THE APPLICATION AND STANDARDISATION OF THE GENERAL REASONING GROUP TEST FOR PUPILS IN VENDA

by

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DECLARATION

I declare that the DISSERTATION hereby submitted to the University of the North for the degree of MAGISTER ARTIUM in PSYCHOLOGY has not previously been submitted by me for the degree at this or any other University that it is my own work in design and in execution, and that all material contained therein has been duly acknowledged.

SIGNED AT _____ on the _____

_____

J G Tshifularo

DEDICATED TO "Lovey" my better-half, my children, MOM, DAD, brothers and sister, who encouraged and supported me through thick and thin.

Let HIM add joy and more life to you.

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SUMMARY

It has been a common practice in South Africa to use "foreign" neuropsychological test batteries to screen children. The application of these westernized neuropsychological test batteries by South African clinicians and researchers compelled them to adapt to their norms. However, there is a dire need to empirically validate the application of such tests and the appropriateness of their norms in the South African situation. Some of these test batteries may be valid and reliable, but are based on a "foreign" culture.

With South Africa committing itself to the process of major changes in many spheres of our lives, some of our clinicians are taking some giant initiatives by facing the challenges of this changing society in some sections of neuropsychology. With the educational systems moving away from the fragmented systems of education (in one South Africa) towards integration; it should obviously be possible and indeed highly desirable to find instruments that are "culture-fair" so that uniform assessment or screening procedures can be developed for the identification of children who are academically at risk.

Foxcroft, Shillington and Turk (1990) of the University of Port Elizabeth devised the General Reasoning Group Test (GRGT). This test is based on the Reitan-Indiana Neuropsychological Test Battery (RINTB), and has been developed locally. The present research study forms part of a major project in collaboration with the University of Port Elizabeth aiming at obtaining norms for all South African Cultural groups.

The application and standardization of the General Reasoning Group Test for pupils in Venda research study was conducted in Venda in the Northern Province. A sample of 86 'normal' pupils from preschool; grade 1 (sub A); grade 2 (sub B); grade 3 (std 1) and grade 4 (std 2) were tested. The findings were correlated with the pupil's proficiency in reading and mathematics to establish predictive validity. A correlation between performance on the GRGT and the Draw-A-Person test was done to give an indication of its construct related validity.

The findings of the present research have highlighted the fact that the GRGT is applicable to pupils in Venda and that performance is:

(a) influenced by General Reasoning Abilities;

(b) age-related;

(c) academically predictive;

(d) not language related; and

(e) related to educational level.

The present findings are in accordance with the findings of the research conducted on the 5; 6; 7; 8 and 9 year old children in Port Elizabeth thus, putting more statistical evidence that further research be conducted to establish South African norms for the GRGT.

OPSOMMING

In die verlede is buitelandse neurosielkundige toetsbatterye algemeen ter ondersoek van kinders in Suid Afrika gebruik. Hierdie toetse is uiteraard nie vir Suid Afrikaanse toetstande gestandaardiseer nie en daarom is aanpassing van die relevante norms noodsaaklik, sodat sekerheid verkry kan word ten opsigte van die geldigheid en betroubaarheid van die toetsbatterye in die Suid Afrikaanse konteks. Teen die agtergrond van verandering in die Nuwe Suid Afrika, het sekere klinici die inisiatief geneem om die behoefte aan Suid Afrikaans gestandaardiseerde neurosielkundige toetsbatterye aan te spreek.

Wat die onderwys en opvoedingsisteme aanbetref, bestaan die tendens huidiglik om te beweeg van gefragmenteerde opvoedingsisteme na groter integrasie. Dit is gevolglik moontlik en uiteraard ook wenslik om meetinstrumente te vind wat kultuurbillik is en kan bydra tot die ontwikkleling van eenvormige takserings - of siftingsprosedures ter identifikasie van kinders wat die risiko loop om probleme te ervaar op akademiese gebied.

Foxcroft, Shillington en Turk (1990) van die Universiteit van Port Elizabeth het die Algemene Redenerings Groep Toets (ARGT) ontwikkel. Hierdie toets is gebaseer op die Reitan-Indiana Neurosielkundige Toetsbattery (RINTB). Die onderhawige studie vorm deel van 'n groter projek wat uitgevoer word in

samewerking met die Universiteit van Port Elizabeth. Die doelwit van die oorhoofse projek is die vasstelling van norms vir alle Suid Afrikaanse kulturele groepe. Gevolglik poog die onderhawige studie om 'n bydrae te lewer tot hierdie oorhoofse doelwit.

Die Algemene Redenerings Groep Toets (ARGT) is toegepas en gestandaardiseer op skoliere in Venda (Noordelike Provinsie). Vir die doeleindes van hierdie navorsing is die ARGT toegepas op 'n steekproef van 86 'normale' leerlinge. Die opvoedingspeil van die proefpersone het gewissel tussen voorskool en standerd twee (graad vier). Ter vasstelling van die voorspellingsgeldigheid, is die toetsresultate gekorreleer met die proefpersone se lees - en wiskundevaardigheid. Voorts is die kriteriumverwante geldigheid van die ARGT ondersoek deur die proefpersone se ARGT resultate te korreleer met hul Teken-'n-mens toetsresultate.

Die bevindings van die onderhawige studie het beklemtoon dat die ARGT bruikbaar is vir Suid Afrikaanse skoliere en dat skolastiese prestasie:

(a) beïnvloed word deur algemene redeneringsvaardighede;

(b) ouderdomsverwant is;

(c) voorspellingswaarde inhou ten opsigte van akademiese prestasie;

(d) nie taalverwant is nie;

(e) verwant is aan graad van opvoeding.

Bogenoemde bevindings is in ooreenstemming met ander navorsingsbevindinge ten opsigte van vyf tot negejarige leerlinge in die Port Elizabeth omgewing. Die waarde van hierdie studie is dus geleë in die feit dat dit verdere statistiese steun verskaf vir toekomstige navorsing ter vasstelling van Suid Afrikaanse norms vir die ARGT.

CHAPTER 1

INTRODUCTION

It is a common practice to use psychological tests or aptitude tests to select relevant individuals in various activities of our life in South Africa today, be it in the academic/scholastic sphere, or in terms of classifications and selections of prospective employees in the employment world. The assessment of admission criteria in schools, preschool, crèches, universities, technical colleges, colleges of education etc, demand screening tests.

Traditionally an important function of psychological tests has been the identification of intellectual deficiency and assessment of emotional and behavioural disorders. Scholastic aptitude tests, assessment and screening of children in accordance with their abilities and/or disabilities and their educational and vocational assistance make the use of neuropsychological batteries today an indispensable component of human screening instruments (Foxcroft & Shillington, 1992).

The main challenge facing clinical neuropsychological researchers in South Africa is lack of standardized assessment instruments to assess children who are academically/scholastically at risk, for possible intervention purposes. Most

instruments are developed based on western culture (Bremner-Stokes, 1991).

Kroukamp and Foxcroft (1991) argued that there was a tendency in the past, here in South Africa, to devise separate tests for different cultural groups or rather different/separate norms. There are moves towards educational integration in all sectors to devise standardised neuropsychological measuring instruments which are culture-fair for uniform assessment procedures for the identification of children who are academically at risk (Foxcroft, Shillington & Turk, 1990).

Recently it has become an accepted tendency for a psychologist to include neuropsychological tests when assessing children with emotional, behavioural and/or scholastic difficulties. The application of standardised psychometric procedures in a neuropsychological screening process raises questions about the psychometric properties of the test applied. Another issue that has received increasing attention has been the inadequacy of normative data of some of the more frequently applied batteries like the Wechsler Memory Scale (WMS) (Ahmed, 1990) and some specialised individual tests (Lezak, 1995). These studies have pointed out the danger of misclassifying subjects as brain-damaged as a result of inadequate normative data.

According to Gouws (1989), neuropsychology explores a particular aspect of the interaction of body and mind: the relationship between, on the one hand, the body, as represented by the central nervous system and on the other hand, the mind, as expressed in behaviour.

In child psychology there is an increasing awareness of the potential role of neuropsychological deficits in a variety of problem situations which has resulted in increasing utilization of neuropsychological test batteries for children. The early screening of school children is essential for the identification of brain dysfunction and the streaming of children into special education. Such screening is, usually most cost-effective if it can be done in group context.

With the above objective in mind, Foxcroft, Shillington and Turk (1990) of the University of Port Elizabeth devised the General Reasoning Group Test (GRGT). This test is based on the Reitan-Indiana Neuropsychological Test Battery (RINTB), and it assesses the following salient aspects: reasoning abilities, visual-motor, and visuo-spatial ability and short-term memory.

This study forms part of a project in collaboration with the University of Port Elizabeth, the aim being to investigate the utility of the GRGT norms for the various cultural groups in South Africa. In spite of the fact that thousands of South African children are tested annually (Venda inclusive) by psychologists for possible dysfunctions, very little research into the application of

neuropsychological assessment techniques (especially with children in Venda) has been undertaken in South Africa. The need for a screening instrument appears to be the greatest amongst black children from 5 to 9 years of age.

The present study will focus on the GRGT for the following salient reasons:

(a) It covers a variety of functions;

(b) The administration of GRGT takes place in an objective and standardised procedure which obviates the need for experienced clinicians to do the administration and scoring.

(c) The General Reasoning Group Test (GRGT) could be considered to be "culture-fair" test in that its items are mostly non-verbal in nature and tally aspects of common cultural experience. It has been found to be a valid reliable measuring instrument for the assessment of cognitive functioning for children in the 5 to 9 years age range in Port Elizabeth (Foxcroft, Shillington & Turk, 1990) and other areas of the East Cape (Foxcroft & Shillington, 1992).

The present study is an attempt to provide empirical information regarding the applicability of the GRGT for children in Venda and thus lays the foundation for future research in the area of neuropsychological assessment screening procedures with this group of children.

Chapter 2 will provide an overview of neuropsychological assessment of children. An extensive review of the literature related to the roles, interpretation of neuropsychological data, its validity, and reliability is presented.

In chapter 3 cross-cultural neuropsychological assessment is discussed. Chapter 4 focuses on the choice of neuropsychological assessment techniques. In chapter 5 the problem is stated and the hypotheses are formulated. The method of investigating and testing these hypotheses is presented in chapter 6, with the results of the statistical test provided in chapter 7. The discussion which highlights the comparisons related to GRGT and scholastic performances, limitations and suggestions for future research is presented in chapter 8.

CHAPTER 2

2. NEUROPSYCHOLOGICAL ASSESSMENT OF CHILDREN

The principal aim of neuropsychological assessment of children is to determine the ways in which children can best be helped to develop their abilities and also to plan educational intervention for such children with disabilities (Rourke, Fisk & Strang, 1986).

According to Golden, Zillmer and Spiers (1992) the goal of clinical neuropsychology through neuropsychological assessment is to be able to evaluate the full range of the basic abilities represented in the brain of the child.

Benton (1975) contends that the neuropsychological assessment of children should be able to serve as an aid in neurological diagnosis: as a baseline for abilities, a prognostic instrument and an aid in planning intervention in the development of the child. Benton (1974) termed this process the elucidation of the relationship between the structure and function of the nervous system. In effect, for the clinical neuropsychologist, this involves not only an understanding of the functional aspects of behaviour and cognition, which may also be

assessed in other areas of psychology, but a specific understanding of how these functions relate to brain functioning and dysfunctioning in particular.

The purpose of neuropsychological assessment of children as advocated by Gilandas, Tonyz, Beaumant and Greenberg (1984) is to carefully assess children to establish their general level of premorbid functioning. The following major areas of neuropsychological functioning should be included in a neuropsychological test battery: motor, auditory, tactile, visuo-spatial, language, memory, higher cognitive processes and personality organization.

The principal goals in clinical neuropsychological assessment or evaluation of children would include:

(i) differentiation of functional versus organic disorders.

(ii) differential diagnosis of subtypes of neurodevelopmental disorders.

(iii) differential diagnosis of assets and areas of deficit in children with organic disorders.

(iv) documentation of current neuropsychological status and in children with traumatic brain damage, estimation of premorbid level of cognitive development.

(v) assistance in the development of plans or rehabilitation and remediation.

(vi) documentation of the rate of improvement or deterioration; and

(vii) participation in research regarding the impact of altered neurological status on cognitive and behavioural development (Hynd, 1988).

In clinical psychology the goal of assessment is the diagnosis of the disorder for the purpose of effecting behavioural change. Intelligence tests, achievement tests and personality tests are used in order to define behavioural change (Nortjé, 1984). However, the goals of clinical neuropsychology differ from this because neuropsychological assessment aims at diagnosing the presence of cortical lesions or dysfunctions and to localize them and where possible, to help with rehabilitation (Kolb & Whishaw, 1990).

What should be kept in mind however, is that the primary aim of neuropsychological assessment with children is to document change in behaviour and mental development due to attention to the functioning of the central nervous system and to describe and explicate a number of salient features for the maximization of the educational/developmental performance of the child (de Quiros & Schrager, 1978).

2.1 THE ROLE PLAYED BY NEUROPSYCHOLOGICAL ASSESSMENT OF CHILDREN

The role played by neuropsychological assessment in children is also expanding to include other areas in addition to those which are purely cognitive and which have historically been the domain of neuropsychology (Golden et al, 1992). Benton (1975) defined the traditional domain of the abilities to be measured as general intelligence, reasoning, memory, orientation, perceptual functions, perceptual-motor functions, language, flexibility, speed of response, attention and concentration. As in any area of psychological assessment the manner and setting in which the referred questions are asked determines the role and focus of the neuropsychological assessment. In a neurodiagnostic setting, the emphasis is traditionally on deficit measurement (Lezak, 1995), or the search for those dysfunctional aspects of an individual's/child's cognition and behaviour which aid the diagnosis of a

particular lesion, disease, syndrome or condition.

In the past clinical neuropsychology has devoted a tremendous research effort to the search for neurodiagnostic techniques which could provide a singular measure of "organicity". The validity of a test was measured primarily according to its "sensitivity" in detecting brain damage and the emphasis was on a dichotomous classification as brain-damaged or non-brain-damaged (Golden et al, 1992). This assessment should also incorporate measurement to aid in intervention planning of the child's potential.

2.1.1 Baseline for abilities

Neuropsychological assessment can serve as a baseline for a child's abilities (Golden et al, 1992). In order to evaluate the course of improvement or decline/ deterioration, it is very important and necessary to assess the same skills at different points in time. As a child's abilities change, repeated administrations of the test battery can be used to plot rate and level of improvement or decline. Repeated application of the test battery is also useful in identifying areas where there are residual deficits. This information enables the clinical child neuropsychologist to assess and evaluate any ongoing treatment plans for the child.

A practical consideration for all clinical child neuropsychologists who need to conduct repeated assessments, is to have tests which can be administered at regular intervals. Tests are required which minimize improvement due to practice effects and with satisfactory equivalency between alternate forms for repeat assessment at short intervals. Unfortunately there are currently very few test batteries other than motor, sensory and perceptual examinations which are not immune to practice effects if readministered over a short period of time (Hynd, 1988).

More reliable, validated, standardized instruments with alternate forms will help to alleviate this shortcoming.

2.1.2 Role in intervention

Neuropsychological assessment of children for the purpose of determining the efficiency of intervention programmes, requires the same detailed functional neurodiagnosis as does an accurate prognosis. The principal purpose of neuropsychological intervention is to help in the reformulation of disrupted functional systems by providing alternate abilities to replace the function of the injured areas. This is done through using the intact areas of the brain (Horton Jr, 1990). The intervention programmes help to provide functional reformulation that has not occurred spontaneously.

2.1.3 Role in neurodiagnosis

Neuropsychological testing/examination often serves as an important aid to physicians, neuropsychologists and neurologists in the diagnosis of neuropsychologically-impaired children. Although the examination is not needed in cases in which the diagnosis is clear-cut, the examination does provide additional and valuable information, in difficult or unclear cases (Uzzell & Gross, 1986).

The evaluation is useful in those situations where the child has definite neuropsychological symptoms, but no diagnosis can be established as well as in those cases in which a diagnostic choice needs to be made between a neurological and a severe emotional disorder. The latter diagnoses are among the most difficult to make because of the overlap of cognitive and emotional signs or dysfunctions and require a thorough understanding of both neurological and psychiatric disorders (Golden et al, 1992).

The results of the evaluation can be used by the neuropsychologist who wishes additional evidence to confirm a tentative diagnosis. In those situations, it is necessary for the neuropsychologist to give a full interpretation of the possible neurological conditions suggested by the neuropsychological results. This interpretation is then used by the neurologist in making the diagnosis (Golden et al, 1992).

2.2 INTERPRETATION OF NEUROPSYCHOLOGICAL ASSESSMENT DATA

2.2.1 Level of Performance

Clinical interpretation of test data from a level of performance perspective has been a traditional mainstay within the clinical psychologists arsenal of interpretative techniques (Tarter & Goldstein, 1984). Central tendency measures of variability are often established for a single test for groups with or without known brain damage. The performance of an individual is then compared with the normal standard to see whether his score falls into the normal or brain-damaged range.

One positive feature of the level of performance approach is that it emphasizes the use of normative data. This is particularly important when our concern is with the age span of five to fifteen years, where it becomes crucial to consider the developmental parameters of brain-related abilities. Failure to consider adequately the age-related aspects of neuropsychological abilities has led to many erroneous generalizations regarding the ability structures of children with learning disabilities (Filskov & Boll, 1981).

This level of performance method compares the child's score on a test to an expected score or norm. The expected test score is determined from the performance of a normative sample of children and controls. Such norms may take into account such factors as age, sex, education and intelligence. Generally these tests have a cutoff score. A child scoring worse than the cutoff score is labelled as brain-damaged; a child scoring better is labelled as normal (Golden et al, 1992).

However, a neuropsychological test score may differ from the normative standard for other reasons such as genetic factors, cultural deprivation, level of education, the presence of severe emotional or psychosomatic conditions and the normal aging process, and not just be indicative of brain damage. In a word, norms are necessary when evaluating children's performance, but it is also possible for them in effect, to become a clinical interpretation rather than serve the purpose for which they were designed namely, as grist for the interpretative mill (Golden et al, 1992).

It is also necessary to point out that normal and abnormal levels of performance may not, in and of themselves, signify normal and brain-related abilities respectively. In point of fact, it is the patterns of performance that most often have relevance for such concurrent validity issues. According to Rourke (1981) this analysis of patterns of performance is known as the "differential score" approach.

2.2.2 Differential Score Approach

Nortjé (1986) advocates that the differential score approach is generally considered to be an extremely useful method for inferring brain functioning, however, it does have its limitations in that it is based on the presumption that all brain-damage is alike and thus has the same effect from one individual to the next and as such ignores complexity of brain-behaviour relationships. It also does not deal with the problem of general versus specific deficits associated with cerebral lesions or the location and the type of lesion.

This approach compares a child's test score on two tests. One test is theoretically highly sensitive to brain damage; the second is theoretically insensitive to brain dysfunction. The insensitive test is supposed to reflect the individual's ability before any brain injury occur, while the sensitive test reflects the effects of brain damage. If the sensitive test score is significantly worse, it is assumed that the difference is due to a brain injury (Golden et al, 1992). In general two test scores are combined to yield a single score, measuring their difference. This may be done simply by subtracting or dividing one score by the other. This single score is then analysed by treating it in a manner described under the level of performance section.

This approach has three potential sources of error. First, the sensitive test may fail to reflect the brain damage present. Second, the insensitive test score may be lowered by the brain injury. Since all abilities depend upon the brain, all abilities can be affected by brain damage. No test is fully insensitive to brain injury. Finally, there are errors involved in setting any cutoff point.

The differential score method has the advantage of recognizing that each child/individual starts at a different level of performance. Thus, the error of misclassifying all persons with low ability as brain injury is avoided (De Quiros & Schranger, 1978).

2.2.3 Pathognomonic Signs Approach

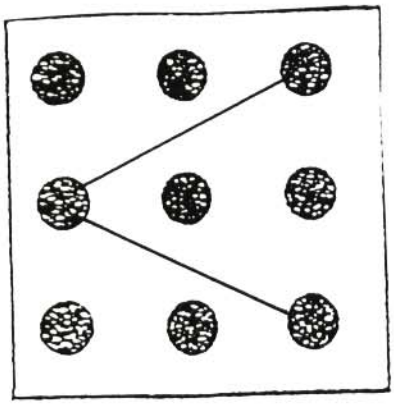
This essentially qualitative approach to the interpretation of neuropsychological test data can also be quantified at least to a certain extent. A "sign" by its very nature is either present or absent (Tarter & Goldstein, 1984).

This method is commonly seen in clinical child neuropsychology. It involves the observation of the child's performance for signs characteristic of the performance of brain-damaged individuals. Pathognomonic signs occur rarely in normal individuals. In clinical

neurology this would include such signs as an eye that will not move from one side-to-side. In neuropsychology, the rotation of drawing or the failure to draw the left half of a figure would be examples of pathognomonic signs.

For instance, a better illustration of a child revealing the symptoms of pathognomonic signs is as follows: which is seen at the failing to copy/draw the following as in Foxcroft (1990's) General Reasoning Group Test, (Section 4), for Visuo-spatial ability of the child.

A child may draw (a) instead of (b) (see below).



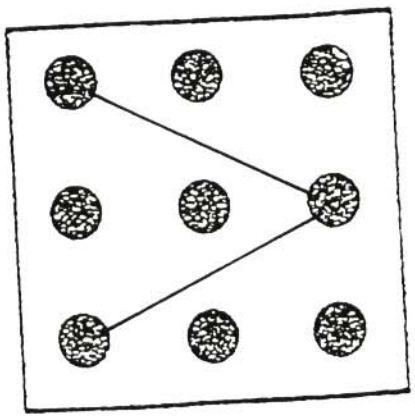


figure 1

(a)

An example of rotation or reversal mostly done by children, between 5 and 9 years old, this shows the neuropsychological pathognomonic signs.

(b)

The correct required drawing as indicated in item 7 of Section 4 on page 31 of the General Reasoning Group Test battery.

The number of pathognomonic signs within a given test may be counted to yield a summary number. This number is treated as a level of performance score. The simple presence of a particular pathognomic sign is taken as an indication of brain damage (Uzzell & Gross, 1986).

"Signs" are valuable in alerting the neuropsychologist to the possibility of brain damage but should be used as a supplement to other measures that yield more quantitative results.

2.2.4 Right - Left Body Difference

A number of tests can be analyzed not only in terms of overall level of performance; the relative adequacy of performance of the two cerebral hemispheres of the brain can also be compared. This measure is very useful, since it is not subject to many of the drawbacks of level of performance. Mood, emotion and educational disadvantage are unlikely to disrupt performance on one side of the body more than on the other (Hynd & Obrzut, 1981). Since motor and sensory performance is governed principally by the contralateral hemisphere, consistent inadequate performance on one side of the body can provide strong support for impairment of the contralateral hemisphere.

This approach is similar to the differential score approach in that one side of the body serves as the control for the other. If one side of the body performs significantly worse than the other; injury to the opposite hemisphere may have occurred.

Generally, the scores from the two sides are to be subtracted to obtain a single difference score. This score is then treated as described in the level of performance approach. This approach may yield inaccurate conclusions when an injury involves both hemispheres or when an injury to the spinal cord is involved because such injuries may also cause lateralized motor or sensory deficits or impair performance in most basic motor activities bilaterally (Hynd & Obrzut, 1981).

Golden et al (1992) state that this method is based on the functional asymmetry of the two cerebral hemispheres; a right hemisphere skill is compared to a left hemisphere skill.

2.2.5 Statistical Approach

In an attempt to derive maximum information from batteries of test data and when a comparison is made between groups of subjects such as non-brain damaged and brain damaged, multivariate statistical techniques are sometimes employed. Those techniques include procedures such as

multiple regression, discriminant function analysis and factor analysis. Each of these techniques attempts to find underlying relationships within test data which is also useful in diagnosis (Golden et al, 1992).

A single weighted score resulting from discriminant function is obtained from each subject together with an optimum least-squares separation between the scores for each groups. The point of minimal overlap between the groups is then established. Factor analysis has been used to find combinations of scores that represent pure abilities. Raw test scores do not do this, since any test reflects more than one behavioural function. A pure ability score should theoretically be more effective in identifying dysfunction in a particular area of the brain (Golden et al, 1992).

Discriminant techniques and multiple regression attempt to develop formulae that can directly discriminate between different criterion groups, such as a formula that discriminates brain damaged from normal children. Such formulae have been shown to be highly affective in specific populations (Wheeler et al, 1963). The drawback of these techniques is their dependence on the specific populations used to derive the formulae. When used with an alternate population, even one from another area/hospital/school they can lose a considerable amount of effectiveness. Consequently it is necessary to validate the formulae for the specific population to be tested (Golden et al, 1992).

2.3 NEUROPSYCHOLOGICAL ASSESSMENT TECHNIQUES

According to Nortjé (1986) neuropsychological assessment of children attempts to answer questions that fall into the following scope:

(i) diagnostic questions such as: is there brain damage or not?

(ii) descriptive questions such as: what abilities does the child have? Is there improvement or deterioration? What are the occupational or vocational possibilities? In addressing the above salient questions, three different approaches of neuropsychological assessment techniques have been used traditionally.

2.3.1 The use of the single tests for assessing organicity

The Bender Visual Motor Gestalt Test (Bender, 1938) and the Revised Visual Retention Test (Benton, 1974) are examples of single tests used for so-called organicity (Nortjé, 1986). The main advantage of these tests is that they are quick and easy to administer, however, the complex nature of the brain's functioning and the wide range of behavioural deficits that could occur in presence of brain damage detracts from the usefulness and accuracy of tests that measure a single function in neuropsychological diagnosis.

2.3.2 A short battery of psychological tests

A comprehensive approach of assessing major areas of neuro-psychological functioning such as memory, articulation and comprehension of language, intelligence, mental maturity, concept formation, problem-solving, reasoning abilities, numerical ability, visual perceptual functioning (visual-motor, and visuo-spatial ability) and short term memory.

The main criticism of most short batteries, however is that the interpretation and integration of a diverse set of results depends on the experience, knowledge and skill of the examiner (Nortjé, 1986).

2.3.3 The standard neuropsychological test battery approach

According to Foxcroft (1991) there is a great need for a valid, standardized, neuropsychological measuring instrument for use in South Africa, especially for economically-disadvantaged children. Nobody can dispute the fact that the use of a standardized neuropsychological test battery is potentially the most useful approach.

The examples of these batteries are the Haislead-Reitan batteries and the Luria Neuropsychological Investigation for adults (Christensen, 1975) and the recently developed Group Reasoning Test (Foxcroft et al, 1990). It is potentially culture-fair, standardized, and its psychometric properties, has initially only been researched with the black children 5 to 9 years of age in the Southern regions of South Africa. Children in the population groups that are situated in the Northern Province were not tested for application and standardization of the General Reasoning Group Test, part of which is covered by this research in the Venda sub-region.

The reason for this is that the need for a screening instrument appeared to be greatest amongst this group of children, since no standardized neuropsychological test battery has been developed in South Africa. Most researchers, and clinicians, have, however, come to the fore in recent years with a number of promising studies in which investigated new tests have been developed to meet the challenges of our times (Foxcroft, 1991).

The empirical validity (in terms of identifying and locating brain damage) is the major advantage of such batteries. According to Lezak (1995) two purposes usually guide the development of such batteries.

(i) they must be accurate in their prediction of brain damage; and

(ii) they must cover a broad area of behaviour so that the fullest possible understanding of the nature of the child's organic abilities can be obtained.

These standardized neuropsychological test batteries are designed to measure the major intellectual functions across at least auditory and visual, verbal and non-symbolic modalities and provide for comparison between the modalities for each of the major functions (Smith, 1969).

The major limitation of these batteries, is that since they cover a wide spectrum of functions, they take a long time to administer but are the most effective and valid techniques that can be used for the psychometric assessment for cerebral dysfunctions today (Nortjé, 1986). The interpretation of these batteries require considerable skill, knowledge and experience and according to Golden (1978), the interpretational accuracy today may still be very low.

2.4. ESSENTIAL ASPECTS OF THE NEUROPSYCHOLOGICAL ASSESSMENT BATTERY

Tarter and Grobler (1984) contend that the principal criteria against which the adequacy of a neuropsychological assessment produced for children

must be judged are: reliability, validity and coverage of a particular test battery.

2.4.1 Reliability

Anastasi (1970) defines test reliability as the consistency of the scores obtained by the same persons when retested with the identical test or with an equivalent form of test. According to Hynd (1988) tests are required which minimize improvement due to practice effects and with satisfactory equivalency of short intervals. The test battery should reflect uniformity of procedure in administering and scoring the test.

The specific dimensions of reliability that are most important relate to inter-rater reliability and test-retest reliability. The test must have very high inter-rater or inter-examiner reliabilities. Certainly, reliability coefficients that fall below 0,90 would be completely unacceptable for this purpose. Most neuropsychologists would aim for reliabilities that fall much closer to 1,00 than to 0,90. For instance if child X obtains an IQ of 115 on Monday and an IQ of 75 on Thursday when retested, it is clear that no reliability can be ascribed to either score, neither score can be taken as a dependable index of his abilities in the material tested.

For any neuropsychological test battery to be released for general use, a thorough objective check of its reliability must of necessity be done.

A neuropsychological test battery is said to be reliable and standardized if the same test yield more or less the same results irrespective of by whom and when the test was administered. However, in general the principal dimensions of reliability that are germane to the neuropsychological assessment of children are the inter-rater and test-retest types of reliability (Tarter & Goldstein, 1984).

2.4.2 Validity

Validity simply refers to the extent to which the test measures what it is intended to measure or the extent to which the test satisfies its intended purposes, because a test may be highly valid for one use and at the same time be highly invalid for another (Huysamen, 1982).

Validity according to Anastasi (1970) provides a direct check on how well the test fulfils its function, the degree to which the test actually measures what it purports to measure.

The main focus of concern with respect to the validity of neuropsychological measures is the extent to which these measures are

valid from a concurrent and predictive standpoint (Tarter & Goldstein, 1984). For instance, many individuals would maintain that the major purpose of neuropsychological assessment is to determine the current structural and functional integrity of brain system through the use of neuropsychological assessment procedures. However, this constitutes only one type of concurrent validity although a rather important one.

There are types of validity such as criterion-related (predictive and concurrent) validity, content validity and construct validity depending on the nature of the test battery. For instance, the construct validity is applied in neuropsychological and educational research such as in intelligence tests, mechanical comprehension, verbal fluency, anxiety and the like (Huysamen, 1982).

The most common drawback encountered in determining the validity of different types of tests as well as the specific criteria and statistical procedures employed will not be covered in this chapter. However, validity tells us more than just the degree to which the test is fulfilling its function. It actually tells us what the test is measuring. By examining the criterion data, together with validity coefficients of the test; we can objectively determine what the test is measuring. It is therefore correct to define the validity as the extent to which we know what the test measures (Anastasi, 1970).

The question of predictive validity is of paramount importance to the child neuropsychologist. The reasons are quite straightforward. The first is that is often the case that the child neuropsychologist is often asked to make predictions on the basis of neuropsychological assessment procedures regarding how important it could be to institute habilitational and rehabilitational procedures for a given child. Without some knowledge of the likely cause of a given condition, it would be impossible to state with any degree of confidence and certainty whether therapeutic intervention is necessary.

Lastly there are many neuropsychological conditions which afflict children that require close physiological and behavioural monitoring. For instance a particular type of seizure disorder (e.g., complex partial seizures) may eventuate in rather more difficult environment interactions for a child than would some other type of seizure disorder (e.g., absence seizures) (Tarter & Goldstein, 1984).

Before the test is ready for application, its validity must be established on a representative sample of subjects. It is important to note that a test may be highly reliable and yet highly invalid at the same time. Reliability is therefore a necessary, but not sufficient condition of validity.

2.4.3 Coverage

In neuropsychological assessment of children, apart from the psychometric properties of reliability and validity, the most important consideration and criterion of evaluation for neuropsychological assessment procedures, is the extent to which the measures obtained with any particular procedure do "justice" to the abilities known to be subserved by the systems within the brain which are dysfunctional and/or damaged (Reitan, 1969).

However, even apart from considerations germane to actuarial purposes, it would seem obvious that tests and measures employed in any neuropsychological battery should "cover" the content of any styles of information analysis, organization and synthesis, together with input and output and the catalogue of the behaviours that can be impaired when the brain of the child is functioning in an abnormal fashion.

There are several aspects of a neuropsychological test battery, that should be commented upon in connection with the issue of coverage. For example, it should be noted that the tests and measures in a neuropsychological test battery include measures of sensory-perceptual, motor and psychomotor, psycholinguistic and concept-formation and problem solving abilities (Smith et al, 1969).

The most important sections that must be included in the neuropsychological test battery are tests that require inter-sensory integration, novel problem-solving and higher-order concept formation and strategy-generating capacities, for example, the Tactual Performance Test (Reitan & Davison, 1974).

2.5 APPLICATION OF NEUROPSYCHOLOGICAL ASSESSMENT RELATED TO CHILDREN

Golden et al (1978) and Nortjé (1986) stated that there are two salient viewpoints that may be favoured when developing a child's version of any standardized test.

Firstly, it sees children as less sophisticated, less skilled adults, and as such uses the same basic tests but makes them easier. An example of this is the Wechsler Intelligence Scale for children (Revised).

Another important view sees children as developing through succeeding stages each of which is different in nature than others. At each particular stage with the appropriate environment the child is able to do certain tasks, which are not done in the same manner during the different stages. Sometimes adult tests can be revised for children, the test usually will not measure the same thing in children as in adults e.g., adaptation of the

adult Halstead-Reitan Battery to the one for younger children (Reitan,1969).

2.5.1 Brain-behaviour inferences in school-age children

According to Reitan and Davison (1974) research findings suggest that the general effects of brain lesions in early childhood affects the potential for normal development of a child negatively, resulting in the lowering of the abilities in general.

Is therefore quite obvious that damage to the immature brain (child brain) seems to have more serious consequences with respect to higher level functions than does damage to the mature (adult) brain (Nortjé, 1986).

There are many facts that may interact in the process of determining neuropsychological deficit emanating from cortical lesions in early childhood. Although an early lesion has relatively severe or rather serious consequences, the "plasticity" of the immature brain allows for adaption to the lesion like wet clay which can be utilized to make any shape one likes but this can only be done when it is not dry (adult) yet (Nortjé, 1986).

Damage to the brain limits the potentials for the unleashing abilities of a child in the development age/school age of the particular child (Hynd & Obrzut, 1981).

Reitan (1974) and Golden (1978) maintain that the following are the most important factors when brain-behaviour inferences from psychological test data in children are made.

The level of performance-approach of inferring brain lesion in children, has some limitations because children may have a limited chance to display their capabilities of normal level of performance (Golden, 1978).

Secondly, the most complicating factor is that deficits from chronic childhood brain lesions can also be affected by later training. A mixed pattern of recovery may be seen since parents and teachers/educators at school age level often concentrate on teaching verbal rather than spatial skills (Reitan, 1974).

The age at which the brain lesion occurred affects the pattern of deficits as well. If the child experience the brain damage later in development it becomes very difficult to rehabilitate and it becomes quite evident in old age. The younger child who sustains brain damage tends to produce severe deficits on tests that are usually fairly insensitive to brain damage in adults

(Golden, 1978). This can be reflected in the low level of performance in abilities.

When using the level of performance, the dynamic nature of the child's brain in development should be remembered, and thus care must be taken in judging/assessing a child's performance against age appropriate normative data. In addition, if the pathognomonic signs (mentioned earlier in this chapter) approach of inferring brain lesion is used it should be recognised that, symptoms which are seen as pathognomonic early in childhood, may represent normal performance at a younger tender age (Reitan, 1974).

Lastly, children with cortical lesions show deviations in performance of the two sides of the body that go well beyond all expectations (Reitan, 1974), tests that allow for comparison of the performance of the two sides of the body, could allow for powerful inference to be made concerning the laterality of the damage. It is difficult to identify and locate the damage, when performing neuropsychological assessment procedures with children.

Therefore, the total evidence associated with the neuropsychological assessment of children should be collectively be considered, which is presented by the approaches to brain-behaviour inferences. Jumping into binding conclusions when working with children, must not be done before

a thorough neuropsychological assessment (Hemp, 1989).

Boll and Bryant (1989) contend that, research findings for children with mixed or homogeneous types of brain lesions, support the idea that the aspects of impairment in human function in children between 3 and 9 years old are attributable to brain damage, can indeed be identified through neuropsychological assessment applying highly reliable, validated and standardized test batteries.

2.5.2 Neuropsychological assessment of learning problems

With the exception of aphasia tests, few neuropsychological batteries contain tests of learned academic skills such as reading, writing, spelling and arithemetic (Lezak, 1995). However, impairment in these activities have profound repercursions on a pupil's scholastic competence and adjustment.

The individual general intelligence test is a major part of any neuro-psychological assessment. The Junior South African Individual Scale (JSAIS) and the Revised Senior South African Scale (SSAIS-R), are the tests to be used. Both may be considered examples of Spearman's *g*-factor theory, that is the various tests and subtests contain varying amounts of a basic intelligence factor. However, both tests can also be conceptualised

as measuring different kinds of intelligence and being broad enough to tap a multiplicity of variables related to thinking and learning (Ven Eeden, 1992).

Several tests have been developed to assess verbal academic skills like reading, writing, spelling, arithemetic and knowledge acquisition and retention (Lezak, 1995).

To fulfill the need of the neuropsychologist to assess specific perceptual and cognitive abilities which bear a direct relationship to learning and classroom achievement, some test batteries have been constructed, for example, the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, 1968), the Revised Peabody Individual Achievement Test (PIAT-R) (Markwardt, 1989) and the Revised Wide Range Achivement Test (WRAT-R) (Jastak and Wilkinson, 1984).

It has to be kept in mind that accurate and enlightened assessment should have much to do with educational policy and the designing of special education programmes. Methods of evaluation help in making decisions on administrative priorities and the allocation of funds for the identification of remediation goals, teaching approaches, programmatic variables, and matters having to do with the effectiveness of a total programme for the child with scholastic problems (Wohl, 1980).

CHAPTER 3

3. CROSS-CULTURAL NEUROPSYCHOLOGICAL ASSESSMENT

3.1 INTRODUCTION

Cross-Cultural Neuropsychological Assessment is a very complex and sensitive field to tread on, especially if one tries to grapple with it in the South African situation today. South Africa has totally entered a process of major metamorphosis in its socio-political-economical scenario.

Kroukamp and Foxcroft (1991) maintain that clinicians will have to rise to the challenge of a changing society and will have to adapt their techniques and strategies if they are to remain relevant in this rapid changing society. Clinicians cannot remain spectators of this metamorphosis game, but will have to stand up and help in this process of major changes, by taking the rightful positions in this scenario.

There has been a practice in the past to devise culturally separate tests or separate norms for different South African cultural groups.

According to de Kohan (1972) most practising psychologists irrespective of their nationality or ethnicity, have been (in most cases) educated within the context of western based academic models, values and institutions. Miron (1977) endorsed this by stating that there is hardly any country that is unaffected by the western ideas and technologies, and the practice has been to use western formulated tests. These tests were developed, standardized and validated based on the western culture and values. The tests were transferred and adapted to South African cultures.

Makunga (1988) says that our planet is pluralistic; and therefore for psychologists to be competent, an understanding of customs and values of other people and in particular their cultures, is very important. This makes cross-cultural assessment a challenging activity of neuropsychologists and other researchers.

Hui and Triandis (1985) state that most test researchers have long been in the know of the sensitive problems associated with developing culturally and ethnically unbiased tests. The central issue here as Makunga (1988) puts it, is whether and to what extent the same meaning can be attached to the test scores of different cultural groups.

The purpose of this chapter is to review some principal issues in the application and standardization of neuropsychological tests cross-culturally.

When we are planning to develop special sensitivities that are needed to respond to situations involving cross-cultural aspects which face neuropsychologists, the rules of standard assessment must be adhered to, adapted and supplemented (de Kohan, 1972).

Miron (1977) pointed out that the major difficulty in test construction is of course, the scarcity of well trained/educated neuropsychologists in the South African context. Vernon (1969) argued that the difficulty in devising tests locally, is also caused by the fact that only a few neuropsychologists have the time or sufficient knowledge of the diversity of the local cultures to face the bull and hold it by the horns, but with tests like Foxcroft's General Reasoning Group Test (Foxcroft, 1990) neuropsychologists are standing up to take their rightful positions in this still bushy field which needs a lot of research.

According to Makunga (1988) a survey of literature has revealed considerable research investigating similarities rather than differences in these various groups to form one South African culture. With the integration of education into one system, Miron's (1977) approach is

consistent with what most cross-cultural researchers do. They start by illustrating that there is something common and universal, and that research procedures are equivalent across populations studied. Populations are only treated differently when assumptions of a more specific nature are rather too strong for existing evidence. A similar approach is rather adopted in this study.

3.2 CROSS-CULTURAL ASSESSMENT IN NEUROPSYCHOLOGICAL TESTING

Even though the central nervous system has long been considered as the system of behaviour associated with things such as intelligence, reasoning, memory, cognition and emotional responses, attempts to explain brain-behaviour relationships with measurement or formal testing is a relatively new effort (Boll, 1978).

Most of neuropsychological test batteries are western formulated. This brings a deep concern as to what extent these can be used locally with great confidence. The obvious answer would be that giving these tests to other cultural population groups may be dangerous because concepts and testing batteries used in one cultural unit are not necessarily appropriate for use in another culture, without standardization. West, Hill and Robins (1977) reported that neuropsychological classification is affected by racial-ethnic influences.

This implies therefore that norms or cutoff scores derived from one standardization sample may be inadequate for judging the performance of subjects in another cultural population. Retief (1988) stated that in this context not only is a difference in cultural groups important, but also the different experience of culture within a group by members of the group.

Foxcroft et al (1989) stated that over the past few years the South African Research Community seems to have launched a concerted effort to remedy the situation.

It was Anastasi (1976) who claimed that the emphasis in cross-cultural testing has shifted towards constructing tests that make use of experiences shared by or common to different cultures. The comparison of people from different cultures (cross-cultural research) and the comparison of people belonging to different groups within a culture (cross-ethnic) has become an important facet of the neuropsychological behavioural and social sciences in recent times.

The aims of these comparative studies in neuropsychological assessment is to discover and try to explain similarities and differences of maximisation of development and neuropsychological behaviour among children (5 to 9 years of age) and to thus reach a deeper and better understanding of children in a cross-cultural context.

3.2.1 The translation of meaning

According to Retief (1988) translation is essential in any cross-cultural assessment which involves the use of language, even if only to communicate the instructions for a non-verbal procedure and must be taken as a very important part of that particular undertaking. Naturally, tests differ according to the topic and nature of research, some test items have figural content and are therefore in this way less dependent on the communication of meaning in the verbal sense, but some tests or items naturally are verbal or linguistic and therefore depend heavily on translation.

According to Brislin (1980) a set of categories as a useful start to any discussion of translation is an essential element in any neuropsychological research/assessment. He suggested in Casagrade (1954) four "ends" of translation/four types of translation. The four types are:

(i) pragmatic translation, where a message is translated with the prime interest in accuracy of the information that was meant to be conveyed in the source language form for example translation in technical documents in which information [e.g. about repairing or operating a machine (radio)] is translated into another language. The translation is only concerned with getting the information

across in the second language.

(ii) aesthetic-poetic translation. This contrasts sharply with pragmatic translation in that the translator is concerned with the effective and emotional shades expressed and the feeling of the original language version; the aesthetic form (e.g. poetic; epic and dramatic dialogue) used in the original author as well as finer nuances of 'meaning' in the message conveyed.

(iii) ethnographic translation, the purpose of which is to delineate and explain the cultural context of the source and second versions. With this aim in mind a translator has to be sensitive to the way words are used and has to know, how the words fit into the riddle of meanings and connotations of the cultures in question using the source and the "target" languages. The best way for the translator to ensure that this criterion is met is to work with one or more persons familiar with both the source and the target languages and to see if agreement on the meanings can be achieved.

(iv) Linguistic translation, it puts more emphasis on the equivalent meanings of the constituent morphemes of the second language and more specifically with grammatical form.

Retief (1988) recommended Brislin's (1980) work as a very comprehensive coverage on the subject of translation, which provides an up-to-date review of the available techniques and possible problems. As has probably become evident by now, all cross-cultural testing concerns the translation and transposition of meanings, and the various translation techniques.

The correct translation must be done to effectively ensure that confusion of meaning does not arise when tests are used or adapted for other cultures; and should aim at providing reasonably good assurances that tests measure what they supposed to measure in those specific cultures being compared. The validity, reliability and the standard of the test must not be compromised at any time.

Translation, is therefore, an important step of comparison in cross-cultural neuropsychological assessment research, and it is aimed at constructing a good basis for comparison. This is an essential element in the process without which the comparisons based on tests may only reflect differences in the meaning attributed to items rather than actual cultural differences or similarities in constructs as measured by neuropsychological tests.

Research has been conducted into the various translation techniques and the problems inherent to the process.

The above passage is a clear indication that language problems occur as a result of the researcher's failure to determine whether the translation is equivalent to the original language. Brislin (1980) suggests that the process of translation to ensure language equivalency should be done as follows:

Source to target to source to target

(1) Bilingual (2) Bilingual (3) Bilingual

figure 2: Translation techniques in language equivalency

One factor contributing to research problems is the use of a "schooling" language rather than vernacular language (Sechrest et al, 1972). In most cases researchers go for highly educated translators, As a result they speak and write, usually more pedantically than the tested group.

The best approach to this venture is to have the translation of the educated translator checked by a speaker of the same language as the prospective test respondents and vice versa. The aim is to arrive at a translation of the language which will be accurate and carry the correct intended meaning to the prospective test respondents.

If an adapted neuropsychological test battery is to contribute to our proper and clear understanding of the child, the researcher must strive for a good translation (de Kohan, 1972; Makunga, 1988; Retief, 1988 and Sechrest et al, 1972). It appears as if there is no general agreement on what a good translation is, but in the cross-cultural neuropsychological assessment of children the opinion of "back translation method" illustrated above as described by Brislin (1976). Brislin, Lonner and Thorndile (1973) and Sechrest et al (1972) seemed to be an appropriate workable method for the present study. This involves the translation from the English language to a Black language (in South Africa).

The translated matter is again back translated to English by another translator or panel of translators. The latter version is again counter-checked against the Black language for equivalency.

Sometimes deficient performance on the test might be attributable to the discrepancy between the dialect to which the subjects are accustomed and the language spoken by the examiner. Poor performance is due to the subjects' failure to understand fully the examiners directions or the items themselves. If the results of the testing are to be reflective of the subjects' performance the subjects must be tested by an examiner who is fluent in the subject's primary language and its particular local expressions (Jensen, 1980).

3.2.2 Cultural bias

'Bias' according to Retief (1988) may be understood in a technical, psychometric sense, as referring to influence exercised by causes not related to the construct being assessed. Bias, in item score level or at the test score level can affect inter-individual or inter-group differences in a test score negatively or positively.

He defined bias in this context as "an item is biased if persons of equal ability do not have an equal opportunity for answering the item correctly" (Retief, 1988, p.117).

Makunga (1988) says that the term "bias" means that the individual tested is familiar with the subject matter or the process required by a test as explained in Jensen (1980). In cases like these prior knowledge or exposure/experience allows the individual to perform better on the test than others. If objective statistical analysis is conducted it is very possible to tell how and the extent to which a test is biased with respect to members of a certain culture as against the other. The possible bias that culture could introduce has been shown in the studies done by Eells and McGurk as reported by Jensen (1980). This is a very complex process, because to understand and to reach the conclusion that the cultural bias is evident, one must have a thorough understanding and knowledge of the two aspects, the culture and the test in question.

The above explanation reflects the most salient need to guard against taking any neuropsychological test battery developed within a single cultural level as a universal barometer for measuring an intended domain of generalization (intellectual ability) or simply brain-behaviour relationships. Failure to recognize subject characteristics can result in serious diagnostic errors such as false hits (Makunga, 1988); namely labelling a child as brain-damaged when he/she is not, or fails to detect or isolate neuropsychological abnormalities that are present (Lezak, 1995). Inappropriate neuropsychological assessment techniques could thus stigmatize the assessee and generate irrelevant or useless information.

Criticisms are not only limited to the accuracy of tests, but also aired about the use of tests developed in one culture to understand behaviour of performance of children in a different context. This poses a great challenge to test developers who, with their knowledge and skill, should assemble test batteries which are accurate in prediction, also in non-western cultural groups.

Berry (1979) states that concepts and instruments developed in one cultural group are not necessarily appropriate for use in another culture. Many assessment procedures are disqualified on the grounds that they lack equivalency (Retief, 1988).

Thus in neuropsychology, in order to draw appropriate conclusions about those being tested there is a need for the recognition of the theoretical and methodological issues some of which have been addressed in this study. This can certainly lead to more careful planning of one's research and thus eliminate the substantial variance in test scores that may arise from a research of cross-cultural issues as outlined in this chapter.

3.2.3 Culture fair tests

Anastasi (1970) described culture fair tests as characteristically designed to rule out several major cultural parameters, including not only language but also knowledge and intellectual skills specific to any given culture. Such tests follow a variety of approaches to achieve their objective. The aim in culture-fair testing is to reduce or to try to eliminate unwanted score effects associated with cultural differences (Retief, 1988), to create tests with no cultural bias as discussed in section 3.2.2, proved to be very difficult.

Tests of a cognitive nature, unlike tests of ability are greatly influenced by experiential background acquired in a particular culture (Jensen, 1980). It would sound as if there is no test that measures a child's ability which is not affected by his past experience. Therefore, it becomes necessary to stress that it is impossible to develop a test that is completely culture-fair (Graham & Lilly, 1984). The point here is to try and minimize the obvious cultural effects. Makunga (1988) and Graham and Lilly (1984) suggest that this can be done by eliminating language and cultural content.

Jensen (1980) emphasizes that the notion of fairness should not be taken as an attribute of the test itself but rather of the ways in which the tests are applied.

3.2.4 Communication

It is very important that there should be an accurate communication in any cross-cultural research. Researchers are presumed to be clear with this aspect, but sometimes there appear to be some lapses in attention in this indispensable aspect of any research in cross-cultural assessment of children. Sechrest, Fay and Zaidi (1972) among other essential things mentioned the following aspects:

(i) Ignoring that a particular verbal stimulus has different meanings for people in different subcultures. Therefore, dialect differences and regional differences may be another source of translation pitfalls.

(ii) Lack of research orientation. Research subjects or informants must be given an idea about the task they are expected to do. It is important to be sure that introductions made in different cultures are the same in their meaning. For example, sometimes the researcher must explain himself or herself to members of different language groups involved. When such a need arises it must be

accompanied by accurate translation.

(ii) Inadequate translation. The nature of the task and the responses of the subjects must be explained in words. In cross-cultural research these words are translated from one language to another. Investigators therefore, must be quite confident that such translations are adequate.

Communication in cross-cultural neuropsychological tests can be done in verbal or non-verbal manner, even in non-verbal tests, the use of language is unavoidable because of the need to give standardized test instructions. Language usage becomes even more conspicuous in those tests that are verbal in content (Schloder, 1986). The language usage needs to be equivalent rather than equal, yet it is obvious that the degree to which the subject is familiar with the language of the test and type of verbal response expected in the test situation will vary across cultures.

For any test to be valid, it is imperative that the examiner communicate clearly with the testee and in turn the testee must co-operate with the examiner (Manaster & Havighurst, 1972).

3.2.4.1 Verbal communication

In verbal communication, the equivalency in language usage is the key to a successful transmission of the meanings of the message. Brislin (1980) says:

> The many, many ways that meaning (in its general sense) can be conveyed through language, and the fact that we often misunderstand people we know very well and who speak the same language as ourselves, is enough of a problem to occupy the careers of many researchers. And when such meaning and potential for misunderstanding must be taken into account while transferring material from one language to another, the number of seemingly unsolvable problems surely causes frustration on the part of researchers who are faced with these problems. (Brislin, 1980, p.97).

3.2.4.2 Non-verbal communication

In cross-cultural neuropsychological assessment of children, gross misunderstanding may result when the tester and the subjects (children) are unable to understand each other's non-verbal communicative cues (Sue & Sue, 1977). Non-verbal communicative gestures include display of emotions, body postures and particular attire (Makunga, 1988). It is important that non-

verbal communication in any cross-cultural neuropsychological assessment study like the present one, be essentially considered to ensure good and fair results from the subjects (children).

3.3 EXTRINSIC FACTORS IN NEUROPSYCHOLOGICAL TESTING

Many factors can influence the meaning of a test and its validity. Factors that have caused problems in a study that would otherwise give equivalent comparisons on standard instruments are the following: differences in cultures; inconsistent test administration and racial characteristics (Makunga, 1988). Vernon (1969) called these extrinsic factors. In this chapter, some of these extrinsic factors in neuropsychological testing of children across the cultures will be discussed.

3.3.1 Socio-cultural domain

Retief (1988) cites Rohner's (1984) attempts to analyse the constituents of the concept of "culture". He puts his aims as follows:

> I attempt to do two things pertinent to this issue; first, to unwrap the packaged construct 'culture' and its complements social systems and 'society', and second to relate these concepts back to each other theoretically. (p.97)

Usually inaccuracies in perception, may occur when one attempts to apply one's diagnostic skills outside one's own cultural domain (Li-Rapac, 1980). For instance in an attempt to be sensitive to cultural differences an examiner may underdiagnose a child from a different cultural background. Anastasi (1976) agrees that certain types of cultural background have an effect on test performance and that this may lower test results.

In assessing differences in cross-cultural neuropsychological assessment research with children, the area of concern is the uncovering of those socio-cultural differences that arise because of varying cultural experiences.

Although some school subjects may for instance be taught in various socio-cultural levels it cannot be assumed that they are covered to the same extent or have the same impact in all socio-cultural domains (Manaster & Havighurst, 1972). Children from different socio-economic levels perform differently (Schloder, 1986). This can affect cross-cultural comparisons.

3.3.2 Racial characteristics

It is important that cross-cultural neuropsychological tests and test instructions be standardized to allow all children an equal opportunity and that the test items be of comparable content.

The most obvious aspects of the actual test situation is the relationship between the tester and testees. Testees may for instance feel that they are participating in a test involuntarily and this could severely hamper performance negatively (Vontross, 1976). Similarity between the racial characteristics of the tester and the testees may enhance test performance by eliminating test anxiety (Davidson, 1979). The atmosphere set must be lucid and conducive to occasion.

When the tester is someone from another culture, the accent or language may be different from that of the testees. The instructions may not be clearly comprehensive to the testees and this could be a source of 'test bias'. Usually in adapting the test using instructions that are thorough and clear reduces the undesirable differences in skills in different cultures (Van der Flier, 1982).

It is generally advisable to use someone who is already familiar to the testees/children/subjects rather than a stranger. If this is binding, the researcher would have to ensure that the testers/examiners are well versed in the particular neuropsychological test for the maintenance of uniformity and the standard in the administration of the test. It is often impractical or impossible however, to have a tester of the same cultural group as the testees/children but the researcher should ensure that the tester has a relatively equivalent status in relation to all the test cultural groups.

3.3.3 Socio-economic status

Cross-cultural issues in neuropsychological assessment of children are mostly confounded with other variables especially in the context of the South African ethnic situation which was based on racial differences.

It is correct to say that the significant factor in cross-cultural neuropsychological assessment of children that must not be ignored, is socio-economic status. This variable cannot be over emphasized as it is very important. Amante, Van Houten, Grieve, Bader and Margules (1977) pointed out that levels of neuropsychological integrity vary along a socio-economic gradient. Those researchers indicated that the presence of central nervous system pathology such as intellectual and various

perceptual-motor deficits correlates significantly with economic status. Similar observations were made by Makunga (1988) in the South African Black community. The same concern was made by Biesheuvel (1943) that children from homes with lower socio-economic status lag behind intellectually after the fourth year in their development.

Some of the adverse conditions that seem to alter the level of neuropsychological integrity are malnutrition, poor environmental stimulation and poor medical facilities. In citing Biesheuvel (1943), Makunga (1988) stated: "when malnutrition is severe and prolonged normal brain development, is however, arrested" (p.122).

Cases of children affected by marasmus in the South African Black community are found in low socio-economic places, Griesel (1973); Griesel and Richter (1986); Makunga (1988); Griesel, Richter and Belcing (1989). Richter, Griesel and Wortley (1989) pointed out that neuropsychological characteristics are shaped by the type of environment to which the child is subjected, with the prenatal phase being the crucial stage of development.

According to Makunga (1988) if a white child in South Africa is exposed to the same adverse environmental forces as a black child, it is more likely that steps will be taken to ameliorate the situation for a white child.

Therefore, clinicians should stand up and face the challenge by displaying their expertise for the maximization of human resources in South Africa. The above elaboration explains the extent to which socio-economic status affects the results of neuropsychological test performance in children.

3.3.4 Cross-cultural sampling

Sampling is not a simple item of the research to perform. The ability to select a fairly representative sample is probably one of the most perplexing problems of research. According to Frijda and Johada (1966) there are three main factors which are crucial when sampling is done: (i) comparability of samples; (ii) adequacy and (iii) representativeness of samples. Obviously these factors would differ in their importance depending on the nature of the proposed research.

In cross-cultural neuropsychological research where descriptive studies are conducted, a truly representative sample should be done. However it is very often difficult to get a truly representative sample in cross-cultural studies. In such cases where it is difficult to get a sample of the entire cultural or ethnic group, it is better to employ the method which will achieve comparability of the samples.

Manaster and Havighurst (1972) suggested the approach of using demographic characteristics such as age, sex, socio-economic status, school grade, urban-rural residence. To attain comparability in terms of age, sex and urban-rural residence proved to be simple but socio-economic status is not easy to assess. Things such as level of education and gross income of the breadwinner, occupation of the parents/guardians are usually used to determine the socio-economic status, but according to Makunga (1988) only two of the mentioned factors can be used to determine the socio-economic status in cross-cultural research namely, occupation and education level of the parents/guardian or subjects in case of cross-cultural neuropsychological assessment of children.

It is important to note that occupation alone cannot be taken as a measure for socio-economic status in sampling, but have to be combined with educational level to have a reliable index of occupational status.

When children are the subject of study it is customary to use the occupational and educational levels of the father (mother or guardian) as an indicator of socio-economic status in sampling (Schloder, 1986).

The above explanation makes it absolutely imperative that when cross-cultural or cross-ethnic neuropsychological assessment research with children is to be conducted, the researcher must be thorough in selecting his sample so as to render data and findings comparable and reliable.

CHAPTER 4

4. THE CHOICE OF NEUROPSYCHOLOGICAL ASSESSMENT TECHNIQUES

4.1 INTRODUCTION

At last South Africa seems to have geared itself positively to a process of major changes in many spheres of its functioning. Clinicians should keep pace if they are to remain part of the acceptable process rather than spectators of the game. They must rise to the challenge of a changing society and will have to adapt their techniques and strategies if psychology is to remain a relevant field (Kroukamp & Foxcroft, 1990).

It is very difficult to dispute the fact that there is a great shortage of valid and standardized neuropsychological measuring instruments for use in South Africa today, especially for economically disadvantaged children (mostly black children). Many researchers and clinicians have however entered the stage recently (Foxcroft, 1991) with a number of encouraging studies in which either the application of foreign tests have been investigated or new tests have been developed to meet the challenges of our times.

It is difficult today to assess children with potential learning abilities and disabilities comprehensively enough because the potential neuropsychological basis for such problems is not extensively explored and no standardized neuropsychological test battery has been developed in South Africa (Foxcroft, 1991). In making any choice of neuropsychological test battery for assessing South African children the lack of a locally developed and standardized neuropsychological test battery is an immediate setback (Gouws, 1989). Most of the tests that are being used here in South Africa today, are of Western origin and are based on the western culture as discussed in chapter 3 of this study.

It is imperative that, to have thorough and standardized neuropsychological measuring instruments in assessment, it requires a number of different tests are required. Basically there are two types of test batteries: those that constitute a formal battery of commercially available tests; and those that are informal composite batteries assembled for use with particular populations. The choice of one neuropsychological assessment technique over another depends largely on the nature of the clinical question being addressed and on the nature of the population being assessed (Kolb & Whishaw, 1990).

A number of well-known formal batteries that are commonly used in South Africa will be briefly considered in this chapter: the Luria-Nebraska Neuropsychological Battery, the Halstead-Reitan Neuropsychological Battery for children, the Reitan-Indiana Neuropsychological Test Battery, the Goodenough-Harris Draw-A-Person Test and the General Reasoning Group Test.

According to Gouws (1989) the batteries designed by Halstead and Reitan and those developed using Luria's neuropsychological examinations were explored in terms of their usefulness and the applicability for South African children at present (e.g., Foxcroft, 1985, 1990; Tollman & Watts, 1981).

4.2 STANDARD NEUROPSYCHOLOGICAL SCREENING TESTS FOR CHILDREN

In chapter 2 it has been indicated that the neuropsychological assessment of children is a young field, but not in its budding stage (Nortjé, 1986). Apart from the fact that there are few well-developed screening tests available to adequately evaluate the child suspected of central nervous system (CNS) disabilities there is yet a small formal theoretical or research base from which to fully develop and standardize such measures. But more clinicians are tackling this neuropsychological setback today (Obrzut & Hynd, 1986).

The brain is a complex organ (Kolb & Whishaw, 1990) which makes it very difficult to find a single test which can cover all the brain functions of the child when screening. Instead of one test, neuropsychologists use a wide range of single tests which are combined into test batteries which include a large variety of tests which cover many brain functions (Golden et al, 1992).

The standard neuropsychological tests for children, some of which will be been discussed in this chapter are: The Luria-Nebraska Neuropsychological Battery, the Halstead-Reitan Neuropsychological Test Battery for children, the Wechsler Memory Scale, the Neuropsychological Screening Procedure (Nell, 1985). The Bender-Gestalt Test of Visual-Motor Integration for all ages, childrens' Neuropsychological Screening Test (NST) for 8 - 13 years, Clinical Neuropsychological Evaluation Instrument (CNE) for 12 - 20 years, "Screening for MBD" Peter's Special Neurological Examination for school-age children of 6 - 14 years (Bender, 1938; Benton, 1974; Makunga, 1988; Obrzut & Hynd, 1986 and Rourke, 1991). The University of the North is developing a neuropsychological test for screening school-age children (Meyer: verbal communication, 1992).

The neuropsychological screening of school-age children has received a different kind of attention in the past, because predictive screening for academic difficulties has not been as much of a focus as has general detection of subtle neurobehavioural deviations (Kolb & Whitshaw, 1985).

The scope of this study does not allow detailed exploration of the many single tests for the screening of children. In most cases neuropsychologists tend to use a standard core of tests or batteries sometimes supplemented by single tests to screen children. According to Golden et al (1992) single tests can be classified into some basic functions/categories. The tests fall into one of 13 basic areas: sensory function, motor-functions, non-verbal auditory skills, visual analysis, receptive language, expressive language, reading, writing, arithmetic, higher intelligence functions, learning and short-term memory, long-term memory, and delayed memory (Golden et al 1992; Kolb & Whishaw, 1985; Lezak, 1995; Obrzut & Hynd, 1986; Rourke, 1991; Wechster, 1974).

In this section of this chapter an attempt is made to describe the characteristics of a standard neuropsychological screening tests for children which we may find in each of the salient areas.

4.2.1 Characteristics of a Standard Neuropsychological Screening Tests for Children

Any neuropsychological screening test for children cannot be considered to be a thorough and a standard screening procedure if it does not sufficiently cover the following neuropsychological functions: motor functions, general intelligence, assessment of language functions (comprehension and articulation), sensory functions, perceptual, memory (short-term and long-term), numerical skills, reading skills, writing skills and the examinations of the left and right frontal lobe functions (Golden, 1992O; Obrzut & Hynd, 1986; Rourke, 1991).

Requirements for a neuropsychological screening examination*

A *good* neuropsychological screening examination should

1. Be appropriate for the age and abilities of the child being screened.

2. Be acceptable to the professionals who will be doing follow-up evaluations.

3. Be simple - to learn, to teach, and to give.

4. Be reliable

5. Be valid

6. Have a good *hit* rate; that is, be sensitive (select "true" abnormal), and be specific (identify "true" normals)

7. Consider and correct for the *base rates* of the disorder in the population.

8. Be *cost effective* in relation to the benefits of early detection of the problem (the "cost" of false positive and false negative should be low)

* Adapted from Frakenburg & Camp (1975), Lichenstein & Ireton (1984), Stangler, Huber, & Routh (1980), and others.

The tests must be easy to administer and score by the psychometrists and the neuropsychologists doing the interpretation. The tests should not be excessively long to administer and it should be adaptable to allow access to all children under assessment line. It should be flexible to give room for further research in the field (Kolb & Whishaw, 1985). The test should be appropriate for the age and abilities of the child being screened, it should be acceptable to the professionals who will conduct follow-up assessments, it should be reliable and valid, simple to master, teach and give, it should be sensitive to a number of brain functions. It should consider and correct for the base rates of the disorder in the population. It should be cost-effective (Hynd & Obrzut, 1981; Obrzut & Hynd, 1986).

4.2.1.1 Motor Functions

Tests that are designed to assess motor functions are quite common in neuropsychology because the motor functions are clear to see and observe, than other functions such as the cognitive functions. Apart from the fact that the motor functions can be used to lateralise as well as localise a wide variety of acute brain injuries and thus, have proven to be very useful to diagnosticians. Finally, impairment in motor functions result in widespread problems in real life, which makes their identification important for an understanding of children's problems (Aiken, 1979; Golden et al, 1981; and Moses et al, 1983).

Motor tests are usually divided into tests of fine-motor skills and gross-motor skills and then further divided into tests of speed, accuracy and strength. Gross-motor tests assess the functioning of large muscles of limbs (fore and hind). Fine-motor tests assess the dexterity of fingers.

Fine-motor tests are more common than gross-motor tests (Aiken, 1979; Golden et al, 1992; Russell, Neuringer & Goldstein, 1970).

4.2.1.2 Sensory Tests

Neuropsychological tests of sensory functions may include assessment of tactile (i.e., touch, muscle position, temperature intensity (cold or hot), pain (pressure), gustatory (taste), and of olfactory (smell) functions (Foxcroft, 1989).

Tests of touch vary from the very simple which are used to detect whether or not the child has been touched; determining the pressure and the place of touch; usually the limbs tapped are the hands, arms and face as they are the most sensitive parts of the body and are accessible.

These are tests which measure accuracy and speed. The child must be blindfolded to be tested. Complex tests may include more touch at a

time (Foxcroft, 1989; Kolb & Whishaw, 1990; Painter & Murdoch, 1976; Foxcroft, 1989).

4.2.1.3 Non-verbal Auditory Skills

Non-verbal auditory skills tests involve most non-language sounds. These tests usually include rhythms, tones, intonations, patterns, sounds of objects such as telephone ringing, whistle, a bird singing, a car hooter. Simple tests may include the ear to discriminate the pitch of the sound and rhythmic beats. These tests can be complex, and others may involve localising the source of the sound while the child is blindfolded (Aiken, 1979; Bremner-Stokes, 1991; Painter & Murdoch, 1976).

4.2.1.4 Visual Functions

These tests cover a wide range of non-verbal visual stimuli, such as matching pictures, objects or drawings as the same or different, or involve the person identifying what is seen in a simple picture. These tests are made more complex by making the pictures more complex.

The visual tests may involve spatial orientation, many are tests of visual motor or constructive skills. Visual-motor tests are quite common

because they are sensitive to a number of different types of brain injuries. The tests may be scored for accuracy, time and types of errors. Common errors may include rotating a figure when constructing it (Kolb & Whishaw, 1985; Rourke, 1991).

4.2.1.5 Receptive Language

These tests cover the comprehension of language (Wernicke's area is the posterior portion of the superior temporal gyrus), that is the understanding of oral language and may be extended to understanding the communication system such as sign language. These tests may focus on the ability to understand or discriminate between simple sounds, words or phrases. Tests are made more complex by using more unusual or rare stimuli and strange sounds (Filskov & Leli, 1981; Kolb & Whishaw, 1990; Moses et al, 1983).

4.2.1.6 Expressive Language

These are tests of expressive or articulatory speech. Broca's area (a region of the left frontal lobe/operculum) is involved in the production of language. The tests measure the persons ability to speak (i.e., expressing/producing simple sounds or word, and complex phrases). These tests may involve naming or describing objects or pictures

(Filskov & Leli, 1981; Gouws, 1989; Kolb & Whishaw, 1990; Walsh & Betz 1985).

4.2.1.7 Reading

Tests of reading usually cover the determination of the person's level of reading recognition, or reading comprehension (Hermes, 1983; Kirk, 1983).

4.2.1.8 Writing

These tests measure the skills of writing down letters, words, sentences or paragraphs. This can be by copying or verbal instruction (dictation) free form on a topic or idea. Writing measures motor skills (fine-motor skills) spelling and grammatical skills (Golden et al, 1992; Hermes, 1983; Wechsler, 1974).

4.2.1.9 Arithmetic

The skills of recognition and writing of numbers of differing levels of complexity, comparing numbers of their size, performing arithmetical operations such as division, multiplication, addition and subtraction and solving verbal/word problems. These tests may measure logical skills

and speed of solving the problem arithmetically (Golden et al, 1992; Painter & Murdoch, 1976; Wechsler, 1974).

4.2.1.10 Memory (short-term, intermediate and long-term)

Memory tests assess the retention of acquired new information. There are a number of materials that can be used in this function such as motor sequences, meaningless pictures, colours, objects, etc (Jordaan & Jordaan, 1989; Painter & Murdoch, 1976; Walsh & Betz, 1985; Wechsher, 1974).

4.2.1.11 Higher Intellectual Processes

This is the most crucial function of the brain and it covers a large area of skills which are important for adult cognitive behaviour. These include high mental processes, the ability to form and test hypothesis, to be flexible and generate alternate solutions, to solve problems, to plan for future, to evaluate one's behaviour, to understand one's strengths and limitations, to deal with complex social situations, to adapt to specific environmental circumstances, to alternate cognitive sets to control emotions, to spontaneously initiate behaviour and through to its conclusion to delay gratification and a variety of related tasks (Klesges, 1983; Richter & Griesel, 1986).

These functions can be assessed by tests which are obviously the hardest to design because these skills are very difficult to define objectively. Usually the common tests are those that test hypothesis formation and testing in which a child must guess at the rules underlying a set of stimuli, other tests, may try to evaluate the ability to change sets or to alternate between ideas that are presented (Foxcroft et al, 1992; Franzen, 1989; Golden et al, 1992; Lezak, 1983; Richter et al, 1989).

4.2.2 Neuropsychological Screening Procedures

There is no ideal battery or a bad test: all tests represent samples of behaviour as does direct behavioural observation and all can contribute to our understanding of the child. What is appropriate for one situation or domain may not be appropriate for another situation. But tests measure more than one domain. For instance, tests for higher cognitive function almost always require basic skills such as memory and receptive language skills. But there are however, general guidelines which should govern the design and the standardisation of neuropsychological screening procedures or test batteries (Adams, Boake & Crain, 1982; Obrzut & Hynd, 1981; Obrzut & Hynd, 1986).

Firstly, the procedure or test must be comprehensive, it should attempt to cover all the major domains of neuropsychological nature as mentioned in this chapter.

Secondly, there should be substantial empirical evidence about the usefulness of the test. Covering areas such as reliability, normative data correlations with other tests, correlating with other indicators of brain abilities and its usefulness in describing the child's characteristics (Kolb & Whishaw, 1990).

The better we understand the test and its properties, the more we can be sure that any interpretation of the child's behaviour tells us more about the child than it does about the test (Walsh & Betz, 1985).

Thirdly, neuropsychologists should use tests with which they are familiar to avoid errors due to lack of a thorough knowledge of the requirements of the particular test (Foxcroft, 1989, Foxcroft et al, 1992; Golden et al, 1982; Moses et al, 1983).

Golden, Zillmer and Spiers (1992) put it

> it is essential to remember that psychological tests do not in and of themselves make diagnoses and interpretations; but that they only provide data which must be interpreted by the clinician. If the clinician is not aware of the research regarding a test then the clinician's opinion about the test cannot be taken seriously. (p.137)

To conclude with continuance of my metaphor: The screening and neuropsychological assessment of children coin is only part of a pocketful of change. The bush of shrubs is thick and it must be explored.

4.3 NEUROPSYCHOLOGICAL ASSESSMENT TECHNIQUES COMMONLY USED IN SOUTH AFRICA

4.3.1 Luria-Nebraska Neuropsychological Battery (LNNB) for 8 - 12 years

The Luria-Nebraska Neuropsychological Battery was devised recently in an attempt to standardize Luria's Neuropsychological Investigation (Golden, Zillmer & Spiers, 1992; Kolb & Whishaw, 1990;). However it should not be considered as a substitute for Luria's Neuropsychological Investigation, but the idea of standardizing the test items is sound and in so doing a different test battery than that of Luria has been produced (Kolb & Whishaw, 1990). Kolb argued again supporting Lezak (1983) that the

"usefulness and validity of this battery is far from proved" (Kolb & Whishaw, 1990, p.763).

4.3.1.1 Administration of the LNNB

The standardized version is less culturally bound (Golden et al, 1992). Each item is administered separately and represents a specific function. The items vary along such dimensions as complexity, degree of difficulty, mode of stimulus input (auditory, verbal, tactile), mode of answering (open-ended, motor speech, multiple choice), whether it is timed or untimed and amount of information available. In this way 11 major areas of neuropsychological performance are explored: motor skills; rhythmic and pitch abilities; tactile abilities; expressive speech skills; receptive speech abilities; reading; writing and arithmetic skills; memory skills; visual-spatial skills; and intellectual ability (Christensen, 1979).

4.3.1.2 General Scale Discipline

4.3.1.2.1 Motor Functions

The motor functions scale covers both simple and complex motor skills. The items on the scale involve simple timed motor tasks, simple motor tasks without visual feedback, bilateral motor co-ordination, copying of simple designs with both verbal and copying instructions oral-motor movements, reproducing complex movements, and following oral instructions which require cognitive as well as motor skills (Golden et al, 1992).

4.3.1.2.2 Rhythm

The rhythmic scale examines the ability to perceive non-verbal acoustic stimuli including the analysis of simple rhythms and tones, and comparisons of rhythmic patterns (Moses, Golden, Ariel & Guslawson, 1983).

4.3.1.2.3 Tactile

This tactile scale evaluates tactile functions on both the right and the left sides of the body, involving the upper limbs. The items range from evaluating whether one is touched and where and how hard one is touched (Golden, Hammeke, Purisch & Berg, 1982).

4.3.1.2.4 Visual

The visual scale is designed to test visual skills without motor involvement. Answers consist either of object identification, numbers or use multiple choice types of questions (Golden et al, 1982).

4.3.1.2.5 Receptive Speech

This area of the battery evaluates the subject's ability to correctly comprehend a wide variety of material presented auditorially. The initial section evaluates the subjects skills in understanding simple phonemes, phonemic combinations, series of phonemes and phonemes presented in different pitches. The second part of the test assesses simple word comprehension, comprehension of simple sentences, spatial relationships and logical relations (Spiers, 1981).

4.3.1.2.6 Expressive Speech

This section assesses the subjects' skill at articulating or expressing material verbally/orally. This includes the reception of phonemes and the repetition of successively more complex words. It also assesses the subject's ability to repeat more complex sentences, as well as to repeat automatic and simple sequences. This section also assesses the subject's/child's ability to spontaneously discuss a topic in response to pictures, a story and a theme. It also assesses the subject's ability to organise words into intelligible statements (Golden et al, 1992).

4.3.1.2.7 Writing

This part measures basic writing skills including simple spelling and the ability to copy letters and words from cards, from memory and dictation and spontaneous writing skills (Golden et al, 1982).

4.3.1.2.8 Reading

There is usually a great correlation between the writing subtest and the reading subtest. The individual articulates sounds from words/letters; naming the specific letters and their respective sounds, reading of complex words sentences and short stories (Golden et al, 1982).

4.3.1.2.9 Arithmetic

Mathematical abilities are assessed, the recognition and manipulation of simple numbers such as addition, multiplication, division and subtraction and simple algebraic problems (Moses et al, 1983).

4.3.1.2.10 Memory

Mnestic processes are measured. Individuals are re-assessed on their ability to memorise a list of items over several attempts, to memorise pictures and other non-verbal stimuli, to memorise short verbal lists with or without interference, to memorise a story and to associate verbal labels with pictures (Golden et al, 1992; McFie, 1975).

4.3.1.2.11 Intelligence

Items of this scale: picture arrangement, picture completion, vocabulary, problem-solving and similarities as well as simple generalisations and basic deductions.

4.3.2 Halstead-Reitan Neuropsychological Battery for Children

The Halstead-Reitan Neuropsychological battery is one of the most widely used batteries both clinically and in research, presumably because it is the most readily available (Golden et al, 1992; Kolb & Whishaw, 1990; Painter & Murdoch, 1976). This battery was developed in several stages by W. Halstead with the principal purpose to develop a comprehensive battery which would reflect both general and specific behavioural correlates of brain functions (Golden, Osmon, Moses and Berg, 1981).

The development of the battery was completed by Halstead's student Ralph Reitan. The final Halstead-Reitan Neuropsychological Test Battery and allied procedures will be discussed in this section. The current version consists of 10 basic subtests (Kolb & Whishaw, 1990) which are based on the measurement of biological intelligence or the sensitivity of the measures to the impairment of the different brain areas, such as Category Test, Tactual-Performance tests, Wechsler Intelligence Scale; the Critical

Flicker Fusion Test; Rhythm Test; Time Sense Test; Finger Oscillation Test; Speech Sounds Perception Test; Aphasia Screening Test (Painter & Murdoch, 1976; Selz: In: Hynd & Obrzut, 1981).

4.3.2.1 Category Test

The Category Test assesses higher or abstract cognitive abilities of a non-verbal nature such as problem-solving. It is a test that requires shifting of thoughts in a flexible manner (Golden et al, 1992). A number of stimulus figures varying in size, shape, number, intensity, colour and location are projected on a screen for the subject's viewing. The pictures can be grouped in an abstract manner for the subject to determine the principle. The Category Test is sensitive to left and right frontal lesions (Painter & Murdoch, 1976).

4.3.2.2 Wechsler Intelligence Scale

According to Kolb and Whishaw (1990) either the WISC, WISC-R or Wechsler-Bellevue intelligence scale, Form I, is administered in the Halstead-Reitan Neuropsychological Battery for children. In South Africa the SSAIS-R may be used.

4.3.2.3 Tactual-Performance Test

The Tactual Performance Test is a modified Seguin-Goddard form board, into which the pieces in block form are fitted by blindfolded testees. The blindfolded testees are asked to place these blocks of wood of various shapes (square, star, half-moon, rectangular etc.) into holes of similar shape and form in the form board, they are then asked to draw it from memory. This assesses the testees in terms of time, memory and localization (Golden et al, 1981).

4.3.2.4 Critical Filcker Fusion Test

This test is often not included in the battery (Kolb & Whishaw, 1990). It is used in such a way that the rate at which flashing lights appear steady or fused into a constant light is assessed by using a light-flashing stroboscope (Painter & Murdoch, 1976).

4.3.2.5 Rhythm Test

The Rhythm Test has been adapted by Halstead from the Seashore Test of musical talents, thus the name Seashore Rhythm Test. According to Golden et al (1992) it consists of 30 items each with two rhythms. The test at least measures two separates abilities. To discriminate

between like and unlike pairs of musical beats. Testees with right temporal lobe lesions are impaired at this task.

4.3.2.6 Speech-Sounds Perception Test

The Speech-Sounds Perception Test in an audio-acuity test in which the testee is subjected to the recorded sound of the spoken nonsensical syllables based on the "ee" vowels between the alphabetical sound. The testee selects the word heard from a series of alternatives. The Speech-Sounds Perception Test determines the strength of comprehension of the left hemisphere, mainly the left posterior temporal-parietal cortex around Wernicke's area (Kolb & Whishaw, 1990).

4.3.2.7 Time-Sense Test

A Time-Sense Test measures the testee's visual-motor reaction time and ability to estimate elapsed time. The task is to watch a clock hand rotate around a clock face and then to estimate covered time from memory. According to Kolb and Whishaw (1990) the memory component of this test has not proved useful and is not generally used.

4.3.2.8 Finger Oscillation Test

Sometimes this test is called the Finger Tapping Test. The testee's finger-tapping ability is measured on a telegraph key-type level resembling a Morse Code Key. Testees with cortical lesions show slow tapping. This is the most sensitive test of the battery (Kolb & Whishaw, 1990). Golden et (1992) say males consistently perform better than females on this test which assesses motor speed.

4.3.2.9 Auxilliary Tests

Apart from the few subtests discussed above, there are other tests included in the original battery but not always administered (Kolb & Whishaw, 1990) these include the Trail-Making Test, Aphasia Screening Test and Minnesota Multiphasic Personality Inventory (MMPI). The Trail-Making Test requires subtests to draw lines to connect either consecutive numbers or letters scattered randomly on a page and in the second part of alternate between the two sequences (i.e. A-1; B-2; C-3; D-4; E-5; F-6; ...); the Aphasia Screening Test is an altered version of the Wepman Aphasia Test; and the MMPI a mostly used self-reporting questionnaire which is alleged to diagnose psychiatric disorders (Golden et al, 1992).

4.3.3 Reitan-Indiana Neuropsychological Test Battery

According to Bremner-Stokes (1991), Halstead in 1947 developed the Halstead Neuropsychological Test Battery for children (HNTBC) 9 - 14 years. This serves as a base for Reitan to tackle the process of developing a related battery for younger children 5 - 8 years of age. He did this by trying to modify the basic tests and developed a number of new tests. The Reitan-Indiana Neuropsychological Test Battery for children assesses a wide spectrum of children's abilities and the tests include measures of motor function, sensory-perceptual skills, memory, basic language and related abilities, visual-spatial skills, measures of abstraction and reasoning ability and the ability to organize and integrate stimuli according to prescribed principles (Foxcroft, 1989; Reitan, 1987). A brief description of the tests in the Reitan-Indiana Neuropsychological Test Battery for children pertaining the administration; scoring of the tests which is well documented in the manual appears below (Reitan, 1987).

4.3.3.1 Category Test

The Category Test which altogether consists of 80 pictures or simple slides projected on to a screen (or in the portable version printed on cards). These 80 slides are divided into 5 subtests which are related to four different colours. The child is asked to identify which colour the picture reminds him of and to press the corresponding button; red, yellow, blue or green; the child receives a feedback on the response that the correct or incorrect button was touched. The test is scored by the number of errors entered.

The test is not timed (Gouws, 1989). Category Test seems to assess the ability to use positive and negative feedback in the structured learning context, abstract thinking process and concept formation (Bremner-Stokes, 1991; Painter & Murdoch, 1976). For better performance on the test, the child must have good attentive skills and concentration (Gouws, 1989).

4.3.3.2 The Tactual Performance Test (TPT)

The Tactual Performance Test is a modification of the Seguin-Goddard form board (which is based on the three main functions; time, memory and localisation) into which the pieces are fitted by the blindfolded child. The item is performed three times with most used hand, or (dominant/preferred) (Painter & Murdoch, 1976), then with other non-dominant hand and lastly with both hands.

The child would have been told that his assignment is to fit the pieces into the proper spaces on the board. The three assignments are timed. The second part is performed after the child has been told to draw the pieces, now with the board and pieces removed, and the child blindfolded, the drawings should be as accurate as possible in their correct positions. The test requires a good intimate relationship between the child and the tester so as to avoid the child being upset or afraid by being blindfolded (Foxcroft, 1989).

Six scores are obtained from the test: the times for the three attempts, the total time recorded, the number of pieces drawn or sketched correctly (incidental memory) and lastly the correct location or position of the drawn pieces.

The Tactile Performance Test (TPT) measures tactile discrimination of form, dexterity, tactile visual integration, quick response to problem solving and incidental memory (Bremner-Stokes, 1991; Golden et al, 1981).

4.3.3.3 Finger Tapping Test

In the Finger Tapping Test the child is required to use his finger (the index) to press the key on an electric tapping instrument that registers the number of tapping in a given time. The frequency is measured. Five consecutive 10 seconds trials are performed with the used hand and thereafter the other non-dominant hand is used. The child is asked to tap as fast as he could within those 10 seconds (Foxcroft, 1989).

The child is allowed to rest to avoid fatigue. Two scores are then obtained (i.e., the average number of taps for each hand per 10 seconds).

The Finger Tapping Test measures the motor velocity (speed), it also demands ability to concentrate and dexterity (Gouws, 1989).

4.3.3.4 Color Form Test

The Color Form Test uses stimulus material of different colours and shapes. The child is required to progress from one form to another making his first move on the basis of the shape and then next on the basis of the colour. The child is required to complete the test by alternating colour and shape in a similar way to which it is done in part B of the Trial Making Test for adults and older children which requires alternation between numbers and letters. The time taken to complete the test and the number of errors is recorded. The test measures concept formation; cognitive flexibility; scanning ability and organizational ability (Bremmer-Stokes, 1991; Gouws, 1989).

4.3.3.5 Progressive Figure Test

The Progressive Figures Test seems to be tougher than the Color Form Test and probably has no real Trial Making equivalent (Painter & Murdoch, 1976). The child is shown a page consisting of the outline of geometric figures within which there are again smaller different shapes, the child is required to connect all the figures in sequence by matching the small figures to the large ones.

Again as in the Color Form Test the time taken to match is the score obtained. This test assesses concept formation, organisational abilities, cognitive flexibilities and abstraction abilities (Bremner-Stokes, 1991).

4.3.3.6 Matching Picture Test

The test material consists of five pages with two groups of items on each page. The child is required to match the picture at the top of the page with pictures at the bottom of the page. The items become more difficult as the child proceeds from the simple to the more complex. The score is determined by the number of scores correctly done out of the 19 items of the test (Foxcroft, 1989; Painter & Murdoch, 1976).

4.3.3.7 Target Test

In the Target Test the child is presented with a large sheet of white paper with 9 black dots arranged in a square. The examiner/tester taps the dots as the child watches on closely. After 4 seconds the child is required to reproduce the patterns; initially it seems simple but becomes more complex as it progresses, it consists of 20 items and the score is the number of items correctly done (Foxcroft, 1989). The test measures the perception and reproduction of visuo-spatial relationships (Gouws, 1989).

4.3.3.8 Individual Performance Test

The Individual Performance Test consists of four different subscales: Matching V's; Star; Matching Figures and Concentric Figures (Gouws, 1989; Painter & Murdoch, 1976).

4.3.3.8.1 Matching - V's

The child is shown a strip of cardboard with arrows of V's with varying acute angles. The child is then given a duplicate set of the figures in random, and required to reproduce the same sequence. The test is scored in terms of the time used to complete the assignment and the number of errors.

4.3.3.8.2 Star

The child is shown how a six-pointed star is constructed from two overlapping triangles. The child is then required to draw the star in the same manner. The score is the time taken to complete the star and the accuracy with which this was done, as measured by the number of drawn angles.

4.3.3.8.3 Matching Figures

This is done in the same manner as that of Matching V's (cf 4.2.3.8.1 above) using figures ranging from simple to complex. The score is the time taken and the errors made.

4.3.3.8.4 Concentric Figures

It is clearly demonstrated to the child how a figure is constructed out of three concentric squares with the two inner ones vertices' slightly touching the lateral sides of the outer figure. The child is then required to draw the same figure (Foxcroft, 1989). The score is the time elapsed and the number of lateral touches. The test measures the ability to perceive and reproduce visuo-spatial relationship and the expressive domain (Painter & Murdoch, 1976).

4.3.3.9 Marching Test

The material for the Marching Test consists of 5 pages each with a series of circles on left and right sides (Painter & Murdoch, 1976). The circles are connected by lines indicating the direction the child should follow in joining circles in crayon from the one nearest him to the one at the top of the page. The child is asked to move as quickly as he can

from the start to the finish, making a mark in each circle. The child starts with the dominant hand and followed by the non-dominant hand (Bremner-Stokes, 1991). There are five trials which become more complex as the child progresses from the beginning. The score is the time used and the number of errors committed for each hand.

The Marching Test assesses the visual-motor co-ordination, motor speed and concentration, dexterity of the hand, the possibility of peripheral injury, the investigation of the relative integrity of the two cortical hemisphere (Gouws, 1989).

4.4 GOODENOUGH-HARRIS DRAW A PERSON TEST (DAP)

The Goodenough-Harris Draw-A-Person Test (DAP) is a revised version or an improved version of the Goodenough Draw-A-Man Test devised by Goodenough (1926). It was re-evaluated by Harris (1963; Jones, 1973). the test may be used to measure intellectual maturity (Mayekiso, 1980) which covers three functions or domains: (1) perception - the ability to discriminate the likenesses and the differences (2) the ability to reach abstract level - to classify objects according to these likenesses and differences and (3) the ability to generalise - to assign an object newly experienced to a correct class according to discriminated features, properties or attributes (Harris, 1963).

Harris added to the Draw-A-Man Scale a Woman Scale (Draw-A-Woman) and Self Scale. From the original 51 scoring items he added new scoring items resulting in the 73 items in the Goodenough-Harris Draw-A-Person Test (DAP) (Richter, Griesel & Wortley, 1989).

4.4.1 Purpose of the DAP Test

The Goodenough-Harris Draw-A-Person Test is not a battery like the LNNB, HNTBC and the RINTB discussed in this chapter which are formed by many tests but this one is just a single test. It was designed as a measure of intellectual or conceptual maturity (Harris, 1963; Jones, 1973; Mayekiso, 1982).

It is based on the hypothesis that a child's concept of frequently experienced object as a human being, becomes a useful index to the growing complexity of his concept generally (Harris, 1963; Jones, 1973).

4.4.2 Administration of the DAP Test

The DAP can be administered individually or in groups. The child or children are each given a booklet and a pencil and a clean rubber, crayons are not allowed. All other pictures on the walls of the room to

be used are to be removed to minimize the temptation to copy. Then the children are told to fill their biographical information on the front cover page, their respective names, sex, name of the school, grade at school (standard), age, date of the writing the test, then the occupation of the father on the spaces provided for these particulars.

The children are then told to start drawing their own original pictures as indicated on top of each page, they must take their own time to draw. The first drawing is that of a Man, then followed by the drawing of a Woman and lastly the Self-Portrait.

This test can serve as an icebreaker for a tense and thick atmosphere if more tests are to be introduced to the children because of its exciting nature (Harris, 1963; Richter et, 1989).

4.4.3 Scoring the DAP Test

Scoring the DAP Test is that part of the test that demands a thorough study of the manual and it needs proper scrutiny and efficiency. After studying the manual of the Draw-A-Man Test as designed by Goodenough (1926), Harris (1963) added the scoring manual for drawing a Woman and the Self Portrait section.

Each item is scored as either a pass, +, or fail, 0, -, a credit or no credit according to the rules set forth in the manual. A child either got a credit + or 0 for any part drawn in the drawing (Harris, 1963).

The raw scores are converted to standard scores by using the conversion table (Harris, 1963; Mayekiso, 1982; Richter et al, 1989).

4.5 GENERAL REASONING GROUP TEST (GRGT)

4.5.1 Development of the General Reasoning Group Test

The General Reasoning Group Test was developed at the University of Port Elizabeth (UPE) in reaction or response to the need for a culture-fair standardised measuring instrument which can assist educators to identify children who may be scholastically at risk (Foxcroft & Shillington, 1992; Kroukamp, 1991).

It was then found that the tests in the RINTB have a lot in common and that they sometimes overlap in some domain in terms of what they assess (Foxcroft et al, 1989).

It was found that the subtests of the Reitan-Indiana Neuropsychological Test Battery (RINTB) that require higher cortical reasoning, concept formation and problem solving abilities correlated with the JSAIS General Intelligence Quotient (GIQ). They (Foxcroft et al, 1989), argued that reasoning (r) forms the greater part of general intelligence ability (g) and therefore it becomes possible to predict the GIQ from the reasoning subtests of the Reitan-Indiana Neuropsychological Test Battery for children (RINTB) and its main target of assessment is the "biological intelligence of the child" (Foxcroft et al, 1991; Richter & Griesel, 1986).

It is clear that there is/was a great need for the development of a cultural-fair, standardised neuropsychological measuring instrument here in South Africa that will assess the general reasoning of the children particularly in our school environment. Thus, the General Reasoning Group Test was devised, based specifically on the Reitan-Indiana Neuropsychological Test Battery (RINTB) (Foxcroft, Shillington & Turk, 1990; Foxcroft et al, 1991; Foxcroft et al, 1992).

The General Reasoning Group Test (GRGT) was then developed to address this great need (Foxcroft et al, 1992). It measures quite a number of important domains in children: reasoning ability, visual-motor, visual-spatial functioning, concept formation, problem solving, language ability, numerical ability, and short-term memory (Foxcroft et al, 1989; Foxcroft

et al, 1990; Foxcroft et al, 1991, 1992).

The 25-item GRGT is in a form of a booklet with 31 pages and manuals for administration, and scoring (Foxcroft, Kroukamp & Norris, 1992; Foxcroft & Shillington, 1992).

The GRGT is considered to be a culture-fair test and it has been tested out with black, white, coloured and Indian South African children. It is presently beind administered to children from the economically disadvantaged community (blacks), including the present study in Venda sub-region of the Northern Province to assess children at schools in the age range of 5 to 9 years, for standardisation purposes and validation of its psychometric properties. It is a group screening instrument which covers a broad spectrum of the cognitive reasoning abilities (Foxcroft et al, 1989).

According to Foxcroft (verbal communication) the General Reasoning Group Test was developed on the basis of intensive research carried out in Port Elizabeth in 1990, involving 525 children of between 5 and 9 years of age. The children were sampled out from a relatively good cross-section of the population in that particular region as far as sex, age, socio-economic status and the estimated intelligence ability were concerned. The mid-year academic achievements of these children were obtained and

correlated with the GRGT performance (Foxcroft et al, 1990).

The above obtained data were then subjected to thorough statistical analysis. This reduced the GRGT items from the initial 82 items to a 25 item measuring instrument with four scales or subtest scores. The test was found to be consistently measuring the same thing over a time after a test-retest exercise i.e. the reliability of the test was established. There was a correlation between scholastic performance and GRGT performance (i.e., predictive validity), and the age of the children had a large influence on the results. The older the child, the better the performance on the test" (Foxcroft (undated); Foxcroft et al, 1992).

4.5.2 Description and Administration of the GRGT

The test consists of a booklet with 31 pages and demonstration posters for each of the four subscales which should be used by the tester before any section or subtest is attempted by the children. No more than 20 children should be tested at a single group, the tester must be well versed with the administration of the test and its instructions, he must have an assistant invigilator with the same understanding of the test. The outer front cover of the booklet requires the biographical information of the child

and the following particulars are to be filled-in on this page: name; date of birth; date of the test; sex; grade at school (std); name of the school; estimated IQ and the additional comments if any by the respective teachers (Foxcroft's (undated), instruction manual).

4.5.2.1 Section 1: Visual-Motor Ability

This section of the test focuses on the examination of the child's ability (i.e. the ability of the child to accurately reproduce/copy a geometric figure). The first three items are practice examples. Cf. Figure 3.

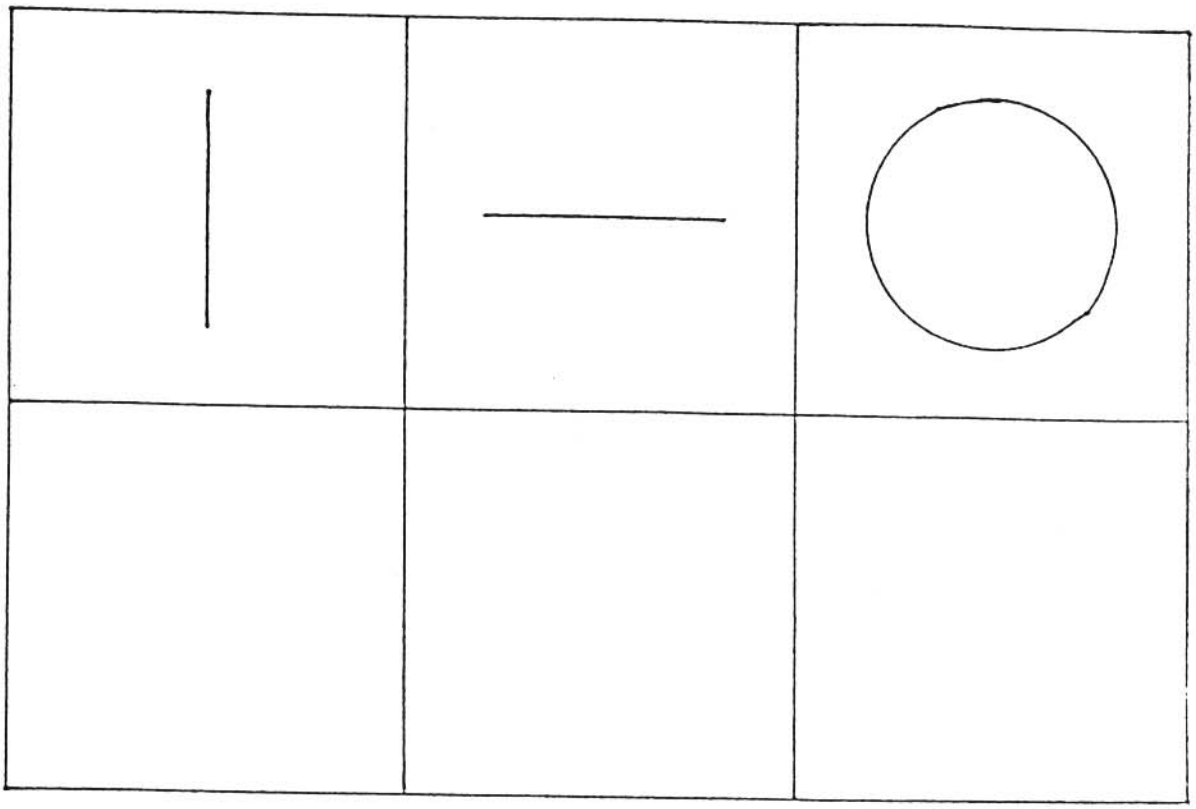


figure 3: Geometric figure

Before the tester proceeds to the next section, he/she must ensure that the child understands what he or she is expected to do. There are six items in this section. This subtest: the visual-motor scale measures the child's ability to accurately copy geometric figures, for instance the child is given a picture of a vertical and horizontal line and a circle, and he must then construct them accurately in the corresponding bottom provided spaces (Foxcroft et al, 1990). This subtest assesses the child's motor dexterity, this is an example of a fine motor test rather than a test of gross motor function (Golden et al 1992; Foxcroft et al, 1992).

4.5.2.2 Section 2: Reasoning

This scale consists of 5 subscales (i.e., missing body parts; number and quantities; seriation; figure-ground and colour-form tests). For instance, in the first subscale the child is presented with a series of pictures. The child will see that there is a face of a human being with some parts of the face missing, three possible answers are given and the child is required to choose the appropriate one and marks it with a line using a pencil.

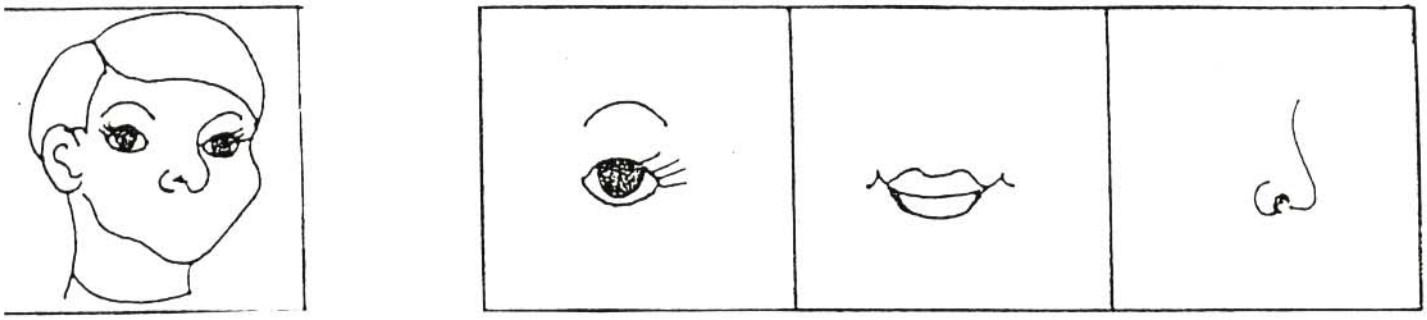


figure 4

In the first example the eye, mouth and nose are given as possible missing parts for the child to identify the correct missing part on the provided face as indicated in figure 4 above.

Generally, the reasoning scale measures the child's ability to form concrete and abstract concepts to solve simple and complicated problems which involve the child's visual input and motor output to complete sequences and to identify and classify things. The child is required to exercise his maximum logical thinking and reasoning ability because there is a relationship between the two aspects in terms of the scholastic performance of the child. Generally, the general reasoning domain can serve as better barometer of the child's scholastic success/failure indicator (Foxcroft et al, 1990; Foxcroft et al, 1992).

The subtest may also assess speed of the child to solve mathematical problems or just the ability to solve problems despite the time taken (Foxcroft et al, 1990; Golden et al, 1992).

The Seriation subscale measures the child's ability to finish/complete the pattern. Deductive thinking, if A = B and B = C therefore C = A both equal B.

The Figure-ground subscale/subtest measures the child's ability for visual discrimination. According to Golden et al (1992) these visual-motor tests are quite popular as they have been found to be very sensitive to a number of different types of brain injury.

The last subscale in this section is the colour-form subtest which examines the child's ability to alternate between two concepts. Golden et al (1992) describe the colour-form test as a neuropsychological scale which assesses the higher intellectual processes where the child's cognitive flexibility is measured. The child must be able to form hypotheses; to be flexible and generate alternate solutions to problems, to plan for the future, to alternate cognitive sets. This test measures organizational and abstraction abilities, concept formation and flexibility in thinking process of the child.

4.5.2.3 Section 3: Incidental Memory

This scale has items that are arranged in such a way that each item consists of 4 pictures, one of which has appeared before in the preceding pages in the booklet. The child must identify the picture that he/she has seen before in the booklet. The children are invigilated in such a way that they are not allowed to page back in the booklet and he should not have been told beforehand to remember the pictures in the booklet.

The first few years of schooling are very crucial in terms of visual memory for a successful scholastic performance (Foxcroft et al, 1992).

The incidental memory test examines the child's non-intentional visual memory (Foxcroft & Shillington, 1992). The test examines the retention of material after delays typically between five seconds and five minutes (Golden, Zillmer & Spiers, 1992).

4.5.2.4 Section: Visuo-Spatial Ability

In this subtest the stimulus is a large sheet of white paper with 9 large black dots arranged in the form of a square. In the booklet there are 8 such sets of black dots of 9-dot figures from page 24 to 31of the test booklet. (Cf. Figure 5)

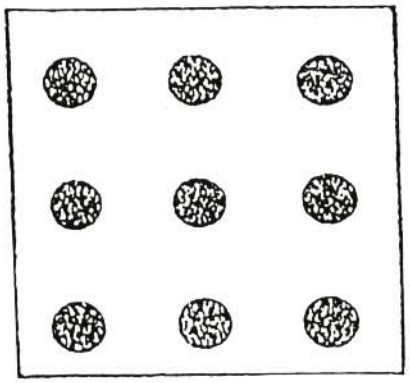


figure 5: Square with 9 large black dots

The tester/examiner clearly points out a design on the stimulus figure by means of a long visible pointer using the dots as reference. After 3-5 seconds delay the children are required to draw the figure on the test booklets on the respective figure and successive pages. Progressively the design proceeds from a simple to more complex ones.

The subtest examines the child's visual-spatial ability i.e. perception and expression of visuo-spatial relationships (Bremner-Stokes, 1991; Foxcroft et al, 1991; Gouws, 1989; Painter & Murdoch, 1976). This is related to the ability to perceive objects in space and reproduce them accurately. Children who are poor in copying from the chalkboard may find themselves fairing poorly in this test.

4.5.3 Scoring the Test

In the GRGT a scoring sheet is provided to guide in the scoring exercise. All the four sections are allocated different points and the grand total is 46 points. The general scoring criteria are as follows:

4.5.3.1 Section 1: Visual-Motor Ability: 12 points maximum

An accurate reproduction of the figure is awarded two points whilst an accurate but rotated or reversed reproduction is allocated one point. Inaccurate reproduction receives no credit but zero. A qualitative analysis of the child's drawings could be of diagnostic assistance. Aspects such as reversals, rotations, omissions and inability to cross the middle line are all pointers to perceptually-based difficulties at certain ages. The maximum number of points that can be obtained is 12 points (Foxcroft, 1990).

4.5.3.2 Section 2: Reasoning: 16 points maximum

According to the manual (Foxcroft, 1990) for scoring the GRGT test all the practice examples for each section are not scored. For both the items in (a) missing parts, the score is one point for each item if the child correctly identifies the missing part from the 3 available options. Incorrect identification is not credited any score but zero.

In Section (b) number and quantities the total score is 2 for the correct answer and nil for incorrect answers.

The Section (c) Seriation is credited on for each correct completion totalling to 2 points and nil for each incorrect answer.

For Section (d) the three items each get one point as the maximum points add up to 3 for correct identification of the correct picture from the possible answers.

The last Section (e) is the color-form test. The correct pair of objects which are joined receive one point. The incorrect pair of joined objects are negatively marked. The colour and the shape of the figures are the key: maximum score is 7 points.

4.5.3.3 Section 3: Incidental Memory

For all the four items, each correct object remembered is credited one point and the total for this section is 4 points.

4.5.3.4 Section 4: Visuo-Spatial Ability

There are 7 items which must be awarded points. Two points are allocated for each correct and accurate reproduction of the drawing design. One mark is given if the reproduction is reversed or rotated but resemble the correct version. Finally no point is scored if incorrect answer is produced. The maximum score is 14 points (Foxcroft, 1990).

CHAPTER 5

5. PROBLEM

5.1 INTRODUCTION

Nowadays psychological tests are highly valued in many sectors of human life, be it the classification and selection of employees, in scholastic predictions and assessment, in the counselling arena, or the effectiveness in any interpersonal interactions, the individual's assessment in development and high level decision-making skills.

Traditionally an important function of psychological tests has been the identification of intellectual deficiency, and assessment of emotional and behavioural disorders. Scholastic aptitude tests, the assessment and screening of children in accordance with their abilities and/or disabilities and their educational and vocational assistance make the use of neuropsychological batteries today an indispensable component of human screening instruments (Foxcroft et al, 1992).

The major challenge facing clinical neuropsychologists and researchers in South Africa is the problem of having very few appropriate standardised measuring instruments with which our children can be fairly assessed for possible neuropsychological abilities or disabilities for intervention purposes. Though few measuring instruments are available which mostly are based on western culture, developed by westernized researchers, the absence of a standardised neuropsychological measuring instruments based on South African culture catering for all population groups is very conspicuous (Ahmed, 1990; Bremner-Stokes, 1991; Foxcroft et al, 1992; Nortjé, 1986; Schloder, 1986).

According to Kroukamp and Foxcroft (1991) there was a tendency in the past here in South Africa based on apartheid, the policy of separate development to devise separate tests, or at least separate norms for our South African cultural groups, the system of racial discrimination which focused on the differences rather than the common aspects or similarities was in full swing, but unfortunately this proved to be very expensive, unfair, irrelevant and unworkable.

Recently there have been encouraging moves from all sectors towards educational and racial integration, to democratise many systems in our society, and it is possible and indeed desirable and necessary for the

benefit of all South Africans, irrespective of race or creed to find and use standardised neuropsychological measuring instruments which are not culturally biased, so that, a uniform assessment procedure can be applied for our children (Foxcroft & Shillington, 1992).

It is currently very difficult to assess and screen children before and at school entry in South Africa, due to the scarcity of standardized neuropsychological batteries which can assist parents and teachers to institute remedial and/or bridging programmes to help children to overcome scholastic difficulties. Foxcroft and Shillington (1992) support the sentiment by Tramontana and Hooper (1988) that researchers should guard against an overly, simplistic approach to assessing and screening.

The best way to provide the researcher or tester with the most valid and comprehensive information concerning the characteristics or abilities of the child's neuropsychological functioning is the application of a standardised neuropsychological measuring instrument which is empirically valid in being able to detect and locate brain lesions; abilities and disabilities and which covers a wide scope of behaviour so that it can locate impairment as well as strengths in as many areas of the child's brain as possible (Nortjé, 1986).

Such standardised neuropsychological measuring instruments which can assess children with potential learning difficulties comprehensively enough are very crucial in South Africa. But the potential neuropsychological bases for such problems have rarely been explored. One reason for this could be that no standardised neuropsychological test battery has been developed in South Africa (Foxcroft, 1991; Sun, 1990).

A study was done with the prime concern to develop a standardised neuropsychological measuring instrument which is culture-fair. Based on the finding that it is possible to empirically devise a valid individual estimate of general reasoning ability from the Reitan-Indiana Neuropscychological Test Battery for all 5 to 9 year old South African children, the GRGT was developed. Based on the research conducted by the University of Port Elizabeth on a sample of 525 5- to 9- year old black children, to assess its psychometric properties, the GRGT was found to be relatively culture fair (Foxcroft, 1991). Although it has been used with other cultural groups in South Africa, the Northern Province cultural groups including Venda, were not included as far as research into the General Reasoning Group Test is concerned. Thus, this study.

It was found that the test-retest reliability of this General Reasoning Group Test (GRGT) was acceptable (r = 0,84), that the performance of matched cultural groups of urban children does not differ significantly and that the General Reasoning Group Test scores correlate with the teachers ratings, and that the correlation with scholastic performance is moderately high. A moderately high correlation was obtained between the General Reasoning Group Test and the Aptitude Test for School Beginners (ASB), the multiple (r) value was 0,73. Thus there is almost a 50% overlap in the abilities assessed by the two tests; but the GRGT only takes about 35 minutes to administer (Foxcroft & Shillington, 1992). The present study aimed to gather more information about the validity of the General Reasoning Group Test, using a Venda sample, preschool to Std II, (age range of 5 to 9 years).

The General Reasoning Group Test is still being refined and tested out in a variety of settings including this one, but the preliminary results have been encouraging. The General Reasoning Group Test can be administered by psychometrists or trained teachers in a group context.

The preliminary research with the GRGT has suggested that its predictive validity in identifying "at risk" children is promising (Foxcroft & Shillington, 1992). Useful qualitative information should also be obtained by analyzing the type of errors that the child makes as well as test taking

behaviour (Foxcroft, 1991).

5.2 AIM OF THE STUDY

The general aim of the present study was to conduct a thorough investigation into the applicability of the General Reasoning Group Test mainly for pupils in the Venda cultural group, with the view to investigating its use as a culture-fair measuring instrument for all South African children in the future. The specific aim of the present study was to correlate performance on the GRGT with scholastic performance for 5 to 9 year old children in Venda to establish the predictive validity for children who are academically at risk.

Although the General Reasoning Group Test is potentially culture-fair, its psychometric properties have initially only been researched with black 5- to 9- year old children in the Port Elizabeth region. The reliability and validity of the test were shown. It was clear that the test was to be conducted in all areas covering all cultural groups of all languages including children in Venda (Foxcroft & Shillington, 1992). Thus this study is being undertaken.

5.3 GENERAL PROPOSITION

The general proposition from which the research hypotheses were derived state that the performance of normal pupils in various areas in Venda from Grade 0 - Grade 4 (aged 5 - 9 years) on the General Reasoning Group test will correlate significantly with

(a) their scholastic performance based on their performance in mathematics and reading and

(b) their performance on the Draw-A-Person Test (DAP-self).

According to Richter et al (1989) the DAP has construct validity as a general cognitive measure for children between the ages of five and nine years. This instrument was used for this assessment.

Mathematics and reading were included in the assessment on the basis of cognitive predictors of scholastic performance.

5.3.1 Research Hypotheses

Research hypothesis I:

There will be a positive relationship between the scores on the General Reasoning Group Test and the academic performance for pupils in Venda in grades 0 - 4.

Null hypothesis 1.1:

There is no significant correlation between scores on the GRGT and performance in Mathematics for pupils in Venda in grades 0 - 4.

Alternate hypothesis 1.1:

There will be a significant correlation between scores on the GRGT and performance in Mathematics by pupils for Venda in grades 0 - 4.

Null hypothesis 1.2:

There is no significant correlation between scores on the GRGT and performance in reading ability for pupils in Venda in grades 0 - 4.

Alternate hypothesis 1.2:

There is a significant correlation between scores on the GRGT and performance in reading ability for pupils in Venda in grades 0 - 4.

Research hypothesis 2

There will be a positive relationship between scores on the General Reasoning Group Test and the performance on the Draw-A-Person test for pupils in Venda in grades 0 - 4.

Null hypothesis 2:

There is no significant correlation between the scores on the General Reasoning Group Test and the performance on the Draw-A-Person test for pupils in Venda in grades 0 - 4.

Alternate hypothesis 2:

There is a significant correlation between the scores on the General Reasoning Group Test and the Draw-A-Person test for pupils in Venda in grades 0 - 4.

CHAPTER 6

6. METHOD

6.1 INTRODUCTION

The research design, the subjects (children), the measuring instruments and the procedure employed in the present study will be discussed as part of methodological considerations.

6.2 RESEARCH DESIGN

During the application and standardisation of the General Reasoning Group Test a correlational method was used to investigate the relationship between the external criterion (scholastic performance) and DAP scores and performance on the GRGT. The advantage of this method was that it enabled the present researcher to determine the relationship between the variables and to explore possible predictions that could be made.

One of the problems with the correlational method is that the direction of cause and effect cannot be determined as no variable is manipulated. However, the present study did not aim to seek out a causal relationship between GRGT test performance and scholastic performance.

Another problem that arises when the correlation method is used is that extraneous (third) variables could mediate and influence the variables being studied and their relationship. Potential extraneous subject variables that could have exerted an influence on the test and scholastic performance had to be controlled by either keeping them constant or by building them into the research design (Bremner-Stokes, 1991; Gouws, 1989; Manaster & Havighurst, 1972; Nortjé, 1986; Schlodder, 1986).

Manaster and Havighurst (1972) and Foxcroft (1985) suggested that subject variables such as age, sex, socio-economic status and urban-rural residence should be controlled when comparing different ethnic or cultural groups. In addition, Foxcroft (1985) suggests that language, school educational grade (exposure), and the status of the Central Nervous System (CNS) development, should also be controlled.

The extraneous subject variables which were controlled in the present study by building them into the design were:

(i) Sex:

A fairly equal proportion of males and females were selected from one ethnic group.

(ii) Age:

Which was built into the design by including children in the 5, 6, 7, 8 and 9 year-old age groups and then analysing the results separately for grade (which correlates highly with age).

(iii) Urban-Rural Residence:

Which was built into the design by selecting children from urban, semi-urban and rural and semi-rural areas and then analysing the results from these groups. These children were selected irrespective of whether it is rural or urban but in all the schools sampled in the Venda region.

(iv) Socio-Economic Status:

A fairly equal proportion of middle and lower class children were included in the present study. Relatively fewer upper class children were, however, included in the present study. Consequently, socio-economic status was not adequately controlled in the present study.

(v) Educational Exposure:

This was built into the design by selecting children who were in pre-school; grade I (Sub-A); grade II (Sub-B); Std I; and Std II for at least 8 months and had not failed or repeated the grade. Results were then analysed separately for each of these groups.

The extraneous subject variables which were controlled in the present study, by holding them constant were:

(i) Language:

Only Venda-speaking subjects/children were selected for this study.

(ii) Status of the CNS development:

Which was held constant by only selecting "normal" subjects (the manner in which normal Central Nervous System (CNS) development was operationalized in the present study will be discussed at a later stage in this chapter.

The other important extraneous subject variables which was not controlled was intelligence. Researchers such as Klesges (1983) and Foxcroft (1985) have found that IQ correlated quite significantly with many of the tests of the Reitan-Indiana Neuropsychological Test Battery for children, the battery on which the General Reasoning Group Test was based when it was developed. The present research was however, limited by the fact that no standardized intelligence test is available as yet for South African Black 5 to 9 year old children and therefore an unbiased estimate of their IQ could not be obtained. Since all the children were being screened for their intellectual maturity on the Goodenough-Harris Draw-A-Person Test (Harris, 1963) as part of the procedure used to decide whether or not they could be classified as being "normal" it was felt that intellectual maturity had been taken into consideration to an extent.

6.3 SUBJECTS

The Northern Province sample consisted of 86 black children of whom 11 were 5 year olds; 14 were 6 year olds; 14 were 7 year olds; 23 were 8 year olds and 24 were 9 year olds resident in the Venda region.

The sample is not truly representative of the population of Black children in the entire Northern Province but only the Venda region/area and therefore the generalisation of the results of the present study cannot be stressed for the entire South African population, but the study is a crucial step towards the goal. The present study is aimed at obtaining information on whether or not the groups differed in their test performance for the purpose of the standardization of the General Reasoning Group Test and to provide normative information representative of the region as part of the entire South African child population. The comparability of the sample being studied in terms of their subjects characteristic in Venda region was the crucial factor.

Table 6.1

Subjects Characteristics

SEX	Male Female	(N) 44 42
LANGUAGE	TSHIVENDA	86
SES	UPPER MIDDLE LOWER	13 41 32
STANDARD	PRESCHOOL 0 GRADE I (SUB-A) 1 GRADE II (SUB-B) 2 STANDARD I 3 STANDARD II 4	11 14 14 23 24
AGE	5 - YEAR - OLD 6 - YEAR - OLD 7 - YEAR - OLD 8 - YEAR - OLD 9 - YEAR - OLD	11 14 14 23 24

6.3.1.1 Gender (Sex)

The sex of the subjects was not kept constant but it was rather built into the design. Table 6.1 represents the distribution of the sexes in the present study.

Table 6.1 indicates that 51,2% of those black children in the present study from the Venda region consisted of males and about 48,8% were females. The distribution of the sexes was, thus, comparable in the sample.

6.3.1.2 Age

It was decided to use only children who had attended a preschool, play school or creche with preprimary facilities for at least not less than 6 months exposure to a structured learning environment. It was felt that all the children would be familiar with aspects such as using a pencil, drawing pictures, classifying shapes according to size and colour and that they would have learned to concentrate on a task until it was completed.

In this study the task that the children were confronted with in the GRGT had a similar degree of familiarity for all of them. It was a new test to all of them equally. All the children from 5 to 9 years of age i.e. from preschool to Std II had the same advantages and the same disadvantages if any over the GRGT. It was a new test to all of them, but all the children could attempt it with equal opportunities.

However, since educational stimulation was provided for the children at the play school, creche from the age of 4 years and pre-school preparation started in the year prior to them starting school. Hence the five sub groups could be considered to be comparable in terms of their educational exposure at this stage based on the requirements of the GRGT.

6.3.2 Socio-Economic Status

A classification and identification of a valid operational definition of the socio-economic status for all the South African population had to be sought in order to correctly classify and identify socio-economic status across the groups that were being studied including the community in Venda as part of the greater spectrum in South Africa.

An index formulated by Riordan (1978) was employed in order to have a reliable and valid indication of the socio-economic stratification for the subgroups under study. Riordan (1978) formulated this composite index in accordance with suggestions from the literature (Erwee, 1976; Foxcroft, 1985).

Riordan (1978) used two variables in her composite index, that is, the occupation (of the father or the guardian) and the educational level (of the father or the guardian). Erwee (1976) developed an index of socio-economic status based on four variables namely: occupation, income, dwelling residence and mobility (number of vehicles) but there was a high degree of association between the occupation and income indices.

In the present study it was decided that since the importance of occupation is an indicator of socio-economic status as found by Erwee (1976) and Foxcroft (1985) was consistent with the literature, and it was felt that subjects might be reluctant to divulge their income, (fathers' or guardians') occupation was used as one of the variables in the index. The information was obtained concerning the fathers' or the guardians' occupation in a questionnaire sent to the parents (cf. Appendix C).

The occupations were recorded numerically according to an occupation classification proposed by Riordan (1978) this was based on the South African population (Erwee, 1976) classification. This numerical occupational classification scale is presented in Table 6.2.

Table 6.2

Classification of Breadwinners Occupation

OCCUPATION CLASSIFICATION		SCORE
(i)	Top professional Executive Administrative and technical occupations.	9
(ii)	Professional, Administrative and managerial workers.	8
(iii)	Independent commercial.	7
(iv)	Lower class administrative, technical and clerical with limited supervisory and administrative responsibility.	6
(v)	Artisans and skilled workers, with trade qualifications.	5
(vi)	Routine clerical and administrative workers, service and sales workers.	4
(vii)	Semi-skilled production and manual workers.	3
(viii)	Unskilled production and manual workers.	2
(ix)	Not economically active or productive.	1
(x)	No response.	0

As proposed by Riordan (1978), the second variable used to determine the socio-economic status of the subject, was the education of their father (or mother/guardian in the absence of a father). This variable was used for two reasons. Firstly, Dohrenwend (1973) reported a high correlation of the education of the head of the household, with current family income and occupation of the household head. Secondly, the likelihood that information on education would be given correctly was high, since answering such a question seemed less likely to trigger or evoke emotional responses that questions about income might.

In the present study, parents were asked to indicate the highest educational level attained by the father or guardian of the child and thereafter numerical values (Riordan, 1978) were assigned to the fixed choice alternative (cf. Table 6.3).

The total score derived from the occupation and education of the father which ranged from 2 - 16, provided the socio-economic status index for each subject (cf. Table 6.4).

Due to the vastly discrepant representative of different ethnic groups in occupational, educational and income categories, Riordan (1978) had to set the boundaries for upper, middle and lower socio-economic levels for each group arbitrarily.

Table 6.3

Classification of Breadwinner's Education

FATHER'S EDUCATION	SCORE
(i) University entrance	7
(ii) Post-matric training (not university)	6
(iii) Matric	5
(iv) Apprenticeship	4
(v) Junior Certificate	3
(vi) Primary School	2
(vii) None at all	1
(viii) No response	0

Riordan (1978) did however, point out that during coding she noticed a close correlation between educational and occupational data and that the definition of the socio-economic classes for the ethnic groups appeared to fit in with this. Due to the fact that there is no other way of establishing social class boundaries in the Venda ethnic group being used in the present study and since the system proposed by Riordan (1978) was devised for South African population, her cutoff points for determining socio-economic class in the various groups were used (cf. Table 6.4).

Table 6.4

Classification of Socio-economic Status

ETHNIC GROUP	LOWER	MIDDLE	UPPER
White	2 - 10	11 - 13	14 - 16
Coloured	2 - 6	7 - 10	11 - 16
Indian	2 - 6	7 - 10	11 - 16
*Black	2 - 5	6 - 10	11 - 16

The above table indicates the cut points for the lower, middle and upper socio-economic status groups as proposed by Riordan (1978) in Foxcroft (1985), for the South African population groups which is also relevant in the present study with the Venda population (sample), as it is one of the Black cultural groups in the South African context.

In the present study the Black (n = 86) subjects were defined as being of South African nationality as they permanently resided in Venda in South Africa and their parents were South African citizens.

6.3.3 Urban-Rural Residence

Berry (1983) found no difference between urban and rural children's scores on the VMI but Schlodder (1986), however reported that there was statistically significant difference in favour of rural and urban scores over a mixed rural and urban population score.

6.4 MEASURING INSTRUMENTS

The General Reasoning Group Test (GRGT), the Goodenough-Harris Draw-A-Person scale, and scholastic performance were the measuring instruments employed in the present study.

6.4.1 General Reasoning Group Test

In chapter 4 it was elaborated how the GRGT was developed by Foxcroft et at (1989) when they modified certain aspects of the tasks of the Reitan-Indiana Neuropsychological Test Battery for children and added certain new tasks. A detailed description of the subtests of the General Reasoning Group Test and a discussion on the skills which each one measures was also well presented in chapter 4 of this study.

The literature review provided in chapter 4 demonstrated that the General Reasoning Group Test could be considered to be a valid measuring instrument for screening children of between 5 to 9 years of age for such aspects/domain as reasoning abilities, visual-motor abilities, visual spatial abilities, and incidental memory.

Foxcroft et al (1992) found the GRGT to be a valid test in Port Elizabeth and the East Cape for children in the 5 to 9 year age range.

No research studies have been conducted to determine the applicability of the GRGT in the Venda region for the Black children of 5 to 9 years of age as yet. Consequently, the present study was conducted to address this issue.

The administration and the scoring of the GRGT in the present study was conducted strictly in accordance with the standardized procedures as explained in chapter 4 of the present study as laid down by Foxcroft et al (1990) in the administration and scoring manuals for the General Reasoning Group Test.

As the GRGT is in English, the administration instructions are also in the same language, English. The pupils tested in Venda were Tshivenda-speakers, so the administration instructions were translated in Tshivenda language by an able bilingual translator and to guarantee the accuracy of translation, the translated version was again handed over to another bilingual translator who in turn translated it into English and then a comparison was made with the original version of the instructions. This was done to double check accuracy in translation. More detailed procedures on translation were fully discussed in chapter 3 of the present study.

Testers being bilingual studied the administration instructions manual in both the Tshivenda and English versions. With the guidance from the supervisor, the small groups of at most 20 pupils each, the administration was conducted with maximum efficiency.

6.4.2 Goodenough-Harris Draw-A-Person Test

The Goodenough-Harris Draw-A-Person Scale is used to measure intellectual maturity (Harris, 1963; Jones, 1973; Mayekiso, 1982) which covers three functions in children:

(i) the ability to discriminate between likenesses and the differences;

(ii) the ability to reach abstract level i.e. to classify objects according to the likenesses and differences; and

(iii) the ability to generalize (i.e., to assign an object newly experienced to a correct class according to discriminated features, properties or attributes).

The administration of the DAP was strictly conducted in accordance with the requirement of the administration as laid down in the manual (Harris, 1963) and as elaborated clearly in chapter 4 of the present study. The test served as an icebreaker for tensed children for subsequent tests because of its exciting nature it appeals to the interest of children (Richter et al, 1989). For more details on the administration and scoring of the DAP refer to chapter 8 of the present study.

6.4.3 Scholastic Performance

The scholastic performance of the subjects in their school subjects in all the grades/standards from preschool to Std II coupled with their reading abilities in language (i.e., English and Tshivenda) were obtained at the end of the academic year in November and these were included in the schedule for raw data for correlation purposes as part of the results. (These results were obtained from the progress record book as compiled and provided by the respective subject teachers from each school.)

6.5 PROCEDURE

The raw data was collected for this study between May and October 1992 and the academic reports for Mathematics and Languages during November 1992. The academic marks were converted to a maximum of 20 marks and minimum to 8 marks for both Mathematics, English and Tshivenda reading for all subgroups i.e. Grade 0; grade I (Sub-A), grade II (Sub-B); Standard I and Standard II.

The whole sample from each subgroup [i.e. preschool (5 - year olds); grade I (6 - year olds); grade II (7 - year olds); standard I (8 - year olds) and standard II (9 - year olds)] was tested during separate time intervals due to practical considerations such as time costs of running the tests, distance to be travelled from one school (venue) to another, school holidays, the school programmes at each and every school and the adaptability due to the fact that children were tested at their respective schools. The children were tested at their respective schools where prior arrangements were made with each schools' administration for a proper classroom with necessary facilities such as tables, chairs, rooms free from disturbances, with proper ventilation.

To obtain subjects (children), a letter was forwarded to the Department of Education and Culture in Venda, seeking permission to conduct tests on a sample of schools in the Venda region for the present study from the Director-General of the said department.

After permission from the Department of Education was granted, letters of application were sent to the six Area Managers in the region together with the permission from the Department attached to seek for their permission to conduct the tests for the present research study in their respective inspection areas in a sample of selected schools. Letters of permission were obtained from the Area Managers (cf. Appendix A3-A12).

A number of schools were identified for the present study, and letters were sent together with an attached permission from the respective Area Manager to the respective principal of each identified school for their permission to conduct tests in their respective schools to a sample of selected pupils according to standard (grade) chosen for each school. Children who met the inclusion criteria for normal CNS function in a particular school were selected.

Permission from the various principals was obtained and attached to the applications to the selected pupils' parents for their permission and consent for their children to participate in the tests. A criteria for parents to identify "normal" children was also attached to each letter to the parents (see Appendix). A final sample was drawn of 86 children (cf. Table 6.5).

A follow-up was conducted to obtain the responses from the parents. The co-operation that the researcher of the present study enjoyed from the Department of Education and Culture in Venda, the Area Managers, the principals, the parents down to the pupils, was excellent and quite encouraging.

Table 6.5

Distribution of the sample

GRADE	AGE RANGE	MALES	FEMALES	(N)
Preschool - 0	5,01-5,09	6	5	11
Grade 1 (Sub-A)	6,01-6,11	7	7	14
Grade 2 (Sub-B)	7,01-7,11	7	7	14
Grade 3	8,01-8,11	12	11	23
Grade 4	9,01-9,11	12	12	24
		n = 44	n = 42	n = 86

The sample was drawn from 5 different schools in the Thohoyandou area in Venda. The final sample as indicated in Table 6.5 above was reached after 150 children were screened to ascertain whether or not they satisfy the criteria for "normal" Central Nervous System (CNS) development. The mothers/fathers/guardians were requested to complete the biographical questionnaire (cf. Appendix C) and after all information was collected, a final decision was reached as to which pupil/subject would be included in the final sample for the study.

The principals were provided with the feedback on the final sample of those children/pupils who could satisfy the requirements for the criteria for selection of "normal" CNS development.

For the 86 children/subjects included in the present study the GRGT and the DAP were administered.

The children were tested at their respective schools.

Although test venues were, therefore, different for various sample groups, the test pre-arrangements remained fortunate strictly constant. Each sub-group from all the sample, five subgroups were tested in a classroom thoroughly prepared for the running of the test free from any possible

distractions.

To eliminate fatigue as an interference factor, all the children were tested in the morning from 08h00. The invigilation was excellent.

Once the testing and scoring on the GRGT and DAP had been completed, the teachers were then requested to compile the schedule for the scholastic marks for their final examination in Mathematics, English and Tshivenda performance. The marks were collected and together with scores of GRGT and DAP schedules of the raw data were compiled for the scientific results.

6.6 STATISTICAL ANALYSIS

The GRGT is a screening test for detecting children who are academically at risk, ie children who are potentially at risk in terms of their scholastic performance.

Data were cross-tabulated and the Contingency Coefficients (CC) were computed to determine the relationship between the GRGT and scholastic performance in Mathematics and reading ability in English and Tshivenda as rated by their respective class teachers to establish the predictive

validity of the GRGT as well as their scores on the DAP test to determine criterion-related validity. The data obtained were analysed using Pearson's Contingency Coefficiency.

GRGT data are classified into categories - Not at risk, Borderline, At risk - hence the data is categorical in nature. Consequently, a correlation technique that makes use of categorical data needed to be employed.

CHAPTER 7

7. RESULTS

7.1 INTRODUCTION

The general proposition from which the research hypotheses were derived state that the performance of normal pupils in various areas in Venda from Grade 0 - Grade 4 (aged 5 - 9 years) on the General Reasoning Group test will correlate significantly with

(a) their scholastic performance based on their performance in mathematics and reading and

(b) their performance on the Draw-A-Person Test (DAP-self).

Null hypotheses were formulated for the investigation of the abovementioned research hypotheses. The GRGT was administered and correlated with the subject's performance in Mathematics and reading as rated by their class teacher (to establish predictive validity of the GRGT) as well as with their scores on the DAP (construct validity). The data obtained were analysed using Pearson's Contingency Coefficient. The

level of significance was maintained at 0,05.

7.2 RESULTS OF INVESTIGATION: DESCRIPTIVE STATISTICS

Table 7.1 represents the descriptive statistical data obtained for each of the sub-test scores of the GRGT, the Draw-A-Person test and the academic performance in mathematics and reading by the pupils in Venda in Grades 0, 1, 2, 3 and 4.

Table 7.1 Average scores on the General Reasoning Group Test Draw-A-Person Test and academic performance in Mathematics and Reading of Grades 0 - 4 pupils in Venda.

KEY:			
	V-M	-	Visual Motor
	IM	-	Incidental Memory
	VS	-	Visuo-Spatial
	TOT	-	Total
	DAP	-	Draw-A-Person
	AC	-	Academic Performance
	Math	-	Mathematical scores
	Read	-	Reading scores
	Reas	-	Reasoning

Table 7.1 Average scores on the General Reasoning Group Test, Draw-a Person Test and academic performance in mathematics and reading of Grade 0 - 4 pupils.

Test	GRADE 0			GRADE 1			GRADE 2			GRADE 3			GRADE 4		
	n	X	sd	n	X	sd	n	X	sd	n	X	sd	n	X	sd
GRGT															
V-M	11	8.0	3.1	14	7.2	2.9	14	8.5	2.1	23	10.3	1.7	24	10.7	2.0
Reas	11	11.1	3.0	14	11.5	2.3	14	12.2	2.4	23	13.8	1.9	24	12.7	1.8
I M	11	2.5	1.0	14	3.3	1.0	14	2.8	1.2	23	1.7	1.8	24	3.5	0.8
V-S	11	4.4	2.9	14	7.5	4.8	14	8.5	3.1	23	10.1	3.8	24	8.5	4.5
TOT	11	26.0	7.2	14	29.7	8.8	14	32.2	5.4	23	36.0	6.1	24	35.5	6.2
DAP	11	8.1	2.4	14	10.2	7.3	14	10.2	4.6	23	17.1	8.5	24	16.3	7.9
AC															
Math	11	14.8	3.7	14	14.7	3.5	14	14.2	3.7	23	13.2	3.1	24	11.4	3.5
Read	11	15.3	3.4	14	13.8	3.8	14	12.0	2.6	23	10.5	2.2	24	10.8	2.2

7.3 STATISTICAL ANALYSIS

7.3.1 Research Hypothesis 1

There will be a positive relationship between the scores on the General Reasoning Group test and the academic performance for pupils in Venda in grades 0 - 4.

7.3.1.1 Null hypothesis 1.1

There is no significant correlation between scores on the GRGT and performance in Mathematics for pupils for Venda in Grades 0 - 4.

Alternate hypothesis 1.1

There will be a significant correlation between scores on the GRGT and performance in Mathematics by pupils in Venda in Grades 0 - 4.

Table 7.2 Represents Pearson's Contingency Coefficient correlation between the scores on the GRGT and performance in Mathematics by pupils in Venda in Grades 0 - 4.

TABLE 7.2 CORRELATION BETWEEN SOCRES ON THE GRGT AND PERFORMANCE IN MATHEMATICS IN GRADES 0-4

	GRADE	Chi^2	df	Cont Coef	p
Visual-Motor	0	65.0833	56	. 0.9249	0.1899
	1	40.15	40	0.886	0.886
	2	50.3383	45	0.8582	0.2706
	3	65.0833	56	0.9249	0.1899
	4	45.0733	52	0.8446	0.2604
Reasoning	0	53.1667	48	0.9103	0.2820
	1	50.8750	48	0.9068	0.3611
	2	55.4166	48	0.8935	0.2152
	3	45.7500	36	0.84471	0.1279
	4	51.3264	36	0.8543	0.04*
Incidental Memory	0	28.8750	24	0.8510	0.2249
	1	19.2500	24	0.7977	0.7385
	2	28.7000	32	0.8198	0.6344
	3	49.7143	36	0.8568	0.0638
	4	22.2986	18	0.7348	0.2190
Visuo-spatial	0	71.5000	64	0.9309	0.2429
	1	60.5000	56	0.9199	0.3167
	2	84.0000	72	0.9258	0.1576
	3	71.5000	72	0.8938	0.4945
	4	76.7916	81	0.8954	0.6118
Total	0	71.5000	64	0.9308	0.2429
	1	68.7500	64	0.9285	0.3197
	2	78.1667	80	0.9209	0.5371
	3	93.0000	90	0.9153	0.3933
	4	111.6250	117	0.9244	0.6229

* P < 0,05

From the results in Table 7.2 it is indicated that Null Hypothesis 1.1 is accepted and Alternate Hypothesis 1.1 is rejected, except for the reasoning subtest in grade 4.

7.3.1.2 Null hypothesis 1.2

There is no significant correlation between scores on the GRGT and performance in reading ability for pupils in Venda in Grades 0 - 4.

Alternate hypothesis 1.2

There is a significant correlation between scores on the GRGT and performance in reading ability for pupils in Venda in Grades 0 - 4.

Table 7.3 Pearson's Contingency Coefficient correlation between the scores on the GRGT and performance in reading by pupils in Venda in Grades 0 - 4.

TABLE 7.3 CORRELATION BETWEEN SOCRES ON THE GRGT AND PERFORMANCE IN READING IN GRADES 0-4

	GRADE	Chi^2	df	Cont Coef	p
Visual-Motor	0	68.7500	56	0.9285	0.1179
	1	42.9000	35	0.8921	0.1686
	2	42.5833	40	0.8675	0.3605
	3	44.2917	30	0.8432	0.0449*
	4	10.1175	12	0.5895	0.6057
Reasoning	0	53.1667	48	0.9103	0.2820
	1	44.0000	42	0.8944	0.3869
	2	49.0000	48	0.8819	0.4328
	3	29.1250	24	0.7862	0.2155
	4	11.3604	12	0.6117	0.4983
Incidental Memory	0	28.8750	24	0.8510	0.2249
	1	19.2500	21	0.7977	0.5691
	2	26.6000	32	0.8094	0.7365
	3	32.4000	24	0.8018	0.1174
	4	11.6771	6	0.6170	0.0696
Visuo-spatial	0	71.5000	64	0.9309	0.2429
	1	52.2500	49	0.9089	0.3489
	2	74.6667	72	0.9177	0.3917
	3	58.0000	48	0.8736	0.1528
	4	28.7375	27	0.7759	0.3737
Total	0	77.0000	64	0.9354	0.1277
	1	57.7500	56	0.9165	0.4104
	2	81.6667	80	0.9239	0.4272
	3	73.0000	60	0.8957	0.1209
	4	42.1562	39	0.8303	0.3361

* $P < 0,05$

The results in Table 7.3 indicate that Null Hypothesis 1.2 should be accepted and Alternate Hypothesis 1.2 be rejected, except for the visual-motor subtest in grade 3.

7.3.2 Research Hypothesis 2

There will be a positive relationship between scores on the General Reasoning Group Test and performance on the Draw-A-Person test for pupils in Venda in Grades 0 - 4.

7.3.2.1 Null hypothesis 2

There is no significant correlation between the scores on the General Reasoning Group Test and the performance on the Draw-A-Person test for pupils in Venda in Grades 0 - 4.

Alternate hypothesis 2

There is a significant correlation between the scores on the General Reasoning Group Test and on the Draw-A-Person test for pupils in Venda in Grades 0 - 4.

Table 7.4 Represents Pearson's Contingency Coefficient Correlation between the scores on the GRGT and performance on the DAP test for pupils in Venda in Grades 0 - 4.

TABLE 7.4 PEARSON'S CONTINGENCY CORRELATION COEFFICIENT FOR GRGT BETWEEN DAP-SELF

	GRADE	Chi^2	df	Cont Coef	p
Visual-Motor	0	64.1667	56	0.9239	0.2120
	1	41.8000	40	0.08898	0.3926
	2	45.3055	45	0.8740	0.4692
	3	58.6667	60	0.8748	0.5246
	4	58.9000	64	0.8695	0.6569
Reasoning	0	61.4167	48	0.9209	0.0924
	1	55.0000	48	0.9129	0.2267
	2	47.6389	54	0.8791	0.7167
	3	56.7500	48	0.8713	0.1811
	4	63.3333	64	0.8771	0.5000
Incidental Memory	0	24.2917	24	0.8296	0.4450
	1	25.6667	24	0.8367	0.3703
	2	37.1000	24	0.8521	0.4181
	3	54.1143	48	0.8663	0.2525
	4	34.0417	32	0.8011	0.3696
Visuo-spatial	0	71.5000	64	0.9309	0.2429
	1	60.5000	49	0.9089	0.3489
	2	84.0000	72	0.9177	0.3917
	3	71.5000	48	0.8736	0.1528
	4	76.7916	27	0.7759	0.3737
Total	0	71.5000	64	0.9309	0.2429
	1	63.2500	56	0.9230	0.2358
	2	82.8333	81	0.9249	0.4446
	3	108.2500	96	0.9260	0.1850
	4	159.13	144	0.9452	0.1839

* $P < 0,05$

The results indicate that Null Hypothesis 2 could be accepted and that Alternate Hypothesis 2 should be rejected.

CHAPTER 8

DISCUSSION OF RESULTS

8.1 INTRODUCTION

The aim of this investigation was mainly to establish whether the General Reasoning Group Test as developed by Foxcroft, Shillington and Turk (1990):

- was applicable to pupils in Grades 0 - 4 in Venda, Northern Province;

- can predict academic performance;

- correlated with an established test that measures neurological development;

- can identify pupils who academically are at risk; and

- to investigate the use of the GRGT as a culture fair measuring instrument for all South African children.

To reach these objectives, the following steps were taken:

1. The instructions of the GRGT were translated into Tshivenda and back translated into English. No alterations were made to the stimulus materials as they were non-verbal.

2. The GRGT was administered to 86 pupils in Venda (Grade 0:11; Grade 1:14; Grade 2:14; Grade 3:23; and Grade 4:24). The subjects were free from neurological impairments. The Draw-A-Person Test (DAP) was administered to this group during the same session.

3. The scores of the different groups on the GRGT were compared with their performance in mathematics and reading as rated by their respective class teachers. This was to establish the predictive validity of the GRGT.

4. The scores on the DAP were correlated with the scores on the GRGT to establish construct validity.

The results of this investigation, a possible explanation and implications will be discussed.

8.2 THE GENERAL REASONING GROUP TEST

The research study investigated whether or not a significant correlation existed between the performance on the GRGT and academic scores (mathematics proficiency and reading abilities) for pupils in Grades 0 - 4.

Table 7.1 represents the descriptive statistical data obtained for each of the subtest scores of the GRGT (i.e. visual-motor; reasoning; incidental memory and visuo-spatial); the Draw-A-Person test and, the academic performance in mathematical proficiency and reading abilities by pupils in Venda for grades 0 - 4. The trends of the tables seem to show a gradual increase or improvement in performance from grade 0 - 4 for GRGT subtests.

This upward trend is also reflected in DAP test scores. This inspection of the descriptive statistical table 7.1 reveals a fairly consistent improvement in GRGT scores with increase in age and grade, although in the performance of mathematics and reading abilities the trend is different.

8.2.1 Correlation between GRGT and performance in Mathematics

Table 7.2 represents the Pearson's Contingency Coefficient correlation between GRGT and mathematical performance of all the 5 groups. The aim of performing this correlation is to establish whether or not the performance of these pupils on the GRGT correlated with their scholastic mathematical performance.

Table 7.2 indicates that the correlation between GRGT and mathematics has a tendency of inclination towards significance. The significant level was $p < 0,05$ throughout.

Sufficient statistical confirmation has thus been obtained to accept the Null Hypothesis 1.1 and reject its alternate. The correlation is not statistically significant.

8.2.2 Correlation between GRGT and performance in reading ability

The correlation between the GRGT and reading abilities of the pupils tested as shown in Table 7.3 reflected that the Null Hypothesis 1.2 could be confirmed and reject the Alternate Hypothesis 1.2. Although there are some significance levels in some subjects for instance 0,0449 shown in

visual-motor ability subtest, the tendency is however towards significance.

8.3 DRAW-A-PERSON TEST

The Goodenough-Harris Draw-A-Person scale is used to measure intellectual maturity (Harris 1963; Jones, 1973; Mayekiso, 1982) in terms of:

(a) the ability to reach abstract levels (i.e. to classify objects according to the similarity and differences);

(b) the ability to discriminate between similarities and differences; and

(c) the ability to generalize (i.e. to assign an object newly experienced to a correct class according to discriminate features, properties or attributes).

8.3.1 Correlation between GRGT and DAP scores

The research hypothesis 2 states that there will be a positive relationship between the scores on the GRGT and the performance on the Draw-A-Person test by the pupils in Venda in grades 0 - 4.

The correlation between the GRGT and DAP scores represented in Table 7.4 shows that the Null Hypothesis 2 should be accepted. Although the DAP is an established test there is a non-significant correlation between the scores on the DAP and the GRGT as indicated on Table 7.4.

8.4 COMPARISON AMONG GROUPS

The present study investigated whether or not a significant relationship existed between performance on the GRGT and the academic subjects (i.e., Mathematics and Reading in English and Tshivenda) abilities in five different grades (i.e., from 0 - 4 for pupils in Venda region). The Descriptive Statistics table reveals a fairly consistent improvement in the GRGT performance and the scholastic subjects when the grades are compared from grade 0 with 26,0; grade I with 29,7; grade II with 32,2; and grade III with 36,0 in the GRGT performance.

This fairly gradual improvement in the GRGT and scholastic performance increases with the increase in age and grade.

8.4.1 GRGT and Mathematics: Grades 0 - 4

The performance on the GRGT in grades 0 - 4 reveals a gradual improvement with the increase in age and grade. As the test was the same (GRGT) from grade 0 - 4 and the performance shows an improvement, as could be expected.

8.4.2 GRGT and Reading: Grades 0 - 4

The trends of the performance observed in the comparison between the GRGT and Mathematics is slightly similar to that of the GRGT and the Reading ability. The performance on reading abilities show a decline in performance from grade 0 with 15,3; grade I with 13,8; grade II with 12,0; grade III with 10,5; and grade IV with 10,8. This is a decline in scholastic performance as compared to the improvement in performance in the GRGT by the same grades. This could be explained by the fact that the respective teachers' rating was not standardized and different teachers were involved and the rating of these teachers might have been subjective and biased as compared to the GRGT which was designed to identify

pupils who are academically at risk.

8.4.3 GRGT and DAP: Grades 0 - 4

The comparison between the GRGT and the DAP as represented in table 7.1 shows a fairly good performance with increasing grade. The DAP and the GRGT scores compare favourably with each other. There was a positive correlation although not statistically significant.

8.5 POSSIBLE EXPLANATIONS OF RESULTS

The statistical analysis of the results as indicated in chapter 7 shows that there is a correlation between the GRGT subtests and academic performance in mathematics and the GRGT and reading ability scores on the other hand. However they were not statistically significant. This may be explained as follows:

(a) The sample in this research study was rather small (N = 86).

(b) The rating of the pupils in those grades in Mathematics and Reading was done by their respective class teachers. The tests were not standardized.

(c) The tests and the scores in Mathematics and Reading performance were moderated by the Principal and handed over to the researcher. The rating by the teachers might have been subjective and biased which would have effected the results.

(d) The Mathematics and Reading tests were not similar in all grades, for instance, the assessment in grade 0 in Mathematics was oral rather than written in view of their educational level. The reading ability in grade 0 was done in terms of associating pictures with objects to check their vocabulary.

8.6 LIMITATIONS OF THE PRESENT STUDY

The stringent control of extraneous subject variables was both the major strength and the major limitation of the present study at the same time. It strengthened the design in that highly comparable grades of pupils were obtained but this also limited the research, and the extent to which the results could be generalized on the other hand.

The academic tests were designed by the teachers and not standardized and as a result of these limitations, the results of the study can only be tentatively generalized to pupils in grades 0 - 4 in Venda.

A number of limitations were highlighted by the nature of the results:

(a) The sample was rather small (N = 86). The subsamples for each grade were extremely small (e.g. n = 11).

(b) The rating by the respective class teachers on academic performance (i.e. mathematics and reading) was not standardized.

(c) The performance on the GRGT is related to educational level (grade 0 - 4).

8.7 SUGGESTIONS FOR FUTURE RESEARCH

The presented study thus generated a considerable amount of knowledge which has important implications for future research with the GRGT in South Africa.

It has indicated that:

(a) the need for a bigger sample when research with the GRGT is done.

(b) The researcher should use standardized academic tests.

(c) The performance on the GRGT is related to educational level (grade 0 - 4) and should be extended to senior grades. The construction of a similar screening test for ages above 9 years is important.

(d) The standardization studies with the GRGT in other regions in South Africa within the same educational level should be done and compared.

Foxcroft, Shillington and Turk's (1990) study on Port Elizabeth children and the present study on grades 0 - 4 pupils in Venda region on the GRGT have indicated that there is a great need for the establishment of a standardized South African screening test for children who are academically at risk. Given the implications that have arisen from this study, and Foxcroft, Shillington and Turk's (1990) study, it is hoped that further studies with the GRGT in South Africa will be conducted to obtain further information in terms of its standardization, reliability, validity and its predictive value for scholastic achivement to detect and identify children who are academically at risk.

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APPENDIX "A"

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

FACULTY OF ARTS

UNIVERSITY OF THE NORTH

Ref No : MA 01/1/92
Tel : 0159 - 21876 (Home)

P.O. Box 903
THOHOYANDOU
27 - 04- 92

THE DIRECTOR GENERAL
DEPARTMENT OF EDUCATION AND CULTURE
PRIVATE BAG 2250
P.O. SIBASA
VENDA

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGICAL TESTS IN A SAMPLE OF SCHOOLS IN VENDA FOR AN M.A. RESEARCH.

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct neuropsychological tests in a sample of schools here in Venda. The sample will be from the following Inspection Areas :
Thohoyandou , Mutshindudi , Mutale , Vuwani , Nzhelele and Tshitandani. This research is for an M.A. in Neuropsychological Research. The project will run as from May 1992 to October 1992.

3. The Department of Psychology at the University of the North is currently conducting a Neuropsychological Research Project on developmental aspects of 5;6;7;8; and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity , visual-motor abilities , visual - spatial abilities , memory , reasoning ability and perceptual development.

4. I hope that this will not only help the pupils , teachers , parents and the Department of Education , but also the entire community as a whole.

Yours Faithfully

J.G. Tshifularo
(M.A. Research Student)

Dr J.A. Meyer
(Senior Lecturer : Supervisor)

VP. 18

REPUBLIC OF VENDA

REPUBLIEK VAN VENDA

RIPHABULIKI YA VENDA

MUHASHO WA PFUNZO NA MVELELE
DEPARTMENT OF EDUCATION AND CULTURE
DEPARTEMENT VAN ONDERWYS EN KULTUUR

PRIVATE BAG
Privaatsak x 2250
SIBASA
Venda

Diresi ya thelegrafu
Telegraphic address *"PFUNZO"*
Telegrafiese adres

Nomborondaula
Reference No:
Verwysings nr.: 7/4/2/1

Nu vhudziswa:
Enquiries:
Navrae: C.E.S (O)

Tel. No. (015581) 3-1001
Fax No. (015581) 3-1179

J.G. Tshifularo
P.O. BOX 903
THOHOYANDOU
VENDA

REQUEST TO CONDUCT TESTS IN SCHOOLS.

1. Your letter dated 27.4.1992 refers.

2. Permission is hereby granted for you to conduct tests in schools in the following areas :

   Thohoyandou, Mutshindudi, Mutale, Nzhelele and Tshitandani.

3. Kindly discuss your plans with the Area Managers concerned before visiting the schools.

DIRECTOR GENERAL FOR EDUCATION AND CULTURE

/kjm/

APPENDIX A3

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

TY OF ARTS

UNIVERSITY OF THE NORTH

Ref. No. : MA 02/1/92
Tel. No. 0159-21876

P.O. Box 903
THOHOYANDOU
22 April 1992

THE AREA MANAGER
THOHOYANDOU INSPECTION AREA
PRIVATE BAG 2216
SIBASA
VENDA

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGICAL TESTS IN YOUR AREA IN A SAMPLE OF SCHOOLS BASED ON URBAN OR RURAL SITUATIONS FOR AN M.A. IN NEUROPSYCHOLOGY RESEARCH

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your Inspection Area at a sample of schools selected on their geographic position, i.e. Urban or Rural. The pupils will select/sample on the basis of age, sex, language, standard in class, from urban or rural or semi-rural and family, socio-economic standing. The tests will be conducted as from May 1992 to October 1992, for an M.A. in Neuropsychology Research.

3. The Department of Psychology of the University of the North is currently conducting a Neuropsychological Research Project on developmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. Research Student)

Dr. J.A. MEYER
(Senior Lecturer: Supervisor)

APPENDIX A4

Tel : 51807
Ref : 8/4/11/1

TO WHOM IT MAY CONCERN

1. This is to certify that the bearer, Mr J.G. Tshifularo, has been granted permission to conduct research for his M.A. degree in primary and Secondary Schools under the jurisdiction of Thohoyandou Inspection Area.

2. You are kindly requested to assist Mr Tshifularo in his research and we thank you in advance.

AREA MANAGER : THOHOYANDOU
MVM/mgm

The Area Manager
Thohoyandou Inspection Area
Private Bag x 2250
SIBASA
VENDA

APPENDIX A5

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

FACULTY OF ARTS

UNIVERSITY OF THE NORTH

Ref. No. MA 02/2/92
Tel. No. 0159-21876

P.O. Box 903
THOHOYANDOU
22 April 1992

THE AREA MANAGER
NZHELELE INSPECTION AREA
PRIVATE BAG X1001
DZANANI

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGIGAL TESTS IN YOUR AREA IN A SAMPLE OF SCHOOLS BASED ON URBAN OR RURAL SITUATIONS FOR AN M.A. IN NEUROPSYCHOLOGY RESEARCH

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your Inspection Area at a sample of schools selected on their geographic position, i.e. Urban or Rural. The pupils will select/sample on the basis of age, sex, language, standard in class, from urban or rural or semi-rural and family, socio-economic standing. The tests will be conducted as from May 1992 to October 1992, for an M.A. in Neuropsychology research.

3. The Department of Psychology of the University of the North is currently conducting a Neuropsychology Research. Research Project on developmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological tests will be used to assess such aspects as intelectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. RESEARCH STUDENT)

Dr. J.A MEYER
(SENIOR LECTURER
SUPERVISOR

APPENDIX A6

REPUBLIEK VAN VENDA

RIPHABULIKI YA VENDA

REPUBLIC OF VENDA

Tel : Dzanari 5
Nomborondaula:
Verwysingsno :
Reference No : 7/4/2/1

Hu Vhudziswa :
Navree : Area Manager
Enquiries :

Ofisi ya-Kantoor Van Die-Office of the
Nzhelele Inspection Area
Tshisagana Tsha Poswo
P.Sak / Private Bag X 1001
Dzanani Venda 9
15 June 1992

To whom it may concern

Permission to conduct Neuropsychological Research in The Nzhelele Inspection Area: Research by J.G. Tshifularo

1. The above stated matter refers.

2. This Office has granted permission to Mr J.G. Tshifularo to conduct his research (Neuropsychological tests) in the Nzhelele Inspection Area.

3. Principals of schools are kindly requested to make the necessary arrangements in such a manner that teaching periods and the general school management will be normal when tests will be conducted.

4. Kindly give Mr J.G. Tshifularo any form of assistance he may require from you.

.....

AREA MANAGER: NZHELELE

em/

APPENDIX A7

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

CULTY OF ARTS
Ref. No. MA 02/6/92
Tel. No. 0159-21876

UNIVERSITY OF THE NORTH
P.O. Box 903
THOHOYANDOU
22 April 1992

THE AREA MANAGER
MUTSHINDUDI AREA
PRIVATE BAG X4000
TSHIDIMBINI

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGICAL TESTS IN YOUR AREA IN A SAMPLE OF SCHOOLS BASED ON URBAN OR RURAL SITUATIONS FOR AN M.A. IN NEUROPSYCHOLOGY RESEARCH

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your Inspection Area at a sample of schools selected on their geographic position, i.e. Urban or Rural. The pupils will select/sample on the basis of age, sex, language, standard in class, from urban or rural or semi-rural and family, socio-economic standing. The test will be conducted as from May 1992 to October 1992, for an M.A. in Neuropsychology Research.

3. The Deaprtment of Psychology of the University of the North is currently conducting a Neuropsychology Research Project on ddevelopmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. Research Student)

Dr. J.A. MEYER
(Senior Lecturer: Supervisor)

TEL: 21 Vhufuli
REF:
ENQ: D.C.E.S.

DEPARTMENT OF EDUCATION
MUTSHINDUDI AREA OFFICE
PRIVATE BAG X4000
TSHIDIMBINI
11 MAY 1992

P.O. Box 903
THOHOYANDOU

APPLICATION FOR PERMISSION TO CONDUCT RESEARCH: MUTSHINDUDI AREA: TSHIFULARO J.G.

1. The above matter refers.

2. Permission to conduct research in our schools is hereby granted. However, particulars of the sample schools must be supplied to us.

.....
AREA MANAGER: MUTSHINDUDI AREA
/tvm.

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

FACULTY OF ARTS
Ref. No. MA 02/4/92
Tel. No. 0159-21876

UNIVERSITY OF THE NORTH
P.O. Box 903
THOHOYANDOU
22 April 1992

THE AREA MANAGER
MUTALE AREA
PRIVATE BAG X1195
MUTALE

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGICAL TESTS IN YOUR AREA IN A SAMPLE OF SCHOOLS BASED ON URBAN OR RURAL SITUATIONS FOR AN M.A. IN NEUROPSCHOLOGY RESEARCH

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your Inspection Area at a sample of schools selected on their geographic position, i.e. Urban or Rural. The pupils will select/sample on the basis of age, sex, language, standard in class, from urban or rural or semi-rural and family, socio-economic standing. The tests will be conducted as from May 1992 to October 1992, for an M.A. in Neuropsychology Research.

3. The Department of Psychology of the University of the North is currently conducting a Neuropsychological Research Project on developmental aspects of 5; 6; 7;8 and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. Research Student)

Dr. J.A. MEYER
(Senior Lecturer
Supervisor)

APPENDIX A10

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

'ULTY OF ARTS

UNIVERSITY OF THE NORTH

Ref. No. MA 02/3/92
Tel. No. 0159-21876

P.O. Box 903
THOHOYANDOU
22 April 1992

THE AREA MANAGER
VUWANI INSPECTION AREA
PRIVATE BAG X1248
VUWANI

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGICAL TESTS IN YOUR AREA IN A SAMPLE OF SCHOOLS BASED ON URBAN OR RURAL SITUATIONS FOR AN M.A. IN NEUROPSYCHOLOGY RESEARCH

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your Inspection Area at a sample of schools selected on their geographic position, i.e. Urban or Rural. The pupils will select/sample on the basis of age, sex, language, standard in class, from urban or rural or semi-rural and family, socio-economic standing. The tests will be conducted as from May 1992 to October 1992, for an M.A. in Neuropsychology Research.

3. The Department of Psychology of the University of the North is currently conducting a Neuropsychological Research Project on developmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological test will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. Research Student)

Dr. J.A. MEYER
(Senior Lecturer: Supervisor)

APPENDIX A11

TEL.: Vuwani 60
REF.: 2/2/6
ENQ.: [illegible]

[illegible]
[illegible] 1240
[illegible]
[illegible]
23. 05. 1992

Mr J.G. Tshifularo
[illegible] 903
[illegible]
VENDA

[illegible] : [illegible].

1. Your minute dated 22.04.92 in respect of the above matter refers.

2. [illegible].

....
[illegible]
[illegible]

DZINDI CIRCUIT
MUNGAMELI WA LIISELA
CIRCUIT INSPECTOR
[illegible]/Private Bag X 1405
1992-05-27
[illegible]LAVIANI, VENDA
[illegible]
[illegible]

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

CULTY OF ARTS

UNIVERSITY OF THE NORTH

Ref. No. M.A. 02/5/92
Tel. No. 0159-21876

P.O. Box 903
THOHOYANDOU
22 April 1992

THE AREA MANAGER
TSHITALE INSPECTION AREA
PRIVATE BAG X1404
MULIMA
VENDA

Dear Sir

APPLICATION FOR PERMISSION TO CONDUCT NEUROPSYCHOLOGICAL TESTS IN YOUR AREA IN A SAMPLE OF SCHOOLS BASED ON URBAN OR RURAL SITUATIONS FOR AN M.A. IN NEUROPSYCHOLOGY RESEARCH

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your Inspection Area at a sample of schools selected on their geographic position, i.e. Urban or Rural. The pupils will select/sample on the basis of age, sex, language, standard in class, from urban or rural or semi-rural and family, socio-economic standing. The tests will be conducted as from May 1992 to October 1992, for an M.A. in Neuropsychology Research.

3. The Department of Psychology of the Univeristy of the North is currently conducting a Neuropsychological Research Project on developmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial ablities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. Research Student)

Dr. J.A. MEYER
(Senior lecturer
Supervisor)

APPENDIX A13

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

FACULTY OF ARTS
Ref. No. MA 03/1/92
Tel. No. 0159-21876

UNIVERSITY OF THE NORTH
P.O. Box 903
THOHOYANDOU
22 April 1992

THE PRINCIPAL

.....

.....

.....

.....

Dear Sir/Madam

APPLICATION FOR PERMISSION TO CONDUCT A NEUROPSYCHOLOGICAL TEST IN YOUR SCHOOL TO A SAMPLE OF YOUR PUPILS FOR AN M.A. RESEARCH PROJECT

1. The above matter has reference.

2. I hereby wish to apply for permission to conduct Neuropsychological tests in your school to a sample of all the pupils selected according to their age, standard, sex, language, from rural, semi-rural or semi-urban for an M.A. in Neuropsychology Research project as from May 1992 to October 1992.

3. The Department of Psychology of the University of the North is currently conducting a Neuropsychological Research project on developmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

4. I hope that this will not only help the pupils, teachers, parents and the Department of Education but also the community as a whole.

Yours faithfully

J.G. TSHIFULARO
(M.A. Research Student)

Dr. J.A. MEYER
(Senior Lecturer: Supervisor)

APPENDIX A14

X1106 SOVENGA, 0727 (01522) 4310 FAX NO. (01522) 4942 331813 SA UNIN

FACULTY OF ARTS

UNIVERSITY OF THE NORTH

Ref. No. MA 04/1/92
Tel. No. 0159-21876 (HOME)

P.O. BOX 903
THOHOYANDOU
VENDA
22 April 1992

THE PARENTS OF .....

The Department of Psychology of the University of the North is currently conducting a Neuropsychological Research Project on developmental aspects of 5; 6; 7; 8 and 9 year old children. These psychological tests will be used to assess such aspects as intellectual maturity, reasoning abilities, visual-motor abilities, visual-spatial abilities, memory and perceptual development.

We shall test your child at his/her school during normal school hours. No fee will be charged and we will give parents and teachers a detailed report on the test results of each child, so that you will know his/her abilities neuropsychologically. Although the tests will be utilized for research purposes, all test information will be treated as strictly confidential.

Futhermore we would appreciate it if you could fill in the attached questionaire which will give us more background information on your child and return it to the Principal as soon as possible.

For further information regarding this project contact:

Dr. J.A. Meyer (01521) 689111 ext 2944

OR

J.G. TSHIFULARO (0159) 21876 (A.H.)

We greatly appreciate your co-operation and assistance in this matter.

Yours sincerely,

Dr. J.A. Meyer
(Senior Lecturer: Supervisor)

J.G. Tshifularo
(M.A. Research Student)

APPENDIX B

X1106 SOVENGA, 0727 (01522) 4310 FAX NO (01522) 4942 331813 SA UNIN

ULTY OF ARTS

UNIVERSITY OF THE NORTH

CONSENT FORM

I hereby *GRANT/DO NOT GRANT permission for my child to participate in the research study concerning the GENERAL REASONING GROUP TEST.

1. PARENT'S NAME: _____

2. PARENT'S SIGNATURE: _____

3. DATE: _____

4. CHILD'S NAME: _____

5. DATE OF BIRTH: _____

*Delete which is not applicable

_____

APPENDIX C

1. QUESTIONNAIRE FOR PARENTS

1.1 CHILD'S NAME: _____

1.2 DATE OF BIRTH: _____ 1.3 AGE: _____ 1.4 SEX: ____

1.5 HOME ADDRESS: _____

1.6 HOME LANGUAGE: _____ 1.7 TEL: _____

1.8 SCHOOL: _____ 1.9 STD: _____

1.10 PARENTS/GUARDIAN NAMES: _____

1.11 PARENTS/GUARDIAN OCCUPATION: _____

2. PARENT'S/GUARDIAN'S EDUCATION LEVEL:

(Please tick the highest level achieved).

	YES	NO
2.1 None		
2.2 Primary School:		
2.3 Junior Certificate:		
2.4 Apprenticeship:		
2.5 Matric:		
2.6 Tertiary Education (Not at University):		
2.7 University Degree/Diploma:		

3. BIRTH HISTORY OF THE CHILD:

3.1 Describe anything unusual during the pregnancy or delivery (if any): _____

_____

3.2 Was the birth:

	YES	NO
3.2.1 Natural?		
3.2.2 Induced?		
3.2.3 By Ceasarian Section?		
3.2.4 A forceps delivery?		
3.3 Was your child anoxic (i.e. did he/she lack oxygen) at birth?		
3.4 Was your child born either prematurely or after more than 41 weeks of pregnancy?		
3.5 Is your child one of twins?		
3.6 Was walking normal? age?		
3.7 Was talking normal? Age?		
3.8 Was toilet training normal?		
3.9 Was feeding development normal?		

3.10 Was your child ever had?:

3.10.1 Meningitis:.....	____	____
	____	____
3.10.2 Encephalitis:.....	____	____
	____	____
3.10.3 Convulsions (fits):.....	____	____
	____	____
3.10.4 Concussion:.....	____	____
	____	____
3.10.5 Anemia:.....	____	____
	____	____
3.10.6 A very high fever/temperature:.....	____	____
	____	____
3.10.7 A head injury where he/she lost consciousness	____	____
	____	____
3.10.8 An allergy:.....	____	____
	____	____
3.11 Does your child complain of headache?.....	____	____
	____	____
3.12 Is your child clumsy?.....	____	____
	____	____
3.13 Does your child have dizzy spells sometimes:	____	____
	____	____
3.14 Does your child have nightmares often?.....	____	____
	____	____
3.15 Does your child fall deeply asleep even though it is not his/her bedtime, sometimes:	____	____
3.16 Does your child have temper tantrums regularly?.....	____	____
	____	____
3.17 Does your child wet the bed regularly:.....	____	____
	____	____
3.18 Does your child sometimes stare blankly:....	____	____

3.19 Does your child sometimes start to say something, blank out and forget what he/she was saying?..... ---- ----

3.20 Does anyone in your immediate family circle suffer from epilepsy?..... ---- ----

3.21 Do you sometimes notice a muscle or group of muscles twitching in your child:..... ---- ----

3.22 Does your child sleep-walk?..... ---- ----

3.23 Is your child on any kind of medication? If so, for what? _____ ---- ----

_____

3.24 Does your child lie or steal?..... ---- ----

3.25 Does your child get on well with other children:..... ---- ----

3.26 Has your child's school history been normal: ---- ----

3.27 What was the symbol for your child's last examination (aggregate):..... ---- ----

3.28 What subjects is your child very poor at school:..... ---- ----

3.29 Has the teacher complained that your child is very restless and struggles to concentrate in class?..... ---- ----

3.30 Does your child sometimes, start crying for no apparent reason?..... ---- ----

3.31 **DOES YOUR CHILD:**

3.31.1	Stutter?.....	____ ____
3.31.2	Stammer?.....	____ ____
3.31.3	Faint frequently?.....	____ ____
3.31.4	Bite his/her nails excessively?.....	____ ____

3.32 List all <u>other</u> his/her childhood diseases and ages: _____

_____

_____

4. PARTICULARS OF BROTHERS/SISTERS

4.1	NAME	STANDARD AT SCHOOL	LEFT-HANDEDNESS/ RIGHT-HANDEDNESS
4.1.1			
4.1.2			
4.1.3			
4.1.4			
4.1.5			
4.1.6			
4.1.7			

5. SCHOOL STAMP:

6. THANK YOU FOR YOUR CO-OPERATION IN FILLING IN THIS QUESTIONNAIRE. ALL THE INFORMATION THAT YOU HAVE SUPPLIED WILL BE TREATED AS STRICTLY CONFIDENTIAL.

INSTRUCTIONS FOR ADMINISTERING

THE GENERAL REASONING GROUP TEST

Introduction

The examiner must be familiar with the test content and instructions before administering the test. It is recommended that the examiner has an assistant, who is familiar with the test, present during the administration. Groups of no more than 20 children should be tested at one time. It is important to ensure that each child understands the questions being asked. Each set of items have example posters that must be used to help explain the instructions to the children. The examples may be repeated until the examiner is satisfied that the children have adequately understood the instructions.

For each item the examiner must hold up the test booklet and point to where the item is so that the child is orientated to where the correct item is in the booklet. This prevents the children from answering the wrong question in the wrong place. It should also help to prevent the child from turning over more than one page at a time.

Test Instructions:

Section 1 - Visual-motor Ability

This section examines the child's visual-motor ability (i.e., the child's ability to accurately reproduce/copy a geometric figure).

Instructions: *"Look carefully at this picture here,* (point to the first item in test booklet) *you must draw a picture exactly like this one in this space here"* (point to empty block). Repeat this instruction for each item. The first three items are practice items. Ensure that the child gets them correct before proceeding to the 6 items which follow them.

Section 2 - Reasoning

(a) Missing Body parts

Example: *"In this picture here* (point) *you will notice that something is missing. Find the missing part among these pictures here* (point). *Draw a line through the missing part. This man's mouth is missing* (point) *and in this picture here* (point) *is a mouth, so I draw a line through this picture here."* Demonstrate on the poster. The instruction can be repeated to ensure that each child has understood the instruction.

Two Items: *"In this picture here (point) you will notice that something is missing. Find the missing-part among these pictures here (point). Draw a line through the missing part."* The instruction is repeated for each item.

(b) Number and Quantities

This subsection examines knowledge of simple number concepts. The instruction for each item can be read more than once if necessary.

Example: Demonstrate using the poster. Say: *"Draw a line through the middle cup. This (point) is the middle cup, so I must draw a line through it. Now you draw a line through the middle cup in your booklet".*

Use the test booklet to point to each item.

1. *"Draw a line through the picture with the most trees."*
2. *"Draw a line through the second longest crayon/pencil."*

(c) Seriation

This test examines the child's ability to complete patterns.

Example: *"Which of these pictures here (point) belongs in this space here (point). You will notice that these pictures here form a pattern, first we have a bucket, then we have a ball and then we have a bucket again. So we need another ball to fit in here (point) to complete the pattern. So we draw a line through this ball."* Demonstrate on poster A. Then show poster B with the completed pattern to demonstrate how it should look. This instruction can be repeated to ensure that each child understands it.

Two items: *"Which of these pictures here (point) belongs in this space here (point). You will notice that these pictures here form a pattern. So you must choose the picture here (point) that will complete the pattern."* This instruction is repeated for each item in this subsection.

(d) Figure-ground

This test examines the child's visual discrimination ability.

Example: *"In this block (point) there is a shape. Find this shape among the pictures in these blocks (point). Draw a line through the block where you can find the same shape as this one (point). This block here (point) has the same shape so I draw my*

line through this block. Draw a line through the block in your book that has the same shape as this one."

Three items: *"In this block* (point) *there is a shape. You must find this shape among the pictures in these blocks* (point). *Draw a line through the block where you can find the same shape as this one."* Repeat this instruction for each item.

(e) Colour-Form

This measures the child's ability to alternate between two concepts.

Example: *On this poster we have different shapes* (hold up poster A) *and on this poster we have different colours* (hold up poster B). *On this poster here* (hold up poster C) *there are various shapes and various colours. For example, here is a red circle and here is another circle, but it is blue. In this exercise we are firstly going to look for the same shape; if I have a square, then I will look for another one* (demonstrate using the poster). *We are then going to look for the same colour, if I have something that is red then I will look for something else that is red* (demonstrate on the poster). *Thus we are going to look for two shapes that are the same and then for two colors that are the same. What we have to do is to draw a line to join first the two shapes that are the same and then a line to join the two colours that are the same. Show me which shape is the same as this one* (point to the red circle)." Once the correct shape has been identified by one of the children, the examiner must draw a line from the first circle to the next circle, which is blue. *"Now we have to go to a shape having the same colour as this one. Point to a shape having the same colour."* The examiner must then draw a line from the blue circle to the blue triangle. *"Then we have to look for a shape that is the same as this one. Point to the shape that is the same as this one."* The examiner must then draw a line from the blue triangle to the orange one. *"Now we have to look for a colour that is the same as this one. Point to the shape that has the same colour as this one."* the examiner must now join the orange triangle and orange rectangle. *"Point to the shape that is the same as this one."* When the black rectangle has been identified by one of the children, the examiner must join the two shapes on the poster. *"The idea here is first to draw a line to the same shape and then to draw a line to a shape that is the same colour. I want to see if you can join the shapes and colours in your test book in the same way as I have just done them."* The instructions must be repeated until the examiner is satisfied that the children have understood what they are expected to do.

Item: *"Now you must try to do this by yourself. Remember, first you must draw a line to the shape that is the same and then a*

line to the colour that is the same. You must start here (point to the orange triangle) *and end here* (point to the yellow semi-circle/moon)".

Section 3 - Incidental Memory

This subsection examines the child's non-intentional visual memory.

Example: *"Which one of these pictures here* (point) *have you seen in this booklet today? We saw the bicycle somewhere else in this booklet. So we must draw a line through the bicycle."* Repeat this instruction until the child understands what is required.

Four items: *"Which one of these pictures have you seen in this book today? Draw a line through this picture."* Repeat this instruction for each item.

Section 4 - Visuo-spatial ability

This section examines the child's visual-spatial ability.

Example: *"On this board there are black dots just like those on your page. This dot here* (point to the upper-left dot) *is the same as this one here* (point to corresponding dot in test booklet and ask all the children to point to this dot too). *This dot here* (point to middle dot on placard) *is the same as which dot in your book? Point to that dot."* Check to see that the children have identified the correct dot. *"Now I am going to tap some of these dots here and I want you to join the same dots that I tap here* (point) *in your book. So if I tap these dots, then you must join these three dots in your book."* Demonstrate.

Seven items: For each item, point to the correct place in the test book and say: *"Watch carefully to see which dots I tap. When I have finished, then you must draw lines to join those dots in your book. Don't start drawing the lines until I say 'Begin'."* Tap out the sequence and say *"Begin"*.

INSTRUCTIONS FOR ADMINISTERING THE GENERAL REASONING GROUP TEST

TESI INSTRUCTIONS

SECTION 1 - VISUAL-MOTOR ABILITY

Ndivhadzo : Sedzesani tshifanyiso hetshi, ni fanela u ola tshifanyiso tshine tsha tou fana tshothe na hetshi hafha

SECTION 2 - REASONING

(a) Missing Body Parts.

Tsumbo "Kha tshifanyiso hetshi (point) ni do wana uri hu na zwithu zwine zwa khou tahela. Talani mutalo kha murado une wa khou tahela. Mulomo wa munna uyu u khou tahela nahone kha tshifanyiso hetshi, ndi mulomo, ngauralo ndi do tala mutalo kha tshifanyiso hetshi.

Two Items: Kha zwifanysio hezwi ni do wana uri hu na zwine zwa khou tahela. Wanani murado kana tshipida tshine tsha khou tahela hafha. Talani mutalo kha tshipida tshine tsha khou tahela.

(b) Number and quantities.

Example: Talani mutalo kha khaphu i re vhukati. Heyi ndi khaphu i re vhukati, ngauralo ndi tea u tala mutalo khayo. Zwino talani mutalo kha khaphu ya vhukati i re kha kubugwana kwanu.

Shumisani kubugwana kwa thesite u sumbedza tshitenwa tshinwe na tshinwe.

(1) Talani mutalo kha tshifanyiso tshi re na zwifanyiso zwinshi.

(2) Talani mutalo kha khirayoni/penisela ndapfusa.

(c) Seriation.

Example: Ndi tshifhio tsha zwifanyiso izwi tshi no tea u dzhena kha tshikhala itshi. Ni do wana uri zwifanyiso izwi zwi ita mutevhe; u thoma ri na bakete, ha tevhela bola, ha dovha ha da bakete. Ngauralo hu todea bola inwe uri mutevhe u fhelele. Ngauralo ri tea u tala mutalo kha bola heyi.

Two Items: Ndi tshifhio tsha zwifanyiso afha tshine tsha tea tshikhalani itshi. Ni do wana uri zwifanyiso izwi zwi ita mutevhe. Ngauralo ni tea u nanga tshifanyiso afha tshine tsha do ita uri mutevhe u vhe wo fhelelaho.

(d) Figure - ground.

Example: Kha buloko iyi hu na tshivhumbeo. Wanani tshivhumbeo itsho kha zwifanyiso zwi re kha buloko iyi. Talani mutalo kha buloko ine na wana i na tshifanyiso tshi re na tshivhumbeo tshi fanaho na itshi. Buloko iyi i na tshivhumbeo tshi fanaho natsho ngauralo ndi tala mutalo kha buloko iyi. Talani mutalo kha buloko buguni yanu i re na tshifanyiso tshi fanaho na itshi.

Three Items: Kha buloko iyi hu na tshivhumbeo. Ni tea u wana tshivhumbeo kha zwifanyiso zwi re kha mabuloko aya. Talani mutalo kha buloko i re na tshivhumbeo tshi fanaho na itshi.

(e) Colour Form.

Example: Kha bammbiri la tsumbedzo/phosita ili hu na zwivhumbeo zwo fhambanaho (imiselani ntha phosita A) nahone kha bammbiri ili ri na mivhala yo fhambanaho (imiselani ntha phosita B). Kha bammbiri ili (imiselani ntha phosita C) hu na zwivhumbeo zwo fhambanaho na mivhala yo fhambanaho.

Tsumbo; hu na tshidanga tshitswuku; huno, hafha hu na tshidanga tshinwe tshi re na muvhala mudala. Kha iyi ngudo ri do tham nga u toda zwivhumbeo zwi fanaho, arali nda wana tshikwairi/thofunde-ina ndi do toda inwe. (Itani musumbedzo ni tshi shumisa phosita). Ri do dovha hafhu ra toda mivhala i fanaho; arali ndi na tshithu tshitswuku ndi do dovha nda toda tshinwe hafhu tshitswuku. (Itani musumbedzo nga phosita). Zwion ri do toda zwivhumbeo zwivhili zwi fanaho na mivhala mivhili i fanaho. Ri teaha u tala mutalo une wa tumekanya (tanganya) zwivhumbeo zwivhili zwi fanaho na munwe u tumekanyaho (tanganyaho) mivhala mivhili i fanaho. Ntsumbedzeni uri ndi tshivhumbeo tshifhio tshi fanaho na itshi (sumbani kha tshidanga tshitswuku). Musi tshivhumbeo tshi re tshone tsho no sumbiwa nga munwe wa vhana, mulingi u tea u tala mutalo u bva kha tshidanga tsha u thoma u swika kha tshi tevhelaho, tshi re na muvhal mudala (wa lutombo). Zwino ri ya kha tshivhumbeo tshi re na muvhala u fanaho na uyu.

Sumbani kha tshivhumbeo tshi re na muvhala u fanaho nawo. Mulingi u tea u tala mutalo u bvaho kha tshidanga tshi dala u swika kha thofunde-raru dala. Zwino re tea u toda tshivhumbeo tshi fanaho na itshi. Sumbani tshivhumbeo tshi fanaho na itshi.

Zwino ri tea u toda muvhala u fanaho na hoyu. Sumbani tshivhumbeo tshi re na muvhala u fanaho na hoyu. Sumbani tshivhumbeo tshi fanaho na itshi.

Muhumbulo muhulwane ndi wa u tala mutalo kha zwivhumbeo zwi fanaho na kha zwivhumbeo zwi re na mivhala i fanaho. Ndi todou vhona arali ni tshi nga kona u tala mitalo kha zwivhumbeo na mivhala nga ndila ye nne nda zwi itisa yone.

Item: Zwino ni tea u lingedza u zwi ita nga vho inwi vhane. Elelwani uri ni tea u tala mitalo kha zwivhumbeo zwi fanaho ni dovhe hafhu kha mivhala i fanaho. Ni tea u thoma hafha na guma hafha.

SECTION 3

Example: No vhona tshifhio tsha zwifanyiso izwi kha zwibugwana zwa vho inwi namusi? Ro vhona baisigiri hunwe fhethu kha zwibugwana hezwi. Ngauralo ri tea u tala mutalo kha baisigiri.

Four Items: No vhona tshifhio tsha zwifanyiso izwi kha bugu namusi? Talani mutalo kha tshifanyiso itshi.

SECTION 4

Example: Kha daba/bodo ili hu na zwithoma zwi fanaho na zwila zwi re kha bugu kana siatari la bugu yanu. Tshithoma itshi tshi fana na itsho.

(Dondo)
Tshithoma itshi tshi fana na tshifhio kha bugu yanu? Zwino ndi khou tama u bvisa zwinwe zwa zwithoma (madondo) izwi uri inwi ni tumekanye zwithoma izwo zwe nda bvisa na zwi re buguni yanu. Nda bvisa tshithoma/(dondo) itshi inwi ni tumekanye izwi zwithoma zwiraru buguni yanu.

Seven Items: Sedzesani ni vhone (dondo)/tshithoma tshe nda bvisa. Musi ndo no fhedza ni tale mutalo wa u tanganya zwithoma izwo buguni yanu. Ni songo thoma u tala mitalo u swikela ndi tshi ri thomani.