personal intelligence would have been assumed to be a predictor of overall intelligence due to both Indian and Black South Africans valuing collectivism and, therefore, social cohesion and interdependence. Due to their value system, understanding and relating to others would be assumed to be important to both these cultures. From the results of this research, intra-personal intelligence also seems to be important to the Indian and Black South African communities. Indian and Black South Africans seem to value the self-understanding.

5.5. ANALYSIS OF SIX QUESTIONS

The analysis of the six questions that the participants answered revealed a significant difference for question 5 which investigated the usefulness of I.Q. tests in educational

settings. Indian South Africans believed that I.Q. tests are useful in educational settings, whereas Black South Africans disagreed.

The distrust of intelligence tests by Black South Africans may be a result of intelligence tests being biased. Intelligence tests have been developed in Western countries and as a result are biased to that specific culture. Houston (1990) argues that most standardised I.Q. tests are specific to the White middle class culture and, therefore, biased to this culture. Despite this, however, intelligence tests are in use in different cultural settings.

Cole (n. d.) argues that culture-free intelligence testing is an illusion. Cole (n. d.) further argues that intelligence tests are only applicable to the culture that they are developed in. This is due to different cultures understanding intelligence differently and thereby considering different behaviour and tasks as being intelligent. Ogbu (1995) further argues that different cultures will encourage different competencies based on their societal demands. Black South Africans have a broader understanding of intelligence than intelligence just being based on school-related tasks. As previously mentioned Mpofu (2002) argues that individuals living in Sub-Saharan Africa view intelligence as comprising of both social and cognitive components.

Bulhan (1985), Taylor and Radford (1986) and Tyghe (1985 as cited in Seedat, 1990) argue that the "acceptance of the premises underlying psychological testing obscures the role of psychologists in advancing the interests of capital and Apartheid in South Africa" (p. 32). In the Apartheid era psychological services in the form of school guidance programs were initially not offered in Black schools. After extensive boycotts by learners from these schools guidance was offered to the learners. Conformity and social control was emphasised in these

programmes in efforts to further entrench the Apartheid system (Dovey, 1983 as cited in Cooper, Nicholas, Seedat & Statman, 1990).

Furnham and Baguma (1999) investigated the views of African, American and British psychology students and found that African students were least likely and American students most likely to have taken an I.Q. test. African students were more likely to believe males are more intelligent than females, that intelligence is primarily inherited, that intelligence tests are useful in educational settings and that some races are more intelligent than others. African students' views of cross-cultural differences in intelligence may be due to research indicating that some races are more intelligent than others. The present findings are inconsistent to the above findings.

Furnham *et al.* (2002a) found that more Japanese students than British students had taken an intelligence test. Americans and British students more than Japanese students believed that I.Q. tests measure intelligence fairly well. More British students believed that intelligence was primarily inherited. More British and Japanese students felt that there were racial differences in intelligence than American students. Furnham *et al.* (2002b) investigated the beliefs of intelligence of Hong Kong parents. Approximately a quarter of the sample had taken an intelligence test and a fair amount of this sample was sceptical about the validity of intelligence tests. Approximately a quarter of the sample believed that males are more intelligent than females. More females than males felt that this was the case. "Over two thirds believed that intelligence was primarily inherited, that some races are more intelligent than others, and that I.Q. tests are useful in educational settings" (Furnham *et al.*, 2002b, p.350).

Furnham and Mkhize (2003) investigating the views of *IsiZulu* mothers' beliefs of intelligence found that only 10% of the participants had taken an intelligence test. 91% of the participants, however, believed that intelligence tests measure intelligence fairly well and all participants believed that intelligence tests were useful in educational settings. 97% believed that intelligence is primarily inherited. 87% believed that there were no gender differences and 79% believed that there were no race differences. The present research seems to have some overlap with the findings by Furnham and Mkhize (2003). Similar to the above findings the majority of the participants did not believe in gender and race differences. The view of *IsiZulu* mothers and Indian South Africans regarding the usefulness of intelligence tests is of concern given the reality of most psychological tests not being appropriately normed or not being normed in the South African population and, therefore, inapplicable to the South African population.

Furnham *et al.* (2004) found that more Indian than *IsiZulu* parents had taken an intelligence test. This is in contrast to the present study where more Black South Africans than Indian South Africans reported that they had taken an intelligence test. In addition, Furnham *et al.* (2004) found that both cultural groups tended to believe in the validity of intelligence tests, which is also in contrast to the present finding. Other findings by Furnham *et al.* (2004) were: Indians more than *IsiZulu* parents believing that males are more intelligent than females, Indians more than *IsiZulu* parents believing that intelligence is primarily inherited, both cultural groups believing that tests are useful in educational settings and finally *IsiZulu* parents more than Indian parents believing that some cultural groups are more intelligent than others (Furnham *et al.*, 2004).

The inconsistency in the findings of the present study as compared to Furnham *et al.* (2004) may be a result of the participants' lack of understanding of the questions. This seemed to be the case for questions asking participants to comment on their views of intelligence tests. Participants, particularly Black South Africans, seemed to understand intelligence tests to be examinations written at school. This was clarified in English, which may have informed the Indian South Africans more than the Black South Africans of their misconception. However there still appeared to be a misunderstanding regarding this concept. The inconsistency in findings as compared to previous research may also be a result of the participants having different views of intelligence. Due to socialisation, different cultures develop different views based on their beliefs and the values of their culture.

5.6. CONCLUSION

The results of this study seem to have highlighted some consistency with previous research findings in the field. However there also appear to be inconsistencies in the findings as compared to previous research. This chapter explored the possible reasons for the present research findings. The finding of no gender differences has been hypothesised to be a result of cultural differences. Western societies seem to view intelligence to be more male-normative than Southern societies. Indian South Africans giving higher estimates of intelligence than Black South Africans may be understood to be a result of the hubris-humility effect. Black South Africans appear to be more humble in their responses which may be attributed to their valuing social cohesion and interdependence. Cultural differences seem to account for the majority of the research findings. This is a result of the present study's being conducted in South Africa while the majority of the previous research has been conducted in Western societies. The present research highlights the cross-cultural differences

that exist in different societies and the need to further explore the cultural views of different societies.

CHAPTER SIX

CONCLUSION AND IMPLICATIONS

This chapter provides a general overview of the present study. The chapter begins with a brief background to the research and highlights the research questions investigated in this study. A summary of the conclusions of the research questions is also included. This is followed by a discussion of the unique contributions of the study to the field and the possible implications for policy, research and practice are discussed. A section is included on the limitations of the research. The chapter is concluded by a discussion on the implications that this study has for future research.

6.1. BACKGROUND TO THE STUDY AND RESEARCH QUESTIONS INVESTIGATED

This study stems from the paucity of research that has been done in South Africa on the estimates of intelligence. This limitation is due to the majority of the research being conducted in Western countries. Generalising the findings from the research conducted in other countries, especially western countries, to South Africa is erroneous given South Africa's unique and complex background.

Investigating the estimates of intelligence in the Indian and Black South African communities was conducted to establish the differences and/or similarities that exist in these communities. During the Apartheid era Indian and Black South Africans were marginalized; however, their marginalization existed in different degrees and, therefore, comparison of their views is important. Indian and Black South Africans are also seen to hold similar views with regard

to valuing collectivism, which made the comparison of these two cultural groups insightful and a valuable contribution.

The research questions investigated in this study were based on the findings of previous research in the field and to establish if the present findings supported or rejected previous findings. Cultural and gender differences were investigated to establish if differences or similarities existed in Indian and Black South Africans' views on the estimates of intelligence. A generational effect was also investigated to establish if parents estimate their own intelligence or their children's intelligence as being higher. An investigation of the best predictors of overall intelligence was also undertaken. Participants were also asked six questions relating to their views of intelligence and intelligence tests.

6.2. SUMMARY OF CONCLUSIONS ABOUT RESEARCH QUESTIONS

Cultural differences were found in the estimates of intelligence. Indian South Africans were found to give higher estimates of intelligence than Black South Africans. With regard to gender differences, mothers were found to give higher self-estimates for musical intelligence than fathers. No gender differences were found in parents' estimates of their first and second-born children. A generational effect was hypothesised to exist whereby parents would estimate their children's intelligence higher than their own. The contrary was found, however, whereby parents estimated their own intelligence higher than their children's.

The predictors of overall intelligence for parents' self-estimates were verbal intelligence, spatial intelligence, race and parents' educational qualification. In addition, mathematical intelligence appeared to approach significance. For first-born children mathematical

intelligence, spatial intelligence and intra-personal intelligence were found to be predictors of overall intelligence. For second-born children the predictors of overall intelligence were verbal intelligence, mathematical intelligence and intra-personal intelligence. The six questions that participants were asked yielded a significant difference for participants' views of the usefulness of I.Q. tests in educational settings. Indian South Africans believed that I.Q. tests are useful in educational settings, whereas Black South Africans disagreed.

6.3 UNIQUE CONTRIBUTIONS OF THE STUDY

The unique contributions made by this study can be seen in the discrepancies that this study has with previous research in the field. The study done by Furnham *et al.* (2004) was conducted using a sample of Indian and Black South Africans. The present study using the same population yet a different sample seemed to yield some inconsistent findings to the study by Furnham *et al.* (2004).

The inconsistent findings as compared to previous research and, therefore, the unique contribution of this study was the finding of no gender differences in the estimates of intelligences. This finding yields a different perspective to the field given the hypothesis made based on previous findings that gender differences would be found. Another unique contribution was the finding that parents estimated their own intelligence as being higher than their children's. In addition, contrary to previous research mathematical and spatial intelligence were not the only predictors of overall intelligence. Verbal intelligence, race, parents' educational qualifications and intra-personal intelligence were also found to be predictors of overall intelligence.

Although some of the inconsistencies in findings have been attributed to methodological limitations of the present study, the inconsistencies noted in the findings do suggest a need to further investigate the views of Black and Indian South Africans. The present findings have raised more questions and highlighted the need for further research. In addition, the findings have provided a broader understanding of the views of Indian and Black South Africans. This contributes to the further understanding of these cultures and also allows for more cross-cultural comparisons to be made thus exploring the similarities and differences of different cultures.

6.4 IMPLICATIONS FOR POLICY, RESEARCH AND PRACTICE

The implications that this study has for policy and practice are mainly for changes to be implemented in the educational arena. As noted from the findings, intelligence in the educational environment and, as a result, in the lay community is largely seen to be linguistically and logically based. This stigmatises individuals who are not so inclined. Attempts need to be made to see each individual independently and assess each individual appropriately to establish his or her strengths. Since traditional assessments focus on linguistic and logical domains further research needs to be conducted to establish assessments that assess all types of intelligences and that take cultural aspects into consideration. Establishing these assessments will broaden the understanding of intelligence and as a result have policy and practice implications to implement the necessary changes in the educational arena.

6.5 LIMITATIONS AND CRITICISMS

The findings of this study should be reviewed taking the limitations of this study into consideration. This study used a survey technique during data collection, which may be seen as a limitation. A survey technique was chosen as it is less time-consuming; however, it does pose the limitation of being directive and limiting the participants' responses. This may have resulted in not establishing a full understanding of the Indian and Black South African communities' views of intelligence.

During data collection a monolingual researcher collected the data, which seems to have posed a language barrier for the Black South African participants. The researcher was English-speaking as compared to the study done by Furnham *et al.* (2004) where the researchers were bilingual (*IsiZulu* and English-speaking). Although an attempt was made to clarify the concepts for the participants this was done in English, which may have not achieved the same goal for Black participants as compared to if it were done in the participants own language. In addition, participants did appear to be sceptical about the research and volunteering to complete the questionnaire despite an initial explanation. This may have been exacerbated for the Black participants due to the language barrier as compared to the Indian participants and, therefore, there is a possibility of there being a lack of trust. Since trust is an important requirement during research an increased effort was made to establish trust. Despite this however, there was still a sense of reluctance by the Black South African participants which was more evident than the reluctance of the Indian South African participants. Data collection was done by a female researcher, which may have posed an additional difficulty whereby the male participants may have not felt entirely comfortable to be honest in their responses.

6.6 INDICATIONS FOR FURTHER RESEARCH

As mentioned previously the results of the present research do not seem to have consistent findings with the research done by Furnham *et al.* (2004) using the same population, namely, Indian and Black South Africans. Further research on the estimates of multiple intelligences needs to be done to further investigate this population. Interviews instead of the survey technique during data collection would be recommended to establish if this technique yields different results. It is anticipated that even if an interview technique does not yield different results it will yield a broader understanding of the two cultural groups. It would also be recommended that bilingual researchers, a male and a female researcher, collect the data to guard against any biases that may be felt by the participants. Concepts should be explained clearly and consensus given as to their understanding. The present study has hypothesised about intelligence being conceived differently across generations. Research investigating this hypothesis would be beneficial.

6.7 CONCLUSION

The aim of the chapter was to give the reader an overview of the research. The chapter, therefore, began by highlighting the background of the research and outlining the research questions. Implications that the research may have for policy, further research and practice are discussed, together with the limitations of the research. An aim of this research was to better understand the Indian and Black South African populations. This has been achieved to some extent although further research is still necessary. Further research should take heed of the limitations and recommendations of this study.

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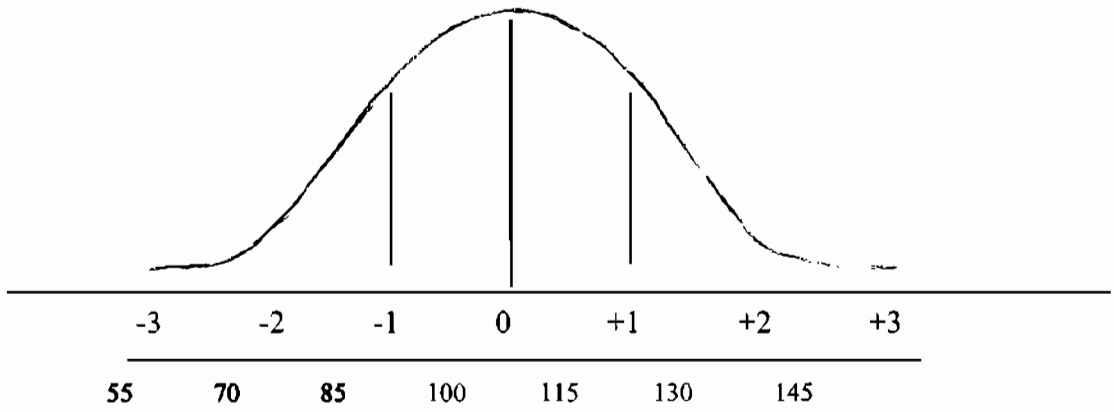
APPENDIX A: THE "ESTIMATES OF INTELLIGENCE" QUESTIONNAIRE

HOW INTELLIGENT ARE YOU?

Intelligence tests attempt to measure intelligence. The average or mean score on these tests is 100. Most of the population (about two thirds of people) score between 85 and 115. Very bright people score around 130 and scores have been known to go over 145. The following graph shows the typical distribution of scores.



But there are different types of intelligence. We want you to estimate your overall I.Q. and your score on 7 basic types of intelligence. We then want you to estimate each score for your children. Please specify your sex and age.

	ESTIMATES				
	YOU	CHILD 1 BOY/GIRL AGE:	CHILD 2 BOY/GIRL AGE:	CHILD 3 BOY/GIRL AGE:	CHILD 4 BOY/GIRL AGE: .....
OVERALL INTELLIGENCE					
1. Verbal or linguistic intelligence **(the ability to use words)**					
2. Logical or mathematical intelligence **(the ability to reason logically, solve number problems)**					
3. Spatial intelligence **(the ability to find your way around the environment, and form mental images)**					
4. Musical intelligence **(the ability to perceive and create pitch and rhythm patterns)**					
5. Body-kinetic intelligence **(the ability to carry out motor movement e.g. being a surgeon or a dancer)**					
6. Interpersonal intelligence **(the ability to understand other people)**					
7. Intra-personal intelligence **(the ability to understand yourself and develop a sense of your own identity)**					

	YES	NO
Have you ever taken an intelligence test?		
Do you believe they measure intelligence fairly well?		
Do you believe males are on average more intelligent than females?		
Do you believe intelligence is primarily inherited?		
Do you believe I.Q. tests are useful in educational settings?		
Do you believe some races are more intelligent than others?		

Please specify details about <u>yourself</u>:

Sex: Male/Female

Date of Birth: _____

Highest educational qualification: _____

Would you like a brief summary of the results of this study? YES/NO

Can the information given in this questionnaire be used in future research? YES/NO

APPENDIX B: ISIZULU VERSION OF THE "ESTIMATES OF INTELLIGENCE" QUESTIONNAIRE

IZINHLOBONHLOBO ZOKUKHALIPHA	Wena Sex Age	Ingane 1 Sex Age	Ingane 2 Sex Age	Ingane 3 Sex Age	Ingane 4 Sex Age
Ukuhlakanipha nje jikelele					
Ulimi: ubuciko bokusebenzisa amagama' noma ulimi					
Izibalo: ukukwazi ukucabanga ngendlela ehlelekile nobungoti bokuxazulula izinkinga ezibandakanya izinamba					
Izinga lokuba nesithombe sendawo noma izakhiwo emqondweni wakhe: Njengokuthi nje, uyakwazi ukuthola indawo, uma eke waya kanye endaweni, uyayikhumbula, ngeke aduke...ngoba isithombe sayo siyasala emqondweni wakhe. Angakwazi ukukuchazela indawo ethile ake waya kuyona, akunike isithombe esicacile saleyondawo.					
Ukuhlakanipha ngokomculo: unalo iphimbo (pitch), uyalizwa iphimbo elifanele, kanti uyakwazi ukuzwa nokwakha isigqi (rhythm) esifanele.					
Ukusebenzisa umzimba, izitho zomzimba, ngendlela enobuciko (e.g. uyakwazi ukudansa, angakwazi ukusebenzisa amathuluzi obuchwepheshe. Njengokuthi nje, udokotela ohlinza iziguli kufanele abambe ama-raizor akhona ngobuciko					
Izinga lakhe lokuqonda abanye abantu, njengokuthi afunde imizwa yabo.					
Uyazazi yena ukuthi ungumuntu onjani. Uyazazi izinto ezimchazayo (define) yena njengomuntu, izinto ezisho ubuyena ezisondele kakhulu kuyena. Njengokuthi nje: Uyazi ukuthi mina ngingumuntu othulayo, othanda ukuxoxa nabanye, njalonjalo.					

Wena-ke

1. Wake wasithatha isivivinyo sokuhlakanipha (intelligence test)?
Wasithathaphi? (e.g. emsebenzini) _____ esikoleni, njll

2. Ngokuqonda kwakho, ngabe uyakholwa ukuthi lezizivivinyo ziyizilinganiso ezanelisayo zokuhlakanipha? _____.

3. Ngabe uyakholwa yini ukuthi ngokujwayelekile nje, abesilisa bakhaliphe ukudlula abesifazane _____.

4. Ngabe uyakholwa yini ukuthi ingxenye enkulu yokuhlakanipha ihambisana nofuzo?
_____

5. Ngabe uyakholwa yini ukuthi izivivinyo zokuhlola ukuhlanipha zinosizo ezikhungweni, ezizindeni zemfundo? (Njengokuthi uma ingane ifika esikoleni, ibhaliswe isivivinyo sokuhlakanipha?) _____.

6. Uyakholwa yini ukuthi kunezinhlanga ezihlakaniphe ukudlula ezinye?
Uma ukholwa, yiziphi? _____ Ukusho ngani lokho
_____

ABOUT YOURSELF

UBULILI _____

USUKU LOKUZALWA _____

HIGHEST EDUCATION PASSED _____