

CONSTRUCT VALIDITY OF THE *PANGA MUNTHU* TEST: A CROSS-SECTIONAL STUDY OF EARLY CHILDHOOD YEARS IN ZAMBIA (4- 6 YEARS)

By

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Declaration

I, Ignatius Ngenda do hereby declare that this dissertation:

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Approval

This dissertation of IGNATIUS NGENDA has been approved as partial fulfilment of the requirements for the award of the degree of Master of Arts Degree in Child and Adolescent Psychology by the University of Zambia.

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ABSTRACT

The assessment of Preschool age children (age 4-6) on their intellectual and cognitive potentials at school and community levels are discussed in this report in the light of other related empirical studies carried out between 1974 and 2009 on the *Panga Munthu* test (PMT). The PMT was earlier administered by Kathuria and Serpell (1998) to find out a more accurate and culturally appropriate assessment of intelligence among Zambian Primary School aged children. This study aims at extending and establishing the validity of the test by including children below the age of seven who were sampled to participate in the study. The inclusion of this age group of children is to ascertain the test's validity by comparing the performance of younger children on the test. Data were collected through the *Panga Munthu* test instrument and two new instruments: the Body Parts naming (BPN) and Dog Model (DM) check lists. The sample comprised 120 participants drawn from (rural) Lufwanyama and (urban) Kitwe districts on Zambia's Copperbelt Province. The data collected were analyzed qualitatively by inspection of children's crude models and quantitatively coded for statistical analysis using analysis of variance and product-moment correlation. The major findings of this study offered the first validation of the PMT with children below the age of seven. The study revealed that the PMT measures some factor which matures with age in children (Mean PMT score for 4 year olds = 5.93; 5 year olds = 8.56, and 6 year olds = 9.90). A three-way analysis of variance showed that the effect of age-group was significant, while the effects of gender (PMT mean score for males 7.97, females 8.18) and residence (PMT mean scores for rural residence 8.23; urban 7.92) were non-significant. Children between 4 to 6 years old scored on average 8- points on the scoring criteria which match the lower end of the average scores reported for 7-8 year- olds by Kathuria and Serpell. The study showed that the *Panga Munthu* test analyses knowledge of human representational skills through everyday cognition. Findings about the relations between the PMT and DM and between PMT and BPN both revealed a significant correlation. Ratings of children's intelligence by their teachers correlated well with the PMT scores from the urban sample but a lower correlation was recorded from the rural sample with ratings of intelligence by their parents. The PMT makes an appeal to specific skills in content and instructions. The data reported provide some validation of the PMT as a tool for developmental assessment and its utility for measuring intelligence in an African setting where children play with clay. It can be concluded from this study that the *Panga Munthu* test can be used in both rural and urban residential settings to test children's everyday competences.

DEDICATIONS

This work is dedicated to my wife Dorcas, my children Muyunda, and Inonge for the endurance they had suffered while I was away at the University of Zambia.

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ACRONYMS

PMT	<i>Panga Munthu</i> Test
BPN	Body Parts Naming
DM	Dog Model
I.Q	Intelligence Quotient
DQ	Development Quotient
DPT	Draw- a- Person Test
ECCDE	Early Childhood Care Development and Education

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

This study emanates from an earlier study done by Kathuria and Serpell (1998) in which they articulated the relationship between intelligence and culture. They developed the *Panga Munthu* Test (PMT) to provide a more accurate and culturally appropriate assessment of intelligence for children in a non- Western society. It is a group administered ability test developed specifically for children in rural Zambia. The PMT is grounded in skepticism about the viability of arriving at valid assessment measures in Zambia through minor adaptations and /or local standardization of Western tests. The first version of the PMT involved a clay modeling task scored on a 10-point scale copied by children from a crude model of a person which was presented for about 30 seconds after which the child was asked to build (*panga*) his or her own model of a person (*munthu*) (Serpell,1974). In this initial study, boys were required to model in wire, while girls modeled in clay. In all subsequent versions of the test, only the clay modeling version was used and no model was shown to the children prior to testing. Scores on the original version of the PMT involved a sample of children aged 6 to 14 years in a rural area of Zambia's Eastern Province and showed a promising pattern of correlations with age and with scores on two other locally developed tests. The aim of this study is to extend the test in order to validate the PMT by using age differentiation, residence, and gender.

1.1 SMALL SCALE STUDIES EXPLORING THE VALIDITY OF THE PMT

Ezeilo (1975, 1978) selected the PMT for further development in her master's Dissertation study at the University of Zambia and based on careful scrutiny of a pilot sample of children's models, she elaborated the scoring system into a scale of 20 points and, finding that children understood the task without it, eliminated the procedure of presenting a standard model as an example. She recommended 5 additional items for scoring responses to the test.

During the 1980s, several small-scale studies on the PMT were made using Ezeilo's 25-point scoring system to explore the range of performance on the PMT by Zambian primary school children of both sexes in various ecological settings (Chama, 1979; Serpell, 1980; Chimbwali, 1982; Nsopela, 1982; Stemler, 2009). In another study, Matafwali (2005) also used the PMT in her Masters Dissertation study on the prevalence of reading difficulties of children in the third grade among Lusaka rural and urban schools.

1.2 VALIDITY OF THE PANGA MUNTHU TEST WITH 4- 6 YEAR OLD CHILDREN

In the current study the author explored further if the PMT provided valid assessment of intelligence in children below the age of seven. It is hoped that more explorations on the test will be done by other scholars in future.

1.3 BACKGROUND TO THE STUDY OF TESTING

Tests provide a standard setting in which practitioners of educational testing can observe behaviors. Further, practitioners can use testing in conjunction with experience and local norms (consideration) to gain accuracy in their observations and decisions they make (Kaplan and Saccuzzo, 2001). Tests provide important feedback to individuals regarding areas of strengths and weaknesses (Stemler et al, 2009).

In 1904, Alfred Binet developed the first I.Q. test capable of identifying students struggling in school so that those students could be identified for remediation (Birney and Stemler, 2007). Testing also provides an objective benchmark against which to compare the diverse educational systems of the world. Many countries have begun to participate in large-scale comparative studies of student achievement.

According to Stemler et al (2009:2), the practice of educational testing is very deeply woven into the fabric of modern Western schooling. Much has been written recently about the potential adverse impact of the increased emphasis on educational and psychological testing. From a social perspective, testing provides a powerful and objective tool for decision making regarding the allocation of scarce resources.

In many European nations, for example, tests are used to place individuals onto different educational tracks early in their life, which is perceived as a fairer allocation of resources within the public school system. In many countries, tests are used to select which students are eligible to pursue further educational opportunities at elite institutions where the demand by students for enrolment far exceeds the realistic supply of resources (Labaree, 1997, in Stemler, et al 2009).

1.4 INTELLIGENCE TESTING

Binet (1905), in Kaplan and Saccuzzo (2001), defines intelligence as “the tendency to take and maintain a definite direction; the capacity to make adaptations for the purpose of maintaining a desired end and the power of autocriticism.” Spearman (1923) defined intelligence as “the ability to educe either relations or correlates” while Freeman (1955), defined intelligence as “adjustment or adaptation of the individual to his total environment,” “the ability to learn” and “the ability to carry on abstract thinking” (Kaplan and Saccuzzo, 2001:254).

‘Several child development assessment systems have been found to be of value, including the Scottish Woodside Health Centre Screening instrument and the Denver Developmental Screening Test from the USA. However, none of these is suitable for cultures other than those in which they were developed. Even when the cultures are similar, it is necessary to derive a locally valid set of norms or values’ (Stemler et al, 2009). All communities have their own ideas on a child’s normal development and the transfer of these standards to other cultures may not be valued. Culturally-accepted milestones of development are known but few have been developed into tests that are standardized. For this reason, there can be no single universally valid test of intelligence hence, the construction of this culturally appropriate scale with its normative data.

With our knowledge of the development of children in the Western world, we know very little about the developing world (Grigorenko and O’Keefe, 2004 cited in Grigorenko (2009), and in particular, Africa (Pritchett, 2001 in Grigorenko 2009). The reason for this asymmetry is the lack of instruments suitable for evaluating competencies and describing relevant individual differences in children in the developing world (Mpofu, Peltzer, Shumba, Serpell and Mogaji, 2005; Sternberg, 2004; Super, 2005 in Grigorenko (2009:4) Serpell, 1999; Nsamenang, 1997. The development of new, custom-tailored instruments is a challenging task for which many developing countries have to develop necessary expertise and develop resources (Serpell & Haynes, 2004). There is nevertheless, urgent need for psychologists in the developing countries to construct tools that will enable them to understand children better in their social context.

The current study is aimed at analyzing the skills required by children (task demands) as they apply to developmental milestones in their motor (fine & gross motor) and language (expressive & receptive) domains in order to test learning potential as well as their intelligence. These constructs are general notions of maturity in the sense that they will help us draw conclusions that are specific to the Zambian culture (emic). This concept of emic is powerful because it will help us to understand what is true about potential in performance and general intelligence in early childhood years in Zambia. In support of this, Matsumoto (1994:5) alludes to the fact that ‘each culture evolves in its own way in how it manages human behaviors to ensure successful survival. There are many ways in which these are done depending on the population

density and availability of resources. Each culture develops different ways in which it impacts the people in it. Culture acts as a filter when interpreting things’.

1.5 STATEMENT OF THE PROBLEM

According to Grigorenko (2009), ‘the practice of educational testing is connected with modern Western schooling. Early childhood years have been seen by a number of educators and child psychologists as a possible solution to many of the massive social problems of illiteracy, under achievement and poverty that confront Zambia’. It has been found that children who have been in preschool classes score significantly higher on mathematics achievement tests in upper grades and have a better self – image than do their peers in control groups (Kelly and Kanyika, 2000; Berger, 2000). In a somewhat analogous study, Super (1976) reports that among the Kipsigis people of rural Kenya, it is established that rural Kenya parents begin to teach their babies to sit up, stand, and walk shortly after birth and hence, children among Kipsigis Kenya communities are advanced in their motor development because of their mothers’ commitment to train them in these basic skills early in life. Their babies reach the developmental milestones of sitting five weeks earlier and walking three weeks earlier on the average than babies in the United States of comparable age. These children experience a formal handling routine according to the tradition of their culture to ensure that infants grow up to be strong, healthy and active.

In an earlier comparative, cross-cultural study of pattern reproduction conducted in 1971-1972, Serpell (1979) tested urban Zambian and English school children of grades two, four, and six while systematically varying the medium in which the

patterns were represented. From this experimental study, it appears that skills with the medium of pencil and paper do not develop in children at the same rate in all eco-cultural settings. By replacing the paper- and- pencil medium with clay, the PMT was designed to sample a set of skills that are actively cultivated in the everyday lives of most African children. Ezeilo selected the PMT for further development in her Masters Dissertation study at the University of Zambia among Zambian primary school children (ages 7-8, 9-10. and 11-12years) of both sexes in various ecological settings. Chimbwali (1982) replicated Ezeilo's findings of significantly lower PMT scores by intellectually subnormal children compared to normal children. He found no significant difference by gender. Nsopela (1982) also replicated Ezeilo's findings and found no significant correlation between PMT and teacher ratings in Lusaka primary schools with a normal range of abilities. He found a significant difference in favor of boys. Chama (1979) found no significant difference in performance of children from two socio-economic backgrounds. The study differentiated between two degrees of subnormality as classified by a psychiatric hospital. Similarly, Kathuria and Serpell, (1998) cite the unpublished work of Lamping-Paffen and Cosijn (conducted in 1986 and 1988, respectively) which was conducted in rural areas of Zambia's Eastern and Western provinces and confirmed the readiness with which children of primary school age responded to the test. This test was similar in content to the Goodenough-Harris Draw-a-Person Test (DPT) (Harris, 1963) with the difference being that the medium required children to represent a person in clay rather than pencil and paper.

Traditional intelligence tests have also been criticized on the basis of their contents by advocates of culture-fair intelligence tests because they often make an appeal to specific skills both in test contents and instructions. Piaget states that the mind of the infant acts directly on the world through sensory-motor reflexes that later give rise to the cognitive processes of representation and reasoning. This account of cognitive development as a process of gradual discovery rests on several cultural premises of mainstream Western philosophy. Serpell (2000), in agreement with Binet (1906) states that the ability of a child of a given age to perform tasks normally assigned to his /her chronological age at school seemed to be an appropriate index of intellectual normality. Moreover the purpose of testing was to establish whether the child was intellectually fit for school enrolment.

The cultural practice in African societies of making models of various items has been described by various ethnographers in the 20th century (Centner, 1963; Kidd, 1906; M'tonga, 1985). It probably serves a comparable developmental function to the activity of drawing, which has become a standard part of children's recreation repertoire in most Western societies. In Zambia, most children have no access to paper and pencil for play before they enter school at age seven, and therefore, activities on clay serve to generate a measure of intelligence on them.

This study therefore, seeks to replicate and extend the study by Kathuria and Serpell (1998) to establish the validity of the test by including a sample of children among the ages of 4, 5, and 6years. Another extension of this study is to compare the performance among children in Urban and Rural areas on the PMT.

1.6 SIGNIFICANCE OF THE STUDY

This study sought to ascertain the validity of *Panga Munthu* Test's assessment of intellectual functioning during the early childhood years (4-6 years) and to test its construct validity. To date, no research has been done using this language reduced test in Zambia with this age group, hence, the need for research. The findings will also motivate psychologists, educationists, policy makers, physicians and others who provide personal and professional services to children to explore further the validity of the test.

1.7 AIM OF THE STUDY

The study aimed at finding out if the PMT provides a valid way of assessing intelligence in children below the age of seven. It will contribute to identifying environmental factors that are risks or benefits to a child's intellectual development.

1.8 OBJECTIVES

1. To contribute to the validation process of the PMT and to give meaning to the theoretical grounding of the test.
2. To compare the general potential of boys and girls between the ages of four and six.
3. To compare task performance of children who live in a rural environment with those who live in an urban set up.
4. To adapt the PMT as a culturally appropriate testing method and establish local reference values for children below the age of seven

1.9 STUDY HYPOTHESES

In the light of previous research presented in this chapter and chapter two, the following are the study hypotheses:

1. There will be no gender difference in performance on the PMT by children below the age of seven.
2. Children aged 4 to 6 years will score on average 8 points or less on the (25) - point scoring system standardized for 7-12 year old in the published norms for the test developed by Kathuria and Serpell (1998).
3. There will be no difference in performance between urban and rural children of comparable age on the PMT.
4. Teacher or parent ratings of their children's general intelligence will match children's actual performance on the PMT.
5. Children who attend school in ECCED centers will not perform better on the PMT than others who do not attend such centres of comparable age, gender and residence.
6. Children's scores on dog model test developed by Ngenda (2011) will show a positive correlation with scores on the PMT.
7. Performance on body parts naming test developed by Ngenda (2011) will show a positive correlation with scores on the PMT.
8. Performance on the PMT will improve with increase in chronological age.

1.10 DEFINITION OF TERMS

- Panga Munthu** A Zambian *Nyanja* language expression meaning “make-a-person”
- Panga Munthu Theory**..... A Theoretical reasoning advanced by Robert Serpell to justify the development of the *Panga Munthu* Test as a cultural measure of intelligence in Zambian children.
- Cross-sectional study**..... A study in which different age groups of people are sampled and compared.
- Intelligence** General potential, independent to prior learning.
- Development quotient** A score on an infant intelligence test based primarily on perceptual and motor responses
- Test**..... A measurement device that qualifies behavior.
- Assessment** A procedure used to evaluate an individual so that one can describe the person in terms of current functioning and also so that one can predict future functioning.
- Developmental milestones**..... A criterion for measuring and monitoring

children's development in terms of
observable outcomes.

Validity..... The extent to which a test measures the quality
it purports to measure.

Construct Validity..... A process used to establish the meaning of a
test through a series of studies.

Reliability..... The extent to which a score or measure is free
of measurement error.

Cognition..... The portrayal of an object by a child that
reveals his knowledge of that object.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.0 INTRODUCTION

This chapter presents the literature review that supports the study in view of what other scholars have done in relation to child assessment, cultural issues in assessment. It also gives an overview of validity in assessment, assessment of cognition, and the *Panga munthu* test.

2.1 CHILD ASSESSMENT IN ZAMBIA

The Ministry of Education in Zambia recognizes the importance of Early Childhood Care, Education and Development (ECCED) (MOE: 2006) and has noted that ‘there is general lack of systematically documented normative data on the development of children aged 0 to 6 years’ (MoE, 2006: x). This has confounded the process of conducting cognitive assessments and suggesting appropriate developmental and educational interventions for children in Zambia in order for policy makers and others who look after children to make informed decisions based on empirical studies on children.

2.2 ASSESSMENT

Assessment may be performed for many reasons and may comprise various types of formal and informal procedures. Assessment is the systematic process of gathering relevant information so that legal and instructional decisions are arrived at (Sternberg, 1998). Child assessment is an attempt to find out what a child can do and how he/she does it. This information will help in planning a curriculum to meet the child’s

individual needs. From an educational point of view, assessment uses tools which may be in the form of both standardized and criterion referenced tests. The tools used should meet the requirements of reliability and validity. Reliability refers to consistency in the information generated by the application of the assessment procedures and tools across multiple assessments at different points in time and/or by different assessors, while validity refers to whether an assessment tool measures what it purports to measure. When a child exhibits behavioral problems, he/she may be subjected to an Adaptive Behavior test on the Vineland Adaptive behavior scale which measures the child's Daily Living skills with its sub-domains of personal, domestic and community living. It also measures motor skills with its sub-domains of gross and fine motor. Test development has begun to pay more attention to developmental theories than before. A set of age related checklists covers the main areas of child development which are grouped under the category headings of:

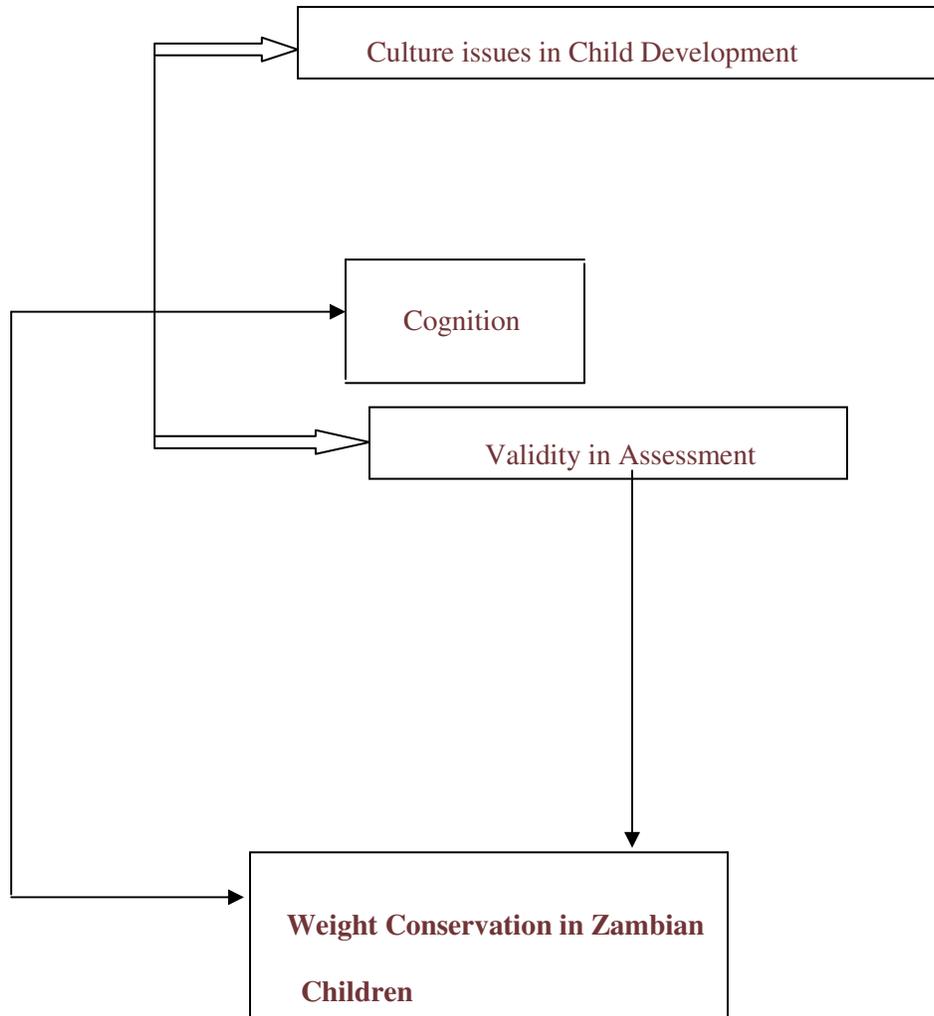
- Gross motor development
- Fine motor development
- Receptive language development
- Expressive language development
- Personal/social development
- Cognitive development

These six areas cover the domains of early childhood development but may also be used for developmentally delayed children (MOE: 2006).

The earlier researchers who attempted to evaluate the intellectual abilities of the African persons used normed instruments obtained outside the African continent.

Hence, they fell into the “trap of equating the mentality of non-western people with that of younger Western children” (Vernon, 1969: 18). This method of evaluating the African’s intellectual level has long been shown to be unjustified since the meaning of intelligence varies from one society to another, and within one society it may vary with level of Western type of education (independent of direct contact with the environment). Piaget was interested in studying the nature of intelligence and in the presence or absence of the intellectual factors. He postulated his theory through observation of the way the individual manipulates the objects in his environment (Piaget,1983). In Western cultures, components of intelligence are abilities to grasp relations as well as symbolic thinking which are encouraged at school and daily life. The abilities called for in non-Western cultures are different since the values of the societies are different. Serpell (1974) states that for one to meaningfully evaluate the intelligence of a group of people, he/she needs to identify the meaning of intelligence in the society being considered.

Figure: 1 Flow chart showing theoretical assessment issues related to the *Panga Munthu* test



Mishra (1997) argues that ‘the general intelligence approach is based on the idea of a unitary cognitive competence, called “general ability,” which is evidenced by a set of correlations among performances on a number of cognitive tasks such as verbal, spatial, numerical and others.’ Cross-cultural studies on concrete operational tasks have focused on the development of conservation, elementary logic, and spatial thinking.

2.3 CULTURE ISSUES IN ASSESSMENT

Woolfolk (1995:47) in agreement with Bakerman et al (1990), Childs & Greenfield, (1982) and Sere (1988) states that: Psychologists today recognize that the child's culture shapes cognitive development by determining what and how the child will learn about the world. For example, young Zinacanteco Indian girls of southern Mexico learn complicated ways of weaving cloth. In Brazil, without going to school, children who sell candy on the street learn sophisticated mathematics in order to buy from wholesalers, sale barter and make a profit. Cultures that prize cooperation and sharing teach these skills early whereas those cultures that encourage competition nurture these abilities in their children.

The Baoule community in Cote d' Ivoire measure their children's intelligence from social behaviour, service to the group, being reliable, helpful and polite. It includes taking initiative in tasks useful to the family and community (Dasen, Barthelemy, Kan, Kouame, Daouda, Adjei, and Assande, 1985). The same attitude has been found among people in Niger, Nigeria, Uganda, and Zambia where mothers' ranking of their children's intelligence correlated significantly with tests of vocabulary and perceptual analysis (Dasen and Colomb, 1984). Serpell (1979) describes that children living in two ecoculturally contrasting groups were compared on several tasks with the prediction that their different ranges of prior experience would enable each group to outperform the other on selected tasks. In his study, the cognitive processes demanded by the different tasks were closely equated. All the tasks involved pattern reproduction, but the patterns were presented for reproduction in different media of

wire, or pencil and paper. The other two media were modeling clay and the child's own fingers. Each group outperformed the other on the task in a relatively familiar medium.

In Vygotsky's theory, (Woolfolk, 1995:47) language is critical for cognitive development. Language provides a means for expressing ideas and asking questions, and provides the categories and concepts for thinking. When we consider a problem, we generally think in words and partial sentences. Vygotsky placed much more emphasis on the role of language in cognitive development; he believed that language in the form of private speech (talking to your self) guides cognitive development. Words develop meanings as the child uses his/her senses, language increases understanding and adds to experiences such as increasing children's ability to express and experience feelings within the context of culture. Language is a tool which helps the child to classify and organize information into working concepts and skills; it is a way in which values are communicated.

According to Kagitcibasi (2007:35), Vygotsky placed great emphasis on the social origins of human mental functioning by alluding to the fact that what is acquired by the growing child is that which exists in the social cultural context and thus, is culturally mediated. Arising from the findings of Bronfenbrenner (1979, 1998, 1999), Kagitcibasi (2007:36) alludes to culture as embedded in the macro- system level through the exo- system, meso-system and micro-systems that all embed the child and are nested within one another. This model is dynamic in the sense that there are

mutual interactions between the active child and the immediate environment (micro system) as well as mutual interactions and influences among the different environmental systems.

Kagitcibasi (2007:37) citing Berry (1976, 1980), states that ‘the eco-cultural context includes both the ecological and the sociopolitical context in which individual functioning is embedded through adaptation’. This framework is used to explain systematic differences between hunter-gatherer and sedentary agricultural societies in significant patterns of human behaviour such as their cognitive styles and compliance orientation in child rearing. Kagitcibasi (2007:37), quoting Super and Harkness (1986, 1994, 1997; Harkness and Super, 1996) conceptualized the developmental “niche” to refer to the habitat of a “particular cultural group” within the human species. They identified three components of the developmental niche as consisting of the physical and social environment of the child, the cultural customs and child rearing practices of the caregiver, as well as the psychology of the caregivers. This is an example of an inclusive ecological framework that focuses on the individual child at the center of the developmental niche. Customs and child rearing include daily routines such as play and work patterns. Psychology of the caregiver includes parental beliefs about their children (parental “ethnotheories”), values and orientations.

Research is necessary as background to an understanding of why cross-cultural strategies are a problematic means for discovering how culture influences the

development of intelligence. “The faculty of intelligence is making judgement, good sense, practical sense, initiative, adapting oneself to circumstances, comprehending well, and to reason well” (Binet & Simon, 1916 In Cole, 1996:52). Binet and colleague studied children’s understanding of graphic symbols such as alphabets and number systems and recognition of these was tested. Children were also expected to manipulate these symbols to store and retrieve vast amounts of information, to rearrange this information according to the demands of the moment (Carroll in Cole, 1996:55). Vernon (1969), has suggested that one must assume that three kinds of intelligence contribute to test score: “native intelligence” is something like a general inherited component; a cultural component which has to do with the ways in which cultures foster native intelligence through problem solving abilities and verbal skills; and a task component which reflects the individual’s experience with the particular kinds of tasks sampled. Assessment is a procedure used to evaluate an individual so that one can describe the person in terms of current functioning and also so that one can predict future functioning. Tests are used in the assessment process.

2.4 VALIDITY IN ASSESSMENT

A number of empirical issues relating to cognition have emerged in the cross-cultural literature in recent years. These are related to:

- (a) The validity of inferences drawn from cognitive behaviors (manifested in the data) about cognitive processes and their organization.
- (b) The validity of the linkage between cognitive behaviors and cultural variables.

(c) The validity of generalizations made from cognitive behaviors (often test scores) about the broader cognitive life of people represented in their day-to-day activities.

The use of a test with cultural groups other than the one for which it was originally designed has led to sharp controversies. The central question is whether a test score has the same meaning for all cultural groups. Related to this main issue are the issues of “culture fair” tests and “test transfers” to other cultures; both have received substantial attention in cross-cultural research by some researchers (Irvine and Berry, 1983; 1988; Poortinga and Van der Flier, 1988). The evidence suggests that “culture fairness” of a test is only a “fiction”, it is not useful to have “test transfers” made to a different cultural setting on a wholesale basis, and it is not easy to draw inferences about cognitive processes simply on the basis of test performance(test scores).

The understanding of cognition and cognitive development in cross-cultural perspective needs to begin from the observation of what people do cognitively in the course of their day-to-day activities. The notions of “everyday cognition” (Rogoff and Lave, 1984), “practical intelligence” (Sternberg and Wagner, 1986), “indigenous cognition” (Berry, Irvine, and Hurt, 1988), and “cognitive apprenticeship” (Rogoff, 1990) used in respect of the characterization of cognitive life of individuals, is basically rooted in such observations. Research literature on the application of Piaget’s approach in countries where the cultural milieu of the child is markedly different from that of the western world is now extensive. There are interrelationships between cognitive performance and different patterns of abilities that develop in

children from different ecocultural settings depending on the demands placed on an individual.

2.5 COGNITION

Cognitive styles approach was first articulated by Ferguson (1956) who argued that “cultural factors prescribe what shall be learned and at what age”. This section highlights several alternative ways of conceptualizing cognition.

Mishra (1997:145) citing J.W.Berry and P.R.Dasen (1974) states that, ‘studies of cognitive processes have been fundamental to psychologists and educationists for a long time. Learning theorists have always shown concern for the development of general principles regarding the acquisition of knowledge and skills; developmental psychologists have tried to comprehend the growth of knowledge and skills as a function of maturation of human organisms; psychometricians have tried to develop tools and techniques for measuring skills and abilities of individuals; and educationists have been concerned with the application of psychological knowledge about individuals to the process of teaching and learning.’ Cognition refers to every process by which individuals obtain and utilize knowledge. It encompasses processes such as thinking, reasoning, recognition, labeling, analysis, categorization, and planning through which people comprehend their environment and achieve successful adaptations to it.

According to Mishra (1997), ‘the identification and description of links between culture and cognition have been made since the late 1800’s. There are two schools of thought associated with research on cognitive development; the nativists, and the

empiricists. The nativists assert that all perceptual and cognitive phenomena are inborn, that there is an inherent organization in information received from stimuli, and that perception of the world does not require any active construction by the organism. The empiricists argue that the way organisms respond to stimuli in the environment exemplifies the role of experience and learning. The most frequently employed in cross-cultural research on cognition is the functional approach, which emphasizes the adaptive aspects of organisms-environment interaction.'

Piaget (1974) states that the essence of nature-nurture controversy related to cognitive development is partly captured in the theory which states that a child in the course of its development, passes through four sequential stages (sensorimotor, preoperational, concrete operational, and formal operational). Each stage is characterized by the appearance of certain cognitive structures that incorporate the previous structures. Though the sequence of these stages and qualitative changes in cognitive structures characteristic of each stage are considered invariant and universal, it is postulated that the interactive influences of physical environment (Piaget,1974), and socio-cultural transmissions (Piaget,1972) may alter the rate of psychological development of any stage. The theory suggests that the nativist and empiricist viewpoints are complementary to each other. In infants, cognitive processes through which humans acquire, retain, and use knowledge about the world develop rapidly during the early years of life.

2.6 WEIGHT CONSERVATION IN ZAMBIAN CHILDREN

Piaget (1977) conceives cognitive development in terms of the logic of action which he called concrete operations which is coordinated by mental actions. Furth (1966) was able to use Piaget's theory with deaf children to assess their intelligence. This was evaluated by a non-verbal or miming method and was used to assess children's intelligence. Heron and Simonsson (1969) conducted a study on weight conservation in Zambian normal hearing children of primary school age using the non-verbal or miming method which was developed by Furth (1966) for use with deaf children.

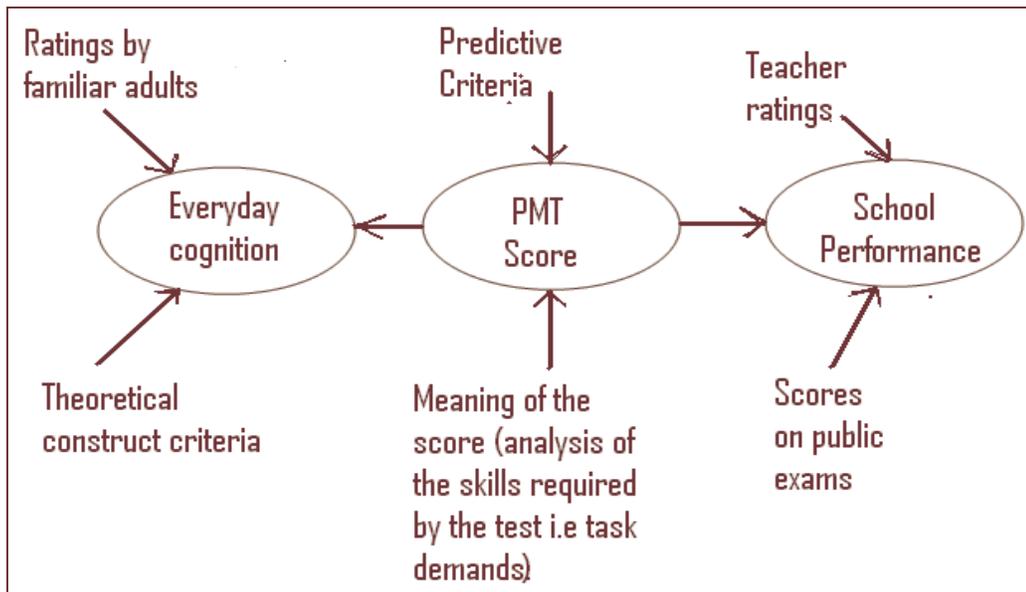


Figure 2: Measures of certain components of the *Panga Munthu* test

Cultural factors prescribe what children learn; consequently, different cultural factors lead to the development of different patterns of ability. The diagram above looks at interrelationships (patterns) in cognitive performances depending on the demands placed on an individual. It looks at relationships that exist between ratings by familiar adults on a child's tasks (both in the school and outside), the predictive criterion of

the PMT based on scores obtained by children, and teacher ratings based on school performance.

The theoretical grounding of the *Panga Munthu* Test is on finding a viable way of arriving at valid assessment measures in Zambia other than through minor adaptations and/or standardization of western tests. The *Panga Munthu* test (a test which uses a modeling medium task symbolic of human representation and a process of rendering concepts into human form using clay) was administered among children in Lusaka. Serpell observed that children engaged often in play activities with clay, making human figures and noted that boys appeared to do less of this after the age of 7 years. On the other hand, girls continued to make models out of clay at later ages. Notable among the items made were cup and saucer, seldom made by boys if ever as reported by some indigenous adult female informants. It was found that boys and girls scored equivalently on plasticine modeling task except for the cup and saucer item which was produced better by girls than by boys (Serpell, 1979:366). Building on this experimental research by Serpell, it shows that the medium of clay elicits stronger cognitive performance by African children than the media of pencil and paper, or construction blocks.

In a comparative study of cross-cultural pattern reproduction conducted in 1971-1972, Serpell (1979) tested urban Zambian (in Lusaka) and urban British (in Manchester) school (grades two and six) children while systematically varying the medium in which the patterns were represented. Zambian children were drawn from a high density housing estate (with low income families) while the British children were drawn from an old high density housing area (with low income families). As

predicted on the basis of their eco-cultural context, the Zambian children surpassed their English counterparts in accuracy of reproduction when the patterns were made of twisted wire strips. The English children surpassed their Zambian counterparts when essentially the same pattern was depicted in the traditional Western medium of pencil and paper. Two other conditions yielded equivalent results of performance by the two cultural groups. These were the use of clay modeling medium and the mimicry of hand positions. Boys in both cultural groups scored higher than girls on the wire modeling and drawing tasks with no gender difference found on clay modeling tasks. All tasks recorded large and significant improvements in performance with increasing age and school grade.

In a Cross- cultural study of Zambian and Scottish children in a sorting task, Deregowski and Serpell (1971) found that the use of photographs instead of solid models reduced the level of classificatory analysis made by children. Similar results had been reported previously by Sigel et al (1966) comparing two socio-economic status groups of Afro-American children.

The first version of the *Panga Munthu* Test (PMT) a modeling task scored on a 10-point scale which involved copying a crude model of a person which was presented for about 30 seconds, after which a child was asked to build (*panga*) a model of a person (*munthu*). Scores on the original version of the PMT among a sample of 57 children aged 6 to 14 were obtained in a rural area of Zambia's Eastern Province. The Panga Munthu test assesses cognitive processes such as pattern reproduction (emphasised by Vygotsky, Wechsler, Sternberg, and others).

In a small scale study, Ezeilo (1978) used the *Panga Munthu* test (PMT) for further development for her Masters dissertation at the University of Zambia among Zambian primary school children (ages 7-8, 9-10, and 11-12 years) of both sexes but from various ecological settings. The development of the PMT was based on careful scrutiny of a pilot sample of children's models by scoring it on a 20 point scale. In this study, Ezeilo eliminated the procedure of presenting a standard model. Thus, the task became more similar in content to the Goodenough-Harris Draw –a- Person Test (DPT) (Harris, 1963), in which children were required to represent a person in clay rather than with pencil and paper. Goodenough published the Draw- a- Person test in 1926 after administering it to some North American school children aged 4-10years. It was later standardized in India, China, and Germany. Researchers in many parts of the world use this test for assessment of intellectual and developmental maturity of children, basing their assumption that it is valid on the premise that the concept of the human body is universal across cultures.

The *Panga Munthu* Test “draws upon the same premise, but with the further qualification that in order to manifest knowledge of the human form in a visual representation, a child must deploy a set of basic skills within a representational medium” (Serpell and Kathuria, 1998:230-231). Similarly, Ezeilo (1975, 1978) reported several indications of local validity for the PMT as an index of intellectual ability. Scores on the test showed a steady rise across three age groups of urban primary Zambian school children (ages 7-8, 9-10. and 11-12 years).

The test differentiated a sample of children diagnosed as mentally retarded and a sample of “normal” school children of comparable age. Scores differed significantly between two sub samples of mentally retarded children clinically rated as moderately and severely subnormal in intelligence. She also identified among the protocols a basis for an additional five criteria to expand the scoring system to a 25- point scale. The 25- point scoring system focused on level of detail included in the child’s model. The *Panga Munthu* Test was standardized (Serpell and Kathuria, 1998) on a nationwide sample of over 3,000 primary school children enrolled in Grades 1, 3 and 5 of rural and urban schools in Zambia and it was revalidated (Stemler et al, 2008) on a sample of over 300 primary school children enrolled in grades 1-7 in Eastern Zambia. The test may be especially suitable for the assessment of children with less formal schooling such as;

- Street children
- Children orphaned by AIDS
- Child soldiers
- Migrant children

Most other available tests for children 5- 12 presuppose general exposure to Western cultural practices and artifacts (such as pencil and paper for drawing and building blocks) which are rare among Africa’s subsistence agricultural or pastoral communities. The *Panga Munthu* test presupposes only familiarity with the widespread play activity of clay modeling, and seems to tap a dimension of cognition more relevant to the home environment than to the demands of the school (Serpell, 2009:3).

In another study with the *Panga Munthu* Test, Chimbwali (1982) replicated Ezeilo's findings in his unpublished undergraduate dissertation at the University of Zambia, and found lower PMT scores among intellectually subnormal children, and further found that the test successfully differentiated between two degrees of subnormality as classified by a psychiatric hospital but found no significant difference in performance between boys and girls. Nsopela (1982), also replicated Ezeilo's study in his undergraduate dissertation at the University of Zambia, and found no significant correlation between PMT scores and teacher ratings of their children in two Lusaka primary schools. Nsopela compared the performance of boys and girls and found a significant difference in favor of boys. Matafwali (2005), in a study for her Masters degree at the University of Zambia on the '*nature and prevalence of reading difficulties in the third grade among Lusaka rural and urban schools*' incorporated the *Panga Munthu* test in her study and found below average results on children's models of the human form. Only a small proportion included necessary details for a complete human form. She noted that pupils who came from high density areas performed better than their counterparts from low density areas. She, however, found no gender difference in performance which was consistent with the findings of Kathuria and Serpell (1998). She however, does not give any evidence of comparing her data with the Kathuria and Serpell (1998) age norms and descriptive rankings.

Among the Baganda communities children are advanced in their motor development because of their mothers' commitment to train them in basic skills early in life. These

children experience a formal handling routine according to the tradition of their culture to ensure that infants grow up to be strong, healthy and active. Children move through a developmental progression in motor skills (Gallahue, 1993) by using their hands and fingers and become more proficient in using small materials as they advance in age. They are able to grasp and control objects as they learn to work with them.

The *Panga Munthu* test was designed to provide a more accurate and culturally appropriate assessment of intelligence for children of primary school (ages 7 to 12) of both sexes in a non- western society. Western tests for general intelligence, like the SON-R, Bayley scale, Woodcock, Vineland Behavior Scale, Stanford- Binet and Wechsler intelligence tests have been criticized on the grounds that these tests measure the outcomes of prior learning experiences more than learning potential. By merely reflecting the end result of prior learning, general intelligence tests would underestimate the learning ability of members of certain cultural groups who have had fewer opportunities to acquire the knowledge and skills to perform well in such test situations.

However, the unpublished work of Lamping-Paffen and Cosijn (1986, 1988) which was conducted in rural areas of Zambia's Eastern and Western provinces confirmed the readiness with which children of primary school age responded to the PMT test. Nevertheless, traditional intelligence tests have been criticized on the basis of their contents by advocates of culture fair intelligence tests because they often make an

appeal to specific skills both in test contents and instructions. Piaget states that the mind of the infant acts directly on the world through sensory-motor reflexes that later give rise to the cognitive processes of representation and reasoning. This account of cognitive development as a process of gradual discovery rests on several cultural premises of mainstream Western philosophy.

Serpell (2000), states that the ability of a child of a given age to perform tasks normally assigned to his /her age at school seemed to Binet (1906), an appropriate index of intellectual normality. Moreover the purpose of testing was to establish whether the child was intellectually fit for school enrolment. Serpell (2010) personal communication states that:

Skills with the medium of pencil and paper do not develop in children at the same rate in all eco-cultural settings. By replacing the paper- and- pencil medium with clay, the PMT was designed to test a set of skills that are actively cultivated in the everyday lives of most African children.

The afore referred to statement is qualified by the fact that the cultural practice in African societies of making models of various items has been described by various ethnographers in the 20th century (Centner, 1963; Kidd, 1906; M'tonga, 1985). This probably serves a comparable developmental function to children's activities of drawing, which has become a standard part of their recreational repertoire in most Western societies. The PMT offers valid assessment of the human representation figure and shows its relationship with other test measures. Because the traditional

tests often make an appeal to specific language skills, both in content and instructions, they place members of certain cultural groups at a disadvantage. This argument also applies to persons with hearing-speech – and language problems. This criticism has led to the development of nonverbal intelligence tests which aim at minimizing the reliance on acquired knowledge and verbal ability.

However, Campbell and Fiske (1959) introduced an important set of logical considerations for establishing evidence of construct validity when they distinguished between the convergent and discriminant evidence in construct validity. The gathering of validity on the test gives support for an ongoing complex scientific theory which is convergent because of its correlation with other tests believed to measure the same construct.

According to Trochim (2006), construct validity refers to the degree to which inferences can legitimately be made from the operations in a study to the theoretical constructs on which those operations were made. When we claim that our measures have construct validity, we are essentially claiming that we as researchers understand how our constructs or theories operate in theory and we can provide evidence that they behave in practice the way we think they should. The researcher essentially has a theory of how the program and measures are related to each other (and other theoretical terms). The researcher provides evidence through observation that the measures actually behave that way in reality or observed pattern. When we claim construct validity, we are essentially claiming that our observed pattern- how things

operate in reality corresponds with our theoretical pattern- how we think the world works. This is the heart of construct validity. A construct reflects a hypothesis (often incompletely formed) that a variety of behaviors will correlate with one another in studies of individual differences and/or will be similarly affected by experiment. Construct validity is making the importance of a construct explicit through description of its relation to other variables.

As Kaplan & Saccuzzo (2001, 145) state, “the gathering of construct validity evidence is an on- going process, similar to amassing support to a complex theory. Although no single set of observations provide crucial or critical evidence, many observations over time gradually clarify what the test means”

In the present study, two new tests were devised to measure the complementary dimensions of cognition thought to be involved in performance on the PMT: manipulative modeling skills and knowledge of the parts of the human body. The Dog model test shares with the PMT the dimension of manipulative modeling skill, while the BPN test shares with the PMT the dimension of knowledge of parts of the human body. Note that BPN and DM do not share any of these theoretical constructs and therefore, were expected to correlate less highly with each other than each of them correlates with PMT. (Details of the tests are presented in chapter 3 and the Appendices).

A 2x3x2 pattern of data analysis was projected onto the three tasks (PMT, Body Parts Naming, and Dog Model). Each individual performed the three tasks in the following

order: (1) body parts naming (in each case the tester asking a subject to identify the body parts pointed at, either on the child's body or on the subject); (2) modeling a human figure (PMT) and (3) modeling a dog (DM). The theoretical rationale for the BPN and DM tests is to find out how scores on these two new tests would be correlated with scores on the PMT.

According to Leedy and Ormrod (2010:92), construct validity is the extent to which an instrument measures a characteristic that cannot be directly observed but is assumed to exist based on patterns in people's behaviour and such a characteristic is a construct. Motivation, creativity, racial prejudices and intelligence are all constructs, in that none of them can be *directly* observed and measured. Sometimes there is universal agreement that a particular instrument provides a valid instrument for measuring a particular characteristic for example a ruler measures length, a thermometer measures temperature. But whenever we do not have such a universal agreement, we must provide evidence that an instrument we are using has validity for our purpose.

The PMT gives discriminant evidence because it measures a unique construct; the measure does not represent a construct other than the one for which it is devised (Serpell and Folotiya, 2008). Analysis of correlations among scores on age and teacher ratings suggests that aptitudes evident in the home and school domains are less well integrated than the demands of the school curriculum.

Validation of the *Panga Munthu* test will be the basis for so many efforts being made by developmental psychologists (e.g. curriculum development, program evaluation, national monitoring and policy making). Moreover, given that high stakes decisions may be made based on the results of the test; it must provide an accurate foundation for decision making. The PMT is also concerned with the extent to which performance is age appropriate (e.g. is the PMT too easy, too hard, or just right for children below age seven). The indicators on the PMT will be considered valid when a consensually pre-determined percentage of children can attain them. Performance on the PMT will also predict a significant degree of association with future desired outcomes e.g. to predict success in school (Serpell and Folotiya, 2008). The PMT therefore, serves to assess a comparable developmental function in the activity of clay modeling to the function assessed by the DPT in the activity of drawing. In Zambia, most children have no access to paper and pencil for play before they enter school at age seven. This study, therefore, seeks to replicate and extend the validity of the test by including a sample of children among the ages of 4, 5, and 6 years. Another attraction of this study is to compare the performance between children in Urban, and Rural areas on the PMT.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

This chapter presents the methods, materials and the statistical treatment used in the research.

3.1 RESEARCH DESIGN

The study used the quantitative paradigm of documenting performance on PMT clay models by:

- Comparing age groups and residence of children's performance.
- Examining correlations among scores on various tasks performed by children.

A multifactorial design afforded an opportunity to examine interaction effects among age, gender and residence across the three tasks.

3.2 PARTICIPANTS

One hundred and twenty participants performed the body parts naming test, the *Panga Munthu* test, and the dog model test. Children were drawn from two ecological sites: (1) a nursery school situated in the Kitwe urban district business center. Participants were a combination from medium to high income families living in the vicinity, their parents being in formal employment as medical doctors, teachers, nurses, police constables and attended formal preschool education, (2) a village setting situated some twenty kilometers on the periphery off the main tarmac road in Lufwanyama district. Participants were exclusively from low income families in the

vicinity with their parents living as subsistence farmers, house servants or as marketeers in Kalulushi and did not attend school. The sample comprised twenty 4-year olds, twenty 5- year olds, and twenty 6- year olds from each ecological zone. Both ecocultural settings were multiethnic communities. These zones were selected as reasonably representative of Zambia's rural and urban ecosystems and the numbers of children tested were adequate for a robust test of the study's hypotheses.

3.3 SYNOPSIS OF THE PILOT STUDY

Before conducting the actual research, a pilot study was done among 4, 5, and 6 year old children from Chongwe, Kafue, and Lusaka districts in order to test the research instruments for the PMT, BPN, and DM. The study was conducted during the month of May, 2010.

Before commencement of testing the children, the respondents and their parents were briefed on the purpose of the study. The instruments were administered among 16 children from the named locations in order to test the suitability of the test to this age group.

The following observations were made on the pilot study:

- Children did not score a zero on any of the tests.
- The poor quality of clay that was used adversely affected the end products. Arising from this observation, the researcher had to buy better quality clay from Kitwe College of Education pottery for the main study. The clay was used in all the testing centers hence, subjecting participants to the same conditions.

- It was observed from the BPN instrument that item number three (Lips) in the Zambian Bemba and Lamba languages was the same as mouth (*milomo*), item number eleven (Leg) was the same as foot (*ukuulu*) and so respondents who were earlier scored a zero for the words in parentheses were later given a point.

The outcome of the pilot study brought in issues that made the researcher to make some adjustments to this questionnaire to suit the aspect of culture and confidentiality for the main study.

3.4 STUDY POPULATION

The study population comprised 120 local residents from Chief Nkana's village in (rural) Lufwanyama District who were recruited through the traditional authorities to whom the author was introduced by a male local school teacher. The Principal researcher and the assistant both carried introductory letters to parents and/ or teachers. The (urban) Kitwe sample was recruited at Lucky Angels which is a local private school (that runs from nursery to Grade seven) through the school authorities. Within each cluster, equal numbers of boys and girls were selected following random procedure. Every second or third child of each gender within an age category was selected for testing.

3.5 SAMPLE AND SAMPLING PROCEDURE

In order to ensure equal representation of the population, the study sites were categorized into urban and rural settings. Gender also received 50% representation at each of the three age levels. Random sampling was done from the names on a list of

200 from the child find list provided by the child lister in Lufwanyama and the school authorities in Kitwe.

Participants' teachers or parents had the right to withdraw the children from the study at any time.

3.6 RESEARCH INSTRUMENTS

The PMT was administered to the sampled children after giving them some modeling clay by the researcher and his assistant. In order to come up with desired data for the study, the 25 - point scale for the PMT described by Kathuria and Serpell (1998) was used. Scores on PMT have traditionally been regarded as amenable to parametric analysis even though the scoring scale is not a true parametric measure. Therefore, the Pearson correlation coefficient (r) was a suitable statistic for assessing correlation between two sets of scores of the PMT models. A 15- point scale on human body parts naming (BPN) and, a 7- point scale on Dog- clay (DM) items were used. Each of the other instruments (Appendices 2 and 3) was correlated with PMT scores.

3.7 VALIDITY AND RELIABILITY MEASURES OF THE INSTRUMENTS

Validity of a measuring instrument is the extent to which the instrument measures what it is intended to measure. Reliability is the consistency with which a measuring instrument yields a certain result when the entity being measured has not changed. Both validity and reliability reflect the degree to which we may have error in our measurement (Leedy and Ormrod, 2010).

3.7.1 Face validity

Face validity measured whether the items appeared to measure particular skills in the instrument. Face validity was assured by having the instrument approved by psychologists from the Psychology Department of the University of Zambia. Pilot testing the instruments was done in Lusaka Province before the full scale study was conducted. The tester asked the child to name the body part pointed at (using either the child's or the tester's body). The researcher preferred this to the use of pictures because some children, especially the non- school going, are not familiar with pictorial representations.

3.7.2 Content validity

Content validity measured the degree to which the various items in each of the administered tests covered the materials that the instruments were measuring. The PMT, DM, instruments were designed and compared to other non-verbal valid and reliable instruments such as the SON-R, and Furth's weight conservation tests.

3.7.3 Construct validity

Construct validity of the PMT instrument was assessed in order to establish how meaningful the scale was when in practical use. The relevant data to this will be presented later in the document

3.7.4 Inter-Rater Reliability

Inter-rater reliability was assessed in order to determine the degree of consistency between two raters when both were rating the same item. The principal researcher who was earlier trained in the Psychology Department at the University of Zambia

rated a sample of children's models in his pilot study carried out in some parts of Lusaka District, that were also rated independently by an experienced tester and originator of the *Panga Munthu* test (Professor Robert Serpell). The differences between their ratings were discussed and consensus arrived at on the best score for each model. An inter-rater correlation co-efficient between their initial, independent ratings was calculated as $r = +.71$.

3.8 RECRUITMENT AND TRAINING OF RESEARCH ASSISTANT

Selection of a research assistant was done purposively in order to involve a person with prior assessment backgrounds and fluent with the local language. Thus, the research assistant recruited was a Primary School teacher. Orientation on the instruments was done for one day to ensure that the assistant had an acceptable level of inter-rater reliability on the administration of the test.

3.9 DATA COLLECTION PROCEDURES

The author and one trained research assistant located and scheduled the activities with children in the urban and rural setting respectively. The children randomly sampled were put in a quiet place/ room at a school and/or village back yard to perform the activities without undue interference from other children or adults.

During the test, the tester provided each child with a lump of modeling clay and gave the following instructions in a language with which the child was familiar: "I want you to use this clay to make the best person/ dog you can. Take your time but do let me know when you have finished. No sample of a standard model was shown to the

children. Children were isolated from another so as to ensure that they did not examine one another's models. The time taken to complete each model was about 10 to 20 minutes and was recorded by the tester while the scoring was done in the absence of the child. The two testers (principal researcher and assistant) then discussed and rated each sample to arrive at a consensually agreed-upon final score using standard, independent double blind procedure. Body parts naming test was administered independently by each tester.

Data was collected in one phase (urban and rural settings) from August- October, 2010. Research assistants were paired during data collection. The pair of raters independently observed and recorded individual children's performance and then compared their results and arrived at one consensus.

3.10 HOME AND SCHOOL RATINGS

Informal discussions were conducted with parents and/or guardians of each child in the rural sample, and with a preschool teacher of the children in the urban sample. Each informant was interviewed about how they rate the child's intelligence. The interview was organized around a scale of low, below average, average, above average, and high intellectual capability criteria which were assigned values of 1, 2, 3, 4, and 5 respectively. After adult rating, each informant was asked to explain the basis for the criterion. Based on this criterion, a qualitative analysis of a child's personal attributes of "intelligence" grounded in adults' observations of the child in everyday life was arrived at. This was based on a Bemba translation of the terminology in relation to the 5-point age norms scale of: low intelligence (*ushakwata*

amano); below average intelligence (*ushakwata amano ukufikapo*); average intelligence (*uwafikapo amano*); above average intelligence (*uwamano ukucila pakati*); and high (*uwamano sana sana*)

3.11 DATA ANALYSIS

Data were analyzed using the SPSS according to the variables of age, gender, residence, and school status. Descriptive analysis was used to present the variables in frequency distribution tables and generating graphical displays.

The models created by the children on the human figure (PMT) received a score of zero or one point for each of the criteria listed on the scoring sheet except for the 24th criterion, which allows for a score of zero, one, or two. Scores on all criteria were summed to calculate the total score for the model. The maximum possible total score was 25.

For the 'Dog' models, children received a score of zero or one point for each of the criteria listed on the scoring sheet. Scores on these criteria were summed to calculate the total score for the model. The maximum possible total score was 7. Children received a score of zero or one point on each item of the body parts naming test. The maximum possible total score was 16- points.

The researcher examined how the variables were interrelated using simple zero- order correlations. An inter-correlation was calculated for the total samples using the variables PMT, DM, and BPN age, gender, and residence as variables. The Analysis of Variance (ANOVA) and t-tests were done on the three tests.

3.12 ETHICAL CONCERNS

Informed consent from parents, teachers or other caregivers who acted on behalf of the children was sought in writing. Once consent had been obtained from caregivers, assent was obtained from the child to agree to participate in the research or not after being informed of the procedure. Participants had their identity concealed on all information collected on them and they were informed of the research results by having the models displayed for their viewing. Clay models were displayed for teachers/ parents to view after they were graded. The scoring of items of clothing on the PMT models was not considered since it could have introduced a cultural bias

CHAPTER FOUR

PRESENTATION OF RESULTS

4.0 INTRODUCTION

This chapter presents the participants, data collected, and results obtained from the study.

4.1 PARTICIPANTS

The distribution of participants according to rural and urban residential settings is shown in Table 4.1.

Table 4.1: The distribution of participants according to gender and rural and urban residential settings

	Rural	Urban	Total
Male	30	30	60
Female	30	30	60
Total	60	60	120

In order to ensure fair distribution, the participants were divided into urban and rural as well as male and female. Both categories received an equal number of participants (N-30) bringing the total number of participants to 120.

4.2 EXAMPLES OF CLAY MODELS THAT WERE ASSIGNED VARIOUS SCORES

Figure: 3 Clay models with PMT scores

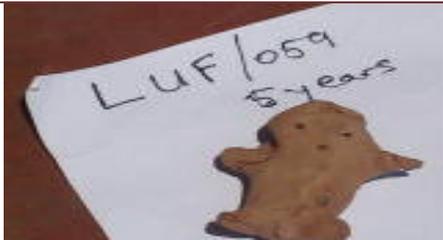
Low PMT scores (below 4)

	Rural	Urban
Male	 <p>PMT Score- 3</p>	 <p>PMT Score-2</p>
Females	 <p>PMT Score- 3</p>	 <p>PMT Score-3</p>

Below average PMT Scores (4 -7)

	Rural	Urban
	 <p>PMT Score- 5</p>	 <p>PMT Score- 4</p>
	 <p>PMT scores- 7</p>	 <p>PMT scores- 6</p>

Average (PMT scores 8 -14)

	Rural	Urban
Male	 <p>PMT Score- 8</p>	 <p>PMT Score- 8</p>
Female	 <p>PMT Score- 10</p>	 <p>PMT Score- 14</p>

Above average to high (PMT scores 15 -19)

	Rural	Urban
Male	 <p>PMT Score- 18</p>	 <p>PMT Score- 15</p>
Females	 <p>PMT Score-19</p>	 <p>PMT Score-18</p>

4.3 CHILDRENS' PERFORMANCE ON THE PMT

The first and second, hypotheses respectively were that there will be no gender difference and that children aged 4- 6 will score on average 8 points or less on the (25)- point scoring system standardized for 7-12 year old children on the PMT. The results relevant to the above hypotheses are presented in tables 4.2, 4.3 and 4.4 below and were analysed using ANOVA (see Table 4.5) .

Table 4.2 Mean scores and standard deviation on the three tests by boys and girls

GENDER		PMT	DM	BPN
Male	Mean	7.97	3.22	10.40
	N	60	60	60
	Std. Deviation	3.469	1.563	2.688
Female	Mean	8.18	3.13	10.63
	N	60	60	60
	Std. Deviation	3.520	1.652	2.911

Table 4.2 shows a similar pattern of performance on the three tests for both males and females. .

Table 4.3 Mean scores and standard deviation on the three tests by children from the two residential settings.

RESIDENCE		PMT	DM	BPN
Rural	Mean	8.23	3.13	11.40
	N	60	60	60
	Std. Deviation	3.702	1.157	2.533
Urban	Mean	7.92	3.22	9.63
	N	60	60	60
	Std. Deviation	3.269	1.958	2.780
Total	Mean	8.08	3.17	10.52
	N	120	120	120
	Std. Deviation	3.481	1.602	2.792

Table 4.3 shows that for performance on the three tests by residence, the pattern of results is the same in both ecological sites.

Table 4.4 Mean scores on the three tests by children of different ages

Age		PMT	DM	BPN
4years	Mean	5.93	2.17	8.98
	N	42	42	42
	Std. Deviation	2.806	1.529	3.048
5years	Mean	8.56	3.49	10.64
	N	39	39	39
	Std. Deviation	2.732	1.048	2.182
6years	Mean	9.90	3.95	12.05
	N	39	39	39
	Std. Deviation	3.640	1.605	2.139

Table 4.4 shows that performance of children on the three tests improves with an increase in age.

Table 4.5 Factorial Analysis of Variance with the PMT as dependent variable and residence, gender, and age as independent variables

Source	Type III Sum of Squares	df	Mean Square	F	p
Residence	2.688	1	2.688	.284	.595
Gender	.640	1	.640	.068	.795
Age	326.112	2	163.056	17.212	.000
Residence * gender	8.474E-07	1	8.474E-07	.00	.000
Residence * age	32.100	2	16.050	1.694	.189
Gender * age	8.094	2	4.047	.427	.653
Residence*gender*age	44.219	2	22.110	2.334	.102
Error	1023.153	108	9.474		
Total	9267.000	120			
Corrected total	1442.325	119			

R Squared = .291 (Adjusted R Squared = .218)

Table 4.5 shows that for performance on the PMT, the main effects of both residence and gender are non significant $p > 0.05$, while the main effect of age is significant $p < 0.05$. The two way interactions of residence, gender, and age and the 3- way interaction are all non significant $p > 0.05$. This confirms hypotheses 1, 3, 5 and 8

Rural- Urban differences in scores on DM and BPN tests.

Table 4.6 shows performance on the Dog model test. The main effects of both residence and gender are non significant $p>0.05$, while the main effect of age is significant $p<0.05$. The interaction between residence and age is significant $p<0.05$. Interactions between gender and age and between residence, gender and age are non significant $p>0.05$.

Table: 4.6 Analysis of Variance on the influence of residence, gender, and age on DM scores.

R

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Residence	.271	1	.271	.150	.699
Gender	.573	1	.573	.317	.575
Age	70.048	2	35.024	19.371	.000
Residence * gender	2.776	1	2.776	1.535	.218
Residence *age	30.094	2	15.047	8.322	.000
Gender *age	3.507	2	1.754	.970	.382
Residence * gender * age	2.689	2	1.345	.744	.478
Error	195.275	108	1.808		
Total	1515.000	120			
Corrected Total	305.325	119			

.360 (Adjusted R Squared = .295)

Table 4.6 shows that there was a significant interaction between age and residence.

Children's scores on dog model test are shown in figure 7 below.

Figure 4: Mean scores on Dog model test.

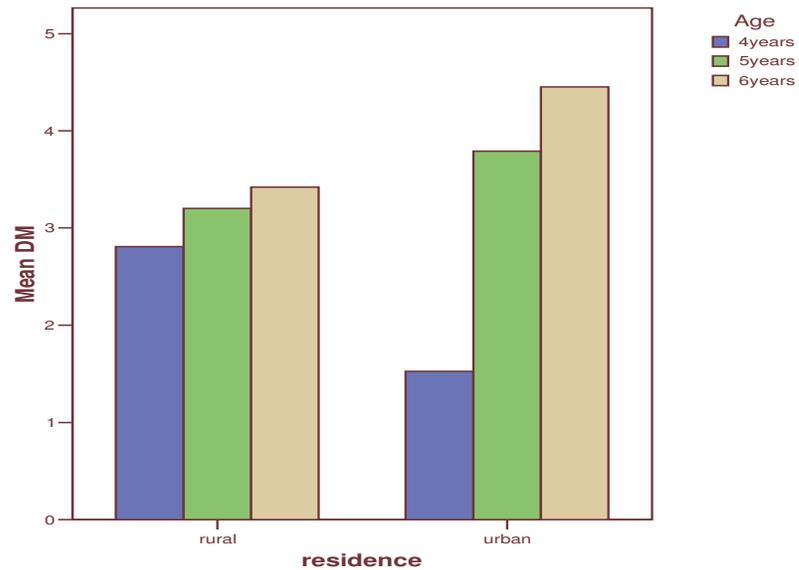


Figure 4 shows that the interaction takes the form of higher scores by the oldest children in the urban area and much lower scores by the youngest age group in both the urban and rural ecological zones. There were much lower scores by the urban children and were due to the refusal of some of the youngest urban children to make dog models preferring instead to model cars, and hence scoring zero.

Table 4.7 Analysis of Variance of scores on the BPN as dependent variable with age, gender, and residence as independent variables

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Age	193.719	2	96.859	17.075	.000
Gender	.611	1	.611	.108	.743
Residence	94.193	1	94.193	16.605	.000
Age* Gender	4.856	2	7.428	1.309	.274
Age* Residence	3.614	2	1.807	.319	.728
Gender* Residence	.252	1	.252	.044	.834
Age*Gender* Residence	7.886	2	3.943	.695	.501
Error	612.623	108	5.672		
Total	14200.000	120			
Corrected Total	927.967	119			

Table 4.7 shows performance on the Body Parts Naming test. The significant main effects on performance on BPN are age, and residence with $p < 0.05$. There were no significant effects of gender, the interaction between age and residence; gender and residence; and the three-way interaction between age, gender, and residence was not significant, $p > 0.05$.

Thus, while there was no significant difference between the rural and urban samples in performance on PMT or DM, there was a large and significant difference on the

BPN between the rural sample (M= 11.40) and the urban sample (M=9.63) (Table 4.) This may be due to the fact that the rural sample used a familiar language (Bemba) while the urban sample used an unfamiliar language (English) in response to the BPN test.

4.4 TEACHER AND PARENT RATINGS OF CHILDREN'S INTELLIGENCE WOULD MATCH WITH THE CHILDREN'S PERFORMANCE ON THE PMT, BPN, AND DM

The fourth hypothesis was that teacher or parent ratings of children's intelligence would match with the child's performance on the PMT. The results revealed the teacher's ratings for the urban sample averaged 2.85 (sd 1.333) and were positively and significantly correlated with PMT scores (N=60, $r=.749$, $p<0.01$). Table 4.8 shows that teachers' ratings of intelligence were less correlated with the children's DM test ($r=.535$, $p<0.01$) and the BPN test ($r=.547$, $p<0.01$) than with the PMT. On the other hand, the parental ratings of their child's intelligence in the rural sample averaged 3.17 (sd 1.147) and were non-significantly correlated with PMT scores (N = 60, $r = + .205$, $p = .117$).

Table 4.8 Correlations of intelligence ratings by urban Pre school teachers with scores on the three tests

		BPN	DM
PMT Pearson correlation Sig. (2- tailed) N		.330**	.487**
		.010	.000
		60	60
Intelligence ratings Pearson correlation Sig. (2-tailed) N		.547**	.535**
		.000	.000
		60	60
BPN Pearson Correlation Sig. (2-tailed) N			.320*
			.013
			60

** correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.5 CHILDREN'S SCORES ON THE DOG AND BODY PARTS NAMING TESTS

The sixth and seventh hypotheses were that scores on the Dog and Body Parts Naming tests would correlate positively with PMT scores. The results on the above hypotheses are presented in table 4.9.

Table 4.9 Bivariate Correlations of performance by urban and rural samples combined among the three tests and with age.

		BPN	DM	AGE
PMT	Pearson Correlation	.340(**)	.331(**)	.472(**)
	Sig. (2-tailed)	.000	.000	.000
	N	120	120	120
BPN	Pearson Correlation		.239(**)	.455(**)
	Sig. (2-tailed)		.009	.000
	N		120	120
DM	Pearson Correlation			.461(**)
	Sig. (2-tailed)			.000
	N			120

**Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed)

Table: 4.9 shows correlations of age with BPN and PMT; BPN and DM; and DM and PMT as being significant, $p < 0.01$. It shows that although the difference between the size of the correlations is probably not statistically significant, $p > 0.05$, the modest correlation between DM and BPN is lower than that between PMT and either of the other two tests. This is consistent with theoretical expectations as follows: DM and BPN represent different, complementary components of the task demands of PMT. Thus, each of them would be expected to correlate with PMT due to sharing of that

component task demand, but DM and BPN do not have any obvious shared task demand. So we would expect them to be less highly correlated with each other. The fact that there is modest correlation between them may reflect such underlying background variables as general cognitive ability, comfort/ confidence in the testing situation.

4.6 PMT SCORES WILL IMPROVE WITH INCREASED CHRONOLOGICAL AGE

Confirmation was reported above of hypothesis 8, that younger children would score lower than the older children on the PMT. Further details of this finding are presented in the figure 4.

Figure 5 The distribution of scores on PMT for the 4,5, and 6- year old children combining boys and girls, and rural and urban residences.

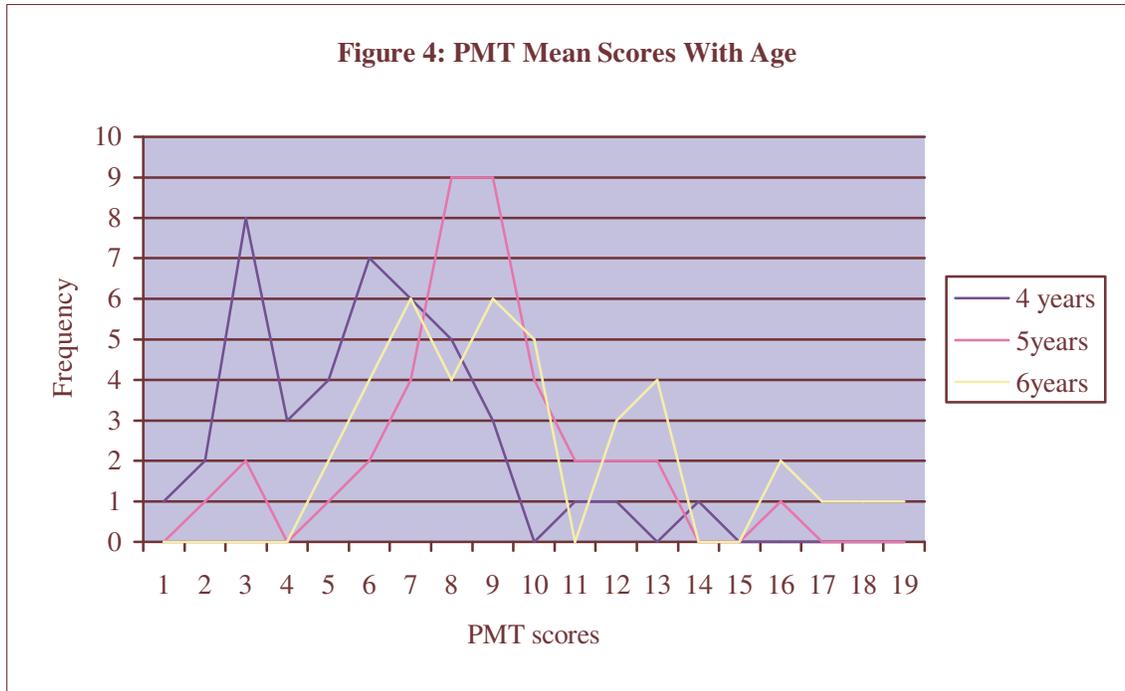


Figure 4 shows the distribution of scores on the PMT for ages 4, 5 and 6. The figure shows that performance of children on the PMT improves with increased age.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 INTRODUCTION

The data presented in chapter 4 serve as preliminary evidence of the sensitivity of tasks to independent variables conventionally associated with intellectual development of preschool age children. These data have been interpreted as reflecting validity of the *Panga Munthu* test as it attempts to give a true measure of intellectual capabilities for children below the age of seven from a non Western world- in particular Zambia. Although the data base was too small to warrant generalization, the pattern of results was consistent across the two (rural/urban) ecological sites as reflected in the PMT test results. Therefore, the test appears to be a good measure of intellectual capabilities for children below the age of seven.

Table 5.1 shows Published age norms found by Kathuria and Serpell (1998)

Table 5.1 Age Norms: PMT Scores and Descriptive Rankings by Age

Age (7- 8 years)	Ranking				
PMT Score	Below 4	4-7	8-14	15-18	19 & Above
Description	Low	Below Average	Average	Above Average	High

Source: Adapted from Kathuria & Serpell (1998)

Serpell (2009:2) reports that various interpretations have been advanced by many authors about the significance of formal test results obtained under laboratory conditions which labeled Zambian children's performance as extremely poor relative

to Western norms. These reports indicate a possibility that African children were developmentally delayed, brain damaged, or lacking in general intelligence, spatial ability, or visual skills when they performed poorly on pattern reproduction tasks involving paper and pencil.

On the other hand, Serpell observed that these same children engaged in spontaneous play activity that involved the construction from scraps of wire, without any guidance from adults, of elaborate, skeletal models of cars. The poor performance on pattern reproduction tasks was due to unfamiliarity of the testing medium. This report notes that many African children get involved in many spontaneous play activities that are of construction by nature without the involvement of adult guidance. Several lines of evidence from other studies “seem to show that PMT taps a dimension of cognition that is more relevant to the child’s home environment than to the demands of the school curriculum (Serpell and Jere-Folotiya, 2008).”

5.1 NO GENDER DIFFERENCE IN PERFORMANCE ON THE PMT BY CHILDREN BELOW THE AGE OF SEVEN

Some studies carried out in Zambia on the *Panga Munthu* test have reported gender differences in performance (Serpell, 1979; Kathuria and Serpell, 1998; Chimbwali, 1982); and Nsopela (1982). In the current study, no significant difference in performance was found on the test which confirms my hypothesis. The result could be attributed to the fact that the tester has had a lot of experience in working with preschool children and thereby was not gender biased in his dealings with children. The differences between boys and girls reported by Kathuria and Serpell (1998) were

not consistent across grades, with grade 1 girls scoring higher than boys and boys scoring higher than girls in grades 3 and 5.

5.2 CHILDREN AGED 4 TO 6 YEARS WILL SCORE 8 POINTS ON THE 25- POINT SCORING CRITERIA

My hypothesis that children aged 4 to 6 years would score on average 8 points was confirmed as children from both ecological zones performed at 8 points on average. The study by Kathuria and Serpell (1998) gives a range of 8-14 as average for 7-8-year-olds and 8-15 for 9-10 year-olds. So a mean of 8 (SD, 3.48) for 4-6 year olds does not seem far from what one might have expected based on those norms for older, school-going children.

5.3 NO DIFFERENCE IN PERFORMANCE BETWEEN URBAN AND RURAL CHILDREN

Nsopela 1982) and Chama (1979) compared the performance of children from two socioeconomic strata and found no significant differences. The current study confirms my hypothesis as it found no difference in performance between urban and rural children. This confirms my reasoning that both ecological settings offer clay as a good medium for play.

5.4 CHILDREN WHO ATTEND ECCDE CENTERS WILL NOT PERFORM BETTER ON THE PMT THAN OTHERS WHO DO NOT

Most children in Zambia who attend ECCDE centers are resident in urban whereas those who do not are from the rural ecological zone. The present study revealed that both ecological zones appear to offer the same play experiences with clay by genders,

age, and residence which confirm the hypothesis. In a related study with the PMT, Kathuria and Serpell (1998) noted that the PMT does not appear to be significantly easier for urban than for rural children.

5.4 TEACHER/ PARENT RATINGS OF CHILDREN'S GENERAL INTELLIGENCE AND MATCHING WITH PERFORMANCE ON THE PMT

The correlations of PMT scores with ratings by rural parents were non significant. This result could be due to the fact that preschool teachers were familiar with assessment related criteria where as rural parents (most of them illiterate) were not. Note also that, unlike the teacher ratings obtained for the urban sample, the parents had no opportunity to compare their children with others when making their ratings.

Nsopela (1982) found no significant correlation between PMT scores and teacher ratings in two Lusaka primary schools catering to children in the normal range of abilities, confirming an earlier finding by Ezeilo (1978). My hypothesis that ratings of children's intelligence by urban preschool teachers would correlate positively with PMT scores was confirmed. This could mean that the dimensions of cognitive functioning measured by the PMT are more closely related to those on which preschool teachers focus their attention in the context of Early Childhood educational activities than to those on which primary school teachers focus in the context of primary school instruction and academic assessment.

5.5 DOG MODEL TEST SCORES WILL SHOW A POSITIVE CORRELATION WITH SCORES ON THE PMT

The study revealed an overall positive correlation between PMT and DM scores with the rural sample ($r = + .331$). The urban sample however, performed less well. It was expected that children will perform well on the DM test with a view that a dog was a familiar animal in every community. This negative correlation for the urban sample perhaps is an artifact generated by the reluctance of the youngest children to make dog models and therefore, requires some investigation on a more robust sample.

5.6 SCORES ON THE BODY PARTS NAMING TEST WILL CORRELATE WITH THE PMT

The results of the current study showed a correlation between BPN and PMT when children had to identify the named parts on a child's body or tester. This provided evidence of children exhibiting linguistic competence.

These data are conceptually related as complementary indications of the construct validity of the PMT. Both the DM and BPN show moderate correlations with PMT though they are less strongly correlated with each other.

A number of cross- cultural studies have demonstrated that the quality of performance on cognitive tasks greatly deteriorates if unfamiliar materials are used as the basis for testing (Gay and Cole, 1967; Okonji, 1971; Irwin et al, 1974). The implication of the test construction has generally been taken to be that the symbolic content of the materials should be recognizable by the subject. Recognition, however, does not guarantee that a subject is able to interpret all aspects of representation.

5.7 PERFORMANCE ON PMT WILL IMPROVE WITH AN INCREASE IN CHRONOLOGICAL AGE

The test differentiated between (*a*) ages of children (4, 5, and 6). An increase in score on the PMT with age was found. Similarly, Serpell (1974) when using the ten point scoring system and Ezeilo (1978) using the 20 point scoring system with the PMT showed that older children scored higher than younger children of same sex on the PMT.

The analyses presented in chapter 4 confirm my hypotheses. This has given a classic validation of the *Panga Munthu* test with this age group. Measuring the intelligence of infants is an especially, challenging task. Unlike older children, young children cannot follow instructions precisely. All that could be done was to present to them stimuli, coax them to respond, and observe what they do. Like the Bayley Scale for Infant Development designed to assess children between 1 month and 3 ½ years (Berk, 1996), the PMT also assesses gross and fine motor skills, such as grasping. Sometimes, very young children do not necessarily show willingness to cooperate. They often get distracted or tired during the testing period. In the current study, some four year old children from the urban site showed a degree of unwillingness to engage in modeling the ‘dog’ and preferred a ‘car’ which was not part of the test.

Because infants and toddlers are especially likely to become distracted, fatigued or bored during testing, the scores often do not reflect their true abilities. There are concerns that infant test scores do not tap the same dimensions of intelligence, and as such, they are conservatively labeled developmental quotients (DQs) rather than

intelligence quotients (IQs) (Berk, 1996). This is attributed to the fact that IQ scores become stable as children advance in their chronological age serving as reasonably good predictors of later performance (Honzik, Macfarlane, and Allen, 1948; Sontag, Baker, and Nelson, 1958). Children's IQ scores can change, though not so drastically in a short period especially during infancy and early childhood, there is a possibility of change in IQ scores frequently. However, IQ scores begin to stabilize in middle childhood. Furthermore, by the age of 7 years, childhood IQ scores are found to be rather good predictors of adult IQ. Infant test based on Piaget's theory has an object permanence criterion and therefore, offers better predictor of school IQ because it too, reflects basic intellectual process of problem solving (Wachs, 1975).

We can say that tests for very young children do show somewhat better long term prediction for extremely low scoring children (Honzik, 1983) and so infant tests are better used for screening- helping to identify for further observation and intervention. Very low scores may mean that they have a high likelihood of experiencing developmental problems in the future (Kopp, 1994).

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.0 INTRODUCTION

This chapter gives a conclusion, recommendations and limitations to the study.

6.1 CONCLUSION

This study was aimed at validating the *Panga Munthu* Test (PMT) with children below the age of seven. The PMT analyses specific skills of human representation required by the test in content and instructions. Scores on intelligence tests, whether designed for infants, children or adults are arrived at in much the same way (Berk, 1996). The *Panga Munthu* Test (along side the Body parts Naming Test, and Dog Model Test) with children under the age of seven was constructed and given a relatively robust representative sample of 120 selected individual children from two contrasting ecological settings

From the results, we can deduce that the PMT suffices to provide a validation of developmental assessment and its utility for measuring intelligence in an African setting when children play with clay. It gives a good measure of children's everyday cognition (schemas) both in the school and out side the formal school system giving a theoretical construct criterion. It measures a synthesis of children's knowledge of human body parts (experience and understanding), representational skills, and specific skills such as fine motor coordination. These skills are very widely distributed among African children irrespective of whether or not they have been to

school. It is significantly easier than paper and pencil tasks for both urban and rural children as well as for boys and girls. It is simple to administer as instructions are very easy for children to understand (Kathuria and Serpell, 1998).

This study shows that the PMT has some validity as a measure of general intellectual competence as it is well understood by children as young as four years which is an attraction relative to other tests currently available for assessment of children of this age. It is not biased to any geographical setting or gender, and it is related to preschool teachers' informal assessment of children's intelligence or some other relevant cognitive dimensions.

On the basis of the results from this study, we can conclude that the *Panga Munthu* test can be used on both rural and urban children and to identify children with special needs, it documents the relationship between the quality of children's environment and child outcomes. Further studies on a larger population with this age group are needed to determine whether the test will yield similar results.

Many teachers and parents of children who participated in the study expressed a lot of keen interest in the study. With this zeal shown, there is need for Government to facilitate and set up a child research budget for more investigations on child development. Since child development is ultimately a cultural process, government, stakeholders and other caregivers should create environments where children can grow, thrive, and become better prepared for their future cognition and intellectual capabilities by the creation of national policy driven guidelines.

6.3 RECOMMENDATIONS

Based on the findings of the study, the following are the recommendations:

The study has exhibited a good start of the administration of the PMT with children below the age of seven. However, there is need for more research with the same age group with children from both urban and rural ecological zones using the PMT so as to confirm the validation of this study's findings and confirm the norms on a larger population sample. The PMT instrument used in the study is valid as it has yielded similar results with increasing scores with age, no gender differences, and similar scores with BPN test from both ecological zones where it was administered. However, there is need to develop some other instrumentation or replicate the BPN and DM as in the current study in order to observe if there will still be any correlations with the PMT. Childhood researchers should study local standards for child development by examining commonalities and variations across communities and introduce these standards where they are known to be important for development. As far as possible, childhood researchers should avoid the use of standards that assume affordances for learning in the home if they are not present in the majority of Zambian communities.

6.4 LIMITATIONS TO THE STUDY

The study was narrow in scope because it focused only on two districts on the Copperbelt Province. A full scale research covering all the districts on the Copperbelt Province or indeed the whole country would be more generalizable.

REFERENCES

- Berger, K. S. (2000). *The developing person through childhood* (3rd Ed.). New York: Worth.
- Berk, L. E. (1996). *Infants and children. Prenatal through Middle Childhood*. (2nd Ed.) Needham Heights: Allyn and Bacon.
- Berry, J. W, Irvine, S. H, and Hunt, E.B. (Eds). (1998). *Indigenous cognition: Functioning in cultural context*. Dordrecht: Nijhoff.
- Birney, D., and Stermler, S.E. (2007). Intelligence Quotient. In N. Salkind (Ed), *Encyclopedia of Measurement and Statistics* (Vol. 2, pp. 473-476). Thousand Oaks, CA: Sage Publications.
- Berry, J.W, Irvine, S.H, and Hurt, E.B. (Eds). (1988). *Indigenous cognition: Functioning in cultural context*. Dordrecht: Nijhoff.
- Campbell, D.T, and Fiske, D.W. (1959). Convergent and discriminant Validation by the multitraitmultimethod matrix. *Psychological Bulletin*, 56, 81-105.
- Centner, H. (1963). L'enfant African et ses jeux; dans cadre de la vie traditionnelle au Katanga (collection memories, No.17). Elizabethville, Katanga, Zambia: Centre d'Etudes Psychologiques et Sociales Interculturelles (CEPSI).
- Chama, A. P. (1979). *Validity of intelligence tests in Zambia*. Unpublished undergraduate dissertation, Department of Psychology, University of Zambia, Lusaka.
- Chimbwali, B.C. (1982). *Construct validity of Panga Munthu Test*. Unpublished Undergraduate dissertation, Department of Psychology, University of Zambia, Lusaka.

- Cole, M. (1996). *Cultural Psychology. A once and future discipline*. Cambridge: The Belknap Press of Harvard University Press.
- Colligan, J. (1983). *Musical creativity and social rules in four cultures*. *Creative child and Adult Quarterly*, 8, 39-44.
- Dasen, P.R., Barthelemy, D., Kan, E., Kouame, K., Daouda, K., Adjei, K.K., and assande, N. (1985). N'glouele, l'intelligence chez les Baoule. *Archives de psychologie*, 53, 295-324.
- Dasen, P.R. and Colomb, E. (1984). Cross-cultural uses of Piagetian methodology. In: Brozek, J., Schuarch, B (Eds). *Malnutrition and behavior critical assessment of key issues*. Lausanne: Nestle Foundation.
- De Lemos, M. (1966). *The development of conservation in Aboriginal children*. Unpublished PhD thesis, Australian National University.
- Deregowski, J.B. and Serpell, R(1971). Performance on a sorting task: A cross- cultural experiment. *International journal of Psychology*, 6, 273-281.
- Ezeilo, B. (1978). Validating Panga Munthu Test and Porteus Maze Test (wooden form) in Zambia. *International Journal of Psychology*.v13 (14), 333-342.
- Ferguson, G.A. (1956). On transfer and abilities of man. *Canadian Journal of Psychology*, 10, 121-131.
- Freeman, F.S. (1955). *Theory and practice of psychological testing*. New York: Holt.
- Furth, H. (1966). *Thinking without language*. New York: Free Press.
- Gallahue, D.L. (1993). *Developmental physical Education for Today's children*. Oxford: Brown company Publishers.
- Gay, J. and Cole, M. (1967). *The New Mathematics and an Old Culture*. New York: Holt, Rinehart and Winston.

- Harrington, D.M. (1990). The ecology of human creativity: A psychological perspective. In M.A. Runco and R.S. Albert (Eds), *Theories of creativity* (pp.143-169). New Bury Park, CA: Sage.
- Harris, D.B. (1963). *A child's drawing as a measure of intellectual maturity. A revision of and extension of the Goodenough Draw- a- man Test*. New York: Willey.
- Heron, A, and Simonsson, M. (1969). Weight conservation in Zambian children. A non-verbal Approach. *International Journal of psychology* 3, v.4, 281-292.
- Irvine, S.H, and Berry, J.W. (Eds). (1983). *Human Assessment and cultural factors*. New York: Plenum.
- Irvine, S.H, and Berry, J.W. (Eds). (1980). *Human abilities in cultural context*. New York: Cambridge University Press.
- Irwin, M.H., Schafer, G.N. and Feiden, C.P. (1974). Emic and unfamiliar category sorting of Mano farmers and U.S undergraduates. *Journal of Cross- Cultural psychology*, 5, 407- 423.
- Jenkins, P.D (1980). *Art for the fun of it: A guide for teaching children*. New York: Prentice hall Press.
- Kaplan, R.M and Saccuzzo, D.P. (2001). *Psychological Testing. Principles, Applications, and Issues (Fifth edition)*. Belmont, CA: Wadsworth.
- Kathuria, R, and Serpell, R. (1998). Standardization of the Panga Munthu Test- A nonverbal Cognitive Test Developed in Zambia. *The Journal of Negro Education*, Vol. 67, No. 3, pp.228-241.
- Kelly, M.J, and Kanyika, J. (2000). *Learning achievement at the middle basic level. Summary report on Zambia's national assessment project 1999*. Lusaka: Examinations Council of Zambia.

- Kidd, D. (1906). *Savage childhood*. London: A & C Black.
- Lowenfeld, V, and Brittain, W. L. (1975). *Creative and mental growth* (5th Ed). New York: Mac Millan Publishing co. Inc.
- Mar'i, S, and Karayanni, M. (1982). Creativity in Arab culture: Two decades of research. *Journal of creative Behaviour*, 16, 227-238.
- Matsumoto, D. (1994). *People: Psychology from a cultural perspective*. Belmont, Carolina: Brooks/ Cole Publishing Company.
- Matafwali, B. (2005). *Nature and prevalence of reading difficulties in the third grade: Lusaka Rural and Urban schools*. Unpublished Masters degree dissertation, Department of EPSSE, The University of Zambia, Lusaka.
- Mishra, R.C. (1997). Cognition and cognitive development. In J.B. Berry; P.R. Dassen; and J.S. Saraswathi (Eds), *A Hand book of cross- cultural Psychology: Basic Processes and human development* (pp.143-172). Boston: Allyn and Bacon.
- Ministry of Education. (2006). *Child Development Assessment in Zambia: A study of developmental Norms of Zambian children aged 0- 72 months*. Lusaka: UNICEF.
- Ministry of Education. (1996). *Educating our Future: National Policy on Education*. Lusaka: ZEPH.
- M'tonga, M. (1985). *Children's games and plays in Zambia*. Unpublished doctoral dissertation, Queen's University, Belfast, Northern Ireland.
- Nsopela, A.K. (1982). *Validation of Panga Munthu intelligence Test*. Unpublished undergraduate dissertation, Department of Psychology, The University of Zambia, Lusaka.

- Okonji, M.O. (1969). The differential effects of rural and urban upbringing on the development of cognitive styles. *International Journal of Psychology*, 4, v. 4, 293-305.
- Okonji, M.O. (1971). A cross- Cultural study of the effects of familiarity on classificatory behaviour. *Journal of Cross- Cultural Psychology*, 39- 50.
- Piaget, J. (1974). Need and significance of cross-cultural studies in genetic psychology. In J.W. Berry and P.S. Dassen (Eds), *Culture and cognition* (pp.299-309). London: Methuen
- Piaget, J. (1983). Piaget's theory. In W. Kessen (Ed), *History, theory and methods, Volume 1 of P.H. Mussen (Ed), hand book of Child Psychology, 4th ed.* (pp.103-128). New York: Wiley.
- Piaget, J. (1972). *The principles of genetic epistemology*. London: Routledge and Kegan Paul.
- Poortinga, Y.H, and Van der Flier, H. (1988). The meaning of item bias in ability tests. In S.H. Irvine, and J.W. Berry (Eds), *Human abilities in cultural context* (pp.166-183). New York: Cambridge University Press.
- Rogoff, B. (1990). *Apprenticeship in thinking: cognitive development in social context*. New York: oxford University Press.
- Rogoff, B, and Lave, J. (Eds). (1984). *Everyday cognition: Its development in social context*. Cambridge, MA: Harvard University Press.
- Serpell, R. (1974). Estimates of intelligence in a rural community of Eastern Zambia. H.D.R.U. Reports, No. 25, University of Zambia.
- Serpell, R. (1979). How specific are perceptual skills? A cross of pattern reproduction. *British Journal of Psychology*, 70, 365-380.

- Serpell, R. (1993). *The significance of schooling: Life Journeys in an African society*. New York, NY, US: Cambridge University Press.
- Serpell, R. (2009). "Strengthening Africa's Voice in and Africa's Contributions to Child Development Research," 4th Africa's International ECD Conference- From Policy to Action: *Expanding Investment in ECD for Sustainable Development*. Dakar, Senegal: 10-13 November.
- Serpell, R. and Folotiya, J. (2008). Developmental Assessment, cultural context, Gender and schooling in Zambia. *International Journal of Psychology*, 43(2), 88 – 96.
- Serpell, R. and Haynes, B.P. (2004). The cultural practice of intelligence testing: Problems of international export. R.J. Sternberg and E.L. Grigorenko (Eds), *Culture and competence: Contexts of life success* (pp. 163-185). Washington, DC: American Psychological Association
- Sigel, I., Andersen, L.M, and Shapiro, H. (1966). Categorization behaviour of lower- and middle- class Negro pre- school children: Differences in dealing with representation of familiar objects. *Journal of Negro Education*, 35, 218- 229.
- Spearman, C.E. (1823). *The nature of intelligence and the principles of cognition*. London: Macmillan.
- Stemler, S.E et al. (2009). Assessing Competencies in Reading and Mathematics in Zambian Children. In E.L. Grigorenko (Ed), *Multicultural Psychoeducational Assessment*. (pp.166-206). New York: Springer.
- Sternberg, R, J. (1998). Abilities and forms of developing expertise. *Educational Researcher*, 27(3), 11-20.
- Sternberg, R.J. and Wagner, R.K. (1986). *Practical intelligence: Nature and origins of competence in the everyday world*. Cambridge: Cambridge University Press.

- Super, C.M. (1976). Environmental effects on motor development: The case of “African infant precocity” *Developmental Medicine and child neurology*, 18, 561-567.
- Terman, L.A. (1916). *The measurement of intelligence*. Boston: Houghton Mifflin.
- Trochim, W.M.K. (2006). The research methods knowledgebase (2nd Ed). Retrieved from <http://www.socialresearchmethods.net/kb/qualval.htm> on 20/12/2010.
- Uzgiris, I.C. (1964). *Situational generality of conservation*. *Child development*, 35, 831-841.
- Vernon, P.E. (1969). *Intelligence and cultural environment*. London: Methuen.
- Wober, M. (1974). Towards an understanding of the Kiganda concept of intelligence. In Berry, J.W and Dasen, P.R. (Eds.) *Culture and cognition*. London: Methuen 261-280.
- Woolfolk, A.E. (1995). *Educational Psychology*. Boston: Allyn and Bacon.
- www.socialresearch.net. Accessed on 09/02/2011

APPENDICES

APPENDIX- 1: 25- Point Scoring Criteria for the Panga Munthu Test

ID_____

SCORE EITHER 1 (PRESENT) OR 0 (ABSENT):

1. Head and body distinguishable
2. Head shorter than length of body excluding neck)
3. Proportion of face 3/8 length of head greater than its width
4. Ears: Any indication of ears
5. Nose: Any clear method of representation
6. Eyes: Two eyes must be shown
7. Mouth: Any clear representation
8. Eye brows: Any indication of eye brows
9. Neck: Definite extension of body between head and arms; must be clearly thinner than head
10. Proportion of trunk: Length of trunk must be greater than breadth
11. Umbilicus: Any clear representation
12. Arms: Two arms at opposite side of body
13. Proportionality of arms: Arms at least equal to the trunk in length; tips of hands extended to the middle of hip but not to knee
14. Shoulders: Definite angle below neck where arms join trunk
15. Elbows: Second definite angle in arms
16. Hands: Either third definite angle in arms or some shaping to differentiate hands from fore arms
17. Fingers: Any indication of fingers
18. Two legs: At opposite end of body from head
19. Proportionality of legs: length of the legs not less than vertical measurement of trunk nor greater than twice the measurement
20. Knees: Definite angle in legs
21. Feet: Definite angle in legs in opposite direction fro knee angle
22. Proportionality of feet: Length of the foot must not be greater than its height from knee angle
23. Toes: Any clear representation of toes
24. Any extra items or details: (Specify, and score up to 2)

Total Score- /25

APPENDIX- 11: 7- Point Scoring Criteria for the ‘Dog’ model

ID_____

SCORE EITHER 1 (PRESENT) OR 0 (ABSENT)

1 .Head and body distinguishable

2. Head shorter than length of body

3. Neck shorter than length of body

4. Tail (long or short)

5. Four legs: Two at opposite end of body

6. Any extra items or details (specify and score up to two)

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.....

Total: /7

APPENDIX- 111: 16- Point scoring criteria for the Body Parts Naming

ID _____

SCORE EITHER 1 OR 0

1. Names the Eye
- 2 .Names the Nose
3. Names the Lips
- 4 Names the Hair
5. Names the Neck
6. Names the Shoulder
7. Names the Elbow
8. Names the Nails
9. Names the Fingers
10. Names the Knees
11. Names the Leg/ Foot
12. Names Ear
13. Names Teeth
14. Any other named characteristics (Specify and score up to Two)

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.....
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TOTAL: /15