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THE USE OF THE DEVELOPMENTAL TEST OF VISUAL MOTOR INTEGRATION AND THE DEVELOPMENTAL TEST OF VISUAL PERCEPTION WITH THE URBAN BLACK CHILD

Moira Elizabeth Helm

A dissertation submitted to the Faculty of Medicine, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science (Occupational Therapy).

DECLARATION

I declare that this dissertation is my own, unaided work. It is being submitted for the degree of Master of Science (Occupational Therapy) in the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination in any other University.

Moira Elizabeth Helm

Moira Elizabeth Helm

4th day of October, 1988.

Ethics Committee Clearance Number 18/9/88

Abstract

The purpose of this study was to investigate the appropriateness of the Developmental Test of Visual Motor Integration and the Developmental Test of Visual Perception for the evaluation of perceptual problems in the urban Black child.

530 children were assessed on both tests. They were grouped according to academic ability. Statistical comparisons were made between the two test results for each of the three academic groups and between each group and the American sample population. Percentile rankings of the South African sample population's results were provided. The results of the above comparisons reflected a low correlation between handwriting and academic performance, and the results of the two tests. There was no significant difference between the three academic group's results on the two tests. There was a significant difference between the South African and the American sample populations on the two tests.

The above factors and the fact that studies by other authors were not conclusive in regard to the tests' relevance to academic performance led the candidate to the conclusion that the tests were inappropriate for the assessment of urban Black children.

In Loving Memory of my Father

Jack Thompson

1925 - 1987

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Chapter 1 Introduction

A survey of the prevalence and types of learning disorders among Black primary school children was undertaken in the townships of Wattville and Daveyton on the East Rand, between 1978 and 1980 by Cartwright, Jukes, Wilson and Xaba (1981). They had noted while working at the Wattville and Daveyton Self-Motivation and Assessment Clinic that there were children with a number of disorders, which could have an effect on learning, at the local schools. They approached the Department of Education and Training and were granted permission to undertake a survey. A standard questionnaire was completed by teachers of 7 516 children in ten schools and 122 classrooms. The main language of instruction varied from school to school. Zulu, Northern Sotho, Southern Sotho, and Tswana children were represented. A total of 2 360 (31.3 per cent) of the 7 516 children were identified "as having problems and not coping adequately" (Cartwright et al, 1981:490). The types of problems which made up this figure were: visual, hearing, epilepsy, physical handicap but mentally normal, mental retardation, difficulty with reading and writing, and hyperactivity. Table 1 reflects the distribution of these problems as presented by Cartwright et al (1981:489).

Table 1 Identification of Learning Problems by their Teachers In 7 516 Black Primary School Children

	Sub A	Sub B	Std 1	Std 2	Total	%	
Visual	58	59	62	106	285	3.8	
Hearing	34	50	41	58	183	2.4	
Epilepsy	11	5	7	10	33	0.4	7.3
Physical Handicap but Mentally Normal	18	17	7	9	51	0.7	
Mental Retardation	49	34	22	9	114	1.5	
Difficulty with reading and writing	137	151	156	118	562	7.5	
Hyperactive	268	284	296	284	1 132	15.1	
Total	575	600	591	594	2 360	31.4	

(Cartwright, Jukes, Wilson, and Xaba, 1981:489)

The staff at the Wattville and Daveyton Self-Motivation and Assessment Clinic found that following their involvement in the school survey, children who were suspected of being learning disabled were being referred to the Clinic for assessment and/or treatment. The Clinic which is run under the auspices of the Physically Disabled Association (Transvaal) (formerly Cripple Care) treats only physically disabled children. Wilson, one of the co-workers in the survey of learning problems (1981), an occupational therapist at the Clinic,

approached the candidate for assistance with assessing and treating those children referred who were not physically disabled and therefore fell outside of the Clinic's domain. The candidate, Wilson, and Xaba worked on a voluntary basis with these children The candidate tested a number of children on two tests commonly used by South African occupational therapists to assess visual perceptual motor function in children experiencing difficulties at school. The tests chosen were the Developmental Test of Visual Perce ion and the Developmental Test of Visual Motor Integration. Both tests are standardized for an American population. The candidate became concerned that while the tests were described as being relatively culture free they did not appear to be valid for the South African urban Black primary school child. This dissertation describes the research conducted in an attempt to establish the appropriateness of these two tests for use with the urban Black South African primary school child.

Chapter 2 A Review of the Literature

2.1 Introduction

The issues which are relevant to the candidate's literature survey are both numerous and complex. The most relevant is clearly the literature related to the two tests themselves. However the role of the occupational therapist in the assessment and treatment of learning disabled children, education in South Africa, cultural differences and cross cultural assessment are but some of the subjects relevant to the study in a broader context.

As both tests are concerned with identifying learning difficulties the candidate will begin by placing the study in the context of the historical perspective of learning disabilities, both for South Africa and internationally.

The candidate will also explain the role of the occupational therapist as part of the multidisciplinary team working with children with learning problems. She will briefly describe tests commonly used by occupational therapists working with learning disabled children. A detailed description will be given of the

two tests used in this study.

The importance of test and reliability in cross-cultural research cannot be ignored in a study which is comparing the test results of one culture with that of another. This and the effect of culture on perception will be reviewed.

Validity and reliability are two terms which will be used frequently in this review and therefore warrant the inclusion of definitions. A valid measurement is one which measures "what it is intended to measure" (Allan, 1982:6) and a reliable measurement is one that "can be repeated again and again without there being a real difference between the values" (Allan, 1982:6).

2.2 Learning Disabilities - Historical Perspective

2.2.1 International

The bulk of the early research with children thought to be suffering from learning disabilities was carried out in the United States of America. The large number of research projects being carried out resulted in many differing viewpoints, with little common use of definition or terminology. The initial work was with adult neurological patients. Emphasis later moved on to children with no clear cut neurological deficit.

The following summary of the international history of learning disabilities was extracted from A Psycho-Behavioral Approach Introduction to Learning Disabilities (Hallahan and Kauffman, 1976), Learning Disabilities. Educational Principles and Practices (Johnson and Myklebust, 1967), Developmental and Learning Disabilities (Meier, 1976) and No Easy Answers. The Learning Disabled Child at Home and School (Smith, 1979).

Kurt Goldstein, a behavioural scientist, who worked with adults was to have a significant effect on future research with children. He studied head-injured soldiers of World War One and identified the following five behavioural changes as a result of their head injuries: "forced responsiveness to stimuli, figure-background confusion, hyperactivity, meticulosity, and catastrophic reaction" (Hallahan and Kauffman, 1976:4). While his work was limited to head-injured adults, the symptoms which are listed above were thought to be common to learning disabled children. Goldstein's work therefore had a marked influence on educationalists working with children who appeared to experience similar problems to those listed above. In particular it formed the basis for the work of Alfred Strauss, a neuropsychiatrist and Heinz Werner, a developmental psychologist. In the early 1940s at the Wayne County Training School in Michigan, and later at the Cove School in Wisconsin, they pioneered work in the field of learning disabilities. In the late 1940s and early 1950s, this group in conjunction with Lehtinen, distinguished between those children who had evidence of neurological impairment as a basis for their learning problems and those whose learning problems were the result of mental retardation. They called the neurologically impaired group _ brain-damaged or brain-injured children. They excluded from this group children with overt brain damage. They placed emphasis on perceptual disturbances.

In 1957 William Cruickshank published the results of a major study. His study population included children of near-normal, normal and above average intelligence, thereby bridging the gap between the work with mentally retarded children and those of normal intelligence. Cruickshank went on to implement Werner and Strauss's educational recommendations but for a population whose intelligence ranged from educably retarded to normal intelligence. In this project Cruickshank grouped children according to mental age and important behavioural characteristics e.g. hyperactivity, figure-ground problems.

Two other former staff members of Wayne County Training School, Newell Kephart and Samuel Kirk, influenced by the work of Strauss and Werner, also made important contributions to the development of the study of learning disabilities. Kephart in his book The Slow Learner in the Classroom (1960) emphasised perceptual motor training, and provided teachers with techniques for training perceptual motor skills. Kephart's premise that "to a large extent, so called higher forms of behavior develop out of and have their roots in motor learning" (1960:79) resulted in much of the theorizing and training programmes of the 1960s being based on perceptual motor skills training.

The clear concern reflected in American professional literature for the child of average intelligence with learning problems was taken up by parents with the formation of a parent organization, the Association for Children with Learning Disabilities (ACLD) in 1963. This group had been confused by the use interchangeably in professional literature of some two to three dozen terms to describe learning problems. In 1963 Samuel Kirk had suggested in an address to the group that the term should not be based on etiology but on educational needs. His term "learning disabilities" was accepted by the ACLD.

The question of terminology was not concluded with the acceptance of the term "learning disabilities" by the ACLD. Professionals continued to use terms interchangeably and Clements in 1966 indicated in his summary of the findings of the Joint Study Committee of the National Institute of Neurological Disease and Blindness and the National Institute for Crippled Children's Committee, in the U.S.A., that thirty-eight terms were currently being used in professional literature to describe learning disabled children. This Committee chose as the most appropriate designation "children with minimal brain dysfunction".

Johnson and Myklebust in Learning Disabilities. Educational Principles and Practices (1967) define some of the more commonly used terms as follows:

1. Specific Dyslexia or Specific Reading Disability _ "children with a disability in learning to read as a result of neurological involvement" (Johnson and Myklebust, 1967:7),
2. Perceptually Handicapped _ "an outgrowth of the work of Strauss which stressed the importance of perceptual disturbances" (Johnson and Myklebust, 1967:6), and
3. Minimal Brain Damage _ "designating children with neurogenic learning and adjustment problems" (Johnson and Myklebust, 1967:5).

They point out the limitations in the application of each of the terms they list and suggest the term "psychoneurological learning disability" be used. They describe this type of learning disability as a disturbance in behaviour "as a result of a dysfunction in the brain and that the problem is one of altered processes, not of a generalized incapacity to learn" (Johnson and Myklebust, 1967:8). They note that this definition was based in part on the work of Luria (1961) and Benton (1959). Johnson and Myklebust (1967) suggested that any criteria for defining this group should include the following as the basis of homogeneity:

> "The learning disability should be a psychoneurological learning disability, resulting

> in a deficiency in learning despite the presence of adequate motor ability, average to high intelligence, adequate hearing and vision, and emotional adjustment" (Johnson and Myklebust, 1967:9).

It is clear from the above that there is no clearcut universally accepted definition of learning disabilities. Many of the thirty-eight terms noted by Clements in 1966 are still in common use; and many more new terms could be added to this list. Smith (1979) includes some forty-nine terms in her list of terms commonly used to refer to learning disabilities (see Appendix 1). An American legislative definition quoted by Meier (1976) is widely referred to in current literature on learning disabilities and it describes a learning disability as

> "a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia, but such a term does not include children who have learning problems which are primarily the result of visual, hearing, or environmental disadvantage" (Meier, 1976:7).

In November 1975 the Public Law 94-142 was adopted by the American Congress. Under this law a child could be identified as learning disabled if a serious discrepancy was found between his achievement, his age and his ability levels in one or more of the following seven areas:

"1. oral expression
2. listening comprehension
3. written expression
4. basic reading skills
5. reading comprehension
6. mathematics calculation
7. mathematics reasoning" (Smith, 1979:177).

These two definitions between them cover what are possibly the five major points, as described by Hallahan and Kauffman (1976), to be considered in defining learning disabilities:

1. The child has academic retardation i.e. his academic performance is not at the appropriate level for his intellectual ability and academic level.

2. The child's pattern of development and achievement is uneven. This uneven pattern of development may be seen on formal testing.

3. The child may or may not have central nervous system dysfunction. In early studies central nervous system dysfunction or brain injury was considered to be an essential part of diagnosis of learning disabilities. Where soft neurological signs were present the term minimal brain dysfunction was used. Hallahan and Kauffman (1976) point out that the emphasis has shifted away from the neurological bias.

4. The child from environmentally disadvantaged backgrounds is generally excluded on the grounds that there is a higher incidence of learning disabilities amongst these children caused by various factors e.g. malnutrition, lack of stimulation. Should the trend away

from defining according to etiology continue it would be assumed that these children would be included in the main body of learning disabled children. This would have particular relevance to this study in that many of the children included in the study were from environmentally disadvantaged backgrounds. Should they be defined as learning disabled there would be greater justification in the provision of specialised remediation facilities.

5. The child with learning disabilities as a result of mental retardation or emotional disturbance is excluded.

The publication by the American Psychiatric Association in 1980 of the Diagnostic and Statistical Manual of Mental Disorders (Third Edition) (DSM III) (American Psychiatric Association, 1980) has resulted in some clarification regarding terminology and classification. The Manual provides clear-cut categories and codes which allow an individual to be assessed on each of five axes. The five axes are:

Axis I and II - all mental disorders (including Specific Developmental Disorders and Personality Disorders);

Axis III - physical disorders and conditions;

Axis IV - severity of psychosocial stressors;

Axis V - highest level of adaptive

functioning in the past year.

While the DSM III classification does not use the term learning disabilities, it does include a number of disorders which could be referred to as learning disabilities e.g. developmental reading disorder, developmental arithmetic disorder, attention deficit disorder, etc. It provides detailed diagnostic criteria e.g.

> "Diagnostic Criteria for Developmental Reading Disorder. Performance on standardized, individually administered tests of reading skill is significantly below the expected level, given the individual's schooling, chronological age, and mental age (as determined by an individually administered IQ test). In addition, in school, the child's performance on tasks requiring reading skills is significantly below his or her intellectual capacity" (American Psychiatric Association, 1980:94).

The advantage in the use of this classification system would be that it is recognised internationally and would therefore resolve much of the current terminological confusion. It also allows for all factors relevant to the child to be included by the use of the axis e.g. in addition to a primary diagnosis, secondary physical or emotional conditions would be reflected.

The confusion regarding terminology still exists internationally. However, the trend, as observed in American literature in particular, seems to be to make more use of the DSM III classification. In South Africa the terms learning disability and minimal brain

dysfunction are still commonly used. However, the DSM III classification is used by a number of professional people. The history of learning disabilities in South Africa follows in Section 2.2.2.

2.2.2 South Africa

As much of the literature on which South African research is based, is American, the debate surrounding terminology applies to South Africa too. Professor C.H. de Murray was appointed chairman of a Committee of Inquiry into the Education of Children with Minimal Brain Dysfunction in 1968. The Committee was asked to determine the characteristics of the child with minimal brain dysfunction and the incidence per 1 000 White children. The Committee was to investigate and report on educational facilities available to these children and to make recommendations for their education, teaching, care and treatment in the future. For the purposes of the report the Committee defined minimal brain dysfunction as follows:

> "Children with minimal brain dysfunction have average or above average intellectual ability, and the motor function, vision, hearing, and emotional adjustment are adequate, but they manifest specific learning disabilities which are associated with deviations of the function of the central nervous system. Dysfunction of the nervous system manifests itself in different ways and in various combinations of the deviations mentioned below:- the impairment, namely, of perception, conceptualisation, language, memory, control of attention, impulse and motor function" (de Murray, 1969:7).

The authors of the report state that they did not consider the terms "children with learning disability or children with specific learning disability" to be more appropriate terms than "children with minimal brain dysfunction" or "children with psychoneurological disability" (de Murray, 1969:10).

The report quotes at length from the work of Clements (1966), Birch (1964) and Myklebust (1967). Emphasis is placed on Myklebust's work; in particular his viewpoint that children with special needs are classifiable by virtue of their homogeneity and that their learning disability is psychoneurological in nature (see Ch.2.2.1, p.9).

The Committee chaired by de Murray also came to the following conclusions regarding incidence of learning disabilities and minimal brain dysfunction in White schools in South Africa:

> "1) Approximately 15 per cent of pupils at school, whose IQ's are at least 90, have learning disabilities which retard their progress at school...";
>
> "2) Children with minimal brain dysfunction constitute approximately 5 per cent to 7 per cent of the school population. The IQ's of these pupils is at least 90..." (de Murray, 1969:24).

They fail to state exactly how they reached the above figures, merely commenting that "After careful consideration of the information at the Committee's

disposal we have come to the following conclusions....." (de Murray, 1969:24). The authors of the report were of the opinion that the incidence of learning disabilities in South Africa was very similar to that of the United States of America. They quote Denhoff's (1967) findings that fifteen per cent of American school beginners have minimal brain dysfunction and Frostig (1967) that ten to fifteen per cent of all American children show specific learning disabilities (de Murray, 1969:24).

The de Murray Report included recommendations regarding the provision of educational facilities for White South African children with special needs. They divided the children into three categories:

Group A: children who will be able to cope in normal schools with assistance.

Group B: children who will have to be moved temporarily to full time remedial (not special) schools.

Group C: children who will be removed to a full time remedial school permanently.

The de Murray Report included recommendations regarding a diagnostic team for children with learning difficulties. They suggested that the team should be made up with a purpose as follows:

> "A clinical psychologist.
> A paediatrician trained in paediatric neurology.
> A remedial teacher.
> A speech therapist.
> An occupational therapist.
> A kinetic therapist" (de Murray, 1969:40).

The Committee recommended that the following specialist services should be made available when appropriate:

> "A neurologist with a knowledge of paediatric neurology.
> An eye specialist.
> An ear, nose and throat specialist.
> Opportunity for an E.E.G. examination to be done.
> Opportunity for a thorough examination of auditory acuity by means of an audiological examination (de Murray, 1969:40).

De Murray recommended later that the term "minimal brain dysfunction" be replaced by the term "learning disabilities" or "specific learning disabilities". He is quoted as having stated in October 1980 that since 1969 when the report was published: "there have been shifts in emphasis regarding the cause and nature of children's learning problems, and sweeping changes of terminology," (Behr, 1980:121). This change to the terms "learning disabilities" or "specific learning disabilities" has been a popular one; though the term "minimal brain dysfunction" is still in common use in South Africa.

As a result of the de Murray Report's recommendations the Transvaal Education Department established two classes for children with minimal brain dysfunction in 1970 on an experimental basis. These classes are now called aid classes and they are available in many

schools. The success of these classes does not appear to have been formally researched to date.

Dr.J.G.Garbers, President of the Human Sciences Research Council, was requested by the Cabinet in June, 1980 to undertake a Human Sciences Research Council Main Committee Investigation into education for children with special educational needs in the Republic of South Africa under the chairmanship of Professor J.P.de Lange. Unlike the de Murray Report, which was only concerned with White children this commission was to address the needs of all racial groups working on the principle that

> "Equal opportunities for education, including equal standards in education for every inhabitant irrespective of race, colour, creed or sex, shall be the purposeful endeavour of the State" (de Lange, 1981a:14).

The de Lange Report begins by pointing out, that at that time there were a number of different educational authorities:- four provincial authorities and the Department of National Education for White pupils, the Departments of Internal Affairs for Indian and Coloured Affairs respectively and the Department of Education and Training for Blacks. The de Lange Report comments that the provincial education departments for White children follow the guidelines given for the provision of education for children with special educational needs as laid down in the de Murray Report but that the Indian, Coloured and Black educational authorities do not. The

following problem areas, amongst others, came to the fore during the investigation:

> "Various education authorities with divergent control structures, facilities, and provision (also considered qualitatively) for children with special educational needs.
>
> Shortages in the professional staff that is at present available to meet the needs of these pupils.
>
> Problems in dealing with scholastically impaired pupils within mainstream education, inter alia regarding the identification, education, diagnosis of the problem of these children and the design and presentation of remedial aid.
>
> Problems in making responsible provision for environmentally handicapped children" (de Lange, 1981a:35 - 36).

All of these problem areas have particular relevance to this study in that the areas outlined by de Lange, as above, affect the effectiveness of both the identification and remediation of the Black learning disabled child. It is also interesting to note that not only does South Africa and the United States of America have the confusion regarding terminology in common, but the incidence of learning disabilities is similar.

2.3 Black Education in South Africa

Black education in South Africa has a long and troubled history. For the purpose of this study the candidate is of the opinion that only the education system and statistics of the period in which study was undertaken need be reviewed.

Two pieces of Government legislation are relevant to this period, namely The Education and Training Act, 1979 and The Education and Training Amendment Act, 1980 (Act 52 of 1980). In the Education and Training Act, 1979 seven policy principles were laid down which in summary are as follows:

1. While education shall be of "Christian character" respect shall be given to other religious convictions.
2. Education up to and including Standard Two shall be in mother-tongue, thereafter one of the official languages may be used.
3. Education shall be both free and compulsory.
4. Education shall make provision for a child's ability and aptitude, and the training needs of the country.
5. Syllabii, courses and examinations shall be co-ordinated with other departments of education.
6. Parents shall be encouraged to take an active role in education.
7. Health services shall be provided.

In the Education and Training Amendment Act,1980 (Act 52 of 1980) conditions of teachers service and remuneration are laid down more fully.

The de Lange Report referred to previously provides a table that reflects the anticipated incidence of the number of handicapped pupils in the year 2 020 (see Table 2).

Table 2 Estimate of the Number of Handicapped Pupils by the Year 2 020 Deduced From the Incidence Rate Among Whites

Impairment	Incidence rate per thousand of the school population	Number of handicapped pupils			
		Asians	Whites	Coloureds	Blacks
The aurally handicapped	1,135	237	850	773	8 356
The visually handicapped	0,532	96	417	362	3 916
The blind	0,182	—	136	—	—
The weak sighted	0,375	—	281	—	—
The physically handicapped	0,737	152	522	498	5 389
The cerebral palsied	1,318	275	987	775	9 713
The epileptic	0,589	123	441	401	4 336
Pupils with specific learning impairments	1,442 *	301	1 080	982	10 616
The autistic	0,062	12	46	42	456
The mentally retarded	2,949	616	2 771	2 008	21 710
Pupils at schools of industry and reform schools (Juvenile delinquents and serious behaviour deviants)	2,275	465	1 928	1 549 (2 032**)	16 748

* This estimate is probably too low because there are also too few schools for White pupils with specific learning impairments and many of these children are accommodated in schools for the cerebral palsied.

** In 1977 there was already an incidence rate of 2 983.

(de Lange, 1981b:130)

The following comment is made regarding the incidence of scholastically impaired children: "It is estimated that 50% of Black pupils are scholastically impaired and that there is no formal provision for remedial education" (de Lange, 1981b:132). The Report points out that the new system of upgrading initial education known as instruction at different levels has been in operation since 1979 and that it promises good results. The de Lange Report describes the Department of Education and Training's Section for Psychological Services and points out that there are no guidance teachers at schools for Blacks and that education for scholastically impaired children is still at the planning stages. At the time of the de Lange Report no medical or paramedical services existed at Black schools. Data of the numbers of pupils in Black schools who receive remedial assistance was not available at the time of the de Lange Report. Comment is made on the difficulties in gauging a pupil's intellectual potential due to the lack of standardized scholastic and intellectual tests; and to the teacher's inadequate professional grounding and training resulting in insensitivity to or inability to identify scholastic impairment. The high pupil-teacher ratio is also seen as a problem. Behr (1980) states that the pupil-teacher ratio in 1976, in Black schools, was 49 pupils to one teacher. He also notes that 17,6 per cent of primary school teachers, in Black schools, were unqualified.

A Government White Paper was published in 1983 setting out its response to the de Lange Report; while accepting most of the Report's recommendations it was based on the new constitution which came into being in 1985, in which education is designated partly as an own affair and partly as a general affair. The new constitution has not however changed the basic structuring of the education departments. Despite the seven policy principles laid down in the Education and Training Act in 1979 (see p.20) and de Lange's (1981a) principle that equal opportunities for education should exist for all, irrespective of race, Black education facilities are still limited. Behr (1980) highlights two major problem areas — high pupil-teacher ratio and numbers of unqualified teachers. Other problem areas are the lack of facilities for children with problems, the high incidence of scholastically impaired Black children (see Table 2, p. 21), and the difficulty in identifying children experiencing difficulties. There is cause for concern that at the time of the de Lange Report (1981b) no medical or paramedical services were being rendered in Black schools. It is hoped that the multidisciplinary team, as described by de Lange (1981b) and de Murray (1969), may be introduced to Black schools. A description of the role of the occupational therapist in such a team follows in Section 2.4 and 2.5.

2.4 The Role of the Occupational Therapist in the Multidisciplinary Team

In the de Lange Report (1981b) it is noted that the identification of specific learning disabilities in children is initially the responsibilty of parents and teachers, but identification should be followed by specialist examination and confirmation. For the specialist examination in South Africa use may be made of inter alia: school psychologists, medical practitioners, remedial teachers, speech therapists, occupational therapists, orthodidactical orthopaedagogues, sociopaedagogues, and medical neurologists (Behr, 1980). This description of the multidisciplinary team concerned with the learning disabled child ties in with the team as viewed by the de Murray Report (see Ch. 2.2.2, p. 17). Meier's (1976) diagrammatic summary of the interplay of the multidisciplinary team in Figure. 1 (p. 25) reflects the complexity of the team.

In both the de Murray and de Lange Reports the occupational therapist is seen to have an important role in the assessment, diagnosis and treatment of the learning disabled child.



(Meier, 1976:94)

Figure 1 "The Interdisciplinary Ball Game - Getting the Child Back Together Instead of Passing Him Around"

2.5 Occupational Therapy Assessment Procedures

In the de Murray Report (1969) it is stated that

> "It is essential to be able to investigate the following processes, by means of tests, amongst other measures: Especially visual and auditory (but also tactile) perception and discrimination abilities, eye hand co-ordination, "directionality", directional confusion, lateral dominance, visual and auditory attention span, co-ordination of large muscles, sequencing ability, and general language development" (de Murray; 1969:33).

Of the multidisciplinary team members listed by de Murray (1969) the occupational therapist and speech therapist would be responsible for assessing the above mentioned areas of function. There would be some overlap by clinical psychologists. The occupational therapist would be concerned with assessing the following of the above list: visual and tactile perception and discrimination abilities, eye-hand co-ordination, "directionality", directional confusion, lateral dominance, visual attention span, co-ordination of large muscles and visual sequencing abilities.

Assessment procedures used by occupational therapists are numerous. They may take the form of informal assessment using non-standardized assessment scales and clinical observations; or formal assessment using standardized tests. To list all the testing procedures and tests used by occupational therapists working in the field of learning disabilities is beyond the scope of this dissertation; however Table 3 (p. 27) is a list of

frequently used standardized tests. The choice of appropriate assessment tools will largely be determined by the purpose of the assessment, and the experience/expertise of the therapist.

Table 3 Standardized Tests Frequently Used By Occupational Therapists with Learning Disabled Children

Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978)
Developmental Test of Visual Motor Integration (Beery, 1982)
Developmental Test of Visual Perception (Frostig, Lefever, Whittlesey, 1966)
Motor-Free Visual Perception Test (Colarusso, Hammill, 1972)
Southern California Sensory Integration Tests (Ayres, 1976)
Wepman Battery (Wepman, Morency, Seidl, 1975)

The above list of tests can be divided into three groups, dependent on their format. The Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978) and the Southern California Sensory Integration Tests (Ayres, 1976) are batteries of tests that assess a number of different skills, including motor performance and pencil and paper skills, amongst others.

The Motor-Free Test of Visual Perception (Colarusso, Hammill, 1972) and the Wepman Battery (Wepman et al, 1975) both assess a number of visual perceptual functions. They both require the child to point to the answer, thus eliminating motor function in the form of pencil control.

The Developmental Test of Visual Motor Integration (Beery, 1982) and the Developmental Test of Visual Perception (Frostig et al, 1966) are both pencil and paper tests. They do not, however, measure the same functions. These two tests are described in detail in Sections 2.6 and 2.7.

Some of the above tests appear to assess similar areas of function as those purported to be assessed in the Developmental Test of Visual Motor Integration (Beery, 1982) and the Developmental Test of Visual Perception (Frostig et al, 1966). Both the Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978) and the Southern California Test Sensory Integration Tests (Ayres, 1976) include design copying, as seen in the Developmental Test of Visual Motor Integration (Beery, 1982). However, neither test includes as extensive a range of designs, nor is their scoring procedure as detailed. The two batteries also include paper and pencil tests which have some similarity to the Eye-motor Co-ordination _ Subtest One of the Developmental Test of Visual Perception

(Frostig et al, 1966).

The Southern California Sensory Integration Tests (Ayres, 1976), the Motor-Free Visual Perception Test (Colarusso, Hammill, 1972), and the Wepman Battery (Wepman et al, 1975) all include some measure of visual perception. While they cover some areas in common with those assessed by the Developmental Test of Visual Perception (Frostig et al, 1966) none of them are pencil and paper tests.

The de Murray Report (1969) mentions the fact that in South Africa reliance has to be placed on tests which have been "constructed and tested overseas, but which have not been adapted to South African conditions" (de Murray: 1969:34). All of the above mentioned tests were developed in the United States of America and have not been standardized for the South African population. The authors of the Report go on to state that it is essential that tests be "adapted to South African conditions and be standardised" (de Murray; 1969:34) but point out that the Committee is not in a position to specify which tests should be chosen for this purpose. They comment that "the "Marianne Frostig Test Developmental Test of Visual Perception" is valuable in testing for perceptual defects" (de Murray; 1969:34).

The candidate in the choice of tests for her study felt it was important to use standardized tests which would allow for the development of local norms where appropriate. She felt that to ensure a suitably large sample, tests which would allow for group administration were more suitable. She also felt that it was important that the tests be used commonly in South Africa. Of the tests used by occupational therapists listed above only the Developmental Test of Visual Motor Integration and the Developmental Test of Visual Perception met all three of the candidate's criteria. The fact that a limited amount of research had been done, at that stage, on either test in South Africa, further justified their choice.

2.6 The Developmental Test of Visual Perception

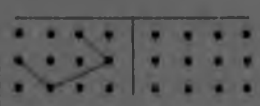
2.6.1 Introduction

Frostig and her co-workers felt there was a need for a test to assess perceptual abilities, differentiating between visual-motor and perceptual functions. They observed that while perceptual tests were available, few had established age-level norms. They pointed out that "visual perception has generally been regarded as the most sensitive indicator of the status of central developmental processes" (Frostig, Lefever, Whittlesey, 1963:160), and stated that their clinical experience

confirmed this. They stated that in their work with learning disabled children they were "impressed by the frequency with which the limitation or impairment of ability to perform different visual perceptual tasks was observed" (Frostig, Lefever, Whittlesey, 1966:5). The aim of the test was "to detect those children whose perceptual abilities were retarded in comparison with the norm" (Frostig, Maslow, Lefever and Whittlesey, 1964:463).

Frostig, as a result of her own clinical observations and based on her own research and that of L.L.Thurstone, K.Wedell and W.M.Cruickshank developed a test which she felt assessed five relatively independent areas of visual perception, namely _ eye-hand co-ordination, figure-ground discrimination, form constancy, position in space and spatial relations. She was of the opinion that while these five perceptual abilities were not the only ones involved in visual perception, they were the most relevant to academic performance. Frostig (1976) includes a diagrammatic summary from Learning Problems in the Classroom (Frostig and Maslow, 1973) which describes the test briefly and relates each of the five perceptual skills to the academic skills they are thought to effect (see Table 4, p. 32).

Table 4 Frostig Developmental Test of Visual Perception (Summary) (Frostig and Maslow, 1973)

Subtest Name	Example	Some Functions Covered	Some Suggested Training Procedures
Eye motor coordination 	"Draw straight lines horizontally." "Stop and start on target."	Eye hand coordination (necessary for hand-writing, drawing, arts and crafts, manipulatory and self-help activities).	Eye movement training, arts and crafts, manipulatory exercises, handwriting exercises, physical education programme.
Figure ground 	"Find a hidden figure." "Find one of two or several intersecting figures."	Ability to focus visually on relevant aspects of visual field and "tune out" irrelevant background.	"Finding" games (e.g., hidden figures included children's activity books), sorting exercises, unscrambling intersecting words etc
Form constancy 	"Find all the squares on a page regardless of colour, background, tilt, size."	Ability to see sameness of essential form despite changes of image on retina. Has implication for learning to identify letters presented in various prints.	Identifying objects or drawing at different distances or angles, drawing diagrams of 3 dimensional patterns, finding all objects of a certain shape in the room
Position in space 	"Find the form that is reversed or rotated."	Ability to discriminate position, ability to differentiate letters such as *d* and *b*, *w* and *m*.	Exercises promoting awareness of body position in relation to obects (go under the table, over chair, around the desk, etc.), physical education programme, learning directions in space — right, left.
Spatial relations 	"Duplicate a dot pattern by linking dots with a line."	Ability to see spatial relationships of objects to one another, related to ability to perceive the sequence of letters in a word	Copying patterns with pegs, beads, marbles; puzzles.

From M. Frostig and P. Maslow, *Learning Problems in the Classroom* (New York, Grune & Stratton, 1973), pp. 126-127.

(Frostig, 1976:112 -113)

The primary use of the Developmental Test of Visual Perception (Frostig et al, 1966) was seen to be as a screening instrument for nursery schools, kindergarten, and first-grade children, for the early identification of children at risk of developing learning disabilities. It was also felt to be suitable for use with the older child experiencing severe learning difficulties, as a clinical tool. Frostig was of the opinion that assessing children should not be used as a means to categorise them but rather to provide the teacher with the detailed knowledge of their weaknesses and strengths necessary for the planning of the child's education programme. The test is therefore designed to be used as a prognostic and diagnostic tool, and as a starting point in treatment or teaching regimes.

The Developmental Test of Visual Perception (Frostig et al, 1966) is a pencil and paper test and takes less than an hour to administer. The test is divided into five subtests, each of which is described by the test authors as assessing a different area of visual perception. The five subtests are:

Subtest I _ Eye-hand co-ordination,

Subtest II _ Figure-ground discrimination,

Subtest III _ Form constancy,

Subtest IV _ Position in space,

Subtest V _ Spatial Relations.

Examples of what is required of the child in each

subtest can be seen in Table 4 and in the test booklet in Appendix 2. It can be administered individually or in a small group. Scoring takes five to ten minutes and is objective. Normative data is available on normal children between the ages of four and eight years, in quarter-year intervals. A perceptual quotient can be calculated from scale scores. Children who do not obtain a perceptual age of six to six and a half years on each subtest are not considered to have reached the perceptual level necessary for beginning academic learning. Children obtaining a perceptual quotient of 90 or less are considered to be in need of perceptual training. Children of ten years and above who do not receive the maximum age equivalent for any subtest are presumed to have difficulty in that area (Frostig, Lefever, Whittlesey; 1966).

2.6.2 Statistical Information

Frostig et al point out in The Marianne Frostig Developmental Test of Visual Perception 1963 Standardization (1964) (1963 Standardization) that the sample of 2 116 children, used in the development of the Developmental Test of Visual Perception, ranging in age from three years to nine years is "far from perfect" (Frostig et al, 1964:467) both geographically and socio-economically as it was drawn from a restricted area. The majority of the children were from middle class homes.

The sample was made up of a majority of Caucasian children. Means, standard deviations, and upper and lower quartiles are provided for each half-year age level between five and eight years. Test-retest and split-half reliability coefficients are given.

The sample size would appear to have been adequate for the development of the test itself but many of Frostig et al's inferences on the test were made on very small samples.

2.6.3 Reliability

Frostig et al (1964) refer in the 1963 Standardization to a small number of studies they conducted to establish the tests' test-retest reliability and split-half reliability. Of the three studies investigating the short term test-retest reliability, two to three weeks apart, the correlation coefficients ranged from 0.29 to 0.74 on scale scores; 0.33 to 0.83 on raw scores and 0.42 to 0.98 on perceptual quotients. It would seem from these figures that the perceptual quotient is more reliable. The correlation figures of under 0.40 are low. However Frostig et al point out that the lower figures were noted on Subtest One, which assesses visuo-motor functioning, and they were of the opinion that it was more susceptible to changes in the child's emotional and physical condition. No reference is made to studies

on long term test-retest reliabilty but Frostig et al state low correlation figures would be expected as test performance would be influenced by experience.

Frostig et al (1964) investigated the split-half reliability of the test by doing an item analysis on all the tests of the sample children aged five years and older. The correlation coefficients ranged from 0.35 to 0.96. They (1964) note a decrease in correlation coefficients with age, which they stated was to be expected, but do not enlarge on why this result would have been anticipated. Frostig et al (1964) Subtest One's (Eye-hand Co-ordination) correlation coefficients were lower and the observations which were made on test-retest reliability were repeated. In addition they state that "physiological factors play a significant role in visuo-motor ability" (Frostig at al, 1964:490). A decline in Subtest Four's (Position in Space) correlation coefficients were also noted (Frostig et al, 1964) with an increase in age. They observe that "the perception of position in space reaches its peak of development somewhat earlier than other abilities assessed by the test" (Frostig et al, 1964:490). Frostig et al (1964) do not comment on any of the other subtests.

2.6.4 Validity

Frostig et al state that the Developmental Test of Visual Perception assesses five "relatively distinct functions: eye-motor co-ordination, perception of figure-ground, perception of form constancy, perception of position in space, and perception of spatial relationships" (Frostig et al, 1964:498). They do not substantiate this claim with studies but it is an area in which many other studies have been carried out. These studies are reviewed in Section 2.6.4.3.

Frostig et al comment in their overview of the test on the "importance of visual perceptual functions for school learning," (Frostig et al, 1964:498). Reference is made to the studies conducted by Frostig et al in this regard in Section 2.6.4.1; and by other authors in Section 2.6.4.2 and 2.6.4.3.

2.6.4.1 The Relationship Between the Developmental Test of Visual Perception and Classroom Behaviour

Frostig et al (1964) provide figures for the correlation studies between the scores on the test, kindergarten teachers' ratings of classroom adjustment, and the Goodenough Test. The sample for the correlation study between the test and kindergarten teachers'

ratings consisted of 374 kindergarten children and the correlation coefficient in this instance was 0.441 ($p < .001$). Frostig et al comment that the results support their "hypothesis that disturbances in visual perception during the early years are likely to be reflected in disturbances in classroom behavior" (Frostig et al, 1964:492). The correlation at 0.441 is however, in the candidate's opinion, low.

2.5.4.2 The Relationship Between the Developmental Test of Visual Perception and Reading Ability

One of the most researched aspects of the Developmental Test of Visual Perception is its relationship to reading. Frostig et al (1964) refer to three studies which they feel prove that a positive relationship between reading and performance on the Developmental Test of Visual Perception does exist. Studies conducted by Gamsky and Lloyd 1971) and Chissom, Thomas and Collins (1974) support Frostig et al's theory. However, studies conducted by Tew (1976), du Bois (1973), Smith and Marx (1972) and Kavale (1982) failed to establish a significant relationship between reading achievement and performance on the Developmental Test of Visual Perception. The studies mentioned above will be reviewed briefly in the following section.

In the 1963 standardization studies, Frostig et al (1964) investigated the relationship between the child's ability to learn to read and visual perceptual development. Eight children who were found to have visual perceptual quotients of ninety or below, and were therefore expected to have difficulties in learning to read, were found three months later to have failed to learn to read. The group of children aged between four and a half and six and a half years was small - numbering only twenty-five in total (Frostig et al, 1964). The small size of the group suggests to the candidate that the results should be interpreted with caution.

Frostig et al (1964) refer to the work of Sprague in their attempt to establish whether the test is a valid predictor of future reading ability. Thirty-six per cent of Sprague's sample of 111 children had perceptual quotients of ninety or less. Of these, twenty-eight children had obtained scores lower than the midpoint in The Reading Achievement test. These results appear to support Frostig's (1963) theory that the visual perceptual development as measured by the test is a predictor of future reading ability.

Frostig et al (1964) note too, that of a sample of fifty three children, aged less than eight years and eleven months, who were referred to her clinic with severe

learning difficulties, and who had intelligence quotient scores of seventy-six or above, fifty-five per cent had scores below the twenty-fifth percentile on the Developmental Test of Visual Perception. This led Frostig et al (1964) to conclude that among these children there was a very high percentage of children with poor visual perception. She does not enlarge further on this point. The number of children discussed is again small. The children were not randomly selected and it could therefore be expected that children referred to a clinic of that nature might display problems in the areas in which the clinic was known to specialise.

Chissom, Thomas and Collins (1974) undertook a study in which they administered four perceptual-motor tests (Developmental Test of Visual Perception, Shape-O Ball Test, Oseretsky Test of Motor Proficiency and a dynamic balance test, the stabilometer) and two academic measures (Otis-Lennon Mental Ability Test and a complex teacher rating) to thirty-nine kindergarten children. The Shape-O-Ball Test was described as measuring three perceptual-motor skills form discrimination, fine eye-hand co-ordination and visual-motor match. Their "results indicated that the Shape-O Ball Test and the Frostig test were highly correlated and were good predictors of the academic measures" (Chissom et al, 1974:46) and that they "appeared to have the best

potential for predicting academic readiness" (Chissom et al, 1974:472).

Gamsky and Lloyd (1971) conducted a study to determine the effect the Frostig Program for the Development of Visual Perception (1972) had on reading ability. The Developmental Test of Visual Perception and the Metropolitan Readiness Test were administered to twenty kindergarten classes divided into randomly selected control and experimental groups. The experimental group underwent perceptual training according to the Frostig Program (1972) for fifteen minutes of each day for a period of four and a half months. Both groups were later tested on the Stanford Achievement Test. The group that had undergone the Frostig Program (1972) scored significantly higher on a number of the Stanford Achievement Test Scales i.e. word reading, paragraph meaning, spelling, word study skills and arithmetic. They did not score higher than the control group on the vocabulary scale. These results led Gamsky and Lloyd to conclude that "the Frostig Test of Visual Perception is useful in predicting which children will have difficulty in reading development" (Gamsky and Lloyd, 1971:454).

In contrast with the above reviews which supported a relationship between the Developmental Test of Visual Perception and reading ability the following studies reviewed failed to support this relationship.

Smith and Marx (1972) carried out a factor analysis on the results of forty-three elementary children on the Developmental Test of Visual Perception (DTVP), the Wechsler Intelligence Scale and the Wide Range Reading Test (WRAT). They comment that the "striking finding was that reading ability as measured by the WRAT failed to correlate with the Frostig Perceptual Quotient, or indeed, any DTVP subtest" (Smith and Marx, 1972:45). They also suggest that as, in their opinion, the test does not measure reading ability, it should be used with caution as a screening tool for the prediction of future reading achievement.

Tew (1976) assessed fifty-seven children on the Developmental Test of Visual Perception and the Wechsler Pre-school Intelligence Test within a month of their reaching five years six months of age. At this age the children would not have been formally taught how to read. At the age of seven, fifty-one of those children were given the Vernon Reading Test. On examining reading age at seven years he concluded that "the Frostig Test is not a sufficiently sensitive instrument to predict either reading achievement or failure" (Tew, 1976:33). He found no significant correlation between perceptual quotient and reading age. Nineteen children were reading at their age level. One of these who had a perceptual quotient of seventy-eight (indicative of severe perceptual difficulties according to Frostig) had a

reading age of nine years. Of twenty-one children with reading ages one or more years below their chronological ages, nine had perceptual quotients of more than 113 and four had perceptual quotients of more than 118. Only two children with perceptual quotients of less than ninety were retarded readers.

In agreement with Tew's findings were those of Du Bois (1973). He studied correlations between reading achievement as measured on the Gates Test and the results of the Grade Two and Four children on the Developmental Test of Visual Perception. He reported that the results "suggest that a spurious relationship existed between performance on the Frostig and performance on the Gates" (Du Bois, 1973:46).

Kavale (1982) used meta-analysis to integrate the results from 161 studies. He does not name the studies but states that the criterion for their inclusion in his study was the "presence of an identifiable visual skill and some facet of reading ability" (Kavale, 1982:42).

Kavale points out the conflicting results in the large number of studies considering the relationship between visual perceptual skills and reading achievement. Kavale reports that only one subtest, form constancy, of the Developmental Test of Visual Perception, exhibited a significant relationship with reading

achievement. He suggested that in view of this result the Developmental Test of Visual Perception should be used with caution.

The studies reviewed here indicate the conflicting nature of their results, which must question the value of the test as a predictor of future learning difficulties. Of the six studies reviewed, in addition to those quoted by Frostig et al, only one supported their belief that there is a relationship between a child's results on the Developmental Test of Visual Perception and their potential to learn to read. Should Frostig et al's theory prove to be incorrect the test's application in regard to identifying potential learning disabilities would be limited.

2.6.4.3 Factors Measured by the Test

Frostig (1963) was of the opinion that the Developmental Test of Visual Perception measured five distinct abilities which developed relatively independently of each other. This opinion has resulted in a number of studies.

Chissom, Thomas and Collins (1974) comment in their study referred to in Section 2.6.4.2 that while previous research indicated that the test probably measures one general visual-perceptual factor this

study "may indicate more than one general factor for the Frostig" (1974:471) They do not describe these factors.

Silverstein (1965) took a portion of data from Maslow, Frostig, Lefever and Whittlesey's (1964) standardization sample and data from two previous studies and analysed it. While noting more than one factor in different groups he felt that "a general factor, perceptual development or possibly intelligence, was the only one of major importance" (Silverstein, 1965:974). Silverstein felt that it may therefore be of value "to direct perceptual training toward the specific functions described in each case" (Silverstein, 1965:976).

Tew (1976) noted a close correspondence between the results on the Frostig and the Wechsler Pre-school Intelligence Test which were statistically significant and came to the conclusion that the Developmental Test of Visual Perception measures intellectual functioning rather than perceptual maturity.

Smith and Marx (1972) in their study referred to in Section 2.6.4.2 found that all subtests loaded heavily on a single factor, confirming Silverstein's (1965) and Chissom and Thomas' (1971) results. They noted "a large general factor, probably perceptual organization, and a second small factor" (Smith and Marx, 1972:45). They suggest that the smaller factor may be motor

steadiness. They conclude "performance on the DTVP reflects some aspect of perceptual-motor organization and is related in part to intelligence" (Smith and Marx, 1972:46). They comment that while the perceptual quotient is probably the best overall measure of test performance, it has serious limitations both for older children and children of lower intelligence.

Becker and Sabatino (1973) administered the Developmental Test of Visual Perception, the Bender Visual-motor Gestalt Test and an experimental Visual Discrimination Test of Words to 154 children from eight kindergarten classes and carried out a factor analysis on the results. The findings of their study indicated that the five subtests of the Developmental Test of Visual Perception do not measure five different and relatively independent perceptual abilities. However, they noted that the data reported in their study did not support the contention that the test measures a common perceptual function. They were of the opinion that the test measures three factors: visual-motor skills, figure-ground perception and visual discrimination skills (1973).

Chissom amd Thomas (1971) took the results of eleven studies, including those of Spraque (1963) and Silverstein (1965) referred to in this review, and compared the factor structures of the five subtests of

the Developmental Test of Visual Perception. They were interested in establishing if the claim of the test authors that the test measured five different factors of aspects of visual perception was justified. Chissom and Thomas note, that Ward (1970), using the original Frostig data, demonstrated that the subtests define a single factor. They conclude that the results of their study "support the findings from several previous studies which indicate a general group factor and one or two specific factors" (Chissom and Thomas, 1971:1 018). Their conclusion puts the validity of the test as a measure of five different areas of visual perception into question.

Of the six studies reviewed, all failed to support Frostig et al's identification of five distinct areas of visual perceptual functioning, i.e. eye-motor co-ordination, figure-ground discrimination, form constancy, and perception of position in space and spatial relations. However they do appear to agree that the test does measure some aspects of visual perceptual development. Silverstein's remark that the test could be used to direct perceptual training has relevance to the occupational therapist in the clinical situation.

2.7 The Developmental Test of Visual Motor Integration

2.7.1 Introduction

Beery (1982) describes in the introduction to his test, his growing interest in form copying. He refers to the work of other researchers, stating in summary that "according to their work, higher levels of thinking and behavior require integration among sensory inputs and motor actions" (Beery, 1982:14). He refers to the importance of integration of what may be well-developed but separate visual and motor skills. For these reasons he started to develop a form-copying test to assess children's sensorimotor development in 1961 and the first Developmental Test of Visual Motor Integration was published in 1967. A further study was completed in 1981 and the Revised Administration, Scoring, and Teaching Manual for the Developmental Test of Visual Motor Integration (Manual) was published in 1982.

The Developmental Test of Visual Motor Integration is a pencil and paper test in which twenty-four graded geometric forms have to be copied (see Appendix 9). It can be administered individually or to groups of children. The test was designed for use with preschool and early grade level children. Beery (1982), however, in his introduction to the test, states that it can be

used with children as young as two years of age through to adults. Norms are provided for children from the age of two years eleven months to fourteen years six months in the form of age equivalents for raw scores, percentiles and standard scores. In the Manual, Beery (1982) points out that the separate norms provided for boys and girls in the 1967 Manual were found to be of neither practical nor statistical value, and the norms in the 1982 Manual are therefore combined for both sexes.

Beery describes the test as being "relatively culture independent" (Beery, 1982:11). He states that separate norms were not felt to be warranted for different ethnic and socio-economic groups. He points out that the test is used both in the United States of America and many other countries.

2.7.2 Statistical Information

Beery (1982) states that test norms were derived in 1964 from a sample of 1 030 children. The 1982 norms were derived from a sample of 3 090 children, ranging in age from two years nine months through to nineteen years and eight months. Beery's (1982:16-17) description of the sample is summarised in Table 5.

A summary of Beery's (1982) description of validity and

reliability studies conducted by himself and others follows in Section 2.7.3 and 2.7.4. The results of other authors' studies on the Developmental Test of Visual Motor Integration can be seen in Sections 2.7.4.1, 2.7.4.2 and 2.7.4.3.

Table 5 Description of Sample Population, 1982 Standardization

Ethnicity	15.7% black, 64.9% Caucasian, 7.3% Latino, and 12.1% other.
Income	27.2% low ($12,500 or less total net family income) 72.8% high ($12,500 or more total net family income)
Residence	7.3% rural, 70.8% suburban, 21.9% urban.
Sex	48.7% female, 51.3% male.

2.7.3. Reliability

Beery (1982) found correlations ranging from 0.58 to 0.99 for two or more scorers scoring the same test booklet. He also found that the correlation between scorers could be increased to between 0.93 and 0.98 if administration and scoring was taught to both scorers.

On test-retest correlation Beery (1982) found good correlations, ranging from 0.63 (seven month period)

to 0.92 (two week period).

On split-half reliability of the test Beery (1982) again reports good correlations, ranging from 0.66 to 0.93.

2.7.4 Validity

Beery (1982) refers to a number of other peoples' research work in his section on concurrent validity. In summary he concludes as follows:

1. Academic Skills. The average correlation between handwriting measures and the Developmental Test of Visual Motor Integration was 0.42. The average correlation between readiness tests and the Developmental Test of Visual Motor Integration was 0.50. Beery (1982) points out that not all relationships between the test and academic performance were found to be strong but that the correlations tended to be higher for the lower grades.

2. Chronological Age. A good correlation of 0.89 between the test and chronological age was found.

3. Ethnic Background. Beery (1982) refers to a number of conflicting study results, in which the Developmental Test of Visual Motor Integration had been administered to children of different ethnic backgrounds. The ethnic background was felt to have had a significant effect on performance on the Developmental Test of Visual Motor Integration. He

however concludes that the test when compared to other types of tests "is one of the least culturally biased" (Beery, 1982:17).

4. Residence. Beery (1982) reports no significant difference between performance on the Developmental Test of Visual Perception of children living in urban versus rural areas.

5. Sex. Beery (1982) found no significicant difference between boys' and girls' performance on the test. This is in contrast to his 1967 version of the test, in which girls and boys had their own normative data.

Beery summarises by commenting on the test's predictive value, stating the test has been "found to be a valuable predictor when used in combination with other measures" (Beery, 1982:17). He does not state with which other measures the test should be used.

2.7.4.1 The Developmental Test of Visual Motor Integration and Group Administration

Beery (1982) makes no mention of validity studies relating to group administration. Pryzwansky (1977) undertook research work with a group of forty kindergarten children. He administered the Developmental Test of Visual Motor Integration under two sets of

conditions - individually and in a single group se sion of twenty-one children. He noted no difference in visual motor integration scores of the two groups, despite the varying testing conditions and concluded that "individually- and group-administered VMIs will yield comparable scores" (Pryzwansky, 1977:421). Pryzwansky comments further on scoring criteria in the manual. He refers to "ambiguous guidelines e.g. vague qualifiers such as 'predominantly', 'slight', 'good'" (Pryzwansky, 1977:422). He comments that this may lead to subjective scoring.

2.7.4.2 The Relationship between the Developmental Test of Visual Motor Integration and Academic Performance

Beery (1982) states that as a result of his work with Kephart he became aware of a relationship between a child's ability to copy forms and his academic performance. He quotes other authors in this regard but does not appear to have conducted any research himself. The results of the other authors quoted by Beery (1982) are reported above in the section on validity with correlations of 0.42, between test performance and handwriting, and 0.50 between test performance and readiness skills. The review of the three studies following seems to support Beery's belief that test performance is related to academic performance.

Duffey, Ritter and Fedner (1976) describe their research in which they administered the Development Test of visual Motor Integration and the Draw-a-Man to eighty kindergarten children. Following a two year interval, by which time the children were at the end of their second grade, the Stanford Achievement Test was administered to the children. Their results indicated that the Development Test of Visual Motor Integration was a "significant predictor of the Reading, Mathematical Concepts and Mathematical Computation subtests" (of the Stanford Achievement Test) (Duffey et al, 1976:544) but that the test was "not of value in predicting Word Skills or Listening Comprehension scores of the Stanford Achievement Test." (Duffey et al, 1976:544). They suggest that "tests which are more educationally related may be better predictors of future academic success" (Duffey et al, 1976:543).

Klein (1978) undertook a study similar to that of Duffey et al. She assessed three groups of children ranging in size from 679 to 766 children. The Development Test of Visual Motor Integration was administered to the children in each of the groups four months prior to their entry into kindergarten. The Screening of Academic Readiness was administered to all three groups during their first month of kindergarten. The Stanford Early School Achievement Test was administered to two of the three groups in the same

period. The Stanford Achievement Test was administered to one group during their second grade year. Klein (1978) reports that all the sixty one correlations between the various test and subtest scores were statistically significant and she concludes that "the VMI provides reasonable estimates of future academic performance" (Klein, 1978:461). She comments further "that arithmetic , as defined by Mathematics and Numbers subtests, appears to be the specific achievement area which is best predicted by the VMI" (Klein, 1978:461). Klein's findings from a very much larger sample than Duffey et al 's (1976) would appear to be in agreement with the results of their study.

Satz and Friel (1974) undertook a longitudinal study in which they used the Developmental Test of Visual Motor Integration as part of a battery of twenty-two tests administered to 497 male children. They evaluated the predictive accuracy of the tests using the criteria of reading level at the end of the samples' grade one year. They divided the children into high and low risk groups of varying levels. They noted that on the Developmental Test of Visual Motor Integration there was a twelve month lag between the High Risk group's chronological age (65.8 mos.) and their performance age (54.4 mos.); but in contrast the Low Risk group matched their chronological age (66.4 mos.) on the test (66.5 mos.). The fact that there was a lag in the High Risk group's

performance versus that of the Low Risk group's appeared to indicate that the test had some predictive value. They suggest that

> "the results provide some hope for an 'early-warning system' in order to detect High Risk children before the child begins formal reading - at a time when his central nervous system may be more plastic and responsive to change" (Satz and Friel, 1974:.9).

The studies reviewed appear to agree that the test is of some value as a predictor of future academic performance, particularly in regard to mathematics and arithmetic. Satz and Friel's feeling that the test could be used successfully as a screening instrument in the identification of children 'at risk' of developing learning disabilities is relevant to this study. A test which is simple to administer to groups of children, for screening purposes, would be of enormous value.

2.7.4.3 Studies Relating to Race and Social Class Differences

Beery (1982) quotes research on performance on the Developmental Test of Visual Motor Integration in regard to race and socio-economic status, as described above in Section 2.7.4. The following study reviews seem to indicate that while the Developmental Test of Visual Motor Integration does not appear to have a strong bias in favour of any particular racial or socio-economic group nor is it "uniquely culture fair" (Hartlage and

Lucas, 1976:1 042).

Georgas and Papadopoulou (1968) undertook a study in which they tested forty Greek boys and girls on the Developmental Test of Visual Motor Integration. They translated test instructions into Greek. They concluded that the Greek children's scores on the Developmental Test of Visual Motor Integration were at the average level according to the American norms.

Hartlage and Lucas (1976) administered the Developmental Test of Visual Motor Integration, the Bender-Gestalt Test, the WISC, Peabody, Raven Matrices and the Wide Range Achievement Test to fifty eight Black and thirty three White American children. For the two groups combined the mean age was ten years five months and the mean I.Q. 81. The children were all from lower socio-economic levels and had been referred for evaluation of possible learning problems. They found a significant co..lation, for both Black and White children as separate groups, between the Developmental Test of Visual Motor Integration scores and the WISC Full Scale, Verbal and Performance I.Q., and with WRAT reading, spelling and arithmetic scores. The study's authors did not feel that their data on the Bender-Gestalt or Developmental Test of Visual Motor Integration supported the viewpoint that they were "uniquely culture fair approaches to predicting

variables of consequence for educational planning" (Hartlage and Lucas, 1976:1 042).

Schooler and Anderson (1976) compared scores of 142 Black and 378 White American pre-schoolers on the Developmental Test of Visual Motor Integration, the Slosson Intelligence Test, and the ABC Inventory. They were particularly interested in analysing sex and race differences. The results of their study failed to show a race difference on the Developmental Test of Visual Motor Integration. However they concluded:

> " the data of this and other studies support the concept of local norms, broken down into key ethnic or otherwise important subgroups, as one safeguard against the misinterpretation of educational and psychological tests, most of which have limited validity data supporting their use for practical purposes" (Schooler and Anderson, 1976:456).

Schooler and Anderson's results are in conflict with those of Martin, Sewell, and Manni (1970). They initially took a sample of 107 American children with a mean age of 52.1 months and divided them into four groups high-status Blacks, high-status Whites, low-status Blacks and low-status Whites. They determined socio-economic status by rating parents' occupations, school placement and whether or not the family received public assistance. They administered the Developmental Test of Visual Motor Integration and obtained mean scores for each of the four subgroups. They observed a sizeable race difference, a consistent social class

difference in favour of the high-status group, and a consistent sex difference in favour of females (Martin et al, 1970). As a result of these findings and their concern that children of lower socio-economic levels or minority ethnic-culture groups would be incorrectly diagnosed and/or classified they undertook a further study. In this second study they administered the Developmental Test of Visual Motor Integration to 137 American Black three and four year olds and developed new norms. They found a mean deviation of 6.3 months between the original norms and that of their sample. They do, however, comment, that while allowances for ethnic and cultural differences should be taken into consideration, their age norms should be used with caution as their sample was not representative of Black pre-schoolers in general.

Yet again, the studies reviewed are not in agreement. The question of the test's validity, for populations other than the original largely Caucasian sample, is central to this study. The candidate is of the opinion that Beery has failed to give any substance to his claim that the test is culture independent. The studies reviewed would appear to support Schooler and Anderson's (1976) belief that local norms should be developed to avoid misinterpretation of results.

2.8 Cross-Cultural Research

2.8.1 Introduction

Cross-culture research could be viewed as having begun as early as the sixteenth century when explorers began to document the characteristics of the people they encountered in their travels. This informally collected information became the basic source material for the mid-nineteenth century researchers. Much of the theorising during this period was based on anecdotal material that could not be verified. The trend has with time moved to formulating hypotheses regarding cultural similarities and differences that can be measured. An enormous amount of research has been done on comparative studies using standardized tests. A detailed review of literature will be limited to the area of cross-cultural research relating to perception.

2.8.2 The Reliability and Validity of Test Data From Culturally Different Children

Adler (1973) stated that "whether a test can possibly be totally culture free is questionable" (Adler, 1973:31). He points out a number of problems in cross cultural testing:

1. Test content e.g. word or picture may be

alien to the child.

2. If an exact verbal response is required this may penalise the child.

3. Test performance may be affected by non-linguistic factors related to the testing situation e.g. testing itself, and/or contact with a stranger who possibly speaks a different language or is of a different skin colour may be inhibiting. He further cautions that

> "it is only permissible for the experimenter to claim that the data are: (a) representative of a carefully defined behavior pattern, (b) exhibited by certain children, (c) on the particular formal test administered to them" (Adler, 1973:31).

Biesheuvel comments particularly on the problems of assessing African abilities stating that "The test setting - emphasis on speed, achievement, competitivenes - is also alien to many African cultures" (Biesheuvel, 1972:10).

Both Adler and Biesheuvel's comments are particularly relevant to this study as they highlight the difficulties and limitations that are present in cross-cultural testing. While the tests used did not require verbal responses, their content may have been alien to the children. The candidate tried to avoid affecting test results by non-linguistic factors e.g. a stranger of a different colour skin and language by using a translator and proctors. However the candidate's

presence in the testing room and the unfamiliar nature of the tests themselves must be taken into account when interpreting the results of this study.

2.8.1 Culture and Perception

When reviewing literature related to perception the problem of terminology is a significant one. Much of the research has been undertaken by psychologists and anthropologists who use the term perception in different ways. Cole and Scribner (1974) note that when a psychologist uses the word perception he is generally referring to the processes used to organise and experience sensory information. They comment further that anthropologists use the term in a broader sense, including both sensory information processing and outlook on life (Cole and Scribner, 1974). For the purpose of this study the psychologist's narrower view of perception would appear to be the more appropriate.

One of the areas researched is that of pictorial depth perception in Africa. Hudson (1967) found that South African Black mine workers failed to respond to visually presented safety material. He developed a pictorial perception test so as to investigate his observation further. The tests were administered to a number of different South African groups including Black primary and secondary children, and non-literate White

and Black workers. He found that non-literate labourers failed to respond to the pictures as three-dimensional, but perceived them as flat. He stated that formal schooling is not the principal determinant in pictorial perception; and that informal and habitual exposure in the home to pictures plays a much larger role (Hudson, 1967). Mundy-Castle (1966) conducted a similar study with Ghanaian children and reports similar results to that of Hudson's. He further comments that he found children did not partake in activities such as reading, drawing, painting, looking at pictures, pattern-making, or playing with constructional toys, and it was exceptional for them to have used a pencil prior to going to school (Mundy-Castle, 1966). Deregowski (1968) used Hudson's Pictorial Perception Test and a construction test to evaluate his theory that "a prolonged exposure to an urban westernized environment leads to a significant increase in the frequency of 'westernized' responses" (Deregowski, 1968:195). His sample was taken from male domestic servants in Zambia who were passively exposed to pictorial material in their places of employment and schoolboys who outside of school-hours were thought to have less exposure to pictorial material than the domestic servants. He stated that

> "Domestic servants were found to be more often two-dimensional perceivers than schoolboys; it appears therefore that passive exposure to pictorial material can play only a minor role in determining pictorial depth perception. It is suggested, on the basis of the results obtained, that the two-

> dimensional responses on Hudson's test may be due, at least in part, to the subjects' inability to organize the material presented in the test pictures" (Deregowski, 1968:195).

Deregowski makes no mention of how his Black subject's performance on either of the tests might compare with White performance.

de Lemos (1974) in a study involving forty Zulu children and forty White children ranging in age from five years to twelve years, administered a number of Piaget's tests on the development of spatial concepts. The Zulu children were mainly from a higher wage-earning group. The study was based on Piaget and Inhelder's investigation into the development of topological, projective and Euclidean concepts. He notes

> " that there are marked differences between the white and Zulu groups in the development of spatial concepts. Topographical, projective and Euclidean relationships emerge at a later age level in the Zulu children than they do in white children, and in the Zulu group relatively few children appear to understand the representation and coordination of perspectives or the principles of geometrical similarity and proportion" (de Lemos, 1974:379).

de Lemos was of the opinion that these differences were the result of a complex interaction of cultural and biological factors. He comments further on the importance of these skills for general development, in the areas of intelligence, basic mathematical concepts, and verbal reasoning ability. He states that his findings have important implications for education and training and that consideration must be given to

establishing causal relationships

> "so that modifications could be introduced in the physical, social or educational environment of these children which would help them to achieve the same conceptual development as is found in children from Western technological societies" (de Lemos 1974:380).

Herbst and Beukes (1986) investigated the importance of enrichment of visual-perceptual ability, in relationship to school achievement, in the South African Southern Sotho child. They evaluated 160 school-starters on the Developmental Test of Visual Perception and from this group selected two comparable groups of forty children. The experimental group were involved in a play programme for a six month period. On retesting the experimental group showed a significant[illegible]e in scores on the eye-motor co-ordination and [illegible]-ground discrimination subtests, against those of the control group. Herbst and Beukes conclude:

> "Consequently it is recommended that black children be helped - as early as possible - to prepare themselves optimally by means of play for the western school educational system" (Herbst and Beukes, 1986:102).

De Wet (1986) conducted a study in which she investigated the effect of an intensive occupational therapy programme on Black Grade One children. She selected two groups of twenty-six children, who were matched according to their sex, age and results on three tests. The experimental group underwent an intensive therapy programme while the control group received a

similar amount of consolation measures. De Wet summarises

> "As the study evolved, it lead to the confirmation that Black school children have motor and visual perceptual deficits but that they derived exceptional benefit from goal-orientated intensive therapy. It was also found that the experimental group performed scholastically better than the control group which did not undergo therapy" (De Wet, 1986:vii).

The studies reviewed indicate that a person's environment and exposure to relevant material is important to the development of his perception. de Lemos (1974) takes this one step further, in his observation that Zulu children develop spatial concepts at a later stage than White children. His comment that these concepts are important for general development and that causal relationships must be found, if modifications are to be made to a child's environment, to encourage this development, is very relevant to this study. The inference could be drawn that if a child is expected to perform adequately on a 'western' measure they must be exposed to a 'western' environment. The children assessed in this study are from an urban population and would certainly have had some exposure to a 'western' society. However, as no data was collected on their socio-economic background, it is impossible for the candidate to comment on the degree of exposure. The environment for these children would certainly be very different to that of either of the test's samples, in that life in a South African Black township would have

little in common with life in an American middle class suburb. However, despite this, the South African urban Black child is expected to learn the skills required of a western technological society and their performance on 'western' measures is therefore relevant .

2.8.4 Factors Which May Have an Effect On Development.

In addition to those factors mentioned above regarding cross-culture testing, consideration must also be given to factors which affect development. How does one explain the variance in performance one sees within a culture, never mind across cultures? The importance of genetic influence can not be underestimated but there are a number of other factors which should be taken into consideration. Biesheuvel (1972) mentions a number of important factors:

1. Nutrition "which can significantly depress the realisation of intellectual potentiality pre-natally (through maternal nutritional status) and particularly postnatally during the first three years of life" (Biesheuvel, 1972:10).

2. "The provision of adequate sensory, perceptual and linguistic stimulation, as well as opportunities for the exercise of motor responses during the maturation and developmental periods" (Biesheuvel, 1972:10).

3. "Parental solicitude, care and affection,

attention paid to the child during early childhood" (Biesheuvel, 1972:11).

4. Scholastic education.

All of the above factors are of an environmental nature, whether it be extrinsic or intrinsic environment. In the nature versus nurture debate genetic factors are weighed against environmental factors, and are viewed separately. Morgan and King comment that the nature versus nurture debate is really "futile, for actually both heredity and environment, or nature versus nurture jointly fashion a person's abilities, skills, and psychological characteristics" (1971:56). They point out that while inheritance could be viewed as determining the person's potential, the person's environment or nurture will determine whether his potential is realised. Environments are described as being impoverished or enriched. Biesheuvel (1972) and Morgan and King (1971) refer to the Project Headstart in which children from impoverished environments were placed in programmes which resulted in I.Q. gains of between one and ten points. Biesheuvel notes that Africans are disadvantaged in regard to the development of skills felt to be important in the western world. Herbst and Beukes (1986) offer a partial solution in their recommendation that the African child should be provided with appropriate 'western'-style play before being exposed to a 'western' educational system.

The above discussion obviously will have particular relevance to the interpretation of the results of this study. Biesheuvel's four points cover areas which were not included in the scope of the study, particularly nutrition, adequate stimulation and parental care. However, they should be borne in mind when interpreting the results of this study, as they could have had an effect on the individual child's performance. Scholastic education is an important point, as the education system for South African Blacks is very different from that of the American children, whose results were used in the development of the two tests. These points are discussed in more detail in Chapter 4, Discussion.

Chapter 3 Research Design

3.1 Hypothesis and Aims of the Study

The aims of the study were:

1. to establish the appropriateness of the Developmental Test of Visual Perception for use with the South African urban Black primary school child;

2. to establish the appropriateness of the Developmental Test of Visual Motor Integration for use with the South African urban Black primary school child; and

3. to collect normative data on the South African urban Black primary school child on the Developmental Test of Visual Perception and the Developmental Test of Visual Motor Integration.

The aims of the study were to be achieved by assessing 530 children on the two tests. As the test authors (Frostig et al, 1966 and Beery, 1982) linked academic performance with perceptual functioning, the children were to be placed in three academic groups in an attempt to establish if academic ability was reflected in test performance. Additionally the test results were to be compared with those of the American samples.

The following null hypothesis was to be tested:

> The Developmental Test of Visual Perception and the Developmental Test of Visual Motor Integration are not appropriate tools for the evaluation of perceptual problems in the urban Black primary school child.

3.2 Selection of Subjects

The authors of the Developmental Test of Visual Motor Integration and The Developmental Test of Visual Perception place emphasis on the relevance of the tests in regard to academic performance, and the possible identification of future learning difficulties. Because of this, and the fact that children of school age were being referred to the Wattville and Daveyton Self Motivation and Assessment Clinic (see Introduction, p.2), the children assessed were drawn from schools. Consideration was given initially to approaching all the primary schools in the Wattville and Daveyton townships in order to make a random selection. This was impractical for a number of reasons. Initial contact with some schools was not favourably received by school staff. As school staff were to be used as proctors their full co-operation was essential as a considerable amount of time would be spent on preparing them for their role in the assessments. School principals in turn would be actively involved both in the selection of

children, and the provision of staff and testing facilities, again a considerable amount of time would be spent with them. Because of the necessity for a high level of commitment and involvement by school staff, only schools that were co-operative were used. Therefore this selection was biased in favour of schools with co-operative staff. Six schools which were in regular contact with the Wattville and Daveyton Self-Motivation and Assessment Clinic were chosen to participate in the study. Of the six schools, five were primary schools and one was a nursery school. The schools used were Solomon Motlana Primary School, Moshoeshoe Primary School, Wattville Combined Primary School, Ekukhanyeni Combined Primary School, Magalagase Primary School and Wattville Nursery School.

The number of children selected from each school was determined by the availability of school staff to act as proctors on the day of the assessment.

3.2.1 Subject Grouping

It was planned that 530 children would be assessed and placed into three groups as follows:

Group One

"Normal" - 420 children were selected from the mainstream by their principals. The school principals were given written and verbal instructions to place all their pupil's names in the requested age groups (regardless of which standard they were in) in two containers according to sex and to select the required number by pulling out a name. The number of

children varied in accordance with the child's age group, and the number of children previously tested in that age group. The selection was done prior to the day of assessment to allow the school staff time to compile lists of names and dates of birth. If a child was absent on the day of assessment he or she was not replaced. The number of children assessed at each school, in year groups, is shown in Table 6, on page 74.

Group Two

"Above Average" This group consisted of thirty-seven children, who were selected by their teachers and were not part of Group One, the "Normal" group. The children in the "Above Average" group had averaged seventy per cent and above (First class pass) in their school examinations and were considered by school staff to be well above average in all areas academically. The numbers of children assessed at each school, in year groups, are reflected in Table 6, on page 74.

Group Three

"Below Average" This group consisted of thirty-six children, who were selected by their teachers and who were not part of Group One, the "Normal" group. These children were considered by school staff to have a specific learning disability. Children with learning problems as a result of physical or psychological disability, or who were suspected of being mentally

retarded were to be excluded. The number of children assessed at each school in this group, in year groups, is shown in Table 6.

Table 6 Number of Children Assessed At Each School, According to Academic Performance Groups

Year of Birth	School					
	1	2	3	4	5	6
"Normal"						
1969	10	1		3	5	
1970	25	1		11	15	
1971	17	1	2	19	13	
1972	14	2	1	9	13	
1973	13	4	1	8	18	
1974	10	12	2	2	21	
1975	4	10	16	1	18	
1976	13	10	16	3	13	
1977	14	1	30	2	5	
1978	1				3	4
1979						3
"Below Average - Learning Disabled"						
1973					1	
1974			1		3	
1975	1		1		2	
1976			4			
1977			23			
"Above Average"						
1969		1				
1973		8				
1974		8				
1975		7	3	2		
1976		1	6			
1977			2			
1978				1		

Schools

1 Ekukhanyeni Primary School
2 Magalagase Primary School
3 Moshoeshoe Primary School
4 Solomon Motlana Primary School
5 Wattville Combined Primary School
6 Wattville Nursery School

As is evident from the above table, no attempt was made to represent schools equally, in any of the academic groups. The higher representation of learning disabled children at Moshoeshoe Primary School is due to the fact that the school has a remedial class.

Subject groups One, Two and Three will be referred to as "Normal", "Above Average" and "Below Average _ Learning Disabled" groups respectively. There is a detailed description of all three groups in relation to sex, age, grade and academic results in Chapter 4, Results.

3.3 Test Materials

3.3.1 Test Booklets

i. The Developmental Test of Visual Perception Test booklet is a thirty-five page booklet printed on white paper (see Appendix 2).

ii. The Developmental Test of Visual Motor Integration is a sequence of twenty-four geometric forms printed on green paper (see Appendix 9).

3.3.2 Test Demonstration Materials

Demonstration cards are provided with the Developmental Test of Visual Perception. An extra set of demonstration cards was provided for each proctor (see Appendix 3).

3.3.3 Materials for Children

Each child was provided with:

i. A well-sharpened pencil without a rubber.

ii. Four well-sharpened wax crayons (red, blue, brown, green) for nursery school children.

iii. Four well-sharpened pencil crayons (red, blue, brown, green) for school children.

There were a number of sharpened pencils and crayons available should a child's pencil point break.

3.3.4 Additional Materials

The test administrator and each proctor were provided with an unused test booklet of each test for demonstration purposes.

3.3.5 Test Translations

The test instructions were translated into Xhosa, Zulu and Sotho by Xaba, a state registered nurse at the Wattville and Daveyton Self-Motivation and Assessment Clinic. She was assisted with each translation by a school teacher whose home language was that of the translation. The translations were checked by another school teacher whose home language was that of the translation. Translations were typed and used in both

English and each of the three languages (see Appendix 5, 6, 7, 8, 10, 11, 12 and 13). Testing sessions were arranged where only one language group was tested on any one day.

3.4 Test Venues

Children were assessed at their own schools. In each case a classroom was prepared in advance by the school staff. The correct number of regular school desks and chairs were placed facing a large blackboard. Aisles were left between the desks to allow the test administrator and proctors easy access to every child. All school materials e.g. books, rubbers, rulers, pencils, etc. were removed from the classroom prior to testing. Other staff and children were instructed not to enter the classroom during testing. Lighting and ventilation were adequate.

3.5 Test Administration and Proctors

All test administrations were undertaken by the candidate. Prior to undertaking the study the candidate had used the two tests on an individual basis with a number of Black and White children.

When testing children of nine years of age and under, the candidate was assisted by Wilson, the occupational

therapist employed at the Wattville and Daveyton Self-Motivation and Assessment Clinic. She had some ten years experience of working with Black children in the Wattville and Daveyton townships, was familiar with both tests and had previously assisted the candidate in administering the tests on an individual basis.

A Black proctor, Xaba, acted as translator at all the assessments, giving all verbal instructions. She too has worked at the Wattville and Daveyton Self-Motivation and Assessment Clinic for some ten years. She had previously acted as translator and proctor for the candidate on numerous occasions when the tests were administered on an individual basis. Prior to the commencement of the test administration the candidate spent a considerable amount of time with Xaba explaining the importance of adhering to standardized procedures, and reviewing these procedures and instructions in depth.

At least one other Black proctor, a member of the school staff, assisted at each school. Where additional school staff were made available, two proctors were used. They were all teachers at the school where the testing was being conducted and their home language was that of the children being assessed. Prior to the commencement of the test administration the proctors were told how the tests were to be administered and the importance of

adhering to standardized procedures was explained. The proctors collected the children from their classrooms, ensuring that they brought no rubbers, rulers, or pencils with them. They escorted the children to their seats in the testing room and provided them with test materials. They remained in the testing room during the assessment and assisted when required to, for example providing new pencils, observing when children were ready to move on to the next subtest, checking that children began on the last page of the Developmental Test of Visual Motor Integration test booklet as per manual instructions, etc.

3.6 Group Administration

Children were tested in groups of varying size determined by age in accordance with the test Manuals (Frostig, Lefever, and Whittlesey, 1966 and Beery, 1982), see Table 7.

Table 7 Group Size According Age

Age	Group Size
4-5 years	2
6-7 years	10
8-9 years	10
9-10 years	15
10-11 years	15
12+ years	5

3.7 Test Scoring

All test booklets were scored by the candidate according to the test Manuals (Frostig, Lefever, and Whittlesey, 1966 and Beery, 1982). Scoring was done on the scoring sheets provided in the test booklets and then transferred to cards for easy access (see Appendix 14). The information was then transferred to analysis paper in readiness for being punched into the computer for statistical analysis. It should be noted that not all of the data on the cards was used for the purpose of this study as it was not felt to be relevant.

3.8 Analysis of Data

3.8.1 General Information

A number of BMDP (Dixon and Brown, 1979) computer programs were used in the analysis of data for this study. These programs were developed at the Health Sciences Computing Facility, UCLA and were sponsored by NIH Special Research Resources Grant RR-3. They were first published in 1961, and were updated in 1975, 1979 and 1983.

Five of the BMDP programs (Dixon and Brown, 1979) were used to extract the information required as described in Sections 3.8.2 and 3.8.3, namely:

"P1D. Simple Data Description",

"P2D. Detailed Data Description, Including Frequencies"

"P5D. Histogram and Univariate Plots",

"P7D. "Description of Groups (Strata) with Histograms and Analysis of Variance", and

"P4F. "Two-way Frequency Tables _ Measures of Association. Multiway Frequency Tables _ Loglinear Models (Including Structural Zeros)".

In their introduction to BMDP computer programs Dixon and Brown (1979) point out that the programs

"are designed to aid data analysis by providing methods ranging from simple data display and description to advanced statistical techniques" (Dixon and Brown, 1979:1).

A detailed description of all the statistical techniques used in this study are not warranted. However, as frequent reference is made to certain techniques, they will be described briefly.

3.8.1.1 Levene's Test for Equal Variances

The BMDP7D program includes in its' results a test, named after Levene. Dixon and Brown (1979) comment

"A robust test of the equality of variances is provided by a one-way analysis of variance computed on the absolute values of the deviations from the group means" (Dixon and Brown, 1979:189).

Analysis of variance is used to establish the

homogeneity of data or samples, or in other words, to assess the similarity or dissimilarity of samples. Allan (1982) points out that there are two ways of estimating population measures:

"By using individual sample means and variances;" or
"By combining all the sample data to form a larger, more representative sample and using its mean and variance as an estimate" (Allan, 1982:197).

He notes that

"the samples may be put together and used as a single larger sample..." when
"There is no significant difference between the means of the samples, and the means may be regarded as being the same, within the limits of sampling error;
The sample data are homogeneous,
The samples may be regarded as having being drawn from the same population;" (Allan, 1982:201).

In the case of this study the Levene's Test for Equal Variances gives a probability figure which is considered significant if less than 0.05. If the difference between the samples is found not to be significant, their results are analysed together, using a method of analysis called the pooled variance-t. Should the difference be significant, the samples' results are analysed separately (the separate variance-t). When using the separate or pooled variance-t pairwise comparisons are made between the samples. In the BMDP7D program the following statement is made on every printout of results:

"The value given for the Bonferronni Test is the simultaneous significance p value of the comparisons of all the pairs of means. That is, after adjustments for the multiple comparisons of all the pairs of means, to be significant at the 0.05 level the p value must be less than 0.016667" (Dixon, 1983).

Neter and Wasserman (1974) comment that "the Bonferroni technique is ordinarily most useful when the number of simultaneous estimates is not too large" (Neter and Wasserman, 1974:147). They note further that "the Bonferroni method can be used whether the factor level sample sizes are equal, or unequal, and for pairwise comparisons as well as for general contrasts" (Neter and Wasserman, 1974:482).

3.8.1.2 The t-Test

The t-Test was used to compare the South African children's results on the Developmental Test of Visual Perception with those of the American sample population's.

3.8.2 Sample Description

3.8.2.1 Subject Grouping

The number of children in each of the three academic groups was counted.

3.8.2.1 Language

The observed frequency and percentages of children in each of the three academic groups was determined for the languages Sotho, Xhosa and Zulu. A histogram illustrating the distribution of all three academic

groups as a whole is provided in Chapter 4.2.2 (p.97).

3.8.2.3 Sex

The distribution of males and females, in each of the three academic groups was established and a histogram reflecting the distribution of all three academic groups as a whole can be seen in Chapter 4.2.3 (p.99).

3.8.2.4 Age

The number of children in each age group was provided for the "Normal" group e.g. 6 years - 52 children (see Ch.4.2.4, p. 100). Age was not a criterion for selection of the "Below Average _ Learning Disabled" and "Above Average" groups as they were small groups (thirty-six and-seven respectively) of children identified by their class teachers according to their academic abilities.

3.8.2.5 Grade

The number of children in each grade was counted for inclusion as a variable in the correlation matrix.

3.8.2.6 Academic and Handwriting Performance

The school principals provided the candidate with copies

of the children's year end reports. As there was a range of academic subjects dependent on the child's grade, it was felt that the child's total year-end academic percentage would be of most value in determining academic performance. This percentage is an average of the individual subject percentages as determined by examinations. As the Developmental Test of Visual Motor Integration was reported (see Ch.2, p. 53) to be particularly relevant in relation to handwriting, these results were included for statistical analysis. Handwriting marks are only given by schools to children in Sub A, B, and Standard One. It should be noted that handwriting marks in the form of a percentage are not given to children in White schools in Grade One (Sub A) and Two (B). A possible explanation for this difference may be that White schools appear to approach teaching in the early primary schools years less formally than do Black schools.

Total percentages and handwriting percentages were the only school results used for statistical analysis.

The mean, standard deviation and range of the total academic percentage and of handwriting was provided for each of the three academic groups separately. Levene's Test for Equal Variances was used to compare the variance on academic and handwriting performance within each group with the variance between the groups.

Dependent on the level of significance, the separate variance-t or the pooled variance-t figures, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974), were used to establish the differences between the groups as follows:

"Normal" and "Above Average" children,

"Normal" and "Below Average _ Learning Disabled" children, and

"Above Average" and "Below Average - Learning Disabled" children.

3.8.3 Analysis of Results on the Developmental Test of Visual Motor Integration and the Developmental Test of Visual Perception

Both tests were administered to all of the children in the three academic groups. The tests both give a raw and a scale score. The mean, standard deviation and range of the raw and scale scores on each test were determined for each of the academic groups separately (all age groups combined) and with all three academic groups combined. Levene's Test for Equal Variances and the pooled or separate-t, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974), were used again as described above (see Section 3.8.1, p.80). These comparisons were made to establish if there was any difference in the subjects' performance on the two tests when grouped according to academic ability and

age.

In addition the mean, standard deviation and range of the raw and scale scores on each test, of the "Normal" group, were established in year groups for children aged six, seven, eight, nine, ten, eleven, twelve and thirteen years. The t-test, Levene's Test for Equal Variances, and the pooled or separate-t, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974) were used to compare the results to see if there was a statistically significant difference in the scores obtained by each group of children, in year groups, by comparing each age group with every other age group, for example as follows:

six years versus seven years,
six years versus eight years,
six years versus nine years,
six years versus ten years,
six years versus eleven years,
six years versus twelve years and
six years versus thirteen years.

3.8.4 Correlation Matrix

The results on each test and subtest of the "Normal" group as a whole were compared by using a correlation matrix to establish whether there was a correlation between the tests. On the same correlation matrix the

correlation between each of the following was also established:

1. Each of the subtests of the Developmental Test of Visual Perception,
2. Each subtest of the Developmental Test of Visual Perception and the Developmental Test of Visual Motor Integration,
3. Each subtest of The Developmental Test of Visual Perception and handwriting percentages,
4. The Developmental Test of Visual Motor Integration and handwriting percentages,
5. Each subtest of The Developmental Test of Visual Perception and academic results,
6. The Developmental Test of Visual Motor Integration and academic results,
7. Each subtest of the Developmental Test of Visual Perception and grade level,
8. The Developmental Test of Visual Motor Integration and grade level.

The above comparisons were made to establish the applicability of the test for the urban Black population. The above information was reflected on a correlation matrix and the BMDP Statistical Software Program (Dixon and Brown, 1979) "8D _ Missing Value Correlation" was used for this purpose. The correlation coefficients allowed for the predictive value of the variables to be established in relation to each of the

subtests of the Developmental Test of Visual Perception, the Developmental Test of Visual Motor Integration, academic results and grade level. A coefficient of 1 would indicate perfect correlation; a value of 0.75 to 0.99 a high degree of correlation; a coefficient of 0.5 to 0.74 a moderate degree of correlation and a coefficient of 0.25 to 0.49 a low degree of correlation. Allan (1982) feels that there are three pitfalls in the interpretation of correlation coefficients, namely:

> "Because of the greater possibility of errors in small samples, results from them may cause misinterpretation of the correlation coefficient (Allan, 1982:127),
> "Another pitfall in interpretation occurs in the comparison of two coefficients, e.g. r=0.6 and r=0.3 does not mean one set of data is twice as much correlated as the other... The correlation coefficient merely indicates how closely the scores in a particular set of data approach a linear relationship and is, therefore, specific to that set of data" (Allan, 1982:129).
> "Perhaps the greatest pitfall in assessing correlations is to attribute a causal relationship to the correlation" (Allan, 1982:129)

In the case of this study the sample (420) is not small but the other two points should be taken into consideration in the interpretation of results.

3.8.5 Comparison Between the South African Groups and the American Sample Population on the Developmental Test of Visual Perception

The candidate wanted to compare the results of the

American sample population and the South African groups on the D elopmental Test of Visual Perception to establish whether the South African groups differed significantly from the American sample population. Statistical data on the American sample population was taken from the Standardization Manual (1963). The BMDP Statistical Software Program "7D _ Description of Groups (strata) with Histograms" was used. The t-test, was used to test whether there was a significant difference between the three South African groups individually and combined versus the American sample population on the Developmental Test of Visual Perception (scale scores). The comparison of the South African groups' results with thos of the American sample populations' would give some indication as to the appropriateness of the test for the South African urban Black child.

It was planned that should there prove to be a significan difference between the "Normal" South African group and the American sample population that percentiles would be provided for the "Normal" South African group on both tests, thereby providing some local normative data. Percentiles were compiled using the BMDP Statistical Software Program (1983) "5D _ Histogram and Univariate Plots". Histograms with cumulative percentages were provided for the variables using the raw scores of both tests in single year age groups from six to fourteen years.

3.8.6 Summary

The subjects were divided into three groups according to academic performance. The initial analysis of data was concerned with the description of these three groups.

Comparisons were then made between the three academic groups on their performance according to academic and handwriting percentages, and their raw and scale scores on the Developmental Test of Visual Perception and the Developmental Test of Visual Motor Integration. The "Normal" group was divided into age groups (six, seven, eight, nine, ten, eleven, twelve and thirteen years) and comparisons were made between the age groups, using raw and scale scores for both tests.

A correlation matrix provided the correlation figures for a number of variables. Finally a comparison was made between the South African sample groups and the American sample population on the Developmental Test of Visual Perception.

This analysis of data would allow the candidate to test her hypothesis. In addition she would be able to establish if the use of percentiles using local normative data would be more appropriate than the use of the American normative data when testing South African urban Black primary school children on the two tests

used for the study.

Chapter 4 Results

4.1 Introduction

The candidate described in detail the information to be extracted from the data and the methods used for the statistical analysis in Analysis of Data (Ch.3.8, p. 80).

The initial information on the subjects was of a descriptive nature i.e. observed frequency, including a breakdown of frequency according to the three academic groups, for the variables _ language, sex, age and grade. The first section of this chapter will reflect these figures.

The following section will cover the analysis of the subjects' academic and handwriting results, and their raw and scale scores on the two tests. The observed frequency, including a breakdown of frequency according to the three academic groups and according to age groups, and the mean, standard deviation, and range (maximum and minimum figures) for each variable will be reflected. In addition, comparisons will be made between the subjects' results on academic and handwriting performance, and on raw and scale scores on the two

tests. These comparisons will be made according to age and academic groups.

The next section will be a discussion on the degree of correlation found between the variables _ academic percentage, writing percentage, age in months, and scale scores on each test.

Finally, the results of a comparison made between the three South African groups' results and the American samples' results on the Developmental Test of Visual Perception, will be provided.

4.2 The Subjects

4.2.1 Subject Grouping

Of some 530 children tested for the purpose of this study, 493 children's details were used for statistical analysis. The thirty-seven excluded were omitted for a number of reasons:

1. date of birth not available (six),
2. test booklet incomplete (two), and
3. children of fifteen years of age and older, as neither test caters for children of those ages (twenty-nine).

The children were grouped in accordance with their

academic performance, as stated in Subject Grouping (Ch.3.2.1, p. 72). There was no overlapping of groups i.e. each group was separate and distinct. The number of children in each group were as follows:

1. "Normal" _ 420 children,
2. "Above Average" _ thirty-seven children, and
3. "Below Average _ Learning Disabled" thirty-six children.

4.2.2 Language

As schools are single language medium, language representation was determined by the choice of schools, as described in Selection of Subjects (Ch.3.2, p. 72). As a result of the difficulties encountered in school selection, no attempt was made to represent the language groups equally. However, children from the three major language groups living in the area i.e. Zulu, Xhosa and Sotho were included in the sample. Sotho has greater representation in the "Below Average _ Learning Disabled" group as one of the Sotho schools has a remedial class for children thought to be learning disabled. The test results of the children of different language groups were combined for statistical analysis. It was felt that any possible cultural differences between the language groups were minimised by the fact that they lived in the same geographical area and were

exposed to similar socio-economic influences. Table 8 reflects the observed frequency and percentage of children in each of the three language groups, both according to the three academic groups individually and as a total. The language of four children was omitted as, in error, it had not been recorded on their scoring cards. All their other results were included in the statistical analysis.

Table 8 Observed Frequency and Percentages of Language Distribution

Language	Normal Group	%	Above Av. Group	%	Below Av. Group	%	Total	%
Sotho	133	31.9	11	30.6	30	83.3	174	35.6
Zulu	155	37.2	24	66.7	6	16.7	185	37.8
Xhosa	129	30.9	1	2.8	0	0.0	130	26.6
Total	417	100.0	36	100 0	36	100.0	489	100.0

A histogram reflecting the language distribution of the three groups as a total follows in Figure 2, on page 97.

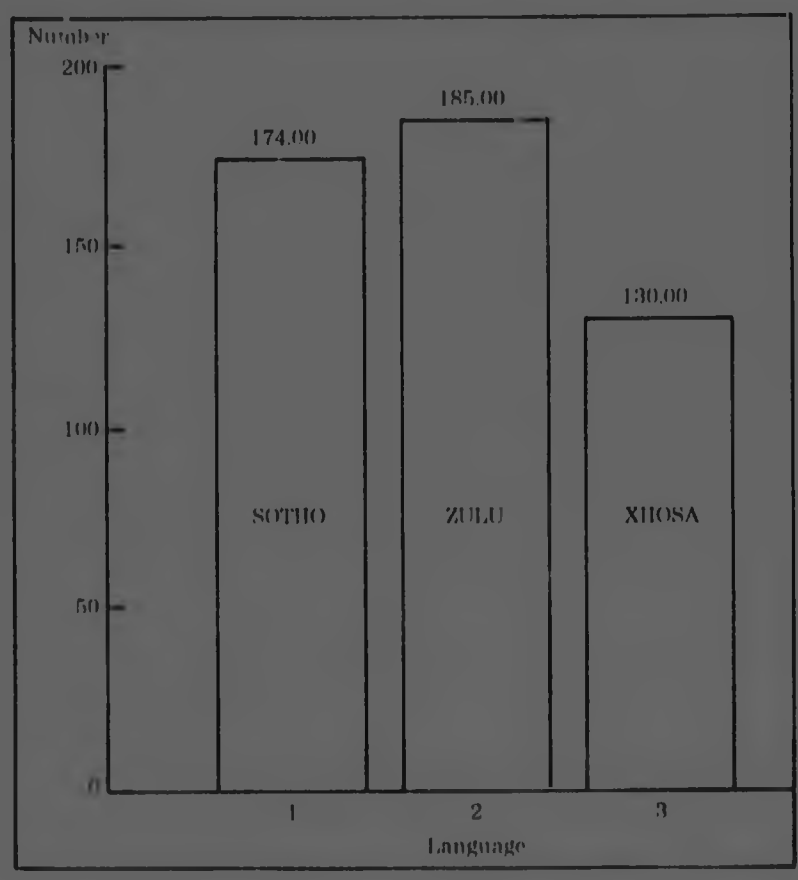


Figure 2 Language Distribution for the Total Groups Combined

4.2.3 Sex

It was the candidate's intention to represent both sexes equally and the school principals were requested to make their selection of children in the requested age groups from two containers, according to sex. However, a number of the children initially selected were absent on the day of testing and were not replaced. A further group of children who had been tested were eliminated from the study for the reasons listed under Subject Grouping (Ch. 4.2.1, p. 94). The omission of these children resulted in an imbalance between the two sexes. Table 9 reflects the observed frequency and percentage of children of either sex in the three academic groups individually and combined.

Table 9 Observed Frequency and Percentages of Sex Distribution

Sex	Normal Group	%	Above Av. Group	%	Below Av. Group	%	Total	%
Male	172	41.0	18	48.6	20	55.6	210	42.6
Female	248	59.0	19	51.4	16	44.4	283	57.4
Total	420	100.0	37	100.0	36	100.0	493	100.0

A histogram reflecting the sex distribution of the three academic groups as a total follows in Figure 3, on p. 99.

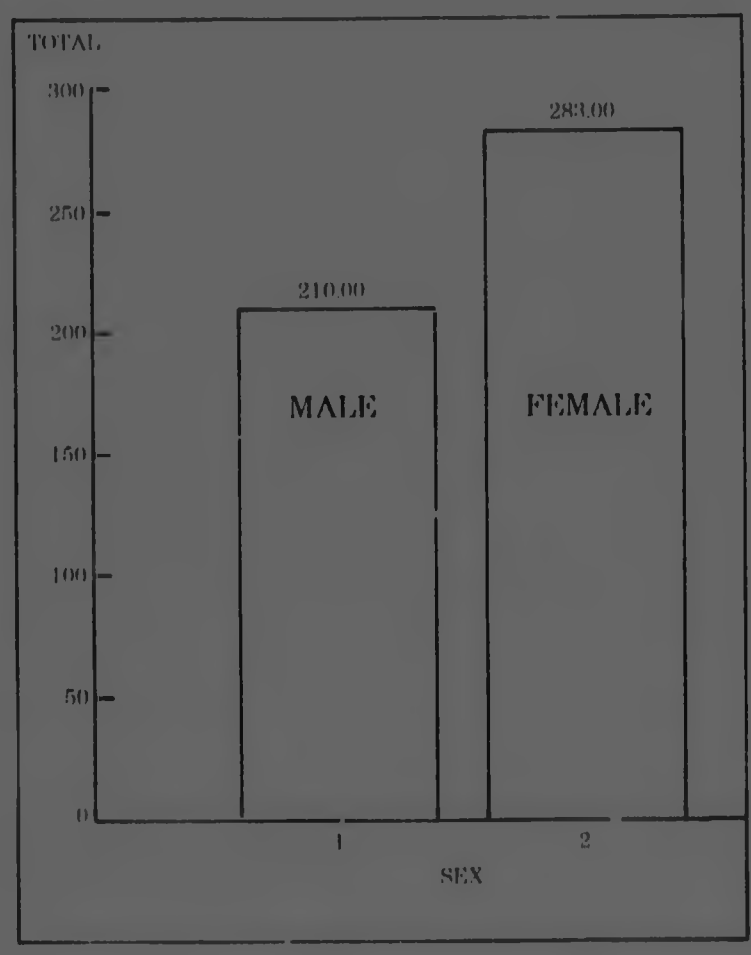


Figure 3 Sex Distribution for the Three Academic Groups Combined

4.2.4 Age

The candidate planned that in the "Normal" group, fifty children should be assessed in each of the age groups _ six years to fourteen years. Age distribution was also affected by the factors listed under Subject Grouping (Ch. 4.2.1, p. 94) and resulted in age groups of varying sizes. The observed frequency in years of children in the "Normal" group, in the age groups four years to fourteen years, can be seen in Table 10. The nineteen children in the fourteen years and the eleven children in the four to five years groups were felt to be too few for inferences to be drawn from their results. Therefore their results were excluded from the statistical analysis involving comparisons according to age groups. However, their results were included in all of the other statistical analyses.

Table 10 Observed Frequency of Age Distribution In Years _ "Normal" Group

Age	Number
4/5 years	11
6 years	52
7 years	55
8 years	49
9 years	47
10 years	44
11 years	39
12 years	52
13 years	52
14 years	19
Total	420

For the purpose of statistical analysis, ages in years were converted to ages in months, for greater accuracy.

While the candidate had planned distribution according to age for the "Normal" group, as previously mentioned, age was not a criterion for selection of the "Above Average" and "Below Average _ Learning Disabled" groups.

4.2.5 Grade

As age was the criterion for selection, the child's grade was not taken into consideration. However, as grade could possibly have a bearing on academic achievement and test results, it was included as a variable for the correlation matrix.

4.3 Academic and Handwriting Performance

4.3.1 Academic Performance

A description of the groups used, according to academic performance and the numbers in each group, can be found in Research Design (Ch. 3.2.1, p. 72). Table 11 reflects the the mean, standard deviation, and range for total academic percentage for each of the three groups separately. Academic results were not provided by schools for five of their children, for the following reasons:

1. political unrest resulted in school closure before reports were made available,
2. child transferred out of the area prior to the examination period, and
3. ill-health during the examination period.

Schools did not give reasons for an individual child's results being unavailable in all cases, but cited the reasons given above as general reasons.

Table 11 Mean, Standard Deviation and Range of Percentage for Academic Performance

	Combined Group	Normal Group	Above Av. Group	Below Av. Group
Mean	58.29%	55.90%	83.50%	53.80%
Std.Dev.	14.39	12.55	2.85	13.30
Maximum	94.50%	82.00%	90.50%	72.00%
Minimum	18.00%	18.00%	80.00%	23.00%
Number	415	363	37	15

Pairwise comparisons between the three groups were carried out to determine whether any statistical differences existed in the total academic percentages obtained by each group. Levene's Test for Equal Variances was used to determine whether there were statistical differences between the groups. Levene's Test for Equal Variances was significant ($p=0.0000$) therefore the separate variance-t with the Bonferroni correction for multiple comparisons, (Neter and Wasserman, 1974) was used to determine what the differences were (Table 12, p. 103).

Table 12 Pairwise Comparisons According to Total Academic Percentages

Group	Group	p-Value (separate variance-t)	
Normal	Above Av.	0.0000	***
Normal	Below Av.	0.5569	
Above Av.	Below Av.	0.0000	***

*** p < 0.001

It can be seen that according to academic performance there was a significant difference between the "Normal" and "Above Average" groups (p=<0.001) and between the "Above Average" and "Below Average _ Learning Disabled" groups (p=0.001), as would be expected for overall academic performance. However, it is interesting to note that the results also indicated that there was no significant difference between the "Normal" and "Below Average Learning Disabled" groups. This could possibly be explained in part by the fact that the majority of children in the "Below Average _ Learning Disabled" group came from a remedial class where the standard of measurement might have been altered to allow for their disability. In other words, these children would not necessarily receive a lower than average percentage in their year end marks.

4.3.2 Handwriting

The handwriting percentages obtained by the children in Sub A and B, and Standard One and Two were combined for each of the academic groups. Comparisons were then made between the three groups, using the same procedure as previously described. Table 13 reflects the means, standard deviations and range for all three groups combined and for each group separately.

Table 13 Means, Standard Deviations, and Range According to Handwriting Percentages

	Combined Groups	Normal Group	Above Av. Group	Below Av. Group
Mean	60.27%	59.48%	72.71%	41.60%
Std.Dev.	16.18	14.25	15.90	14.58
Maximum	99.00%	98.00%	99.00%	64.00%
Minimum	12.00%	30.00%	40.00%	12.00%
Number	197	150	32	15

Comparison was then made between the three academic groups, using the same procedure as previously described. As Levene's Test for Equal Variances showed the variances between the groups were not significant, ($p=0.2654$) the pooled variance-t was used to extract what the differences were (Table 14, p. 105). A significant difference was noted according to handwriting percentage between the "Normal" and "Above Average" groups ($p<0.001$); between the "Normal" and "Below Average Learning Disabled" groups ($p<0.001$);

and between the "Above Average" and "Below Average - Learning Disabled" groups (p=<0.001). As the academic groups were all identified by handwriting performance, there may be a direct relationship between handwriting and academic performance, as a total percentage.

Table 14 Pairwise Comparisons According to Handwriting Percentages

Group	Group	p-Value (pooled variance-t)	
Normal	Below Av.	0.0000	***
Normal	Below Av.	0.0000	***
Above Av.	Below Av.	0.0000	***

*** p <0.001

4.4 The Developmental Test of Visual Motor Integration

4.4.1 Introduction

The Developmental Test of Visual Motor Integration was administered to all the children in each of the three academic groups. Two sets of scores were obtained for each individual, i.e. a raw score and a standard score. The standard score was obtained by converting the individual's raw score, by using the relevant table in the test Manual (Beery, 1982). The standard scores were based on the American normative data. The Manual points out that the standard scores can be used to

indicate how far away a child's raw score is from the average raw score for that child's age group, and that they allow for statistical comparisons with other tests.

Additionally, in view of the fact that the test is described as developmental and performance is thought to be closely related to age, the raw and standard scores of the "Normal" group were analysed further in year groups six, seven, eight, nine, ten, eleven, twelve and thirteen years.

Sections 4.4.2 and 4.4.3 describe in detail the analysis of data of the raw and standard scores respectively, both according to academic and age groups.

4.4.2 Raw Scores

It should be noted that in the test Manual (Beery, 1982), raw scores are not used in their own right in the interpretation of performance, but are used for the conversion to age equivalents and standard scores.

4.4.2.1 Academic Groups

Table 15 reflects the mean, standard deviation and range for the three academic groups separately and as a whole, for the raw scores on the Developmental Test of Visual

Motor Integration. Three children's results, from the "Normal" group, were excluded from the statistical analysis, in error. Their other results were included in the statistical analysis.

Table 15 Mean, Standard Deviation and Range According to the Developmental Test of Visual Motor Integration, Raw Scores

	Combined Groups	Normal Group	Above Av. Group	Below Av. Group
Mean	12.298	12.583	13.000	8.278
Std Dev.	3.529	3.336	2.877	3.881
Maximum	23.000	23.000	21.000	21.000
Minimum	1.000	5.000	7.000	1.000
Number	490	417	37	36

Levene's Test for Equal Variances was used to compare the three academic groups' performance on raw scores, on the Developmental Test for Visual Motor Integration. As the test was not significant (p=0.4630), the pooled variance-t, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974) was used to establish any differences which existed between the groups. These results can be seen in Table 16, on page 108.

Table 16 Pairwise Comparisons According to the Developmental Test of Visual Motor Integration, Raw Scores

Group	Group	p-Value (pooled variance-t)	
Normal	Above Av.	0.4677	
Normal	Below Av.	0.0000	***
Above Av.	Below Av.	0.0000	***

*** p<0.001

It can be seen that no significant difference was found between the "Normal" and "Above Average" groups, when comparing raw scores on the Developmental Test of Visual Motor Integration. A significant difference was noted between the "Normal" and "Below Average Learning Disabled" groups (p=<0.001) and between the "Above Average" and "Below Average Learning Disabled" groups (p=<0.001). It is difficult to comment on what these results mean practically, as raw scores of children of different ages would not normally be grouped together. It would seem more appropriate to refer to the comparisons made between the groups, using standard scores (see Table 20, p. 112).

4.4.2.2 Age Groups

The mean, standard deviation and range of the raw scores obtained on the Developmental Test of Visual Motor Integration by the subjects in the "Normal" group,

divided into year groups, are reflected in Table 17.

Table 17 Mean, Standard Deviation and Range According to the Developmental Test of Visual Motor Integration, Raw Scores, "Normal" Group, According to Age

Age	Number	Mean	Std.Dev.	Maximum	Minimum
6 years	52	9.404	1.953	13.000	5.000
7 years	55	10.236	2.365	15.000	6.000
8 years	49	12.020	2.015	15.000	7.000
9 years	47	12.766	2.460	20.000	8.000
10 years	44	13.227	2.351	20.000	8.000
11 years	39	13.462	2.713	21.000	8.000
12 years	52	13.827	3.104	21.000	9.000
13 years	52	15.865	3.778	23.000	7.000

The mean raw score, as seen in Table 17, shows an increase with age. This pattern is, as would be expected, as in a developmental test, improvement with age is assumed.

The t-test was used to determine the differences between the age groups according to the raw scores on the Developmental Test of Visual Motor Integration. These results are shown in Table 18, on page 110. There is a significant difference between all the age groups, in the subjects' performance on the Developmental Test of Visual Motor Integration, raw scores, with the exception of between the nine versus eight, ten, eleven and twelve; ten versus eleven; and twelve and eleven versus twelve-year-old children. A significant

difference would have been expected, between all the age groups, as commented on above It would seem that the test is less sensitive to children in the older age groups.

Table 18 Comparisons According to the Developmental Test of Visual Motor Integration, Raw Scores, in Year Groups

Age Groups	p-Value	
6 vs 7 years	2.0039	*
6 vs 8 years	6.8344	***
6 vs 9 years	7.8647	***
6 vs 10 years	9.0377	***
6 vs 11 years	8.6421	***
6 vs 12 years	9.1284	***
6 vs 13 years	11.5727	***
7 vs 8 years	4.1145	***
7 vs 9 years	5.2867	***
7 vs 10 years	6.2692	***
7 vs 11 years	6.1284	***
7 vs 12 years	6.7539	***
7 vs 13 years	9.2919	***
8 vs 9 years	1.6284	
8 vs 10 years	2.6656	**
8 vs 11 years	2.8605	**
8 vs 12 years	3.4472	***
8 vs 13 years	6.3255	***
9 vs 10 years	0.9127	
9 vs 11 years	1.2466	
9 vs 12 years	1.8714	
9 vs 13 years	4.7805	***
10 vs 11 years	0.4228	
10 vs 12 years	1.0518	
10 vs 13 years	4.0182	***
11 vs 12 years	0.5854	
11 vs 13 years	3.3714	**
12 vs 13 years	3.0056	**

* p<0.05
** p<0.01
*** p<0.001

4.4.3 Standard Scores

4.4.3.1 Academic Groups

The mean, standard deviation and range according to the standard scores on the Developmental Test of Visual Motor Integration, for the "Normal", "Above Average", and "Below Average _ Learning Disabled" groups separately and as a whole, are shown in Table 19.

Table 19 Mean, Standard Deviation and Range According to Standard Scores on the Developmental Test of Visual Motor Integration

	Combined Groups	Normal Group	Above Av. Group	Below Av. Group
Mean	5.419	5.311	7.162	4.861
Std. Dev.	2.911	2.876	2.863	2.820
Maximum	16.000	16.000	14.000	14.000
Minimum	0.000	0.000	2.000	0.000
Number	482	409	37	36

The Levene's Test for Equal Variances was used again to determine the variance between the groups. As the variance was not significant (p=0.6431) the pooled variance-t, with Bonferroni correction for multiple comparison (Neter and Wasserman, 1974) was used to establish what the differences were between the groups. These results are reflected in Table 20, on page 112.

The results of the pairwise comparisons (see Table 20) of the academic groups' performance on standard scores on the Developmental Test of Visual Motor Integration indicated a significant difference between the "Normal" and "Above Average" groups; ($p=<0.001$) and between the "Above Average" and 'Below Average Learning Disabled" groups ($p=<0.01$). No significant difference was noted between the "Normal" and "Below Average Learning Disabled" groups. These reults are in contrast with the results on the raw scores in which there was a significant difference between all the groups, with the exception of between the "Normal" and "Above Average" groups.

Table 20 Pairwise Comparisons According to the Developmental Test of Visual Motor Integration, Standard Scores

Group	Group	p-Value (pooled variance-t)	
Normal	Above Av.	0.0003	***
Normal	Below Av.	0.3684	
Above Av.	Below Av.	0.0007	**

** p<0,01
*** p<0.001

4.4.3.2 Age Groups

In Table 21, on page 113, the mean, standard deviation and range of the standard scores, of each age category

of the "Normal" group, in year groups, performance on the Developmental Test of Visual Motor Integration is shown.

Table 21 Mean, Standard Deviation and Range According to the Developmental Test of Visual Motor Integration, Standard Scores, "Normal" Group, According to Age

Age	Number	Mean	Std. Dev.	Maximum	Minimum
6 years	52	6.8461	2.1179	11.000	2.000
7 years	55	5.8182	2.4652	16.000	2.000
8 years	49	6.2857	1.9365	11.000	2.000
9 years	47	5.9787	2.5064	13.000	1.000
10 years	44	6.0909	2.0665	12.000	2.000
11 years	39	5.0513	2.2021	13.000	0.000
12 years	52	4.5000	2.7830	11.000	0.000
13 years	52	3.2308	3.6868	12.000	0.000

Once again dependent on the level of significance on Levene's Test for Equal Variances, the pooled variance-t or separate variance-t, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974) was used. The differences between the year groups, on standard scores, for the Developmental Test of Visual Motor Integration were established. These results can be seen in Table 22, on page 114.

There is a significant difference between the year groups on standard scores, as reflected in Table 22, in a number of cases. This result is not the anticipated one as standard scores remove the age factor, there

should therefore be no differences between the groups. However, it should be noted that the differences occur, in all but one case, in the comparisons between children of eleven years and older. This pattern is similar to the one observed on raw scores and confirms that the test appears to be less sensitive in the older age groups.

Table 22 Comparisons According to the Developmental Test of Visual Motor Integration, Standard Scores, in Year Groups

Age Groups	Levene's Test	Separate -t	Pooled -t	p-Value
6 vs 7 years	0.8785		0.0230	*
6 vs 8 years	0.5797		0.1691	
6 vs 9 years	0.4098		0.0651	
6 vs 10 years	0.4759		0.0816	
6 vs 11 years	0.9935		0.0004	***
6 vs 12 years	0.2261		0.0000	***
6 vs 13 years	0.0000	0.0000		***
7 vs 8 years	0.5455		0.2888	
7 vs 9 years	0.5661		0.7456	
7 vs 10 years	0.4621		0.5586	
7 vs 11 years	0.9094		0.1431	
7 vs 12 years	0.3412		0.0108	*
7 vs 13 years	0.0001	0.0001		***
8 vs 9 years	0.1905		0.5025	
8 vs 10 years	0.8115		0.6400	
8 vs 11 years	0.6732		0.0107	*
8 vs 12 years	0.1003		0.0003	***
8 vs 13 years	0.0000	0.0000		***
9 vs 10 years	0.1750		0.8170	
9 vs 11 years	0.5275		0.0910	
9 vs 12 years	0.6861		0.0068	**
9 vs 13 years	0.0005	0.0000		***
10 vs 11 years	0.5821		0.0414	*
10 vs 12 years	0.0967		0.0023	**
10 vs 13 years	0.0000	0.0000		***
11 vs 12 years	0.3397		0.3317	
11 vs 13 years	0.0001	0.0062		**
12 vs 13 years	0.0030	0.0504		

* p<0.05, ** p<0.01, *** p<0.001.

4.5 The Developmental Test of Visual Perception

4.5.1 Introduction

The Developmental Test of Visual Perception was administered to all the children in the three academic groups. Raw and scale scores were provided for statistical analysis and a detailed description of the results follows in Sections 4.5.2 and 4.5.3. Section 4.5.4 provides a comparison between the three South African groups and the American sample population.

4.5.2 Raw Scores

The subjects' raw scores on each of the five subtests of the Developmental Test of Visual Perception were analysed in academic groups and year groups. Sections 4.5.2.1 and 4.5 2.2 describe the results for these groups respectively.

4.5.2.1 Academic Groups

The mean, standard deviation and range of the raw scores on the five subtests of the Developmental Test of Visual Perception, were determined for each of the three academic groups and can be seen in Table 23, on page 116.

Table 23 Mean, Standard Deviation and Range According to the Developmental Test of Visual Perception, Raw Scores, Subtests One to Five, According to Academic Groups

Group	Number	Mean	Std. Dev.	Maximum	Minimum
Subtest One _ Eye-hand Co-ordination					
Normal	417	15.031	4.898	26.000	1.000
Above Av.	37	16.459	4.318	24.000	9.000
Below Av.	36	11.667	5.077	23.000	4.000
Subtest Two _ Figure-ground Discrimination					
Normal	417	17.000	3.406	20.000	0.000
Above Av.	37	16.973	3.312	20.000	8.000
Below Av.	36	13.444	5.969	20.000	0.000
Subtest Three _ Form Constancy					
Normal	417	6.971	3.577	16.000	0.000
Above Av.	37	7.784	3.622	14.000	1.000
Below Av.	36	4.417	3.737	15.000	0.000
Subtest Four _ Position in Space					
Normal	417	5.731	1.673	8.000	0.000
Above Av.	37	6.486	1.216	8.000	4.000
Below Av.	36	3.444	2.104	8.000	0.000
Subtest Five _ Spatial Relations					
Normal	417	5.782	1.814	9.000	0.000
Above Av.	37	6.459	1.043	8.000	4.000
Below Av.	36	2.250	2.130	7.000	0.000

The raw scores on the Developmental Test of Visual Perception, for the three academic groups, were compared using Levene's Test for Equal Variances. Dependent on the probability level, the pooled variance-t or the separate variance-t, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974) was used. The probability of differences between each group, for each subtest, is reflected in Table 24, on page 118. A significant difference was noted between all the academic groups, according to their raw scores, on all the subtests of the Developmental Test of Visual Perception, with the exception of between the "Normal" and "Above Average" groups on Subtests One, Two and Three.

4.5.2.2 Age Groups

The mean raw score for the "Normal" group for each subtest of the Developmental Test of Visual Perception, according to age, is given in Table 25, on page 119. As would be expected the raw scores show an increase with age.

Table 24 Pairwise Comparisons According to the Developmental Test of Visual Perception, Subtests One to Five, Raw Scores

Group	Group	p-Value	
Subtest One _ Eye-hand Co-ordination			
Levene's Test p=0.8416 :- pooled variance-t.			
Normal	Above Av.	0.0881	
Normal	Below Av.	0.0002	***
Above Av.	Below Av.	0.0001	***
Subtest Two _ Figure-ground Discrimination			
Levene's Test _ p=0.0000 :- separate variance-t			
Normal	Above Av.	0.9624	
Normal	Below Av.	0.0012	**
Above Av.	Below Av.	0.0030	**
Subtest Three _ Form Constancy			
Levene's Test _ p=0.7419 :- pooled variance-t			
Normal	Above Av.	0.1879	
Normal	Below Av.	0.0001	***
Above Av.	Below Av.	0.0001	***
Subtest Four _ Position in Space			
Levene's Test _ p=0.0056 :- separate variance-t			
Normal	Above Av.	0.0010	**
Normal	Below Av.	0.0000	***
Above Av.	Below Av.	0.0000	***
Subtest Five _ Spatial Relations			
Levene's Test _ p=0.0029 :- separate variance-t			
Normal	Above Av.	0.0009	**
Normal	Below Av.	0.0000	***
Above Av.	Below Av.	0.0000	***

* p<0.5
** p<0.01
*** p<0.001

Table 25 Mean, Standard Deviation and Range of Raw Scores on the Developmental Test of Visual Perception. Subtests One to Five. "Normal" Group. According to Age.

AGE	NUMBER	MEAN	STD. DEV.	MAXIMUM	MINIMUM
Subtest One Eye-hand Co-ordination					
6 years	52	11.350	3.727	18.000	1.000
7 years	55	13.036	4.405	21.000	4.000
8 years	49	14.061	4.888	23.000	5.000
9 years	47	14.596	4.504	25.000	3.000
10 years	44	15.704	4.511	21.000	6.000
11 years	39	17.077	4.220	26.000	10.000
12 years	52	16.731	4.529	25.000	2.000
13 years	52	17.804	4.592	26.000	5.000
Subtest Two - Figure-ground Discrimination					
6 years	52	14.933	4.242	20.000	0.000
7 years	55	15.455	4.118	20.000	2.000
8 years	49	16.816	3.060	20.000	9.000
9 years	47	17.213	3.262	20.000	10.000
10 years	44	18.227	2.477	20.000	10.000
11 years	39	18.077	2.659	20.000	9.000
12 years	52	17.692	2.818	20.000	7.000
13 years	52	18.211	2.269	20.000	12.000
Subtest Three - Form Constancy					
6 years	52	5.300	2.924	14.000	0.000
7 years	55	5.655	3.438	26.000	0.000
8 years	49	6.388	3.094	14.000	0.000
9 years	47	7.404	3.327	13.000	2.000
10 years	44	8.205	3.554	15.000	0.000
11 years	39	7.385	3.345	15.000	0.000
12 years	52	7.250	3.935	15.000	0.000
13 years	52	8.404	3.527	15.000	0.000
Subtest Four - Position in Space					
6 years	52	4.567	1.934	8.000	0.000
7 years	55	4.764	1.587	8.000	1.000
8 years	49	5.673	1.477	8.000	2.000
9 years	47	5.979	1.294	8.000	3.000
10 years	44	6.023	1.532	8.000	2.000
11 years	39	6.205	1.525	8.000	1.000
12 years	52	6.135	1.495	8.000	2.000
13 years	52	6.673	1.184	8.000	3.000
Subtest Five - Spatial Relations					
6 years	52	4.117	2.043	7.000	0.000
7 years	55	4.727	1.967	7.000	0.000
8 years	49	5.898	1.674	8.000	1.000
9 years	47	6.277	1.057	8.000	3.000
10 years	44	6.432	1.354	8.000	4.000
11 years	39	6.641	0.932	8.000	4.000
12 years	52	6.077	1.595	8.000	2.000
13 years	52	6.538	1.320	8.000	1.000

The t-test was also used to determine the differences between standard scores of the different age groups on the Developmental Test of Visual Perception, for Subtests One to Five. These results are shown in Table 26, on page 121. The comparisons did show some significant differences between the age groups' performance on various subtests. However, the differences are not consistent with an increase in age as would be expected for a developmental test. As no clear pattern emerges with an increase in age, reference should be made to Table 26. However, it should be noted that the differences exist only at younger age levels. Therefore the test would appear not to be selective to changes in the older age groups.

4.5.3 Scale Scores

The subjects' raw scores on the Developmental Test of Visual Perception, Subtests One to Five, were converted to scale scores for all children under the age of ten years in accordance with the Test Manual (Frostig, Lefever, Whittlesey, 1966). The Manual (Frostig et al, 1966) does not allow for the determination of a scale score for children older that ten years of age, therefore scale scores were only provided for statistical analysis for the six, seven, eight and nine years age groups. The analysis of the results is discussed in Sections 4.5.3.1 and 4.5.3.2 respectively.

Table 26 Comparisons According to the Developmental Test of Visual Perception, Raw Scores, Subtests One to Five, in Year Groups

Age	p-Value Subtest One	p-Value Subtest Two	p-Value Subtest Three	p-Value Subtest Four	p-Value Subtest Five
6 vs 7	2.2217 *	0.6685	0.5980	0.5940	1.6281
6 vs 8	3.2843 **	2.6023 *	1.8826	3.2938 **	4.9033 ***
6 vs 9	4.0787 ***	3.0450 **	3.4765 ***	4.3050 ***	6.5861 ***
6 vs 10	5.3820 ***	4.6038 ***	4.5671 ***	4.1313 ***	6.5333 ***
6 vs 11	7.0892 ***	4.1274 ***	3.2744 **	4.4614 ***	7.2320 ***
6 vs 12	6.8963 ***	3.9879 ***	3.0006 **	4.7446 ***	5.5953 ***
6 vs 13	8.3089 ***	4.9864 ***	5.0916 ***	6.8203 ***	7.3208 ***
7 vs 8	1.1249	1.8938	1.1374	3.0121 **	3.2486 **
7 vs 9	1.7645	2.3607 *	2.5993 *	4.1907 ***	4.8362 ***
7 vs 10	2.9627 **	3.9302 ***	3.6126 ***	3.9829 ***	4.8942 ***
7 vs 11	4.4586 ***	3.4908 ***	2.4307 *	4.4078 ***	5.6381 ***
7 vs 12	4.2778 ***	3.2610 **	2.2361 *	4.5937 ***	3.8862 ***
7 vs 13	5.5738 ***	4.2534 ***	4.0822 ***	7.0208 ***	5.5596 ***
8 vs 9	0.5571	0.6152	1.5502	1.0779	1.3200
8 vs 10	1.6783	2.4266 *	2.6357 **	1.1210	1.6792
8 vs 11	3.0522 **	2.0335 *	1.4486	1.6545	2.4808 *
8 vs 12	2.8494 **	1.4977	1.2188	1.5613	0.5503
8 vs 13	4.0529 ***	2.6127 *	3.0462 **	3.7648 ***	2.1400 *
9 vs 10	1.1718	1.6612	1.1105	0.1483	0.6108
9 vs 11	2.6164 *	1.3275	0.0263	0.7436	1.6765
9 vs 12	2.3484 *	0.7836	0.2091	0.5524	0.7272
9 vs 13	3.5901 ***	1.7805	1.4470	2.7867 **	1.0784
10 vs 11	1.4263	0.2660	1.0784	0.5413	0.8087
10 vs 12	1.1090	0.9792	1.2381	0.3616	1.1635
10 vs 13	2.3364 *	0.0330	0.2745	2.3430 *	0.3874
11 vs 12	0.3712	0.6606	0.1725	0.2192	1.9689
11 vs 13	0.8586	0.2589	1.3941	1.6484	0.4155
12 vs 13	1.2891	1.0344	1.5748	2.0343 *	1.6057

* $p<.05$
** $p<0.01$
*** $p<0.001$

4.5.3.1 Age Groups

The mean, standard deviation and range for each of the five subtests, for each of the year groups, are reflected in Table 27, on page 123. The means for the year groups on all of the five subtests decreased with age. This is not what would be expected in a developmental test, where scale scores would be expected to be the same regardless of age. From this it appears that the South African population's performance tails off with age, as can be seen in the raw score patterns. In view of this, the percentile ranks for the South Afric n population, as provided in Appendices 18 - 23, are of particular value.

Levene's Test for Equal Variances was used again to determine the variance between the age groups. The significance levels and whether the pooled or separate variance-t was used is indicated in Table 28 (p. 125). Table 28 also reflects the results of the pairwise comparisons between the age groups. It would be anticipated again that there would be no significant difference between the age groups. However, this is not the case, and a significant difference between age groups occurs a number of times on all of the subtests. There is no pattern in the differences and reference should be made to Table 28. Again it is emphasised that percentile ranks for the local population seem to have

particular relevance in view of the above.

Table 27 Mean, Standard Deviation and Range According to the Developmental Test of Visual Perception, Scale Scores, Subtests One to Five, "Normal" Group, According to Age

Group	Number	Mean	Std.Dev.	Maximum	Minimum
Subtest One - Eye-hand Co-ordination					
6 years	52	9.288	2.003	15.000	5.000
7 years	55	8.909	2.335	14.000	5.000
8 years	49	8.000	1.671	11.000	5.000
9 years	47	7.383	1.726	10.000	4.000
Subtest Two - Figure-ground Discrimination					
6 years	52	10.077	2.496	19.000	4.000
7 years	55	8.636	1.850	12.000	4.000
8 years	49	8.367	1.577	10.000	6.000
9 years	47	7.872	1.825	10.000	4.000
Subtest Three - Form Constancy					
6 years	52	7.904	2.190	15.000	4.000
7 years	55	7.000	2.228	14.000	3.000
8 years	49	6.612	1.669	10.000	3.000
9 years	47	6.383	1.701	10.000	3.000
Subtest Four - Position in Space					
6 years	52	8.404	2	15.000	0.000
7 years	55	7.545	1.[illegible]1	13.000	4.000
8 years	49	7.306	1.176	10.000	5.000
9 years	47	6.851	1.367	10.000	5.000
Subtest Five - Spatial Relations					
6 years	52	9.788	1.882	13.000	6.000
7 years	55	9.182	1.744	12.000	5.000
8 years	49	8.898	1.373	10.000	6.000
9 years	47	8.766	1.355	10.000	6.000

particular relevance in view of the above.

Table 17 Mean, Standard Deviation and Range According to the Developmental Test of Visual Perception, Scale Scores, Subtests One to Five, "Normal" Group, According to Age

Group	Number	Mean	Std.Dev.	Maximum	Minimum
Subtest One _ Eye-hand Co-ordination					
6 years	52	9.288	2.003	15.000	5.000
7 years	55	8.909	2.335	14.000	5.000
8 years	49	8.000	1.671	11.000	5.000
9 years	47	7.383	1.726	10.000	4.000
Subtest Two _ Figure-ground Discrimination					
6 years	52	10.077	2.496	19.000	4.000
7 years	55	8.636	1.850	12.000	4.000
8 years	49	8.367	1.577	10.000	6.000
9 years	47	7.872	1.825	10.000	4.000
Subtest Three _ Form Constancy					
6 years	52	7.904	2.190	15.000	4.000
7 years	55	7.000	2.228	14.000	3.000
8 years	49	6.612	1.669	10.000	3.000
9 years	47	6.383	1.701	10.000	3.000
Subtest Four _ Position in Space					
6 years	52	8.404	2.329	15.000	0.000
7 years	55	7.545	1.561	13.000	4.000
8 years	49	7.306	1.176	10.000	5.000
9 years	47	6.851	1.367	10.000	5.000
Subtest Five _ Spatial Relations					
6 years	52	9.788	1.882	13.000	6.000
7 years	55	9.182	1.744	12.000	5.000
8 years	49	8.898	1.373	10.000	6.000
9 years	47	8.766	1.355	10.000	6.000

4.5.3.2 Academic Groups

Table 29, on page 126, reflects the mean, standard deviation and range for the Developmental Test of Visual Perception (scale scores), Subtests One to Five, according to academic groups.

Levene's Test for Equal Variances was used to determine the variance between and within the three academic groups, according to the subject's performance on the Developmental Test of Visual Perception (scale scores). The significance level and whether the pooled or separate variance-t, with Bonferroni correction for multiple comparisons (Neter and Wasserman, 1974) was used as indicated in Table 30 on page 127.

No significant difference was noted between any of the three groups on Subtests One, Two or Three. On Subtest Four, no significant difference was noted between the results of the "Normal" and "Above Average" groups; nor between the "Normal" and "Below Average - Learning Disabled" groups. There was however a significant difference between the results of the "Above Average" and the "Below Average - Learning Disabled" groups ($p=<0.05$).

On Subtest Five a significant difference was noted between the "Normal" and "Below Average - Learning

Disabled" groups (p=<0.001) and between the "Above Average" and the "Below Average _ Learning Disabled" groups (p=<0.001). No significant difference was noted between the "Normal" and "Above Average" groups on this subtest.

Table 28 Pairwise Comparisons According to the Developmental Test of Visual Perception, Scale Scores, Subtests One to Five, in Year Groups

Age Group	p-Value		Age Group	p-Value	
Subtest One Eye-hand Co-ordination Levene's Test _ p=0.0860 (pooled variance-t)			Subtest Two Figure-ground Discrimination Levene's Test _ p=0.0539 (pooled variance-t)		
6 vs 7 yrs.	0.3200		6 vs 7 yrs.	0.0002	**
6 vs 8 yrs.	0.0012	**	6 vs 8 yrs.	0.0000	***
6 vs 9 yrs.	0.0000	***	6 vs 9 yrs.	0.0000	***
7 vs 8 yrs.	0.0197		7 vs 8 yrs.	0.4886	
7 vs 9 yrs.	0.0002	***	7 vs 9 yrs.	0.0527	
8 vs 9 yrs.	0.1261		8 vs 9 yrs.	0.2207	
Subtest Three Form Constancy Levene's Test _ p=0.3822 (pooled variance-t)			Subtest Four Position In Space Levene's Test _ p=0.0046 (separate variance-t)		
6 vs 7 yrs.	0.0192		6 vs 7 yrs.	0.0285	
6 vs 8 yrs.	0.0013	**	6 vs 7 yrs.	0.0035	*
6 vs 9 yrs.	0.0002	**	6 vs 9 yrs.	0.0001	***
7 vs 8 yrs.	0.3197		7 vs 8 yrs.	0.3764	
7 vs 9 yrs.	0.1181		7 vs 9 yrs.	0.0185	
8 vs 9 yrs.	0.5710		8 vs 9 yrs.	0.0844	
Subtest Five Spatial Relations Levene's Test _ p=0.0743 (pooled variance-t)					
6 vs 7 yrs.	0.0537				
6 vs 8 yrs.	0.0062	*			
6 vs 9 yrs.	0.0020	*			
7 vs 8 yrs.	0.3724				
7 vs 9 yrs.	0.1967				
8 vs 9 yrs.	0.6896				

* p<0.05
** p<0.01
*** p<0.001

Table 29 Mean, Standard Deviation, Range for the Developmental Test of Visual Perception, Subtests One to Five, Scale Scores, According to Academic Groups

Group	Number	Mean	Std. Dev.	Maximum	Minimum
Subtest One - Eye-hand Co-ordination					
Combined	266	8.481	2.040	15.000	4.000
Normal	203	8.433	2.089	15.000	4.000
Above Av.	28	8.964	2.081	13.000	6.000
Below Av.	35	8.371	1.682	12.000	5.000
Subtest Two - Figure-ground Discrimination					
Combined	266	8.741	2.099	19.000	3.000
Normal	203	8.764	2.123	19.000	4.000
Above Av.	28	8.821	1.611	12.000	6.000
Below Av.	35	8.543	2.331	13.000	3.000
Subtest Three - Form Constancy					
Combined	266	6.996	2.070	15.000	3.000
Normal	203	6.995	2.048	15.000	3.000
Above Av.	28	7.500	2.117	10.000	3.000
Below Av.	35	6.600	2.131	11.000	4.000
Subtest Four - Position in Space					
Combined	266	7.511	1.789	15.000	0.000
Normal	203	7.547	1.758	15.000	0.000
Above Av.	28	8.071	1.676	12.000	6.000
Below Av.	35	6.857	1.912	10.000	3.000
Subtest Five - Spatial Relations					
Combined	266	9.000	1.662	13.000	5.000
Normal	203	9.172	1.652	13.000	5.000
Above Av.	28	9.500	1.139	12.000	8.000
Below Av.	35	7.600	1.376	10.000	6.000

Table 30 Pairwise Comparisons According to the Developmental Test of Visual Perception, Subtests One to Five , Scale Scores, Academic Groups

Group	Group	p-Value	
Subtest One _ Eye-hand Co-ordination			
Levene's Test _ p=0.4431 :- pooled variance-t			
Normal	Above Av.	0.1981	
Normal	Below Av.	0.8681	
Above Av.	Below Av.	0.2529	
Subtest Two _ Figure-ground Discrimination			
Levene's Test _ p=0.3312 :- pooled variance-t			
Normal	Above Av.	0.8916	
Normal	low Av.	0.5673	
Above Av.	Below Av.	0.6022	
Subtest Three _ Form Constancy			
Levene's Test _ p=0.3820 :- pooled variance-t			
Normal	Above Av.	0.2265	
Normal	Below Av.	0.2970	
Above Av.	Below Av.	0.0870	
Subtest Four _ Position in Space			
Levene's Test _ p=0.4866 :- pooled variance-t			
Normal	Above Av.	0.1428	
Normal	Below Av.	0.0343	
Above Av.	Below Av.	0.0073	
Subtest Five _ Spatial Relations			
Levene's Test _ p=0.0234 :- separate variance-t			
Normal	Above Av.	0.1869	
Normal	Below Av.	0.0000	***
Above Av.	Below Av.	0.0000	***
*	p<0.05		
**	p<0.01		
***	p<0.001		

4.5.4 Comparison Between the South African Groups and the American Sample Population on the Developmental Test of Visual Perception

Results were obtained from the original Frostig (1964) monograph and compared with those of the three South African academic groups. Scale scores were used for each of the five subtests of the Developmental Test of Visual Perception. The t-test was used to determine the significance of the differences between each of the three South African academic groups separately. The scores of the three groups were then combined and these scores were compared with the American groups' scores, again using a t-test. The results of the t-test and the probability levels are reflected in Table 31, on page 129. There was a significant difference between the three South African groups as a total and individually versus the American group on all of the five subtests, with the exception of the "Above Average" group on Subtest One, Two, Four and Five. The South African groups results were significantly lower.

4.5.4 Comparison Between the South African Groups and the American Sample Population on the Developmental Test of Visual Perception

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Table 31 Comparison Between the South African Groups and the American Sample Population on the Developmental Test of Visual Perception (Scale Scores)

Normal Group		Above Av. Group		Below Av. Group		Combined Groups	
Subtest One – Eye-hand Co-ordination							
4.379	***	0.437		5.040	***	5.765	***
Subtest Two – Figure-ground Discrimination							
4.288	**	1.318		3.451	**	4.649	***
Subtest Three – Form Constancy							
12.153	***	4.189	**	9.592	***	15.315	***
Subtest Four – Position in Space							
10.843	***	1.026		9.195	***	13.030	***
Subtest Five – Spatial Relations							
4.650	***	1.195		12.679	***	6.537	***

* $p<0.05$
** $p<0.01$
*** $p<0.001$

4.6 Correlation Matrix

In order to indicate the applicab lity of the tests to the urban Black population, the degree of correlation between the variables, - total percentage, writing percentage, age in months, and the scale scores on each test was calculated. A correlation matrix reflects these results for the "Normal" group in Table 32, on page 130.

TABLE 3: CORRELATION MATRIX

	GRADE	TOT. %	AD. %	BEERY S.S.	FR.1 S.S.	FR.2 S.S.	FR.3 S.S.	FR.4 S.S.	FR.5 S.S.	AGE M.
GRADE	1.0000									
TOTAL %	- 0.0859	1.0000								
ADDITIVE %	0.0004	0.4260	1.0000							
BEERY S.S.	- 0.1484	0.2865	0.2800	1.0000						
FR.1 S.S.	- 0.2209	0.1159	- 0.0437	0.0729	1.0000					
FR.2 S.S.	- 0.2189	0.1954	0.0861	0.2625	0.2710	1.0000				
FR.3 S.S.	- 0.1409	0.2280	0.0887	0.2217	0.0643	0.4415	1.0000			
FR.4 S.S.	- 0.2128	0.1901	- 0.0995	0.2403	0.3841	0.3505	0.3707	1.0000		
FR.5 S.S.	- 0.0673	0.2408	0.1897	0.4009	0.2264	0.2929	0.3677	0.4939	1.0000	
AGE IN MONTHS	0.3845	- 0.3695	0.2411	- 0.4092	0.3549	- 0.3845	- 0.2872	- 0.3334	- 0.2544	1.0000

ABBREVIATIONS

TOT. % = TOTAL PERCENTAGE
AD. % = ADDITIVE PERCENTAGE
BEERY = DEVELOPMENTAL TEST OF VISUAL MOTOR INTEGRATION STANDARD SCORE. SOUTH AFRICAN GROUP
FR.1 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION. SUBTEST 1. SCALE SCORE. SOUTH AFRICAN GROUP
FR.2 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION. SUBTEST 2. SCALE SCORE. SOUTH AFRICAN GROUP
FR.3 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION. SUBTEST 3. SCALE SCORE. SOUTH AFRICAN GROUP
FR.4 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION. SUBTEST 4. SCALE SCORE. SOUTH AFRICAN GROUP
FR.5 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION. SUBTEST 5. SCALE SCORE. SOUTH AFRICAN GROUP
AGE M. = AGE IN MONTHS

KEY

_____ . 40+ reasonable correlation

———— . 60+ good correlation

TABLE 32 CORRELATION MATRIX

	GRADE	TOT. %	WR. %	BEERY S.S.	FR.I. S.S.	FR.2. S.S.	FR.3. S.S.	FR.4. S.S	FR.5. S.S.	AGE M.
GRADE	1.0000									
TOTAL %	- 0.3207	1.0000								
WRITING %	0.3303	0.4260	1.0000							
BEERY S.S.	- 0.2484	0.2865	0.2500	1.0000						
FR.1 S.S.	- 0.2269	0.1356	- 0.0417	0.2729	1.0000					
FR.2 S.S.	- 0.2128	0.1994	0.0861	0.2925	0.2710	1.0000				
FR.3 S.S.	- 0.1429	0.2260	0.0087	0.2717	0.2643	0.4415	1.0000			
FR.4 S.S.	- 0.2139	0.1901	- 0.0965	0.2403	0.3341	0.3505	0.3707	1.0000		
FR.5 S.S.	- 0.0973	0.2458	0.1807	0.4229	0.2264	0.3929	0.3677	0.463	1.0000	
AGE IN MONTHS	0.8345	- 0.3655	0.2411	- 0.4052	0.3549	- 0.3445	- 0.2872	- 0.3334	- 0.2344	1.0000

ABBREVIATIONS

TOT. % = TOTAL PERCENTAGE
WR. % = WRITING PERCENTAGE
BEERY = DEVELOPMENTAL TEST OF VISUAL MOTOR INTEGRATION STANDARD SCORE, SOUTH AFRICAN GROUP
FR.1 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION, SUBTEST 1, SCALE SCORE, SOUTH AFRICAN GROUP
FR.2 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION, SUBTEST 2, SCALE SCORE, SOUTH AFRICAN GROUP
FR.3 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION, SUBTEST 3, SCALE SCORE SOUTH AFRICAN GROUP
FR.4 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION, SUBTEST 4, SCALE SCORE, SOUTH AFRICAN GROUP
FR.5 S.S. = DEVELOPMENTAL TEST OF VISUAL PERCEPTION, SUBTEST 5, SCALE SCORE, SOUTH AFRICAN GROUP
AGE M. = AGE IN MONTHS

KEY

_____ | 40+ reasonable correlation

..... | 85+ best correlation

Table 33 reflects the reliability coefficients between 0.40 and 1. Causation was not to be assumed on the basis of correlation. The degree of correlation can be interpreted as the percentage of association between the two variables, thereby indicating the predictive value of the variables.

Table 33 Reliability Coefficients Between 0.40 and 1

Handwriting Per Cent	Total Academic Per Cent	0.43
Frostig Subtest 3 (SA)	Frostig Subtest 2 (SA)	0.44
Frostig Subtest 5 (SA)	Beery Std. Score (SA)	0.42
Frostig Subtest 5 (SA)	Frostig Subtest 4 (SA)	0.46
Age in Months	Beery Std. Score (SA)	0.41
Age in Months	Grade	0.89

Key to Abbreviations

Frostig - Developmental Test of Visual Perception, Scale Scores.
Beery - Developmental Test of Visual Motor Integration, Standard Scores.
SA - South African Group.

In view of the pitfalls described by Allan (1982), (see p. 89) the results reflected on the correlation matrix should be interpreted with caution. Where there is correlation between the variables, the coefficients are low, with the exception of between age in months and grade. The possible implications of these results are discussed in detail in the Discussion Chapter.

4.7 Conclusion

The results lead the candidate to retain her null hypothesis "The Developmental Test of Visual Perception and the Developmental Test of Visual Motor Integration are not appropriate tools for the evaluation of perceptual problems in the urban Black child."

The most noteworthy of these results are:

1. the low correlation between the handwriting and academic results, and the results on the two tests,

2. the lack of a consistent increase in the mean raw and standard/scale scores with age progression on both tests, and

3. the failure of the results on the tests, in a number of cases, to identify children according to their academic groups.

Chapter 5 Discussion

5.1 Introduction

A brief description of the subjects and a summary of their results on the two tests follows.

5.2 Subjects

Of the 530 children assessed, the results of 493 children were used in the statistical analysis. An explanation for the exclusion of children is given in Chapter 4, Results. The assessment of children of fifteen years of age could be viewed as an error in design as neither test was designed to test children of this age. However the candidate was of the opinion that their inclusion would provide useful data for use with the urban Black primary school child. The other exclusions were of small numbers and were not anticipated. The numbers of children excluded were not felt to be sufficient to affect the value of the study, although it may have been helpful to include more children in the older age groups. A detailed description of the 493 subjects used in the statistical analysis is provided in Chapter 4, Results.

It should be noted that only the one racial group was represented in the sample population. In contrast with

both Beery (1982) and Frostig et al (1964), whose sample populations were largely Caucasian, this study's sample population was South African urban Blacks. Beery (1982) and Frostig et al (1964) give some indication of their subjects' socio-economic background. Their subjects were drawn from largely middle and upper class families. No attempt was made to investigate the subjects' socio-economic background in this study, as they came from a very small geographical area where it was felt that there would not be enormous contrast in living standards. Should further research be conducted, socio-economic grouping may warrant inclusion and further investigation.

The three language groups represented in the sample are of similar size. However, no comparisons were made between the groups in regard to their performance on the two tests, as the groups were not felt to be significantly different in either their environmental or socio-economic backgrounds.

The size of the groups as regards sex was similar. No comparison was made between the sexes as Beery (1982) and Frostig et al (1964) did not provide separate normative data for either sex. In future research on these two tests, consideration should be given to comparing performance according to sex.

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In summary, a valid criticism of this study may be that insufficient attention was paid to the variables: sex, language and socio-economic status.

5.3 Results on Academic and Handwriting Performance

5.3.1 Academic Performance

There was a significant difference between the "Normal" and "Above Average" groups ($p=<0.001$) and between the "Above Average" and "Below Average _ Learning Disabled" ($p=<0.001$) groups on total academic percentage. No significant difference was noted between the "Normal" and "Below Average _ Learning Disabled" groups. The lack of significant difference between these two groups could possibly be explained in two ways. The one explanation may be, that as there are limited facilities for scholastically impaired children, the mainstream may include children with problems, which could have resulted in the "Normal" group's academic results being depressed. Another explanation may be that allowances may be made for the "Below Average _ Learning Disabled" group's difficulties, resulting in their receiving higher academic marks than they might have received had they been in the mainstream (see Section 4.3.1, p. 103).

The correlation between total academic performance and

performance on the two tests was low, ranging from 0.10 and 0.25. It could be inferred from these results that performance on either of the tests is not a predictor of academic performance. This is in conflict with the claims of the tests' authors.

Should further research be undertaken in regard to the two tests and academic performance, academic groups with a greater number of children may give more conclusive results.

5.3.2. Handwriting Performance

There was a significant difference between the "Normal" and "Above Average" groups ($p=<0.001$); the "Normal" and "Below Average _ Learning Disabled" groups ($p=<0.001$); and the "Above Average" and "Below Average _ Learning Disabled" groups ($p=<0.001$). This could possibly be attributed to the fact that children who achieve academically may not experience difficulty in learning to write. Both Beery (1982) and Frostig et al (1964) were of the opinion that children who under-achieved academically experienced difficulty with visual motor integration and eye-hand co-ordination, skills they thought were necessary for learning to write. Another factor may be that teachers respond unfavourably to poor handwriting, which could affect academic marks adversely. As noted in Section 4.3.2, (p. 104) there

appears to be a relationship between the results obtained by the subjects on total academic performance and handwriting. The correlation between handwriting and total academic performance was 0.43. While statistically significant, this correlation figure is low.

5.4 Results on the Developmental Test of Visual Motor Integration

The subjects' raw and standard scores on the Developmental Test of Visual Motor Integration were analysed in age and academic groups.

5.4.1 Raw Scores

A significant difference was noted between the academic groups, with the exception of between the "Normal" and "Above Average" groups. However, the practical implication is unclear as, as pointed out in Section 4.4.2.1, p. 108, children of varying ages would not normally be grouped together. It is again recommended that reference be made to standard score results (see Section 5.4.2, p. 138).

The mean raw score of the "Normal" group showed an increase with age, as would be expected in a developmental test. A significant difference was noted between a number of the age groups, with the exception

of between the nine versus eight, ten, eleven and twelve; ten versus eleven and eleven versus twelve year old children. As the test is a developmental test, a significant difference would have been anticipated between all the age groups. Frostig et al (1964) noted that in their sample, age progression did not necessarily result in improved performance in children over seven and a half years of age. While Beery (1982) did not observe a similar pattern in his sample, he does comment "predictive correlation appear to decline as children move up the grade levels" (Beery, 1982:19). The test results did not show the anticipated pattern for older children and it is therefore recommended that its use should be limited to younger children

5.4.2. Standard Scores

5.4.2.1 Age Groups

The standard scores obtained by the subjects showed a significant difference between a number of the age groups. No significant difference should have been found between the age groups, as standard scores remove the age factor. As with the raw scores, the majority of differences occur in the comparisons between children of eleven years and older. Again it would appear that performance does not improve consistently with an increase in age. Once again the recommendation is that

the tests should only be used with younger children. Should the test be used with older South African urban Black children a further recommendation would be that the American standard scores should not be used for the interpretation of results. The percentiles provided in this dissertation could be used to evaluate older children's performance.

5.4.2.2 Academic Groups

Beery claimed that his test had a bearing on both handwriting and academic achievement (see Chapter 2). There was a significant difference between the results of the "Normal" and "Above Average" groups ($p=<0.001$) and between the "Above Average" and "Below Average - Learning Disabled" groups ($p=<0.01$) on the Developmental Test of Visual Motor Integration. No significant difference was noted between the "Below Average - Learning Disabled" group and the "Normal" group. It would appear that the test has limited value in the identification of those children who are experiencing difficulty at school. However, it must be borne in mind that the "Normal" group may include children with problems. It should also be noted that the low correlation figures of 0.29 and 0.25 between results on the test, and total academic and handwritng percentages respectively, do not lend support to Beery's claim. He reports higher correlation figures (0.51 to

0.73) between results on the test and academic measures.

5.5 Results on the Developmental Test of Visual Perception

Once again the subjects' results on the five subtests of the development Test of Visual Perception were analysed using raw and scale scores, in academic and year groups.

5.5.1 Raw Scores

A significant difference was noted between all the academic groups, according to their raw scores, on all of five subtests, with the exception of between the "Normal" and "Above Average" groups on Subtests One, Two and Three. It would seem that comparisons between the academic groups' raw scores identify differences between the groups at the lower levels of achievement i.e. between the "Normal" and "Below Average" - Learning Disabled". However, it must be borne in mind, as pointed out previously, raw scores are not used in isolation for the interpretation of performance. It is recommended that the scale scores (see Section 5.5.2), which allow for variation in age and percentile ranks, be used in preference to raw scores.

It should be noted that the Development Test of Visual Perception is only standardised for children up to nine years of age. Once again, the analysis of children in the age groups ten to fourteen years was included in order to provide data for future use with the urban Black primary school child.

The "Normal" group's mean raw score showed an increase with age. However, on more detailed analysis, the results did not indicate a consistent increase with age. The pattern was fairly consistent for the younger age groups but a consistent increase in mean scores was not seen in the older groups. This might in part be explained by the fact that continued improvement in perceptual skills is not anticipated with age progression in older children. Frostig et al comment that "in the five areas of visual perception tested, clear evidence of age progression was found from three years of age up to about seven and a half, but with little development after that age" (Frostig et al, 1964:465).

5.5.2 Scale Scores

5.5.2.1 Age Groups

The subjects' results on the five subtests of the Developmental Test of Visual Perception were analysed in academic and year groups. The means on the five subtests all showed a decrease with age and a significant difference was noted between the age groups in a number of instances. The pattern that emerges from these results is not consistent with that expected of a developmental test and is not consistent with that described by Frostig et al (1964), as quoted above.

Scale scores are obtained from a table in the Standardization Manual (Frostig et al, 1964). They are calculated by dividing the perceptual age by the chronological age, multiplied by ten and adjusted to the nearest whole number. With the division by chronological age, age as a variable is effectively removed, allowing for comparisons between children of different ages.

5.5.2.2 Academic Groups

Frostig et al (1964) state that the test "serves as an integral part of the evaluation of children needing remedial or readiness programs" (Frostig et al, 1964:498). They also quote (see Chapter 2) studies that support this contention. However, the results of this study fail to support their belief as, with the exception of three out of the fifteen comparisons made between the academic groups on the five subtests, the comparisons failed to indicate a significant difference between the groups. The three exceptions were between the "Above Average" and "Below Average Learning Disabled" (Subtest Four), between the "Normal" and "Below Average Learning Disabled" (Subtest Five) and between the "Above Average" and "Below Average Learning Disabled" (Subtest Five). The premise on which the test was designed was that visual perceptual functions were important for school learning (Frostig et

al, 1964) and it would therefore be expected that the test results would have identified the children according to their academic groups. Possibly a different result would have been obtained had the age groups been large, to allow for comparisons according to age between the academic groups.

5.6 Comparison Between the South African Groups and the American Sample Population on the Developmental Test of Visual Perception

The three South African groups were found to differ significantly, in a lower direction, from the American sample population on all the subtests, with the exception of the "Above Average" group on Subtest One, Two, Four and Five. One explanation for this might be that, as pointed out in Chapter 2, there is little in common between life in a South African urban Black township and life in an American middle class suburb. Another explanation might be as suggested by de Lemos (1974) and Herbst and Beukes (1986) that there is a difference in the spatial and/or conceptual development of the Black child and that, without adequate exposure to 'western' environment, they cannot be expected to achieve on 'western' measures.

These results again indicate that the use of the American normative data is inappropriate and further

substantiates the value of using percentile ranks obtained from the local normative data.

5.7 Correlation Matrix

Some conclusions can be drawn from the degree of correlation reflected on the correlation matrix. The correlation between handwriting and total percentage at 0.43 would suggest that handwriting plays a role in academic achievement and that children with poor handwriting should be given assistance in an effort to enhance their academic performance. This argument is further supported by the fact that the three groups showed a significant difference in regard to handwriting scores. The correlation between the Developmental Test of Visual Perception Subtests Three and Two (0.44) and Subtests Four and Five (0.46) lends some weight to the findings of Chissom, Thomas and Collins (1974), Silverstein (1965), Smith and Marx (1972) and Becker and Sabatino (1973) in which they all indicate that the Developmental Test of Visual Perception does not measure five separate abilities. Subtests Two and Three could be said to measure figure-ground discrimination, Subtests Four and Five _ spatial/visual discrimination and Subtest One _ eye-hand co-ordination.

The correlation between the Developmental Test of Visual Perception Subtest Five (spatial relations) and the

Developmental Test of Visual Motor Integration at 0.42 can be explained by looking at the nature of the task - both involve the copying of designs on paper with a pencil. The lack of correlation between the Developmental Test of Visual Perception and the Developmental Test of Visual Motor Integration on all other subtests would seem to indicate that they assess unrelated skills. The correlation between age in months and the Developmental Test of Visual Motor Integration at 0.41 is considerably lower than that noted by Beery (1982) at 0.89.

The high correlation between age in months and grade (0.89) would be expected as the majority of children start school at the same age.

It is a matter for concern that these tests show very low correlation between their results and handwriting and total academic percentages, particularly in view of the fact that they are used both in determining diagnosis and prognosis in children suspected of being learning disabled. However, the cautions listed in Section 3.8.4 (p.89) regarding the interpretation of correlation coefficients, must be borne in mind.

Chapter 6 Summary and Conclusion

There is concern amongst the professional health team working with children, regarding the identification of learning disablilities in the South African context. The two most obvious problems are the lack of standardized tests designed for the South African population and the diversity and number of populations in South Africa. Another problem is the question of whether the tests that are available are of value in the identification and treatment of learning disabilities.

The candidate's hypothesis that "The Developmental Test of Visual Motor Integration and the Developmental Test of Visual Perception are not appropriate screening tools for the evaluation of visual motor problems in the urban Black primary school child" was developed because of the inappropriateness of applying one population's norms to another totally different population. The two tests used in the candidate's research are imported from the United States of America and are both described as developmental tests, implying that "the direction of development is universal (peculiar to all people), but that the rate of development is unique (peculiar to each individual)" (Jordaan et al, 1975:65). Their relevance to the South African situation can be queried as

South African urban Black population differs in many ways from the American sample population. Some obvious differences are the age of commencement of formal education, educational systems and syllabi, language medium _ both for test administration and educational instruction, and cultural differences, particularly the opportunity to develop skills evaluated in the tests. While many of these differences could be said to apply to the White South African population too, there are some problems which are encountered particularly when giving consideration to assessing Black children. The foremost problem must be the diversity within the Black population: language, customs and religion. A criticism of this study might be that allowance was not made for this diversity. However, the candidate felt that the fact that the subjects came from a very limited geographical area, minimised the effect of cultural diversity.

In addition, as pointed out in Chapter 2, the Literature Survey (p.61), cross-cultural studies demonstrate a number of problems which could affect performance: test content unfamiliar to the child, language differences, etc. The candidate attempted in her initial research design to eliminate as many factors as possible which could have affected the child's performance adversely, by having the test administered by Black people, in the child's home language and in a familiar environment.

Many factors which Biesheuvel (1972) (p.67) felt warranted consideration in culture bound studies e.g. nutrition, previous relevant experience in the skills required, parental involvement and academic education could not be ascertained by the candidate but could have had a bearing on the child's performance. While there is little literature available which reviews these particular factors, some generalisations can be made from the studies reviewed in Chapter 2.8, (p.60). They would appear to have a common theme differences in biological and cultural factors may result in differences in performance. The implications seem to be that if a child has not had sufficient exposure to a 'westernized' environment he will fail to achieve on a 'western' measure. This would seem particularly relevant to pencil and paper activities where performance is related to experience and practice and should be taken into consideration when reviewing the data on the two tests used.

The cautions outlined by Adler (1973) (p. 61) regarding interpretation of test results seem to be particularly relevant to this study. He recommends that the experimenter should only claim that the results of his testing are representative of a well-defined area of functioning or behaviour, or of certain children, on a particular test. Criticism could be levelled at Beery and Frostig et al for taking a child's results in

a limited area of functioning (those thought to be measured by the tests) and applying them to other areas (academic performance). The candidate is of the opinion that in reviewing her data, Adler's three points should be continually borne in mind and that generalisations should not be made in the interpretation of her results.

A significant factor in regard to this study is the standard and availability of education. The following points from Chapter 2.3, (p. 22) warrant repetition:

1. the lack of medical, paramedical and remedial services in Black schools (de Lange, 1981b),
2. the high percentage of unqualified teachers - 17,6 per cent (Behr, 1980).

In addition de Lange (1981b) mentions two points which he felt further aggravated the problem - the lack of standardized scholastic and intellectual tests and the lack of expertise amongst teachers in identifying learning problems, due to the lack of adequate grounding and training. The very high estimate by de Lange (1981b) of scholastically impaired children - fifty per cent - must give rise to enormous concern. It must be noted that the majority of these scholastically impaired children remain in the mainstream as there are few other facilities available to them. Therefore, as pointed out previously, the candidate's "Normal" group may well include a number of scholastically impaired children.

This may explain the fact that the tests appeared to discriminate at the upper levels i.e. between the "Above Average" and "Normal" groups but did not always discriminate at the lower levels i.e. between the "Below Average _ Learning Disabled" and "Normal" groups.

The candidate hoped to ascertain the relevance of the two tests to the South African urban Black population by undertaking the study. Despite the claims of the authors of the Developmental Test of Visual Perception to the contrary, the test fared badly in studies which attempted to establish its predictive value in regard to academic achievement in American children. The consensus of opinion in those studies reviewed seemed to be that there was little correlation between academic achievement and results on the test (Ch. 2.6.4.2, p.38). Of the four studies reviewed only one found a significant correlation between reading and the Developmental Test of Visual Perception.

What abilities the test measures has also been questioned and this has resulted in a number of conflicting studies. The consensus of the studies reviewed seems to be that the test does not measure five separate areas as described by the test authors. Studies differ in their opinions regarding how many areas are being measured. The majority of the studies describe one general large factor, with the possibility of a further

one or two specific factors. The results of this study seem to be in agreement, in that they appear to indicate that the test measures three areas of function (see Section 5.7, p. 144). In view of the above, the candidate is of the opinion that the test is limited in its application, both prognostically and diagnostically, and therefore should be used with caution.

The Developmental Test of Visual Motor Integration fared better than the Developmental Test of Visual Perception in validity studies relating to academic performance (see Ch. 2.7.4.2, p. 53). The three studies reviewed had good-sized samples and reached similar conclusions that the test was a significant predictor of future academic success. Two of the studies' (Duffey et al, 1976 and Klein, 1978) findings indicated that the test was predictive of future academic success, particularly in the areas of mathematics and arithmetic concepts. Another study (Satz and Friel, 1974) suggested the test should be used with preschool children for identifying those children who were at "high-risk". The Developmental Test of Visual Motor Integration therefore appears to have more scope in its application than the Developmental Test of Visual Perception.

Having discussed the implications of using the tests for White children, it is appropriate to discuss their use with Black children. Frostig et al observe in the

Standardization Manual (1964) that the test sample was taken from a restricted area and that as a result, the sample was not representative of ethnicity, socio-economic status or area of residence (urban versus rural). Beery, on the other hand, describes his test as being "one of the least culturally biased" (Beery, 1982:17). It must, however, be noted, that Beery's sample was not representative of ethnicity, socio-economic status or area of residence. His sample consisted mainly of Caucasians (64.9%), of high income (72,8%), living in suburban areas (70.8%). Of the studies reviewed relating to cultural differences and the Developmental Test of Visual Motor Integration, one study (Martin et al, 1970) noted a significant race and social class difference in favour of the White and high socio-economic groups respectively. In another study (Schooler and Anderson, 1976), while no significant difference was observed in relation to race, the authors were of the opinion that local norms for key ethnic groups would safeguard against the misinterpretation of results. The candidate is of the opinion that neither test has been proven to be culture independent and that further investigation into their relevance to the Black South African population was warranted.

The study carried out by the candidate had limitations in sample choice. For the practical reason of accessibility the candidate's sample was limited to the

urban Black child in only two townships. In addition, the choice of schools was limited to those with co-operative principals and teachers. No attempt was made to represent socio-economic groups equally. Ethnic groups, in regard to language were represented fairly equally (Sotho - 35.6 %, Zulu - 37.8%, Xhosa - 26.6%). However, comparisons between the three language groups were not included in the final statistical analysis, as the distribution according to age made each group too small for the candidate to feel they were representative. The candidate also feels some concern as regards the accuracy of the translation of the test administration instructions, as she speaks none of the languages used. However, as she was present at all the testing sessions, she is confident that the tests were administered in accordance with the test manuals. She hopes that by having had them double checked by a teacher whose home language was that of the translation, that errors may have been minimised. In addition, the translations are included with the local normative data in the appendices, allowing for their use in combination with that data.

Sex distribution was fairly equal (male - 42.6% and female - 57.4%). While age distribution varied from nineteen in the smallest group to fifty-two in the largest group, the numbers were felt to be large enough for inferences.

The candidate's hypothesis, "The Developmental Test of Visual Motor Integration and the Developmental Test of Visual Perception are not appropriate screening tools for the evaluation of visual motor perceptual problems in the urban Black primary school child", would appear to be supported by the results of her study. In view of low correlation between the handwriting and academic percentages and the results on the two tests, the lack of significant differences between the academic groups in test performance, and the inconsistency noted in regard to age progression and performance on the two tests, the diagnostic and prognostic relevance of the tests for this population must be questioned. This argument is further supported in regard to those validity studies on the Developmental Test of Visual Perception quoted, in which there is little backing for the claims of the authors that this test should be used as a screening tool for the identification of learning disabilities. An additional factor in support of the hypothesis would be the fact that there is a significant difference between the three South African groups on the five subtests of the Developmental Test of Visual Perception, with the exception of the "Above Average" group, when compared with the American sample. A comparison between the South African groups and the American sample population on the Developmental Test of Visual Motor Integration was not possible because of the lack of statistical data provided by the test author.

However, in view of the results on the Developmental Test of Visual Perception, the South African groups' results on both tests are provided with percentile rankings for every age group.

The candidate feels that while the two tests will continue to be used with the South African urban Black population because of the lack of any other suitable tests. She hopes that the inclusion in this study of translations of the test instructions and the percentile rankings might increase the validity of the tests. She would also suggest that interpretation of results should be made with great caution, bearing in mind Adler's (1973) comments that test results are only representative of a defined area of function (that measured by the test), for only certain children, on the particular test. She suggests that generalisations in the interpretation of results should be avoided. Use of the test in establishing diagnosis and determining prognosis should be avoided. However, they may be of value in indicating the need for occupational therapy, in treatment planning and in the assessment of progress.

In view of all of the above, the candidate would like to suggest in conclusion, that a test should be designed specifically for the South African urban Black child.

APPENDIX I

List of Terms Commonly Used to Describe Learning Disabilities

Association deficit pathology

Attention disorders

Brain-injured child

Central nervous system disorder

Conceptually handicapped

Congenital alexia

Congenital strephosymbolia

Diffuse brain damage

Dysgraphia

Dyscalculia

Dyslexia

Educationally handicapped

Hidden handicap

Hyperactivity

Hyperkinetic behavior syndrome

Hypoactivity

Hypokinetic behavior syndrome

Language disability

Language disordered child

Maturation lag

Minimal brain damage

Minimal brain dysfunction (MBD)

Minimal brain injury

Minimal cerebral dysfunction

Minimal cerebral palsy

Minimal chronic brain syndrome

Multisensory disorders

Neurological immaturity

Neurologically handicapped

Neurophrenia

Neurophysiological dysynchrony

Organic brain dysfunction

Organicity

Perceptually handicapped

Primary reading retardation

Psycholoinguistic disabilities

Psychoneurological disorders

Reading disability

Specific dyslexia

Specific learning disabilities

Strephosymbolia

Strauss syndrome

The child with multisensory difficulties

The interjacent child

The invisibly handicapped child

The other child

Waysider

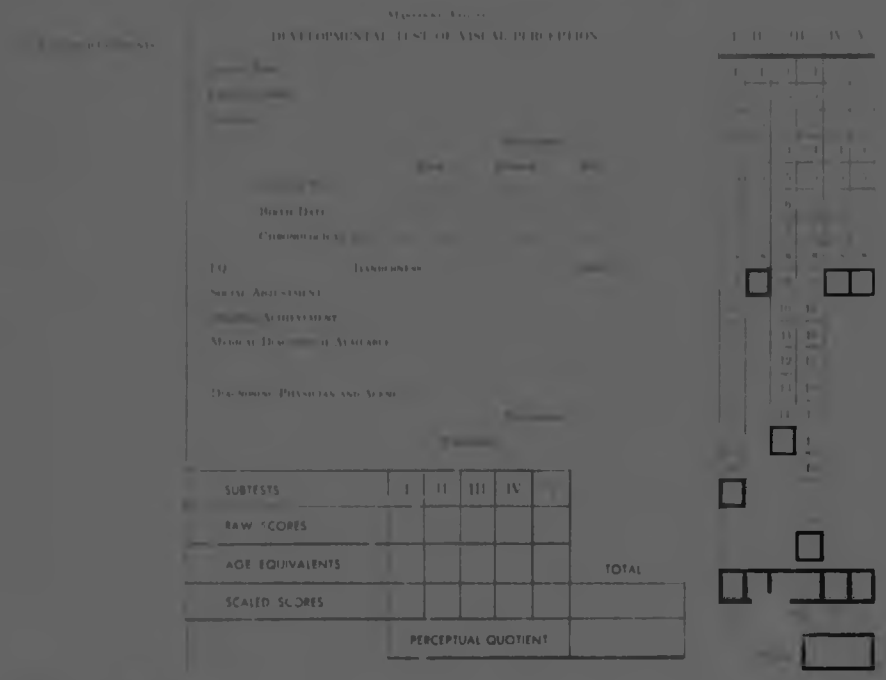
Word blindness

(Smith, 1979 : 23)

APPENDIX 2

The Developmental Test of Visual Perception

Test Booklet (50 % Reduction in Size)



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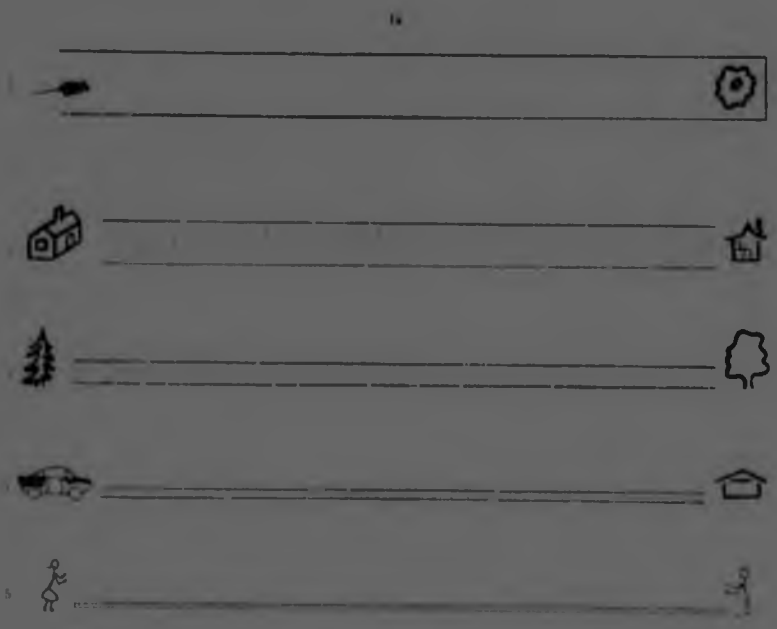

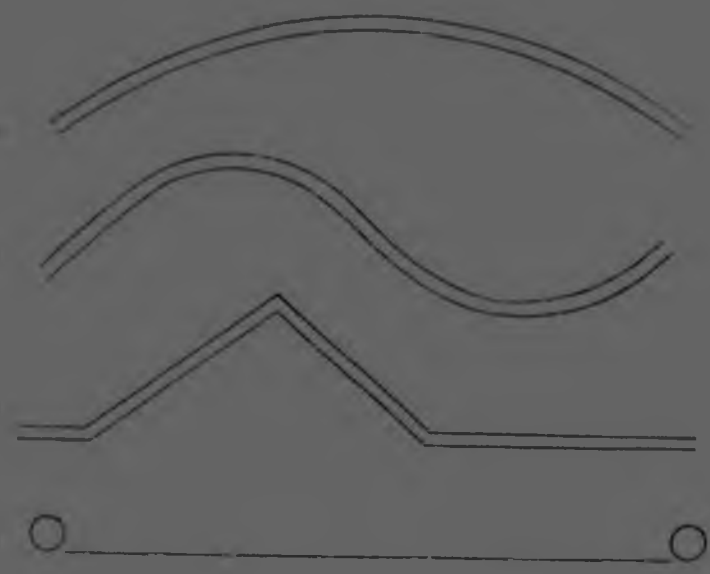



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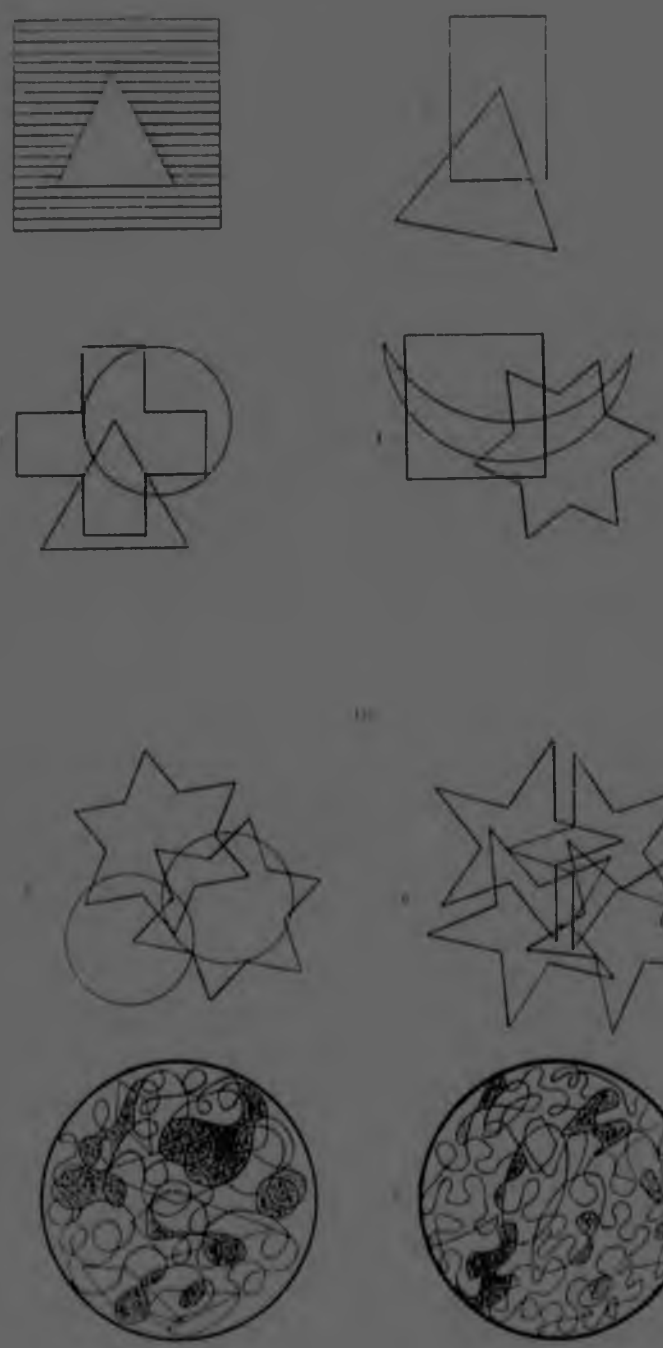
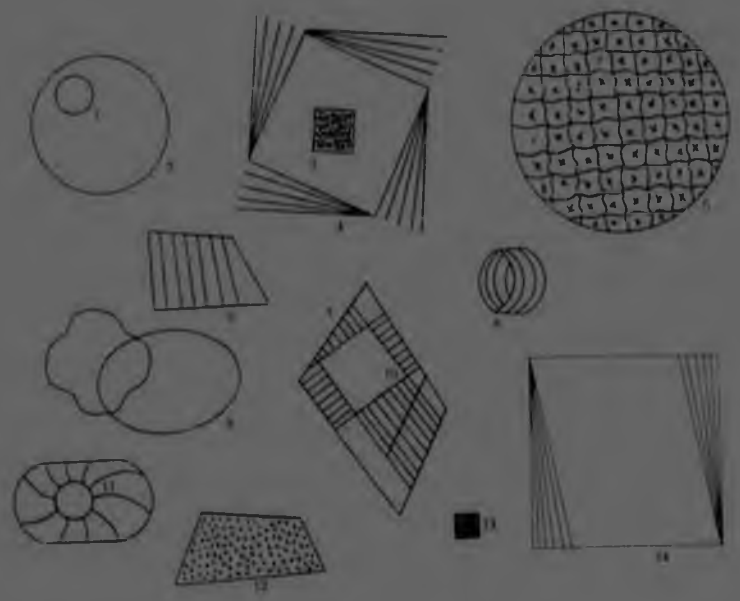


Subtest Three

IIIa



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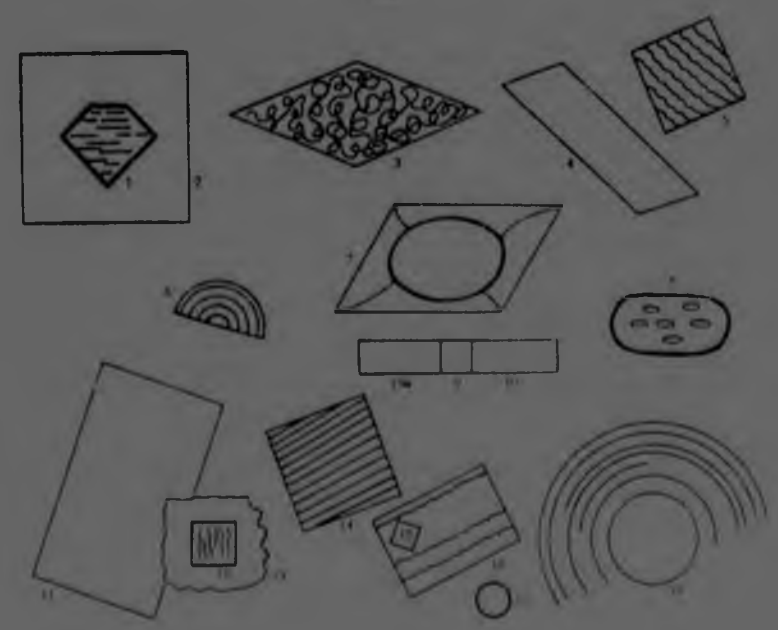

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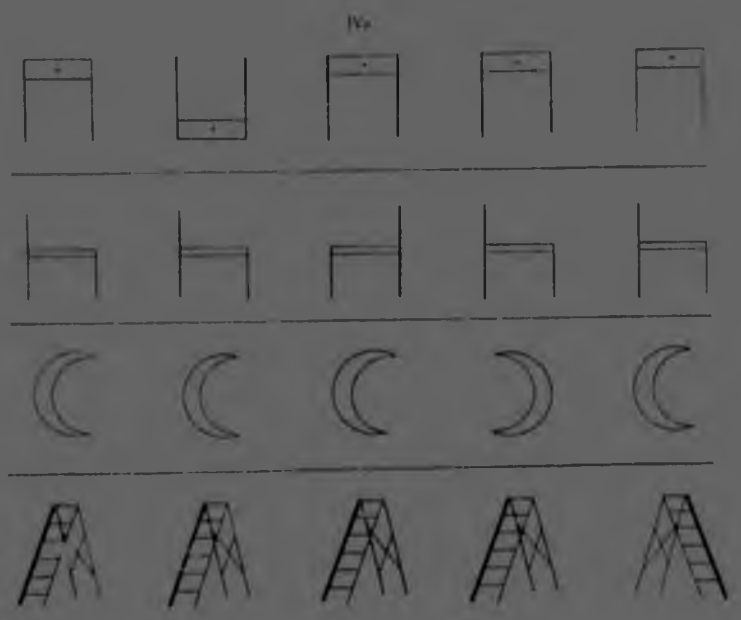

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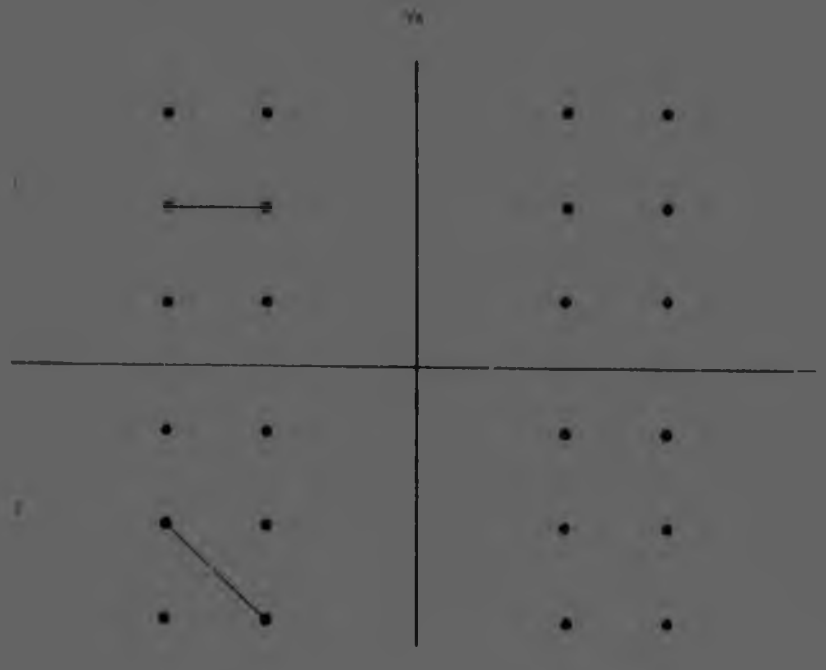
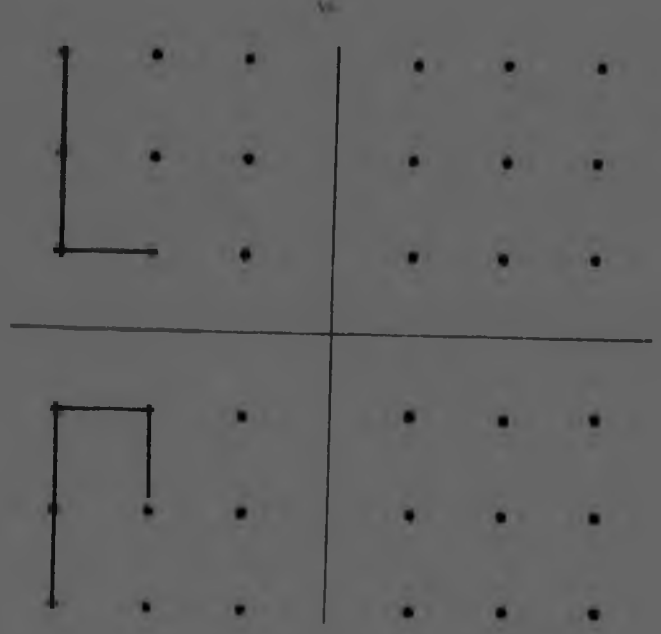
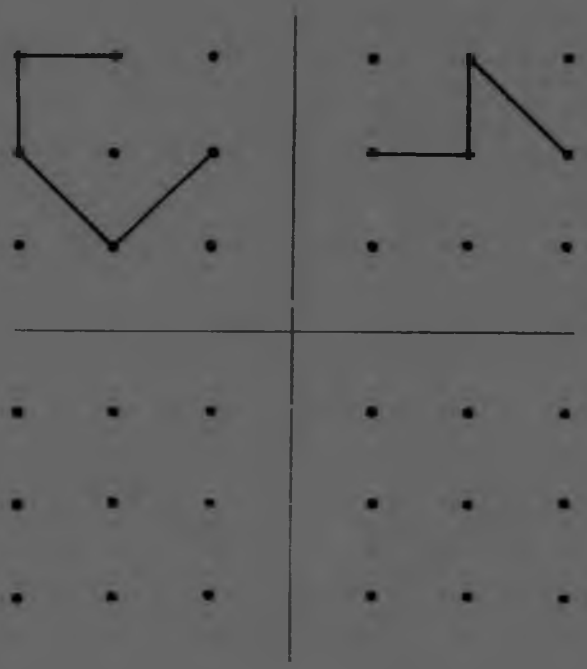
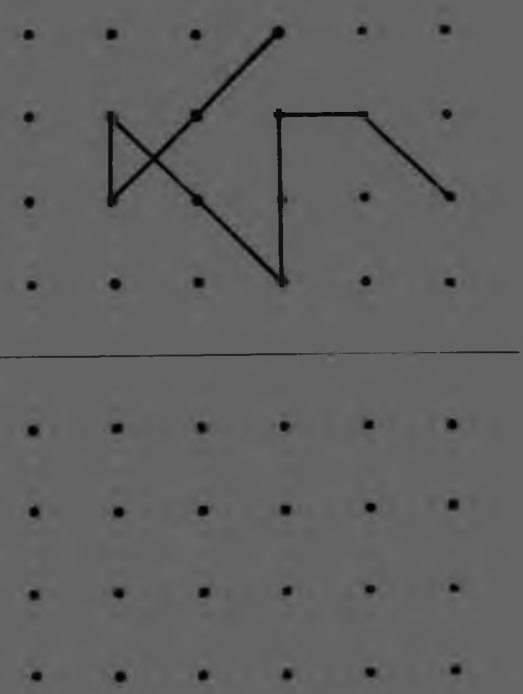






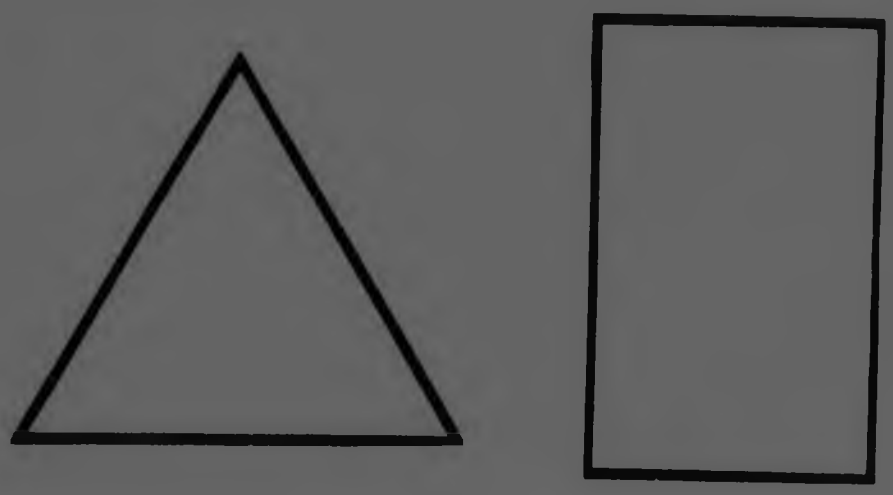


APPENDIX 3

The Developmental Test of Visual Perception

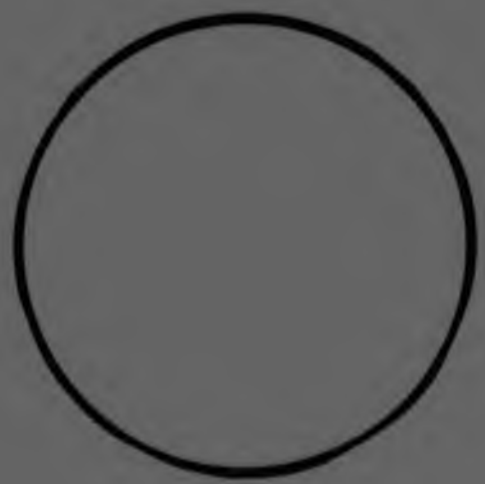
Demonstration Card Set (Reduction in Size)

Subtest Two





Subtest Three



Subtest Four







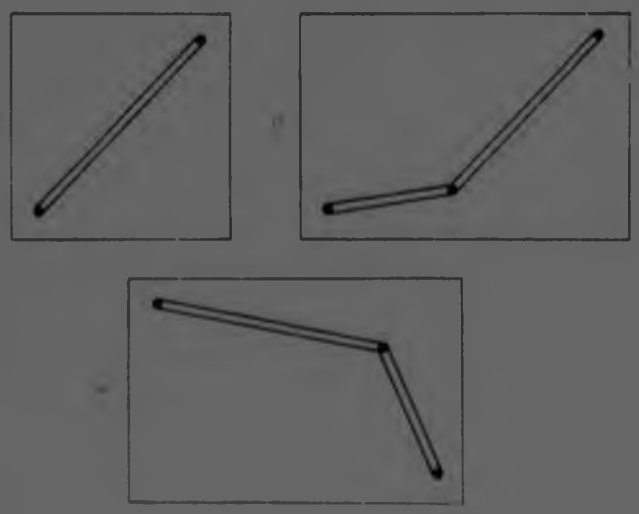


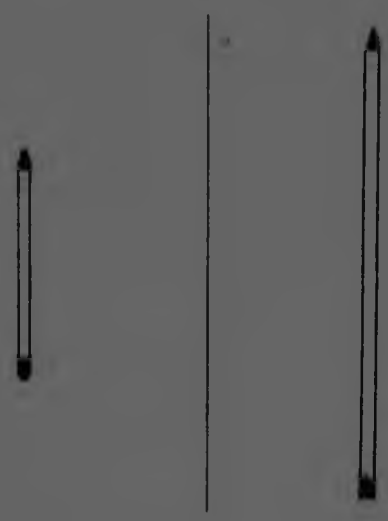
APPENDIX 4

The Developmental Test of Visual Perception

Scoring Transparencies (Reduction in Size)

Subtest One





APPENDIX 5

The Developmental Test of Visual Perception

English Instructions

"Miscellaneous Cautions

Make sure that the children understand their instructions before beginning. Demonstrate each subtest on the blackboard or with demonstration material. Children may be reminded as necessary that they may not erase or make corrections. (Pencils should not have erasers on them.) They must also understand that most exercises must be drawn in a single stroke without taking the pencil or crayon from the paper.

It is preferable that children have only the page they are working on face upward on the table. Preceding pages may be folded under. It is also important that they not be distracted by any subsequent items which may show through the page. To prevent this disturbance, it is recommended that a blank sheet of paper be placed under those pages which are not sufficiently opaque to eliminate distracting stimuli.

Pencils and crayons must be well sharpened. Lines too thickly drawn will invalidate some of the test items. Children of nursery school age should use only crayons. Note that while recognition of color is not a scoring factor in the test, certain test items do require the use of two or more colors. All work should be done from

left to right regardless of the child's handedness. The child should not turn the test booklet. Left to right progression should always be reinforced with all children.

For nursery school children the following parts of the test should be omitted: Ia5, Ib9, Ic, Id, Ie, IVb, Vc, Vd, Ve. For kindergarten children omit test Ve.

Test Administration

Distribute appropriate materials to each child. Say: Children, do not open your books. Now we are going to play some games together. Listen very carefully and do just what I tell you to do. (Proctors see that names are on all the booklets). We will open our books together and start each new game together.

Test I

Materials

Appropriate pencil primary or #2

In this test the children tend to take the pencil off the paper, even though they have been forewarned. The examiner should demonstrate on the blackboard that the pencil should not be lifted and should repeat this direction before every test item. This direction is to help the child; however, as discussed in the scoring section, the child is not penalized for lifting his pencil if he can complete the line without a break or sharp angle.

During this subtest, the children should not be permitted to turn their test booklets in such a way as

to make horizontal lines vertically or vice versa. If a child persists in doing so, he should not be given credit for the item.

If a child draws his line from right to left or from bottom to top, note should be made of this, but the manner of performance does not affect the scoring as such.

Item 1. Mouse Examiner holds test booklet so children can see demonstration. Open your books to the first page. Here is a mouse (point), a tunnel (trace along middle of the tunnel with finger), and a cookie. We are going to draw a line to show how the mouse can get the cookie without stopping or bumping the sides of the tunnel. Watch me! (Illustrate on blackboard) (Examiner holds up pencil and says): Hold up your pencil. (Check to see that each child holds up a pencil). Now you do it. Let the mouse go inside the tunnel to the cookie, but don't let the mouse bump the sides of the tunnel. Make a straight line! Leave the pencil on the paper! (Check to see that everyone has drawn the line and put his pencil down).

Item 2. Houses Examiner holds up test booklet. Here is a house (point) and here is a house (point). When I tell you, you are to take your pencil and go from one house to the other house. Go down the middle of the road. Keep your pencil on the paper. Don't bump! Now go! (Check that the children put their pencils down).

Item 3. Trees Examiner holds up test booklet. Now we

go on the road with the trees (point) from one tree to the other tree (trace). Take your pencil, stay in the middle of the road. Keep your pencil on the paper. Do not go back. Now go! (Check that the children put their pencils down).

Item 4. Car and Garage _ Examiner holds up test booklet. Here is a car. Show with your pencil how you would drive the car to the garage. Don't go off the driveway. Keep your pencil on the paper. Go!

Optional_

Keep your pencil on the paper. Do not go back _ take your pencil! Do it! (Check that the childrer put their pencils down).

With nursery school children, stop here and begin Item 6.

Item 5. Human Figures _ Examiner holds up test booklet. Here are two friends (point to each). The girl goes to the boy. Go all the way without stopping. Be sure to stay in the middle of the walk. Keep your pencil on the paper. Go!

Optional

Keep your pencil on the paper. Do not go back! _ Now take your pencil and do it. (Check that the children put their pencils down). Now let's turn the page.

Item 6. Curved Lines _ This is a new game. We will use the same rules. Examiner holds up test booklet. This is a road. Show with your pencil how you go from one end to the other (point) without bumping. Begin right

here (trace) and stop at the end, here. (Have the children point to beginning and end of line. Check). Remember, keep your pencils on the paper. Now go ahead. (Check that the children put their pencils down).

Item 7. Winding Lines _ Examiner holds up test booklet. This is a winding road. Go on it the same way we did before; keep your pencils on the paper. Now go! (Check that the children put their pencils down).

Item 8. Crooked Lines _ Examiner holds up test booklet. Now look at the crooked road. Do it the same way! Ready. Keep your pencils on the paper. Go ahead! (Check that the children put their pencils down)

With nursery school children, stop here and begin TEST 11.

Item 9. Balls _ (Demonstrate on board and then hold up booklet). Look up here. I am going to cover up the line with my red chalk, like this. (Demonstrate) Now take your red pencil and cover up the black line without stopping and without going back. Keep your pencil on the paper. (Check that the children put their pencils down) Now let's turn the page.

Item 10. Dots _ Examiner holds up test booklet. Here is a new game. See these dots? We are going to draw a line from this one to that one without stopping or going too far. Watch me! (Demonstrate on board) I drew a straight line; I started right on this dot and I finished right on this dot. I didn't go past. and I didn't stop. Now look at your book. See the dots

(point). Draw a line on your book the same way. Do not go too far. Keep your pencil on the paper. Go ahead!
The examiner must emphasize that the child begins and ends his line precisely on the dots. If the child does not do so, he is given no credit.
(Check that the children put their pencils down).
Do not trace path between figures on remaining items in Test 1. Point to the two figures simultaneously but do not trace between them.
Item 11. Stars _ Examiner holds up test booklet. Now look at these two stars. Make a straight line the same way as before. Begin! (After the children have finished) Now turn the page.
Item 12. Pears _ Examiner holds up test booklet. Now look at these two pears! With your finger touch one of the pears. And now touch the other pear. Draw a straight line from one pear to the other pear. Keep your pencil on the paper. Start right on the first pear and finish right on ther second pear. (Check that the children put their pencils down)
Item 13. Trees _ Examiner holds up test booklet. Here are two trees. Draw a line from one tree to the other tree. Do not go too far. Remember the rules: Do it! (Check that the children put their pencils down) Turn the page.
Item 14. Two Dots _ Examiner holds up test booklet. In this box there are two dots (point to dots). With your finger touch one of the dots. Now touch the other one.

Draw a straight line from one dot to other! Start right on the first dot and finish right on the second dot. Keep your pencils on the paper. Do not go too far! Now do it! (Check that the children put their pencils down)

Item 15. Three Dots _ Examiner holds up test booklet. In this box there are three dots (point to dots). With your finger touch the first dot, then the second dot, then the third dot. Like this (touch dots left to right). With your pencil make a straight line from this dot to the other dot and then to the third dot, without lifting your pencils. Make your lines straight! Now begin! (Check that the children put their pencils down).

Item 16. Three Dots _ In this box are three more dots (point). With your finger touch each of the dots (demonstrate). Now draw your lines the same way as before. Do it! (Check that the children put their pencils down). Now let's turn the page...

End of Test I

Test II

General Directions

Materials:

Four pencils of contrasting color for each child, (red, blue, green, brown). Crayons for nursery children. Demonstration materials: 7 cards displaying a triangle, rectangle, cross, "moon", star, "kite", oval.

Note

The figures should not be shown to any of the children in the same position as the figures in the tests. For

instance, the demonstration triangles should be shown upside-down, like this ▽ , not like this △ .

Be sure to tell the children before each item: Do not take your pencil off the paper. Keep it right on the line. When you are finished outlining the triangle, (box, etc.) put your colored pencil down. Show demonstration cards each time. Erase drawing or remove cards before children begin to outline the demonstration item. Make it very clear that the children should not take their pencils off the paper but should draw one unbroken line for each item.

Item 1. Triangle _ Here is a new game. In this game we are going to try to find something. Do you know what a triangle looks like? It looks like this. (Draw a triangle on the blackboard.) Do you know what the word outline means? It means to cover up lines of a figure like this triangle but not to color it in. Watch me while I outline the triangle. (Demonstrate.)

It is important to explain "outline" and to use this word consistently throughout the remainder of the test. The expression "draw around" is often interpreted literally by the child, and he may draw a circle around the figure.

I have outlined the triangle on the blackboard. I did it carefully, and I did not lift my chalk from the board. Do you see a triangle here? (Indicate Item 1)

The examiner should never use a pencil or one finger for pointing. Rather, the entire hand should be used so as

to avoid giving what the child may interpret as a cue.

Take your blue pencil and outline the triangle. When you have finished put your pencil (crayon) down. Now do it!

With young children, the examiner may wish to have the children hold up the blue crayon to check if each child has selected the proper color.

(Check to see that the children have put their crayon or pencils down.)

Item 2. Rectangle _ Now here is a shape like a long box. (Show.) In this picture (indicate Item 2) are a long box and a triangle. Take your red pencil and outline the long box only (Remove demonstration card or drawing). Find the long box and outline it. Try not to lift your pencils from the paper. Now do it. (Check that the children put their pencils or crayons down)

Item 3. Cross _ (Follow directions for Item 2, substituting "cross" for long box). Have the children use red pencil again for this item.

Item 4. Moon _ (Follow directions for Item 2, substituting "moon" for long box). The brown pencil should be used for this item.

(Concerning Items 5 & 6) Because these two items involve the outlining of stars, the test administrator should take care that the children work on the correct item. Use the booklet to demonstrate to the children which item they should tackle first. See that they put their colored pencils down after completing Item 5 and

do not go on to Item 6 until told to do so. The examiner will designate the color of the pencil. Show the children the correct pencil as you mention the colors. Tell them to take a pencil of the same color and hold it up, then check.

Item 5. Two Stars _ Here is a star. (Show on card; then point to items in booklet). Here are two stars. Take your green pencil and outline one of the stars. Try not to lift your pencil. After the children have finished, say: Now put your pencil down. Take a red penci' and outline the other star. Put your pencil down. (Check that the children put their crayons or pencils down).

Item 6. Four Stars _ Examiner points to Item 6. Here are four stars. (Follow d'rections for Item 5, making sure that the children use a pencil (or crayon) of a different color for each of the four stars. The order is green, brown, blue and red)

Item 7. Kites _ Examiner points to Item 7. Here is a ball (circle) (indicate). Inside the ball are some kites. They are shaped like this. (Show card). Take your blue pencil and outline all of the kites. Only outline the kites _ nothing else. Go ahead. (Check that the children put their crayons down)

Item 8. Easter eggs _ Examiner points to Item 8. (Follow directions for Item 7, substituting "Easter eggs" for kites. Show "oval" demonstration card. Use green pencil for this item). End of Test II

(Collect pencils not needed in next test, then continue).

Test III

Materials:

Two colored pencils for each child (green and brown). Crayons for nursery school children. Demonstration materials showing a circle, oval, square, rectangle.

Here is a new game.

III (a) 1. Circles - Introduce this item by holding up the demonstration cards showing a circle and an oval. The examiner indicates the circle and says, This is a round ball (circle). This is an egg (oval). On this page are some round balls (circles). (Hold up test booklet.) Find as many balls (circles) as you can. Take your green pencil and outline all the balls (circles) you can find. Do not color them in. Do not outline anything that is not a ball (circle) like this (point to the circle). Now you can go ahead. (Examiner should remove examples). Before the children begin to draw: Remember, don't outline the egg shaped ones (ovals), just the round balls (circles).

Some children may stop after they have found only one or two figures. Repeat the phrase, See how many circles you can find, as the standard form of encouragement, without exhorting them to find the rest of the figures or implying that they are not succeeding. Say, before the children complete the page, When you are finished,

put your pencil down...If one child takes longer than the rest of the group, stop him and continue the test.

III (a) 2. Squares - Begin by holding up cards of a square and a rectangle and say: This is a square (indicate). See, all the sides are just the same. This (indicate) is a long box (rectangle). (Hold up test booklet) On this page there are some squares and also other things like long boxes (rectangles). Now look at your books. Find all the squares you can and outline them. Do not outline anything that is not a square. Do not outline the long boxes (rectangles) or wiggly lines or anything else. Outline only the squares. See how many squares you can find. Now take your brown pencil (crayon) and do it.

As before, repeat the phrase, See how many squares you can find. When the group is almost finished, or all but one or two of the children are finished, say: When you are finished, put your pencil down...If one child takes appreciably longer than the rest of the group, stop him and continue the test.

Now let's turn the page. Fold it back. Here are some more drawings. We will again try to find circles and squares.

III (b) 1. Circles - Repeat instructions and use demonstration cards exactly as for III (a) 1.

III (b) 2. Squares - Directions identical to III (a) 2.

Be sure that circles and squares are done on both

sections a and b. End of Test III

Test IV

Materials:

For each child, a primary pencil or #2 (for kindergarten and above) or crayons (for nursery school children). Demonstration cards.

Now let's turn the page. Examiner holds up demonstration card. Look at this row of arrows. One of the arrows is not like the other arrows because it points in a different direction (indicate). We must mark it like this. (Show.)

For group testing, it is often helpful to ask the class which one is "different", and then to let a child explain why.

This subtest should be administered as briskly as possible.

Item 1. Tables - Examiner holds up test booklet. Look at this first row (point). These are tables. Most of the tables are right side up. But one table is upside down. Mark the one that is upside down. Now do it. (Check that the children put their pencils down).

Item 2. Chairs - Examiner holds up test booklet. Look at this row. These are chairs. Most of the chairs are turned the same way, but one is turned the wrong way. Mark the one that is turned the wrong way. (Check that the children put their pencils down).

Item 3. Moons - Same directions as for the previous item.

Item 4. Ladders - Same directions as for the previous item.

With nursery school children, stop here and begin Test V.

Now let's turn the page... Examiner holds up demonstration card. Look at the first girl - the one in the box. Now look at this row of girls. One girl is just like the one in the box. She is turned the same way (show). The others are facing the other way. This one over here is the one you mark, because she is just the same as the one in the box. Like this (show). It is often helpful to make the example more concrete by saying, for example, "The girl in the box is facing the windows." Examiner holds up test booklet.

Item 5. Flowers - Now look at your book. Look at this row of flowers. Put your finger on the one in the box, and then find the one that is just like the one in the box. Now take your pencil and mark it. (Check that the children put their pencils down).

Item 6. Snowmen - Same directions as for previous item.

Item 7. Beachball - Examiner holds up test booklet. Here are balls with drawings on them. Put your finger on the first ball. Find one which is just like it over here and mark it. Go ahead. (Check that the children put their pencils down).

Item 8. Boxes - Same directions as for previous items.

End of Test IV

Test V

Materials:

Crayons for nursery school children. Primary pencil or pencil #2 for kindergarten children and above.

Now let's turn the page.

Item 1. Examiner holds up test booklet. Do you see the picture on this side? (Demonstrates.) It has dots and a stick. Take your finger and trace the stick. Now look at this side. It has dots but it doesn't have a stick. Take your pencil and draw a stick or line so that this side looks just like the other side. Do it. Good.

Item 2. Now look at this picture. Draw a line on this side so that the pictures will look exactly the same. (Check to see that the children put their pencils down.)

Now let's turn the page.

Item 3. Same as above.

Item 4. Same as above.

With Nursery school children, end testing here.

Item 5. Same as above.

Item 6. Same as above.

Item 7. You see there is only one picture on this page. You have to make one just like it on the other side of the page. Now do it. When you are finished put your pencil down. (Check that the children put their pencils down)

With Kindergarten children, end testing here.

Item 8. Same as Item 7.

End of Test"(Frostig et al, 1966:10 - 17)

APPENDIX 6

The Developmental Test of Visual Perception

Zulu Instructions

Ingxubevange

Ibaneqiniso lokuthi abantwana bayaziqonda zonke izimfanelo phambi kokuba baqale. Bonisa zonke izivivinywana ebhodini yokubhala, noma endwangwini yeziboniso. Abantwana mabakhunjuzwe njalo ukuthi abafanelanga basule. Amapenisele makangabi nerabha. Kufuneka baqonde ukuthi izivivinyo eziningi kufuneka badwebe kanye kuphela, ngaphandle kokususa ipenisele noma ikhilayoni ephepheni.

Kudingeka ukuthi umntwana ngamunye iphepha lelo abhalela kulo libheke phezulu phezu kwetafula. Amaphepha alandelayo makasongelwe phansi. Kuyisidingo esikhulu ukuthi angangenelwa yinto ezobonakala ngaphandle kwephepha. Ukuvimbela loluhlupho kuyadingeka ukuthi ngaphansi kwephepha obhalela kulo ubeke amapheshana ambalwa ukuze into ebhaliwe ingaphumeli emva kwephepha obhala kulo. Amapenisele namakhilayoni makalolwe kakhulu. Imigqa edwetshwe ngokucindezela okukhulu iyokwehlisa inani lesivivinyo. Abantwana abase minyakeni yenkulisa mabasebenzise amakhilayoni kuphela. Qaphela ukuthi izinga lemibala akusilo elenza imiklomelo emikhulu esivivinyweni. Ezinye izigabana ziyadinga zisetshenziswe ngemibala emibili noma engaphezulu.

Wonke umsebenzi mawenziwe kusukele esandleni sobunxele

kuya kwesokudla abantwana mabangazijiki izincwajana zesivivinyo. Indlela yokusebenza kusuka kwesobunxele, kuya kwesokudla mayicindezelwe ebantwaneni. Ebantwaneni basenkulisa lezizingxenye ezilandelayo zesevivinyo, kufanele zingasetshenziswa: Ia5, Ib9, Ic, Id, Ie, IVb, Vc, Vd, Ve. Ebantwaneni abaneninyaka engaphansi kwesihlanu yekela isivivinyo Ve.

Ukwenza Izivivinyo

Yabela abantwana izimfanelo zabo. Uthi: Bantwana ningazivuli izincwadi, zenu. Manje sizodlala imidlalo sonke kanye kanye. Lalelani ngokunakekela, okukhulu besenenzake into leyo enginitshene yona. (Proctors bhekani ukuthi amagama akhona kuzo zonke izincwajana). Sizovula izincwadi zethu sonke besesiqala imidlalo yethu ngaminye.

Isivivinyo Sokuqala

Izinto Ezidingekayo

Ipenisele elifanele - Primary or Nombolo yesibili.

Kulesisivivinyo - abantwana banento yokuthanda ukususa ipenisele ephepheni; kanti basuke beyaliwe ukuthi - bangalisusi. Umhloli kufuneka ababonise ebhodini yokubhala ukuthi ipenisele akufuneki isuswe noma iphakamiswe. Kufuneka aphinda phinde lendlela yesiboniso. Ngalendlelake umntwana uyasizeka ukuthola imizuzo emihle njengoba sishilo, umntwana akajeziswa ngokuphakamisa ipenisele uma umuqqa wakhe unganqamukanga noma ungaqweganga.

Uma kusenziwa lesisivivinyo esincane abantwana

abavunyelwe ukuba bavule izincwajana zabo zesivivinyo ngaleyondlela ebonisa imigqa evundlayo, nona eyehlayo. Uma umntwana eqhubeka ngokwenzenjalo makangafumani mivuzo kuleyo ngxenye.

Uma umntwana edweba imigqa kusukakwesobunxele kuya kwesokudla, noma kusuka phezulu kuya phansi; kufuneka kuqashelwe lokhu, kodwa indlela yokwenza ayithintani nemivuzo.

Ingxenye Yokuqala - Igundwane

Umhloli ubamba incwajana yesivivinyo ngendlela ukuze bonke abantwana babone indlela yokwenza. Vulani ikhasi lokuqala. Nali igundwane, (uyalikhomba.) nansi intuba (khomba uhambise umunwe njalo emphakathini wentuba, nali ikhekhana. Sizodweba umugqa sibone ukuthi igundwane lihamba kanjani lingazanqe lime liphumule, futhi lingazange lishayise udonga lwentuba. Gadani minake. (Bonisa ngokwenza ebhodini lokubhala. Umhloli ubamba ipenisele lakhe abesethi): "Bambani amapenisele enu niwaphakamise" (Bonake ukuthi wonke umntwana uphethe, futhi uphakanise ipenisele lakhe). Manje yenzanike. Yekelani igundwane lihambe phakathi kwentuba, liye ekhekheni, kodwa ubone ukuthi igundwane alizithinti izindonga zentuba. Yenzani umugqa oqondile! Beka ipenisele phezu kwekhasi! (Bheka ukuthi wonke umntwana uwudwebile umugqa wabeka ipensele lakhe phansi).

Ingxenye Yesibili - Izindlu

Umhloli ubamba ngokuphakanisa incwajana yesivivinyo.Nansi indlu, (uyayikhomba) nansi enye indlu

(uyayikhomba nayo futhi). Uma senginitshelileke nizothatha amapenisele enu nidwebe, nihamba nisuka kwenye indlu niya kwenye. Nihambe phakathi naphakathi komgwaqo. Gcina ipenisele lakho ephepheni! Ungathinti emaceleni! Manjeke hamba! (Bonake ukuthi abantwana amapenisele bawabekile phansi).

Ingxenye Yesithathu - Izihlahla

Umhloli ubamba ngokuphakamisa incwajana yesivivinyo. Manje sihamba emgwaqweni onezihlahla (khomba) sisuka kwesinye isihlahla siya kwesinye isihlahla (dweba). Thathani amapenisele enu wamiseni phakathi nomgwago. Gcina ipenisele lakho ephepheni. Ungayi emva. Manjeke hamba. (Bonake ukuthi abantwana amapenisele bawabekile phansi).

Ingxenye Yesine - Inqola Nendluyayo

Umhloli ubamba ngokuphakamisa incwajana yesivivinyo. Nansi inqola. Bonisa ngepenisele ukuthi ungayihambisa kanjani inqola uyisa endlini yayo. Ungaphumeli eceleni kwendlela. Gcina ipenisele lakho ephepheni. Hambake! Noma:- Gcina ipenisele lakho ephepheni. Ungaphindeli emva - thatha ipenisele lakho! Yenzake! (Bona ukuthi bonke abantwana bawabekile amapenisele abo phansi). Esikolweni senkulisa abantwana baphelela lapha bese uqala ingxenye yesithupha.

Ingxenye Yesihlanu - Umfanekiso Womuntu

Umhloli uphakamisa incwajana yesivivinyo. Nampa abangane ababili (Uyabakhomba). Intombazane iya kumfana. Hambake yonke indlela ungemi. Ubeneqiniso

lokuthi uphakathi naphakathi nendlela. Gcina ipenisele lakho ephepheni. Hamba!

Noma - Gcina ipenisele lakho ephepheni. Ungaphind li Emva! - Manje thatha ipenisele lakho besewenzake. (Qaphela ukuthi abantwana bawabekile phansi amapenisele). Manje masivuleni ikhasi.

Ingxenye Yesithupha - Imigqa e Gobile

Lona ngumdlalo omusha. Sizosebenzisa imithetho efanayo. Umhloli uphakamisa incwajana yesivivinyo. Lona ngumgwago. Bonisa ngepenisele lakho ukuthi ungahamba kanjani kusukele ekuqaleni komgwaqo kuya ekupheleni kwawo ungazange ushayise. Qala lapha (dweba) Gcina ekuphe'eni lapha. (Bona ukuthi abantwana bayakhomba ekuqaleni nase kupheleni komugqa. Bhekisisa). Khumbulani ukugcina amapenisele enu emaphepheni. Manje ke qhubekani. Bona ukuthi bonke abantwana amapenisele bawabeke phansi).

Ingxenye Yesikhombisa - Umugqa Oyinsongensonge

Umhloli uphakamisa incwajana yesivininyo. Lo! umgwago oyinsongensonge. Hambani kuwo njengoba senzile ngaphambili; gcina ipenisele lakho ephepheni. Manje lihambise. (Bona ukuthi bonke abantwana babeke amapenisele abo phansi).

Ingxenye Yesishiyagalombili - Umugqa Ogwegile

Umhloli uphakamisa incwajana yesivivinyo. Manje bheka lomgwaqo ogwegile. Yenza ngendlela efanayo! Lingelake, gcina ipenisele lakho ephepheni. Qhubeka! (Bonake ukuthi bonke abantwana amapenisele bawabeke phansi).

Abantwana basenkulisa bayema lapha babe sebeqala isivivinyo sesibili.

Ingxenye Yesishiyagalolunye - Amabhola

Bonisa ebhodini yokubhalela, bese uphakamisa incwajana yesivivinyo. Bhekani lapha ngenhla. Ngizogquma lomugqa ngeshoki elibomvu, kanje. (Bonisake). Manje thatha ipenisele elibomvu ugqume ngalo imigqa emnyama ngaphandle kokuma nangaphandle kokuphindela emva. Gcina ipenisele lakho ephepheni. (Bonake ukuthi bonke abantwana amapenisele bawabeke phansi). Manjeke masivule elinye ikhasi.

Ingxenye Yeshumi - Amaqashaza

Umhloli uphakamisa incwajana yakhe yesivivinyo. Nangu umdlalo omusha. Niyawabona lamaqashaza? Sizodweba umugqa kusuka kuleli kuya kuleliya ngaphandle kokuma noma nokuya kude kakhulu. Qaphelanike! (Bonisa ebhodini yokubhalela). Ngidweba umugqa oqondile: ngiqala kuleli qashaza ngizoqedela kuleliya qashaza. Angidlulanga futhi angimanga. Manje bheka encwadini yakho. Niyawabona amaqashaza (wakhombe). Dweba umugqa encwadini yakho ngendlela efanayo. Ningayi kude kakhulu. Gcina Ipenisele ephepheni. Qhubekelaphambili. Umhloli makaqqizelele ekutsheleni umntwana ukuthi kufuneka umugqa wakhe uqale eqashazeni, futhi uphelele eqhashazeni. Uma umntwana engenzi kanjalo angeke athole umvuzo. (Bona kuthi abantwana amapenisele bawabeke phansi).

Ingxenye Yeshumi nanye - Izinkanyezi

Unhloli uphakamisa incwajana yesivivinyo. Manje bhekani lezizinkanyezi ezimbili. Dweba umugqa oqondile njengoba sike senza. Qala! (Emva kokuba abantwana beqedile) Vula elinye ikhasi.

Ingxenye Yeshumi nambili - Amapeya

Umhloli uphakamisa incwajana yesivivinyo. Manje bhekani lamapheya amabili. Ngomunwe wakho thinta elinye lalamapheya. Thinta elinye futhi. Manje dweba umugqa oqondileyo kusuka epeyeni lokuqala uya kwelesibili. (Bonake ukuthi abantwana bawabeke phansi amapenisele).

Ingxenye Yeshumi nantathu - Izihlahla

Umhloli uphakamisa incwajana yesivivinyo. Nazi izihlahla ezimbili. Dweba umugqa kusukela kulesisihlahla kuya kulesiya. Ungayi kude kakhulu Khumbula umthetho. Yenza! (Bona ukuthi abantwana bawabeke phansi amapenisele) Phendula ikhasi

Isigaba Seshumi nane - Amaqashaza Amabili

Umhloli uphakamisa incwajana yesivivinyo. Kulencwadi kunamaqashaza amabili. Khomba amaqashaza ngomumwe wakho. Thinta iqashaza, manje thinta elinye. Dweba umugqa oqondile osuka eqashazeni lokuqalala uya eqashazeni lesibili. Gcina ipenisele ephepheni. Ungahambeli kude kakhulu! Manje yenzake. (Bona ukuthi abantwana bawabeke phansi amapenisele).

Ingxenye Yeshumi nesihlanu - Amaqashaza Amathathu

Umhloli uphakamisa incwajana yesivivinyo. Kulelibhokisi kunamaqashaza amathathu (wakhombe ngomunwe wakho). Thinta

iqashaza lokuqala, lesibili nelesithathu. Kanjena, thinta amaqashaza kusukele kwesobunxele kuya kwesokudla. Ngepenisele lakho dweba umugqa oqondile kusuka kuleqashaza kuya kuleliyaqashaza kuze kufike eqashazeni lokugcina okungelesithathu, ungazange ususe ipenisele lakho. Yenza imigqa yakho iqonde. Manjeke Qala. (Bona ukuthi abantwana amapenisele bawabeke phansi).

Ingxenye Yeshumi Nesithupha - Amaqashaza Amathathu

Kulelibhokisi kukhona amanye futhi amaqashaza amathathu. (Khomba ngomunwe wakho). Thinta iqashaza ngalinye. Bonisa. Manje dweba umugqa wakho ngendlela efanayo.

Isivivinyo Sesibili

izindlela ezijwayelekile

Izimfanelo

Amapenisele amane anemibala eyahlukene emntwaneni ngamunye. (Ebomvu, eliluhlaza, njengesibhakabhaka, eliluhlaza njengotshani, nelisundu.) Amakhilayoni ebantwaneni basenkulisa. Izinto zokubonisa. Amakhadi okudlala ayisikhombisa ngesiboniso:-

Unxantathu, isikwele, isiphambano, inyanga, inkanyezi, ikhayithi, oval.

Qaphela I

Imifanekiso mayingaboniswa abantwana ime ngendlela efanayo njengasesivivinyweni. Kanjena isibonakaliso so nxantathu kufanele siboniswe iphansi libheke phezulu nephezulu libeke phansi. Phezulu phansi kanje ∇ hayi kanje Δ.

Ibaneqiniso lokuthi uyabatshela abantwana phambi kwaleyo naleyo ngxenye: Ungalisusi ipenisele lakho ephepheni. Ligcine emgqeni, uma sewuqedile ukudweba unxantathu, ibhokisi nokunye njalo. Beka phansi amapenisele akho amibala bala. Bonisa emakhadini ngaso sonke isikhathi. Susa imifanekiso namakhadi phambi kokuba abantwana baqale. Bacacisele ngokusobala ukuba bangasusi ipenisele ephepheni kodwa benze umugqa onganqamukanga.

Ingxenye Yokuqala - Unxantathu

Nangu umdlalo omusha. Kulomdlalo kukhona into esizozama ukuthi siyithole. Niyazi ukuthi unxantathu ubukeka kanjani? Ubukeka njengalento. (Dweba umfanekiso wonxantathu ebhodini). Niyalazi igama elithi umphandle lisho ukuthini? Lisho ukudweba ingaphandle lento ofuna ukuyidweba, njengo nxantathu kodwa ungayifaki imibala. Ngiqaphelenike njengoba ngidweba lonxantathu. (Bonisa). Kubalulekile ukuchaza igama elithi "ngaphandle" nokulisebenzisa njalo kulesivivinyo esilandelayo. Igama elithi dweba ujikeleze lichazeka ngokunye ebantwaneni. Okungangoba omuye umntwana angadweba indilinga ajikeleze umfanekiso.

Ngiwenzile unxantathu ebhodini. Ngiwenze ngokunakekela angizange - ke ngiphakanise ishoki yani ebhodini. Niyawubona unxantathu lapha? (Khomba isiqephu sokuqala). Umhloli angasebenzisi ipenisele noma ununwe owodwa ekukhombeni. Okungcono angasebenzisa isandla sonke ukuze umntwana angabi nengqondo ekhomba isimilo

Ibaneqiniso lokuthi uyabatshela abantwana phambi kwaleyo naleyo ngxenye: Ungalisusi ipenisele lakho ephepheni. Ligcine emgqeni, uma sewuqedile ukudweba unxantathu, ibhokisi nokunye njalo. Beka phansi apenisele akho amibala bala. Bonisa emakhadini ngaso sonke isikhathi. Susa imifanekiso namakhadi phambi kokuba abantwana baqale. Bacacisele ngokusobala ukuba bangasusi ipenisele ephepheni kodwa benze umugqa onganqamukanga.

Ingxenye Yokuqala - Unxantathu

Nangu [illegible]lalo omusha. Kulomdlalo kukhona into esizozama ukuth[illegible]yithole. Niyazi ukuthi unxantathu ubukeka kanja Ubukeka njengalento. (Dweba umfanekiso won[illegible]a ebhodini). Niyalazi igama elithi umphandle lisho [illegible]thini? Lisho ukudweba ingaphandle lento ofuna ukuyidweba, njengo nxantathu kodwa ungayifaki imibala. Ngiqaphelenike njengoba ngidweba lonxantathu. (Bonisa). Kubalulekile ukuchaza igama elithi "ngaphandle" nokulisebenzisa njalo kulesivivinyo esilandelayo. Igama elithi dweba ujikeleze 'ichazeka ngokunye ebantwaneni. Okungangoba omuye umntwana angadweba indilinga ajikeleze umfanekiso.

Ngiwenzile unxantathu ebhodini. Ngiwenze ngokunakekela angizange - ke ngiphakanise ishoki yani ebhodini. Niyawubona unxantathu lapha? (Khomba isiqephu sokuqala). Umhloli angasebenzisi ipenisele noma ununwe owodwa ekukhombeni. Okungcono angasebenzisa isandla sonke ukuze umntwana angabi nengqondo ekhomba isimilo

esibi. Thatha ipenisele lakho ubonise unxantathu. Uma sewuqedile beka ipenisele lakho (ikhilayoni phansi). Manje yenzake. Ebantwaneni abancane umhloli uke athande ukuthi umntwana ngamunye aphakamise ikhilayoni eluhlaza njengesibhakabhaka, ukuze abone ukuthi bakhothe umbala ofanele. (Bona ukuthi abantwana amapenisele nama khilayoni abo bawabeke phansi).

Ingxenye Yesibili - Ibhokisi elide

Nasi isimo esinjengebokisi elide. (Bonisa) Kulomfanekiso ibhokisi elide kanye nonxantathu. Thatha ipenisele lakho elibomvu ubonise ibhokisi elide kuphela. (Susa izibonisa zamakhadi nezomdwebo).Thola ibhokisi elide bese uyalidwebela. Zama ungalisusi ipenisele lakho ephepheni. Yenzake. (Bonake ukuthi abantwana amapenisele nama khilayoni bawabeke phansi).

Ingxenye Yesithathu - Isiphambano

(Landele indlela yengxenye yesibili wenze isiphambano endaweni yebhokisi elide). Abantwana mabasebenzise ipenisele elibomvu ekudwebeni lengxenye.

Ingxenye Yesine - Inyanga

Landela indlela yengxenye yesibili wenze inyanga endaweni yebhokisi elide. Sebenzisa ipenisele elinsundu. Manje phendula ikhasi. Maqondana nengxenye yesihlanu neyesithupha. Njengoba lezingxenye ezimbili ziqondene nokudweba izinkanyezi, umenzi wesivivinyo kufuneka anakekele ukuthi abantwana basebenza ezingxenyeni ezifanele. Sebenzisa izincwajana ukubonisa abantwana ukuthi iphi ingxenye okufanele bayisebenze.

Bona ukuthi amapenisele abo ambalabala bawabeka phansi uma sebeqede ingxenye yesihlanu.

Bangayi koqala ukwenza za ingxenye yesithupha bengakatshelwa. Umhloli uzokhetha umbala wepenisele alifunayo. Bonisa abantwana ipenisele elifunekayo njengobo ubabonisa imibala. Batshene ukuthi bathathe amapenisele alowo mbala owufunayo bawaphakamise, bese uyawahlolake.

Ingxenye Yesihlanu - Izinkanyezi Ezimbili

Nansi inkanyezi. (Ibonise ekhadini bese ubonisa engxenyeni esencwajaneni). Nazi izinkanyezi ezimbili. Thatha ipenisele lakho eliluhlaza okotshani bese udwebela ngalo lezizinkanyezi. Zama ungaliphakanisi ipenisele, (uma abantwana sebeqedile batshele babeke amapensele). Bheka ukuthi abantwana amakhilayoni noma amapenisele bawabekile phansi).

Ingxenye Yesithupa - Izinkanyezi Ezine

Umhloli ukhomba ingxenye yesithupha. Nazi izinkanyezi ezine. Landela indlela yengxenye yesihlanu. Yiba neqiniso lokuthi abantwana basebenzisa amapenisele noma (amakhilayoni) anembala ehlukene kuleyo naleyo nkanyezi njengoba zizine iyinye. Indlela yemibala ngokulandelana ile: Eluhlaza okatshani, ensundu, eluhlaza okwesibhakabhaka nebomvu.

Ingxenye Yesikhombisa - Ikhayithi

Umhloli ukhomba ingxenye yesikhombisa. Nali ibhola. (Indilinga) (bonisa). Phakathi kwalebhola kukhona amakhayithi. Enziwe kanje, (bonisa ikhadi). Thatha

ipenisele lakho elisasibhakabhaka udwebele onke amakhayithi. Dwebela amakhayithi kuphela hayi okunye. Qhubekela phambili. (Bona ukuthi abantwana bawabeke phansi amakhilayoni).

Ingxenye Yesishiyagalombili - Amaqanda Ama Easter

Umhloli ukhomba ingxenye yesishiyagalombili. (Ulandela indlela yengxenye yesikhombisa. Aveze iqanda le Easter endaweni yekhayithi. Bonisa "ubusandilinga" ekhadini yokubonisa. Sebenzisa iponisele elisatshani kulengxenye).

Isiphetho sesivivinyo sesibili.

Isivivinyo Sesithathu

Okufunekayo

Amapenisele amabili anemibala emntwaneni ngamunye. Eliluhlaza satshani nelinsundu. Amakhilayoni ebantwaneni basenkulisa. Amakhadi adwetshiwe abonisa indilinga, isandilinga, isikwele, nebhokisi.

Nangu umdlalo Omusha

III (a) 1. Izindilinga

Ngenisa lengxenye ngokubonisa esibonelweni seladi indilinga. Umhloli ubonisa indilinga bese, ethi:- Leli ibhola eliyi-ndilinga. Leli iqanda elisandilinga. Kuleli khasi kunamabhola azindilinga. Izindilinga. Phakanisani izincwajana zesivivinyo. Funani amabhola azindilinga amaningi eningase niwathole. Ningawafaki imibala. Ningadwebeli noma yini nje engesilo ibhola 'ndilinga inje. Khomba indilinga. Manje ningaqhubeka. Umhloli kufuneka asuse izibonelo phambi

kokuba abantwana baqale ukudweba). Khumbula ningadwebeli isandilinga. Yenzani ibhola elisandilinga.

Abanye abantwana bangase bayeke uma sebenze izibonelo ezimbili noma sinye. Phinda phinda ukuze ubone ukuthi uthola izindilinga ezingaki, lokho kwenza amabhongo. Ukuze bangadinwa, yithi kubo:- Uma umntwana eseqede ikhasi makabeke phansi ipenisele lakhe.

Uma kukhona obona ukuthi ubhala kancane kunabanye, myekise, uqhubeke nesivivinyo.

III (a) 2. Isikwele

Qala ngokupbakamisa amakhadi esikwele nesikwele esisabhokisi. Bese uthi; Lesi isikwele niyasibona amacala onke ayalingana. Leli ibokisi elide. Phakamisa izincwajana zesivivinyo. Kuleli khasi kukhona isikwele kanye nezinye izinto ezifana namabhokisi amade. Manjeke bhekani izincwadi zenu. Funani zonke izikwele, bese nizi-dwebadweba kancane. Ningadwebadwebi yonke into ngaphandle kwezikwele. Ningalidwebi ibhokise elide noma yini enye.

Dwebedwebelani kuphela izikwele. Bona ukuthi uthole izikwele ezingaki. Manjeke thatha ipenisele lakho elinsundu (ikhilayoni) bese uya lihlikihla. Njengaphambili bona ukuthi zingaki izikwele ongazithola, uma sewubona ukuthi ixelana, noma bonke abantwana ngaphandle kwababili noma abathathu sebeqedile, uthi Uma seniqedile bekani phansi amapenisele enu. Uma Omunye umntwana ethatha isikhathi eside kunabanye,

myekise, uqhubeke nesivivinyo.

Manje masiphendule ikhasi. Libhekise emva. Nansi eminye imidwebo. Sizozama futhi ukuthola izindilinga nezikwele.

III (b) 1. Izindilinga

Phinda inkulumo usebenzise izibonakaliso zamakhadi njengoba kwenziwe ku III (a) 1.

III (b) 2. Isikwele

Indlela ifana kanye neka III (a) 2.

Isivivinyo Sesine

Izinto Ezisetshenziswayo.

Umntwana ngamunye -

Ipenisele elinenombolo yesibili. Ebantwaneni abaneminyaka engaphansi kwesihlanu, nengaphezu kwesihlanu. Amakhilayoni esikoleni senkulisa. Amakhadi eziboniso. Manje asiphendule ikhasi. Umhloli uphakamsa ikhadi lesibonelo. Bhekani lomugqa wemikhonto. Omunye wemikhonto awufani neminye, ngoba ubheke kwenye indlela. (khombisa). Kufuneka siwuphawule kanje. (Bonisa) Ekuvivinyeni ingxenye kuba usizo olukhulu ukubuza ikilasi ukuthi, "yimuphi ohlukile"? Bese uyekela omunye wabantwana achaze ukuthi kanjani.

Ingxenye Yokuqala - Amatafula

Umhloli uphakamisa incwajana yesivivinyo. Bhekani lomugqa wokuqala (khomba) lawa ngamatafula. Iningi lamatafula icala lawo langasokudla libheke phezulu, kodwa elinye itafula umphansi ubheke phezulu. Phawula lelo umphansi ubheke phezulu, nomzansi ubheke phezulu.

Phawula lelo umphansi ubheke phezulu, nomzansi ubheke phezulu. Yenzake. (Bona ukuthi abantwana bawabeke phansi amapenisele).

Ingxenye Yesibili - Izihlalo

Umhloli uphakamisa izincwajana zesivivinyo. Bhekani lemiqqa. Lezi izihlalo. Iningi lezihlalo zibheke endaweni efanayo, sinye kuphela isihlalo esibheke kwesayo ingxenye. Phawula Lesi esisodwa esibheke endaweni yaso sodwa. (Bona ukuthi amapenisele abantwana bawabeke phansi).

Ingxenye Yesithathu - Izinyanga

Indlela efanayo nengxenye engenhla.

Ingxenye Yesine - Amaladi

Indlela efanayo nengxenye engenhla.

Ebantwaneni basenkulisa yima lapha beseuqala isivivinyo sesihlanu.

Manje asiphenduleni ikhasi. Umhloli uphakamisa ikhadi lesibonelo. Bhekani intombazane yokuqala, leyo esebhokisini. Manje bhekani lomugqa wamantombazane. Enye yalamantombazana ifana naleya esebhokisini.

Lenake elapha yiyo okufuneka uyiphawule ngoba iyefana naleya esebhokisini. Kanje, (Bonisa). Esikhathini esiningi kuyasiza ukwenza izibonelo ziqine njengalesisibonelo. "Intombazane esebhokisini ibheke efasiteleni". Umhloli uphakamisa izincwajana zesivivinyo.

Ingxenye Yesihlanu - Izimbali

Manje bheka encwadini yakho. Bheka lemiqqa yezimbali.

Bheka umunwe wakho kuleyo esebhokisini. Manje funa enye efana naleyo esebhokisini. Thatha ipenisele lakho uyiphawule. Bonake ukuthi abantwana bawabeke phansi amapenisele.

Ingxenye Yesithupha - Indodayeqwa

Indlela efanayo nalezongxenye esezenziwe.

Ingxenye Yesikhombisa - Ibhola Lokudlalisa Olwandle

Umhloli uphakamisa incwajana yesivivinyo.

Nanka amabhola anemidwebo kuwo. Beka umunwe wakho ebholeni lokuqala. Funa elifana naloke kulawa, bese uliphawula Qubeka. (Bona ukuthi abantwana amapenisele bawabeke phansi.)

Ingxenye Yesishiyagalombili - Amabhokisi

Indlela efanayo njengaleyo engenhla.

Isiphetho sesivivinyo sesinye.

Isivivinyo Sesihlanu

Izinto Ezisetshenziswayo

Amakhilayoni ebantwaneni benkulisa sikole, amapenisele esikoleni sabancane, noma ipenisele enenombolo yesibili ebantwaneni abaneminyaka engaphansi kwesihlanu noma ngaphezulu.

Manje masiphenye ikhasi elilandelayo.

Ingxenye Yokuqala

Umhloli uphakamisa incwajana yesivivinyo. Niyawubona lomfanekiso olapha. (Khomba) Unamaqashaza kanye nenduku. Thatha umunwe wakho ucindezele endukwini. Manje bheka kulelicala. Linamaqashaza kodwa alinayo induku. Thatha ipenisele lakho udwebe induku, noma

umugqa ukuze lelicala lifane naleliya-cala. Yenza kube kuhle.

Ingxenye Yesibili

Manje bhekani lomfanekiso. Dweba umugqa kulecala, ukuze lemfanekiso ibukeke ifana njengoba injalo. Bheka ukuthi abantwana amapenisele bawabeke phansi. Manje masiphendule ikhasi.

Ingxenye Yesithathu

Iyafana nale engenhla.

Ingxenye Yesine

Iyafana nengenhla.

Nabantwana basenkulisa sikole. Gcina isivivinyo lapha.

Ingxenye Yesihlanu

Iyafana nengenhla.

Igxenye Yesithupha

Iyafana nengenhla.

Ingxenye Yesikhombisa

Niyawubona lomfanekiso owodwa kuphela kulelikhasi. Wenake kufuneka wenze omunye unfanekiso, emva wakwelinye ikhasi, ozobukeka ufana njengalowo wokuqala. Yenza ke Manje. Uma sewuqedile beka phansi iphenisele. (Bheka ukuthi abantwana bawabekile amapenisele phansi).

Ebantwaneni abaneminyaka engaphansi kwesihlanu, gcina isivivinyo lapho.

Ingxenye Yesishiyagalombili

Iyafana nengxenye yesikhombisa.

Isiphetho Sesivivinyo

APPENDIX 7

The Developmental Test of Visual Perception

Sotho Instructions

Tlhokomela

Bona gore botlhe ba tlhaloganya melao e e filweng pele ba simolola go kwala. Leka go bontsha bontlha-nngwe jwa teko mo letlapeng kgotsa sengwe fela se o ka se dirisang gore ba go tlhaloganye. Bana ba tshwanelwa go gakololwa gore ba se dirise sephimodi ka gope. Ba seke ba dira ditshiamiso ka gope. Dipotleloto ga di a tshwanelwa ke go nna le sephomodi (rabara). Ba tshwanelwa ke go itse gore bontsi jwa diteko di tshwanelwa ke go dirwa ka nako e le nngwe kwa bontsi jwa diteko di tshwanelwa ke go dirwa ka nako e le nngwe kwa ntle ga go tlosa potleloto foo pele motlhokomedi a re ba dire jalo.

Go botlhokwa gore motho, tsebe eo a e kwalang e nne fa godimo fa tse dingwe di le kwa tlase ga eo a kwalelang mo go yone. Go botlhokwa gore fa motho a kwalelang gone go nne le pampiri fa o tla bayang dikwalo tsa gagwe gone, gore di se kgotlelege kgotsa tsa phunyega ka mokgwa mongwe.

Dipotleloto di tshwanelwa go loodiwa sentle. Mela e thadilweng ka bokima e diretswe go kwala sentle mme ga e ne e tlhokega thata mo mabakeng mangwe. Bana ba ba botlana thata, ba di kheretshe ba ka dirisa dipotleloto tsa mebala (crayons). Lefa tiriso ya mebala e sa tseye

sekgele mo tekong, dingwe tsa dilo tse di leng foo di tla tlhoka mebala e mebedi kgotsa e mentsinyana.

Tiro ya mongwe le mongwe e tshwanelwa ke go kwalwa go tloga molemeng go ya mojeng, go sa kgathaletsege gore motho o dirisa lebogo lefe. Ngwana ga a tshwanela go phetla tsebe ya bukana. Mokwalo wa go simologa kwa molemeng go ya mojeng o tshwanelwa ke go gatelelwa mo go mongwe le mongwe.

Bana ba sekolo sa Nursery ba seke ba kwala 1a5, 1b9, 1c, 1d, 1e, IVb, Vd, Ve. Bana ba Kindergarten ba seke ba kwala Ve.

Test Administration

Naya ngwana mongwe le mongwe dilo tsotlhe tse di tlhokegang tsa go kwala. Ba reye o re: Le seke la bula dibukana tsa lona. Jaanong re tlile go dira metshamekwana e rotlhe. Reetsang ka tlhwafalo mme lo dire fela jaaka ke lo bolelela. (Bona gore maina a gone mo dibukaneng tseo o di ba fileng). Re tla bula dibukana tsa rona mme ra simolola go dira motshameko wa rona mmogo.

Teko 1

Ditlhokego

Appropriate pencil - primary or number 2.

Mo tekong e, gantsi bana ba emisa dipotleloto tsa bone ntekwana ba boleletswe gore ba se dire jalo. Motlhokomedi wa bana o tshwanelwa ke go ba supetsa mo letlapeng gore ba seke ba emisa dipotleloto tsa bone, a ntse a ipowa sebowane ka ga se mo tekong nngwe le nngwe.

Seo se thusa ngwana fela, mme e seng gore fa a ka emisa potleloto o tla jelwa maduo.

Mo nakong e, ngwana a seke a letlwa go sutisa bukana ka mokgwa ofe fela ka gonne o tsile go kwala a kgabaganya mela ka tsela nngwe fela e e fosagetseng. Fa ngwana a gapoletsa go dira jalo a seke a fiwa dintlha ka ga seo. Fa ngwana a thala mola gotswa mojeng go ya molemeng, kgotsa go tswa tlase go ya godimo, a a seke a jelwa maduo ka ga seo.

Teko 1 - Legotlo

Motlhokomedi a emise bukana ya gagwe go supetsa bana legotlo. Bulang dibuka tsa lona mo tsebeng ya ntlha A lo bona legotlo? A lo bona le phatlha eo le ka fetang mo teng go ya go ja kuku ele kwa ntle ga go thula sepe mo phatlhaneng eo? Bona nna gore ke dira jang. Bontsha mo letlapeng la go kwalela, o supe kwa ntle ga go emisa gore legotlo le tla tsamaya jang le sa thulane le sepe mo phatlheng go ya le fitlha mo ntlheng nngwe ya phatlha. Emisang dipotleloto tsa lona lotlhe. Bona gore botlhe ba di emisitse. A mongwe le mongwe a thale mola o o tlhamaletseng fela jaaka wena (motlhokomedi) o dirile mo letlapeng. Fa botlhe ba thadile mme o ikgotsofaditse gore ba dirile jalo, nte ba beye dipotleloto fatshe.

Teko 2 - Ntlo

Tsholetsa bukana ya gago. Supetsa bana ntlo. Ba bontshe ya bobedi. Tsayang dipotleloto tsa lona lo bontshe go tloga go ntlo ya ntlha go ya go ya bobedi o

tsamaa gare ga mmila kwa ntle ga go thula sepe, mme o beye potleloto fatshe. Bona gore botlhe ba di beile fa fatshe.

Teko 3 - Ditlhare

Tsholetsa bukana ya gago. Ba bontshe setlhare seo o simololang ka sona, go tswelela jalo go tse dingwe. Tsamaya ka bogare jwa mmila, o seke wa boela morago, tswelela pele. A bana le bone ba dire jalo mme o tlhokomele gore ba beile dipene fa fatshe fa ba fetsa.

Teko 4 - Koloi Le Ntlwana Ya Yone

Tsholetsa bukana ya gago go ba supetsa. Koloi ke eo, bontsha ka pene gore o tla e kganna jang go ya go tsena mo ntlwaneng ya yone kwa ntle ga go kgeloga tselana e e tsenelelang kwa ntlong ya yone. A dipene di nne fa fatshe.

(Bana ba sekolo sa Nursery ba emisa fa, mme ba tswelele ka potso 6)

Teko 5 - Batho

Dira jaaka gale o ba supetse. Ditsala tse pedi ke tseo. Mosetsana o ya go mosimane. Tsamaa jalo kwa ntle ga go ema. Tlhokomela gore o tsamaa ka tlhamalalo. Baya pene mo pampiring, tsamaa. Bona gore dipene tsotlhe di fa fatshe pele o phetlha tsebe e e latelang.

Teko 6 - Ditsela Tse Di Manyokenyoke (Curved Lines)

Yo, ke motshameko o moshwa. Fela re tla dirisa melao yone ele ya ntlha. Motlhokomedi o emisa bukana ya gagwe go supetsa bana. Se ke tsela. Supa ka pene go tloga go tsela ya ntlha go ya go ya bofelo kwa ntle ga

go tlodisa pene kgotsa go emisa. Bana le bone a ba dire jalo mme morago ba beye dipene fa fatshe. Bona gore botlhe dipene di beilwe.

Teko 7 - Ditsela Tse Di Manyokenyoke (Winding Lines)

Motlhokomedi o bontsha pele mo bukaneng ya gagwe seo se diriwang. Letla bana go tswelela jalo, dipotleloto di nne fa fatshe. Bona gore botlhe ba beile dipotleloto fa fatshe.

Teko 8 - Ditsela Tse Di Sa Tlhamalalang (Crooked Lines)

Motlhokomedi o emisa bukana ya gagwe jaaka gale. Leba tsela e e sa tlhamalalang, ipakanyetse go tsamaa. Dipene fa fatshe. Bona gore dipene tsa bana botlhe di fa fatshe. (Bana ba sekolo sa Nursery ba felelela fa, go ya go teko/potso II)

Teko 9 - Dikgwele (Balls)

Bontsha mo letlapeng la go kwalela mme o emise bukana. Bonang fa. Ke tlile go tshasa mola ka pene e khibidu, jaana. Bontsha. Jaanong tsaya pene kgotsa petleloto e khibidu mme o tshase mola kwa ntle ga go ema kgotsa go boela morago. Baya pene fa fatshe. A bana le bone ba dire jalo mme ba beye dipotleloto fa fatshe. (Jaanong re phetla tsebe.

Teko 10 - Dikhutlo (Dots)

Motlhokomedi o emisa bukana ya gagwe. Se ke motshameko o moshwa. A lo bona dikhutlo tse? Re tsile go simolola go thala fa go fitlhela fa. Mme seo lo se dira kwa ntle ga go kgaotsa kgotsa go fetisa fa. Bonang gore nna ke dira jang. (Bontsha). Ke thetse mola o o tlhamaletseng

go tloga fa go fitlhela fano. Ga nke ka fetisa kgotsa ka kgaotsa felo gongwe. Jaanong le lona dirang jalo. Motlhatlhobi a tlhokomedise sentle gore bana ba tsamaa sentle mo godimo ga dikhutlo tseo.

Teko 11 - Dinaledi (Stars)

Emisa bukana ya gago go ba supetsa. Bonang dinaledi tse pedi tse. Dira mola o o tlhamaletseng jaaka pele. Simolola. (Fa ba feditse) phetlang dibukana.

Teko 12 - Dipere (Pears)

Emisa bukana go ba supetsa. Bonang dipere tse pedi tse. Ka monwana wa gago o monnye, kgoma pere e le nngwe. Jaanong kgoma ya bobedi. Dira mothalo o o tlhamaletseng go tswa go pere go ya go e nngwe. Bona gore dipotleloto di fa fatshe fa ba fetsa.

Teko 13 - Ditlhare

Motlhatlhobi o tsholetsa bukana ya gagwe. Bonang ditlhare tse pedi. Thala mola go tloga mo setlh reng sa ntlha go ya go sa bobedi. O seke wa fetisa mola. Gopola melao ya teko. Bona gore bana botlhe ba beile dipotleloto fa fatshe fa ba fetsa. Phetlha tsebe ya bukana.

Teko 14 - Dikhutlo Tse Pedi

Tsholetsa bukana go ba supetsa. Mo lebokosong le go dikhutlo di le pedi. Kgoma khutlo ya ntlha ka monwana. Kgoma ya bobedi. Dira mola o o tlhamaletseng go tloga go ya ntlha go ya go ya bobedi. Baya potleloto mo pampiring. O seke wa fetisa mola. Bona gore dipotleloto di fa fatshe fa ba fetsa.

Teko 15 - Dikhutlo Di Le Tharo.

Tsholetsa bukana go ba supetsa. Lebokoso le le na le dikhutlo di le tharo. Ka menwana ya gago, kgoma khutlo ya ntlha, ya bobedi le ya boraro.(Simolola kwa molemeng go ya mojeng). Dira mola o o tlhamaletseng go tswa go khutlo ya ntlha go ya go fitlha ka ya boraro, kwa ntle ga go emisa potleloto. Morago o bone gore dipotleloto di tsotlhe fa fatshe.

Teko 16 - Dikhutlo Di Le Tharo

Mo lebokosong le go dikhutlo tse dingwe gape tse tharo. Kgoma nngwe le nngwe ya tsona ka menwana ya gago o ba supetsa gore ba dire jang. Dira mola jaaka mo ditekong tse di fetileng. (Bona gore dipotleloto di tsotlhe fa fatshe).

Teko II

Dintlha Ka Kakaretso

Ditlhokego (Materials)

Ngwana mongwe le mongwe a a fiwe dipotleloto di le nne tsa mebala, (khibidu, botala jwa legodimo, botala jwa tlhaga, phifadu). Bana ba ba botlana ba sekolo sa kheretshe (Nursery) ba fiwe dipotleloto tsa mmala (crayons).

Motlhatlhobi a nne le dikarata tse supang (7) tsa ditshupetso tseo mo go tsona go nang le matshwao a a latelang: khutlotharo khutlonnetsepa sefapano ngwedi (moon); naledi sefofisi popego ya lee.

Tlhokomela

O seke wa bontsha bana matshwao ao jaaka a ntshitswe mo

tekong. A tlhanolele ka mokgwa o sele. Jaa[illegible] gongwe khutlotharo, e lebise kwa tlase jaaka mo setshwantshong se ▽ Mme e seng jaana △ .

Dira gore o bolelele bana pele ga go kwala sengwe le sengwe gore: Le seke la tlosa dipotleloto mo dipampiring. Baya potleloto sentle fa godimo ga mola. Fa o feditse baya potleloto ya gago fa fatshe. Ba supetse matshwao a gago nako nngwe le nngwe fa ba tsile go dira teko ya one. Ba tlhokomedise sentle gore ba seke ba tlosa dipotleloto mo bukeng, mme motho a kopanye dimelanyana tseo di robegileng go di dira ditshwantso tse di tlhamaletseng.

Teko 1 - Khutlotharo

Motshameko o montshwa ke o. Re tlile go leka go dira sengwe. A lotlhe lo itse gore khutlotharo ke eng? E lebega jaana. (Thala khutlotharo mo letlapeng). Kgomaganyang mela e e fa thoko. Lo seke lwa tshasa bogare jwa modiro oo. Bonang gore nna ke dira jang. Le lona lo tsile go dira fela jaalo.

Go botlhokwa go dirisa lefoko bontle (outline) mo go tlhaloseng gore ba dire eng go fitlha ba fetsa tlhatlhobo ya bone. Fa o ka re thala ditikologo ya letshwao leno. Ngwana a ka akanya ka mokgwa mongwe mme a thala tshekeletsa kwa ntle ga letshwao leo.

Ke dirile bontle jwa khutlotharo ya me mo letlapeng kwa ntle ga go emisa tjhoko ka gope. A lo bona khutlotharo e. (e supe).

Motlhatlhobi a seke a dirisa potleloto kgolsa monwana go

supa. Boqolo a dirise letsoqo lotlhe fela. Seo se tla dira gore ngwana a seke a gopola gore monwana kgotsa potleloto e ka mo thusa mo go thaleng.

Dirisa potleloto ya gago ya botala jwa loapi go dira bontle jwa knutlotharo ya go, mme o beye potleloto ya gago fa fatshe.

Mo go ba ba botlana, a motlhatlhobi a nte ba tshololetse dipotleloto tsa bona gore a bone fa ba tlhophile mmala o o tshwanetseng.

Bona gore dipotleloto tsotlhe di fa fatshe.

Teko 2 - Khutlonnetsepa

Setshwantsho sa se tshwanang le lebokoso le le leele ke se. (le supe). Fa go lebokisi le le leele le khutlotharo. Tsaya potleloto e khibidu o dire bontle jwa lebokoso le le leele fela. (Tlosa letshwao kgotsa fa o thetseng gone). Batla lebokoso mme o dire bontle jwa lone. Leka gore potleloto e se tloge mo pampiring pele o fetsa go thala. (bona gore bana ba tlositse dipotleloto tsa bone botlhe).

Teko 3 - Sefapano

Dirisa mokgwa o o e dirisitseng mo tekong ya bobedi. Mo boemong jwa lebokoso le le leele a go nne sefapano. A bana ba dirise mmala o mohibidu gape.

Teko 4 - Ngwedi/Kgwedi

Dirisa molao ya diteko tse o di fetileng. Mo boemong jwa lebokoso le le leele a go nne le ngwedi. Bana ba dirise mmala o o phifadu go dira se. Jaanong phetlha tsobe.

Mabapi le teko 5 & 6, motlhatlhobi o tshwanetse go tlhokomela gore bana ba tshwantsha setshwantsho se se batlegang foo, ka gonne ditshwantsho di batla go thadiwa ga dinaledi ka bobedi. Motlhatlhobi a itlhophelele mebala eo a batlang gore bana ba e dirise go farologanya ditshwantsho. Bona gore ba tshotse mmala oo tlhokegang. Bona gore fa ba fetsa setshwantsho sa ntlha dipotleloto di nne fa fatshe. Ngwana a se thala sa bobedi a ise a bolelelwe go dira jalo.

Teko 5 - Dinaledi Tse Pedi

Naledi ke ye. (Ba bontshe naledi mo matshwaong a gago, morago o ba bontshe mo bukaneng).Dinaledi tse pedi ke tseo. Tsaya potleloto e tala o thale bontle jwa yone. Leka gore o se emise potleloto ya gago. Tsaya potleloto e khibidu o thale bontle jwa naledi ya bobedi. Baya fa fatshe potleloto. (Bona gore dipotleloto tsotlhe di fa fatshe).

Teko 6 - Dinaledi Tse Nne

Dinaledi tse nne ke tseo A bana ba dire jaaka teko 5. Mebala e nne e e farologaneng. A bogolo e nne botala jwa tlhaga, phifadu, botala jwa loapi le bohibidu.

Teko 7 - Difofisi

Ba supetse teko ya bosupa. Se ke tshekeletsa eo mo teng ga gone go leng difofisi. Di ntse jaana. (Ba supetse mo ditshupetsong tsa gago). Tsaya potleloto ya botala jwa legodimo o dire bontle jwa difofisi fela, mme e seng sepe kwa ntle ga difofisi. (Bona gore dipene tsa bana di fa fatshe).

Teko 8 - Mae A Paseka

A bana ba dirise melao ya teko ya bosupa. Go nne mae mo boemong jwa difofisi. Ba bontshe tshupetso ya setshwantsho sa lee. A b' dirise mmala o botala jwa tlhaga.

O Ka tsaya dipotleloto mo baneng ga di ne di tlhokega mo tekong III.

Teko III

Ditlhokego

Dipotleloto tse pedi tsa mebala ngwana mongwe le mongwe. Mebala e nne botala jwa tlhaga le bophifadu. Bana ba sekolo sa kheretshe (nursery) ba fiwe dipotleloto tsa mebala. Go nne le ditshwantshi tse di bontshang kgolokwe (circle); Lee (oval); khutlonne (square) le khutlonnetsepa.

Motshameko o moshwa.

III. (a) 1. Dikgolokwe

Ba itsise kgolokwe ka go ba supetsa kgolokwe le popego ya lee go bona pharologanyo. Fa o ba tlhalosetsa, ba ree o re: Se ke kgwele/bolo. Mme se ke lee. Ba supetse mo bukaneng. Batla dikgolokwe tsa bontsi jo o ka bo kgonang. Dirisa potleloto e botala jwa tlhaga, o seke wa di tshasa mme o thale bontle jwa tsone. O seke wa thala sepe kwa ntle ga kgolokwe. Simolola jaanong. Motlhatlhobi a ka a tlosa dikao tsa gagwe fa bana ba thala. Gopola gore o se thale lee lepe fela, thala tse di kgolokwe fela.

Bana ba bangwe ba ka tlogela go thala la mongwe a bone

kgolokwe e le nngwe kgotsa tse pedi fela. Ba ree o re ba batle tse dingwe gape. O seke wa dira gore ngwana a ikutlwe jaaka e kete o a palelwa, kgotsa wa mo lapisa tlhaloganyo ka gore a batle dikgolokwe tsotlhe. O dire gore a nne le matlhagatlhaga a go di batla. Mme o ba ree o re yo o feditseng a a beye potleloto ya gagwe fa fatshe. Fa go na le mongwe yo o tsayang lobaka morago ga botlhe ba feditse, mo tlogedise mme lo tswelele ka temana e ngwe.

III. (a) 2. Dikhutlonne

supetse ditshwantsi tsa gago tsa dikhutlonne le dikhutlonnetsepa. Ba lemose pharologanyo va dipopego tseo ka bobedi. Supa mo bukaneng ya teko gore ke dife, mme o nte ba thale dikhutlonne fela, e seng sepe kwa ntle ga tsone. Bona gore o ka bona bontsi jo bo kae jwa tsone. Dirisa potleloto e phifadu.

Boeletsa gore ba bone gore ba ka bona dikhutlonne di le kae. Fa ba feditse ba bee dipotleloto tsa bone fa fatshe. Fa mongwe a palelela go fetsa, mo tlogedise mme lo lire teko e e latelang.

Phetla tsebe. Go dikgolokwe dingwe le dikhutlonne tse dingwe tseo o tshwanelwang ke go di batla.

III. (b) 1. Dikgolokwe

Boeletsa melao le ditshupetso jaaka mo go III. (a) 1.

III. (b) 2. Dikhutlonne

Melao e tshwana fela le e o e dirisitseng mo go III. (a) 2.

Teko IV

Ditlhokego

Ngwana mongwe le mongwe a a fiwe potleloto go simolola ka bana ba Kindergarten go ya godimo. Bana ba ba botlana ba Nursery ba fiwe tsa mebala (crayons). Motlhatlhobi a nne le ditshupetso.

Phetla tsebe. Motlhatlhobi a a bontshe mo ditshupetsong tsa gagwe marumo a a leng foo. Ba bontshe lerumo leo motsu wa lone o sa lebang ntlheng ya metsu ya marumo a mangwe. Bontsha gore o tla le tshwaa jang.

Go itse gore bana ba a tlhaloganya seo se bodiwang, gobotoka gore o botse bone gore ke lefe le le sa siamang le gore goreng a re ke lone.

Teko 1 - Ditafole

Tsholetsa bukana ya gago.Bontsha gore ditafole di ntse sentle mme e lenngwe e ntse ka go sa siamang. A ba tshwae tafole eo. Mme o bone gore dipene di nne fa fatshe.

Teko 2 - Ditulo

Bontsha mo bukaneng ya gago gore bontsi di ntse ka mokgwa o o rileng fela e le nngwe e ntse ka go farologanya le tse dingwe, a ba e supe mme dipotleloto di nne fatshe ka bonako.

Teko 3 - Dingwedi

Mokgwa e ntse e le one o o dirisitsweng fa godimo, tswelela.

Teko 4 - Dipalangwa (Ladders)

Dira jaaka mo ditemeng tse di kwa godimo.

Mo baneng ba kheretshe (nursery), bore ba emisa fa go tlolela mo tekong \.

Phetla tsebe. Motlhatlhobi a bontshe ditshupetso-karata tsa gagwe.

Bonang mosetsana yo wa ntlha yo o leng mo lebokosong. Bonang basetsana ba ba leng kwa morago. Mosetsana yo o tshwana le mosetsana yo o mo bokosong yo. Bangwe ba lebile ntlha e le nngwe fela ene o lebile go sele. Dira sesupo go bontsha gore ke letlhaodi mo basetsaneng.

Teko 5 - Malomo/Dithunya

Leba mo bukaneng ya gago. Malomo ke ao, lengwe le mo lebokosong, senka le le tshwanang nalo mme o le tshwae go bontsha botlhaodi ba lone. Bona gore dipotleloto di tlogile mo dibukeng tsa bana.

Teko 6 - Banna Ba Letlhwa

Dira fela jaaka mo temeng e e fetileng.

Teko 7 - Dibolotlowa

Motlhokomedi a emise bukana ya gagwe.

Dibolo/dikgwele ke tse tseo di nang le mekgabiso fa godimo. Baya monwana wa gago mo go ya ntlha mme o batle e e tshwanang nayo o e tshwae. Bona gore dipotleloto di fa fatshe.

Teko 8 - Dibokosa

Dira fela jaaka temana e e fetileng.

Teko V

Ditlhokego

Didiriswa tse di dirisitsweng mo tekong IV. Phetla tsebe.

Teko 1

Bontsha go tswa mo bukaneng ya gago. Mo setshwantshong go molamu le dikhutlo mo letlhakoreng le le losi. Mo go le lengwe go dikhutlo fela. Thala o dire molamu gore matlhakore a tshwane ka bobedi.

Teko 2

Bona setshwantsho se. Dira mola mo letlhakoreng go dira gore matlhakore otlhe a tshwane. Bona gore bana fa ba fetsa ba bee dipene fa fatshe.

Teko 3

Dira fela jaaka teko 9 e e fetileng.

Teko 4

Dira jaaka teko e e fetileng.

(Bana ba sekolo sa nursery, teko ya bone e felelela fa).

Teko 5

Dira jaaka mo tekong e e kwa godimo.

Teko 6

Dira jaaka teko e e kwa godimo.

Teko 7

Go setshwantsho se le sengwe fela mo pampiring e. O tshwanelwa ke go dira setshwantsho mo ntlheng nngwe ya pampiri se se tshwanang fela le se se leng foo. Se dire. Fa o fetsa, o setse o feditse tlhatlhobo ya gago, baya potleloto fa fatshe.

(Bana ba Kindergarten ba fetsa ka teko ya bone).

Teko 8

Dira fela jaaka mo tekong ya 7.

Bokhutlo Jwa Teko.

APPENDIX 8

The Developmental Test of Visual Perception

Xhosa Instructions

Ingxubevange Yezinto Emaziqatshelwe

Qinisekisa okokuba abantwana bayayiqonda yonke imigwago ngaphambi kokuba baqale. Bolathise indlela emabenze ngayo icandelo ngalinye lemvavanyo ebhodini okanye ngamanye amaphepha alungiselwe ukwalathisa. Abantwana kufuneka ukuba bakhunjuzwe ukuba kubalulekile ukuba akuvumelekanga ukuba bacime okanye benze naziphi na izilungiso (Ipensile zabo akufunekanga okokuba zibe nerabha). Kufuneka beqondile kwakhona okokuba uninzi lwemizobo kufuneka lwenziwe ngefuthe elinye ipensile okanye ikhrayoni ingakhange yaphakanyiswa ephepheni.

Kunqaba bhetele ke ukuba amaphepha ekuzotyelwa kuwo ajongiswe phantsi ibelelo asebenzela kulo elijonge phezululodwa. Amaphepha aqqithileyo asongelwe ngaphantsi. Kubalulekile kwakhona ukuba imizobo elandelayo ingakhanyeli kweliphepha liphezulu ukwenza ukuba imigca ezofywayo ingacaci ukuba yeyiphi.

Ukunqanda esi sekhwasilima ke, kucetyiswa okokuba kuhlonywe iphepha elingabhalwanga nto ngaphantsi kwephepha eliphezulu ukuze imizobo esephepheni elandelayo ingamphazamisi umntwana.

Ipensile neekhrayoni kufuneka zilolwe ngokwaneleyo. Imigca ezotywe ngombhalo otyebe kakhulu ingadila okokuba

eminye imizobo yemvavanyo ingavumeleki.

Abantwana abaseminyakeni yekhretshi encinci kufuneki basebenzise iikhrayoni kuphela. Phawula okokuba noxa ukuqonda okokuba umbala ayiyonto ezuzisa amanqaku koluviwo, eminye imizobo yemvavanyo igafuna oku imibala eyahlukeneyo emibini okanye ngaphezulu.

Yonke imisebenzi kunyanzelekile okokuba yenzine ukusukela ngesekhohlo ukuya ekunene nokuba umntwana usebenzisa esiphina isandla. Umntwana akufuneki okokuba ayijike incwadana. Umthetho wokuqala ngasekhohlo ubhekise ngase kunene kufuneka unyanzelise ebantwaneni bonke. Abantwana bekhretshi encinci kufuneka bangayenzi lemibuzo ilandelayo: Ia5, Ic, Id, Ie,IVb, Vc, Vd, Ve. Abantwana bekhretshi enkulu bona bayakutsiba umbuzo Ve.

<u>Ulwawulo Lwemvavanyo</u>

Yabela umntwana ngamnye izixhobo zemvavanyo ezifanelekileyo. Yithi: Bantwana ningazivuli iincwadana zenu. Sizakudlala imidlalo embalwa kunye. Mamelani kakuhle nenze into endinixelela yona qha. (Nina ke enongamele lomsebenzi kufuneka nibonile ukuba amagama abantwana abhaliwe kuzo zonke iincwadana) Sizakuvula iincwadana zethu ngaxeshanye sonke siqale umdlalo ngamnye sonke.

<u>Imvavanyo I</u>

Izixhobo

Ipensile efanelekileyo - Iprimary okanye unamba 2.

Koluvavanyo abantwana banento yokuphakamisa ipensile ephepheni noxa sebesazisiwe okokuba bangakwenzi oku.

Umvavanyi kufuneka abolathise ebhodini okokuba bangayiphakamisi ipensile ephepheni de bagqibe. Kwaye ke umvavanyi kufuneka awuphinde lomzekelo kumbuzo ngamnye. Lo myalelo wenzelwa ukunceda umntwana kodwa ke, njengoko kusitshiwo kwicandelo lamanqaku, umntwana akohluthwa amanqaku ngenxa yokuphakamisa ipensile ukuba uyakwazi ukuwugqibezela umgca ngaphandle kokuwuqhawula okanye kokuzoba i-engile etsolo.

Ngelixa umntwana esenza elicanelelo lovavanyo, abantwana akufuneki ukuba bavunyelwe ukuguqula iincwadana zabo zemvavanyo into keleyo eyakubangela ukuba umntwana axwesise umgca onyukayo anyuse umgca oxwesayo xa ebhala. Ukuba umntwana uyaqhubeka ukwenjenje, akayi kuzuza manqaku ngaloo msebenzi.

Ukuba umntwana uqala umgca wakhe ekunene ukuya ekhohlo okanye uwuqala ezantsi awujongise phezulu oku kufuneka kubhalwe phantsi kodwa indlela umntwana aqhuba ngayo ayizi kuc nanxaxheba ekuzuzeni amanqaku komntwana.

Umzobo 1 Impuku - Umhloli ubamba incwadi ukuze abantwana babone kakuhle xa ebolathisa. **Vulani incwadi zenu ekhasini lokuqala. Nantsi impuku (yikhombe) I tonela, (thyuthya umbindi wetonela ngomnwe) nekeyiki. Sizakubhala umgca ukubonisa ukuba impuku ingayifumana njani ikeyiki ngaphandle kokungqubeka emacaleni etonela Jongani kuml (zoba ebhodini).** (Umhloli uphakamisa ipensile athi): **Phakamisa ipensile yakho** (Khangela ukuba umntwana ngamnye uyiphakamisile ipensile yakhe na). Ngoku yenzani ukuba impuku lhambe phakathi

kwetonela iye ekeyikini kodwa ningayivumeli impku ukuba ingqubeke emacaleni etonela.

Yenzani umgca othe ngqo! Ningayisusi ipensile ephepheni! (Qononodisa ukuba wonke umntu ubhale umgca wabeka ipensile yakhe pantsi).

Umzobo 2 Izindlu - Umhloli uphakamisa incwadana yomvavanyo. Nantsi indlu (Yikhombe kwakhona nantsi enye indlu (khomba). Xa ndinixelela, nizakuthatha ipensile nisuke kwenye indlu niye kwenye. Hambani embindini wendlela. Ningayisusi ipensile ephepheni. Ningaqhubeki! Ngoku ke hambani (Jonga ke ukuba abantwana bazibeke phantsi iipensile zabo).

Umzobo 3 Imithi - Umhloli uphakamisa incwadana yovavanyo. Ngoku ke sizakuhamba endleleni enemithi (khomba) Ukususela komnye umthi ukuya komnye umthi (khomba). Thatha ipensile yakho uhambe embindini wendlela. Ungayisusi ipensile yakho ephepheni. Ungabuyeli umva. Hamba ke ngoku. (Qaphela ukuba abantwana bazibeka phantsi iipensile zabo)

Umzobo 4 Imoto Nendlu yayo - Umhloli uphakamisa incwadana yovavanyo. Nantsi imoto. Bonisa ngepensile yakho ukuba ungayiqhuba kanjani imoto ukuba ingene endlini yayo. Ungaphumi endleleni. Ungayisusi ipensile yakho ephepheni. Hamba!

Ungazikhethela ukuba uthi:-

Ungayisusi ipensile yakho ephepheni. Ungabuyi umva! Ngoku ke thatha ipensile yakho! Yenza! (Khangela ukuba abantwana bayazibeka iipensile) Abantwana bekhretshi

encinci mabayekiswe apha bagqithiselwe kumzobo 6.

Umzobo 5 Imifanekiso Yabantu - Umhloli uphakamisa incwadana yovavanyo. Naba abahlobo ababini (Bakhombe ngamnye) Intombazana iya enkwenkweni. Hamba indlela yonke ungemi. Qiniseka ukuba uhamba embindini wendlela. Ungayisusi ipensile yakho endleleni. Hamba!

Xa uthanda ungathi:-

Ungayisusi ipensile yakho ephepheni. Ungabuyi umva Ngokuke thatha ipensile yakho wenze. (Bona ukuba abantwana bazibeka phantsi iipensile zabo). Ngoku ke masithyile kwelinye iphepha.

Umzobo 6 Imigca Egobileyo - Lo ke ngumdlalo omthsa. Sizakusebenzisa kwa laa mithetho besiyisebenzisa. Umhloli uphakamisa incwadana yovavanyo phezulu. Le yindlela. Bonisa ngepensile yakho ukuba ungasuka kanjani kwelinye icala uye kwelinye (khomba) ngaphandle kokungqubeka. Qala khona apha (yalatha) uze ume ekugqibeleni, apha (Yenza ukuba abantwana bolathe ekuqaleni nasekugqibeleni. Qononondisa). Nikhumbule okokuba ningazisusi iipensile zenu ephepheni. Ngoku ke qhubekani. (Qaphela ukuba abantwana baziboke phantsi iipentsile zabo)

Umzobo 7 Imigca Ejikajikayo - Umhloli uphakamisela incwadi yovavanyo phezulu. Le yindlela ejikajikayo. Hamba ngoluhlobo ebesihambe ngalo kuqala, ningazisusi ephepheni iipensile zenu. Qhubekani! (Khangela ukuba abantwana bazibeka phantsi iipensile zabo).

Umzobo 8 Imigca Egoso - Umhloli uphakamisela incwadana

yovavanyo phezulu. Ngoku ke jongani indlela egoso. Nayo yenzeni kwangolahlobo! Lungani. Gcinani iipensile zenu sizephepheni. Ngoku ke, hambani. (Qaphela ukuba abantwana bazibeka phantsi iipensile zabo). Kubantwana bekhretshi encinci pheza apha uqalele kwakhona kuvavanyo II.

Umzobo 9 Ibhola - Yalathisa ebhodini uzeke uphakamisele incwadana yovavanyo phezulu) Jongani phezulu apha. Ndiza kugquma umgca ngetshoko yam ebomvu, kanje. (Babonise). Ngoku ke thabatha ipensile yakho ebomvu ugqume umgca omnyama ungemanga futhi ungabuyeli umva. Ungayisusi ipensile yakno ephepheni. (Qonda okokuba abantwana bazibeka phantsi iipensile zabo). Ngoku ke masithyile elinye ikhasi.

Umzobo 10 Amachokoza - Umhloli uphakamisela incwadana yovavanyo phezulu. Lo ke ngumdlalo omtsha. Niyawabona lamachokoza? Siza kuzoba umgca ukususela kweli chokoza ukuya kwelinye ngaphandle kokuma okanye ukuya phambili. Jongani mna! (Babonise ngokubhala ebhodini). Ndizobe umgca othe nggo; Ndiqale kanye kwelichokoza ndaze ndaqqiba kanye kweli. Andigqithelanga phambili, kwakhona andimanqa xa ndizoba. Jongani kwincwadana zenu. Niyawabona lamachokoza (Yalatha). Zoba umgca kwincwadana yakho njengokuba ndisenzile. Ungayi phambili. Ipensile yakho mayihlale isencwadini.

Qhubela phambili!

Umvavanyi kufuneka agxininise okokuba umntwana uqala aze aqqibelise umgca wakhe kwichokoza elisencwadini. Ukuba

umntwana akenzi njalo, akafumani manqaku (Qaphela okokuba wonke umntwana uyibeke phansi ipensile). Ungafuniseli indlela kwimizobo esaseleyo kuvavanyo lokuqala. Yalatha kwimizobo ngokulinganayo ungafuniseli.

Umzobo II Iinkwenkwezi - Umhloli uphakamisela incwadana yovavanyo phezulu. Ngoku Jongani ezi nkwenkwezi zimbini. Zoba umgca ngolahlobo ebesisebenze ncalo ekuqaleni Qalani! (Emva kokuba abantwana beqqibile). Ngoku thjila ikhasi elilandelayo.

Umzobo 12 Iiperi - Umhloli uphakamisela incwadana yovavanyo phezulu. Ngoku Jongani ezi peri zimbini! Ngoku bamba enye yezi peri. Zoba Umgca omde osuka kwenye yezi peri uze ke ugqibe ukuzoba kwenye (Qaphela okukuba abantwana bazibeke phantsi ipensile zabo)

Umzobo 13 Imithi - Umhloli uphakamisela incwadana yovavanyo phezulu. Nantsi imithi emibini. Zoba umgca osuka komnye umnthi oya komnye umthi. Ungayikude umzobo. Ungalibali imigaqo: Yenza (Qaphela okokuba abantwana babekile ipensile zabo) Thyila elinye ikhasi.

Umzobo 14 Amachokoza Amabini - Umhloli uphakamisela incwadana yovavanyo phezulu. Kweli bhokisi kukho amachokoza amabini (Yalatha amachokoza amabini) Ngomnwe wakho bamba ichokoza libe linye. Uze ke ngoku ubambe nelinye. Zoba umgca othe ngqo ke ngoku ukusukela kwelinye uze uye kwelinye! Qala kanye kwichokoza lokuqala uze ke uqqibele kwelokuqqibela ukuzoba.

Gcinani iipensile zenu emaphepheni. Ningazobi ukuya kude! Ngoku yenzani. (Qaphela okokuba iipensile bazibeka phantsi ngaxeshanye).

Umzobo 15 Amachokoza Amathathu - Umhloli uphakanisela incwadana yovavanyo phezulu. Kweli bhokisi kukho amachokoza amathathu (Yalatha loo machokoza). Ngomnwe wakho yalatha ichokoza lokuqala, uze ngelesibini, ugqibele ngelesithathu ngoluhlobo (bamba amachokoza ukususela ngasekhohlo ukuya ngasekunene). Zoba umgca othe ngqo ngolohlobo olungaphambili ngaphandle kokuphakamisa iipensile. Zobani imigca ethe ngqo! Ngoku ke Qalani! (Qaphela okokuba abantwana bazibeka phantsi iipensile ngaxesha nye)

Umzobo 16 Amachokoza Amathathu. Kweli bhokisi kukho amachokoza amathathu ongeziweyo (Yalatha). Ngomnwe wakho bamba ichokoza ngalinye (babonise). Ngoku ke zoba imigca ethe ngqo ngokusesikweni.

Uvavanyo II

IIndlela Ezibekiweyo

Izixhobo

Iipensile ezine ezinemibala eyahlukeneyo umntwana ngamnye, (ebomvu, odakhi, oluhlaza, kunye nomdaka) Iikhrayoni kubantwana bekhretshi encinci. Izixhobo zokubonisa abantwana: Ikhatsi zibe sisixhenxe ezibonisa isanqqa, unxantathu, umqamlezo, inyanga inkwenkwezi, ikhayithi, uxande.

Qaphela - Le mizobo akuvumelekanga okokuba iboniswe abantwana ngendlela ezime ngayo kuna xa bebhala uviwo.

Njengokuba xa ubonisa unxantathu kufeneka umjongise phezulu ngoluhlobo ▽ hayi ngoluhlobo △ .

Qiniseka okokuba ubaxelele abantwana ngaphambi kokuba ubabonise umzobo ngamnye: Ungayithathi ipensile yakho ephepheni. Yibeke kanye emgceni. Xa ugqibile ukuzoba unxantathu okanye ibhokisi njalo njalo beka ipensile yakho enombala phantsi. Bonisa umboniso wekhasi nganye lo nke ixesha. Cima umzobo ngaphambi kokuba abantwana baqale ukuzibhalela eyabo. Jongisisa okokuba umntwana ngamnye akayisusi ipensile yakhe ephepheni kodwa kutuneka azobe umgca owaphukileyo kumzobo ngamnye.

Umzobo 1 Unxantathu - Nanku umdlalo omtsha. Kulo mdlalo sizakuzama ukufumana into. Uyazi okokuba unxantathu unjani? Ijongeka ngoluhlobo (zoba unxantathu ebhodini). Uyalazi eligama lithi hombisa okokuba litsho ukuthini? Lichaza ukudibanisa imigca yomzobo ofana nalo nxantathu kodwa hayi ukufaka imibala phakathi. Ndijonge xa ndihombisa unxantathu (Babonise).

Kubalulekile ukuchaza eligama "ukuhombisa" kwakhona ulisebenzise umzuzu nomzuzu kulo lonke uviwo olusaseleyo. Le ntetho ethi "zoba isangqa" ngeyona eququlelwayo njalo njalo ngabantwana, kwakhona angazoba isangqa kumzobo awunikiweyo.

Ndimhombisile unxantathu ebhodini. Ndiyenze ngobunono, andizange ndiphakamise itshoko ebhodini. Uyambona unxantathu apha (bonisa Umzobo 1)

Umbloli akufunekanga asebenzise ipensile okanye umnwe ukwalatha. Bhetele isandla sonke masisetyenziswe

ukunqanda ukunika abantwana into yokubambelela.

Thabatha ipensile yakho enombala odakhi uhombise unxantathu. Xa ugqibile beka ipensile yakho phantsi. Ngoku yenzani!

Kubantwana abancinci umhloli angathanda ukuba abantwana baphakamise ikhrayoni ezinombala odakhi ukuqinisekisa okokuba abantwana bazibekile iipentsile okanye iikhrayoni phantsi).

Umzobo 2 Uxande - Ke ngoku nabu ubume boxande njenge bhokisi ende (Babonise). Kulomboniso (Babonise umzobo 2) kunebhokisi ende kunye no xande. Thatha ipensile yakho ebomvu uhombise ibhokisi ende yodwa. (Susa iikhadi zokubabonisa okanye umzobo). Funa ibhokisi ende uze uyihombise. Zama okokuba ipensile yakho isoloko isencwadini ngalo lonke ixesha. Ngoku zenzele. (Qaphela okokuba abantwana bazibeka phantsi iipensile zabo).

Umzobo 3 Umqamlezo -(Landela imigaqo kumzobo 2) ususe umqamlezo endaweni yebhokisi ende. Abantwana mabasebenzise iipensile ezibomvu kwakhona.

Umzobo 4 Inyanga - (Landela imigaqo kumzobo 2) ususe "Inyanga" endaweni yebhokisi ende. Abantwana mabasebenzise iipensile ezimdaka. Ngoku masithyile elinye ikhasi.

(Malunga nomzobo 5 & 6). Ngokuba le mizobo mibini ifaka ukuhonjiswa kwenkwenkwezi, umlawuli vavanyo kufuneka ajongisise okokuba abantwana basebenza ngemizobo efaneleyo. Sebenzisa incwadana yovavanyo ukubonisa abantwana okokuba ngowuphi umzobo amabaqale ngawo

kuqala. Qwalasela okokuba bazibeka phantsi iipensile zabo ezinemibala xa begqibile ukubhala umzobo 5 kwakhona bangambhali umzobo 6 bengaxelelwanga. Umhloli uzakubabonisa umbala wepensile. Babonise abantwana iipensile xa ubabonisa imibala.

Baxelele bathathe ipensile efana nalombala ababonise wona emva koko baziphakamise, emva koko qwalasela.

Umzobo 5 Inkwenkwezi Ezimbini - Nantsi inkwenkwezi (Babonise kwikhatsi; emva koko yalatha kwincwadana yovavanyo). Nazi inkwenkwezi ezimbini. Thatha ipensile yakho eluhlaza uhombise inkwenkwezi enye. Zama okokuba ungayiphakamisi ipensile. Emva kokuba abantwana begqibile, yithi: Ngoku bekani iipensile zenu phantsi. Thatha ipensile ebomvu uhombise enye inkwenkwezi. Beka iipensile yakho phantsi (Qwalasela okokuba abantwana bazibeka phantsi iipensile zabo okanye ikhrayoni)

Umzobo 6 Inkwenkwezi Ezine - Umhloli walatha kumzobo 6. Nazi inkwenkwezi ezine landela imigaqo kumzobo 5 uqwalasele okokuba abantwana basebenzisa iipensile (okanye ikhrayoni) ezinemibala eyahlukeneyo kwinkwenkwezi nganye kwezi ezine. Umgaqo ngoluhlaza, omdaka kunye nobomvu)

Umzobo 7 Ikayiti - Umhloli walatha kumzobo 7. Nantsi ibhola (isangqa) (Yalatha) Phakathi kwebhola kune kayiti. Zime ngoluhlobo. (Babonise ngekhatsi) Thatha umbala odakhi uhombise zonke ikayiti. Uhombise ikayiti zodwa - hayi enye into. Qhubela phambili (Qwalasela okokuba abantwana bazibeka phantsi iikhrayoni zabo)

Umzobo 8 Amaqanda - Umhloli walatha umzobo 8 (landela imigwaqo kumzobo 7 ususe iqanda endaweni yekhayithi). Bonisa isangqa esinobugoso (oval) ngamakhatsi. Sebenzisa iipensile eluhlaza kulo mzobo.

(Qokeleia iipensile azifuneki kuvavanyo olulandelayo)

Uvavanyo III

Izixhobo

Kufuneka iipensile ezinemibala kumntwana ngamnye (oluhlaza kunye nomdaka). Iikhrayoni abantwana bekhretshi endinci. Izixhobo zokwalatha ubabonise isangqa, isangqa esigoso (oval), unxazonke kunye noxande).

Nanku Umdlalo Omtsha

III (a) 1. Izangqa

Yazisa lo mzobo ngokuphakamisa umboniso wekhatsi owalatha isangqa kunye nesangqa esigoso. Umhloli walatha isangqa athi: le yibhola eyisangqa. (Phakamisa incwadana yovavanyo). Funa ibhola ezininzi kangangoko unako. Thatha iipensile enombala oluhlaza uhombise iibhola onokuzifumana. Ungazihombisi ngaphakathi, ungayi hombisi into engeyiyo ibhola ngoluhlobo (talatha isangqa). Ngoku ningaqhubekela phambili. (Umhloli kufuneka acime imizekelo) Ngaphambi kokuba abantwana baqale ukuzoba. Khumbulani ningazihombisi izangqa ezigoso, kuphela izangqa (circles).

Abanye abantwana bayayeka xa befumene zambini qha. Phinda le ntetho, Jonga okokuba ufumene zangaphi, njengenqanaba (okumkhuthaza umntwana, ngaphandle

kokubacela okokuba bazifumane zonke okanye ubaxelele okokuba abaphumeleli, sithi, ngaphambi kokuba baligqibe ikhasi. Xa nigqibile, bekani iipensile zenu phantsi ukuba umntwana omnye uthatha kade ukugqiba kunabanye, mmise uze ke uqhubeke neno novavanyo.

III (a) 2. Oonxazonke - Qala ngokuphakamisa iikhatsi zikanxazonke kunye noxande, uthi: Lo ngunxazonke (Yalatha). Uyabona, onke amacala akhe ayalingana. Le (Yalatha) Yibhokisi ebanzi (uxande) (phakamisa incwadana yovavanyo) Kweliphepha kunoonxazonke kunye nezinye izinto ezinjengama bhokisi abanzi. Ngoku jongani ezincwadini zenu. Funani bonke oonxazonke niba hombise. Ungahombisi into engeyiyo unxazonke. Ningazi hombisi iibhokisi ezibanzi okanye imigca ejikajikayo okanye enye into. Hombisa oonxazonke bodwa. Jonga okokuba bangaphi oonxazonke ongabafumana. Ngoku thabatha ipensile enombala omdaka uzenzele.

Njengaphambili uphinde le ntetho, jonga okokuba bangaphi oonxazonke obafumeneyo. Xa wonke umntu esegqibile, okanye omnye nobababini sebegqibile, yithi: Xa seniqqibile, bekani iipensile zenu phantsi ukuba ngaba omnye wabantwana uthatha kade kunabanye, mmise uqhubele phambili.

Ngoku masithyile elinye ikhasi. Songa iphepha. Nantsi emanye imizobo. Sizakuzama ukufuna abanye oonxazonke.

III (b) 1. Izangqa - Phinda imitheto uze ke usebenzise khatsi zokubonisa kanye ku III (a) 1.

III (b) 2. Oonxazonke - Indlela kanye ngokufanayo ku

III (a) 2.

Uvavanyo IV

Izixhobo

Kumntwana ngamnye, ipensile yakwiprimary okanye unamba 2. (abantwana abangenako nangaphezulu) okanye ikhrayoni (abantwana bekhretshi encinci). Amakhatsi omboniso. Ngoku masithyile ikhasi. Umhloli uphakamisela iikhatsi zovavanyo phezulu. Jongani kulo mgca weentolo. Enye yezintolo ayifani nezinye iintolo ngoba yalathe kwelinye icala (Babonise). Kufaneleke okokuba niyi phawule ngolu hlobo (Yalatha).

Kwicala lovavanyo, kububulumko ukubuza kubantwana okokuba loluphi utolo "olwahlukileyo" kunamanye, uze ke uyekele emntwaneni okokuba achaze isizathu.

Oluvavanyo kufaneleke okokuba lulawulwe kangangoko ninako.

Umzobo 1 Iitafile - Umhloli uphakamisela incwadana yovavanyo phezulu. Jongani kulomgca wokuqala (Yalatha). Ezi ziitafile. Ezininzi zezi tafile zijonge ngasekunene. Kodwa enye yezitafile ijonge phezulu. Ngoku zenzeleni (qwalasela okokuba abantwana bazibeka phantsi iipensile zabo).

Umzobo 2 Izitulo - Umhloli uphakamisela incwadana yovavanyo phezulu. Jongani kulomgca. Ezi zizi tulo. Ezinye zezitulo zijikwe indlela enye, kodwa esinye sijikwe ngendlela engeyiyo. Phawula esi esijikiweyo (Qwalasela okokuba abantwana bazibeka phantsi iipensile zabo).

Umzobo 3 Iinyanga - Ngendlela efanayo nale esigqiba kuyenza.

Umzobo 4 Iileli - Ngendlela efanayo nezi ezingaphambili. Kubantwana bekhretshi encinci yima apha uze ke ubaqalise kwakhona kuvavanyo V.

Ngoku masithyile ikhasi. Umhloli uphakamisela phezulu iikhatsi zokubonisa abantwana. Jongani kwintombazana yokuqala le ekwi bhokisi. Ngoku jongani kulomgca wamantombazana. Enye kulamantombazana ifana nenye le esebhokisini. Ujongiswe ngendlela efanayo (Babonise) Amanye ajonge eyawo indlela. Lomnye nguye lo umphawulayo, ngoba ujonge indlela enye nalo osebhokisini. Ngoluhlobo (babonise). Kubalulekile ukwenza umzekelo oqinileyo ngokuthetha, umzekelo, "Intombazana esebhokisini ijonge ezifestileni" Umhloli uphakamisa incwadana yovavanyo.

Umzobo 5 Iintyatyambo - Ngoku jongani ezincwadini. Jongani kulo mgca weentyatyambo. Beka umnwe wakho kulentyatyambo esebhokisini ke ngoku ufune enye efana nale esebhokisini. Ngoku thatha ipensile yakho uyiphawule. (Qwalasela okokuba bazibeka phantsi iipensile).

Umzobo 6 Indoda Yekhephu - Yindlela efanayo nale sigqiba kuyenza.

Umzobo 7 Ibhola Yolwandle - Umhloli uphakamisela incwadi yovavanyo phezulu. Nazi iibhola ezinemizobo kuzo. Beka umnwe wakho kwibhola yokuqala. Funa enye kwezi efana nayo uze ke uyiphawule. Zenzele ke ngoku.

(Qwalasela okokuba abantwana bazibeka phantsi iipentsile zabo).

Umzobo 8 Iibhokisi - Yindlela efanayo nale sigqiba kuyenza.

Uvavanyo V

Izixhobo

likhrayoni kubantwana bekhretshi encinci. Iprimary pensile okanye ipensile namba 2 kubantwana abasaqabukayo nangaphezulu.

Umzobo 1 - Umhloli uphakamisela incwadi yovavanyo phezulu. Niyayibona ifoto kwelicala? (Babonise) Inamachokoza nokhuni. Thatha umnwe wakho ufune ukhuni. Ngoku jongani kwelicala. Inamachokoza kodwa hayi ukhuni Thatha ipensile yakho uzobe ukhuni okanye umgca kuzokwazi okokuba amacala afane omabini. Yenzani kakuhle.

Umzobo 2 - Ngoku jongani lefoto. Zobani imigca kwelicala ukuze iifoto zizojongeka ngokufanayo macala (Qwalasela okokuba iipensile bazibeka phantsi). Masityile ikhasi.

Umzobo 3 - Yindlela efanayo nale sigqiba kuyenza.

Umzobo 4 - Yindlela efanayo nale sigqiba kuyenza Kubantwana bekhretshi encinane uvavanyo luphela apha.

Umzobo 5 - Yindlela efanayo nale sigqiba kuyenza.

Umzobo 6 - Yindlela efanayo nale sigqiba kuyenza.

Umzobo 7 - Uyabona kunefoto enye qha kweliphepha Ufanelwe kukwenza enye ifoto efana nale kwelinye iphepha. Ngoku yenzani. Xa nigqibile bekani iipensile

zenu phantsi (Qwalasela okokuba abantwana bazibeka phantsi iipensile zabo).

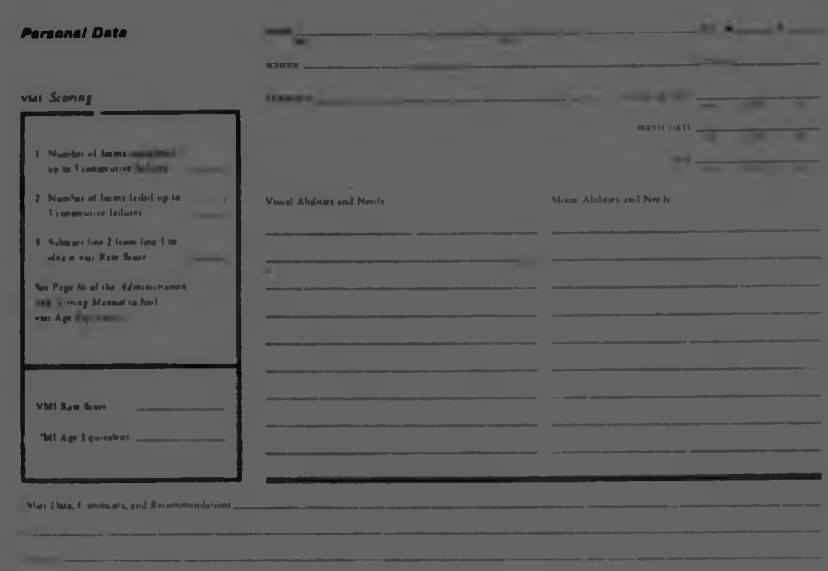
Kubantwana abaseboqabukile uvavanyo luphela apha.

Umzobo 8 - Yindlela enye zomzobo 7.

APPENDIX 9

The Developmental Test of Visual Motor Integration

Test Booklet (50% Reduction in Size)



Personal Data

VMI Scoring

1 Number of items [illegible] up to 3 consecutive failures

2 Number of items failed up to 3 consecutive failures

3 Subtract line 2 from line 1 to obtain a VMI Raw Score

See Page 16 of the Administration and Scoring Manual to find VMI Age Equivalent

VMI Raw Score

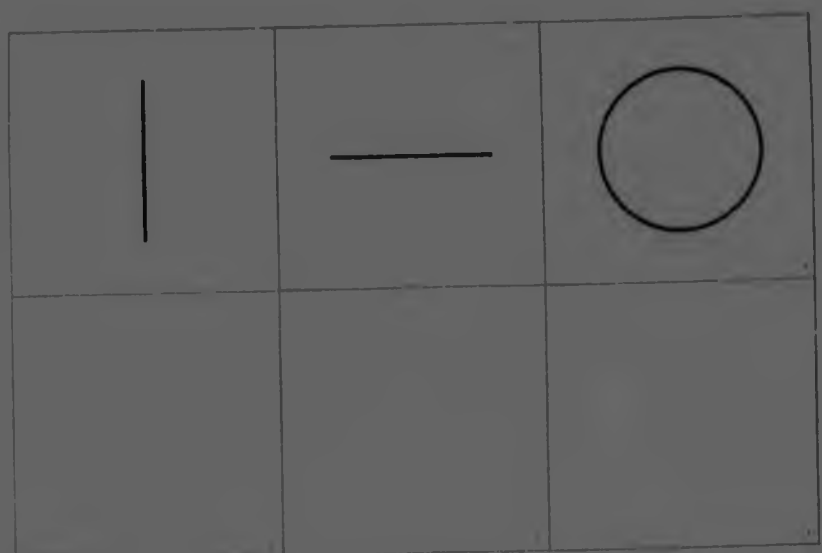
VMI Age Equivalent

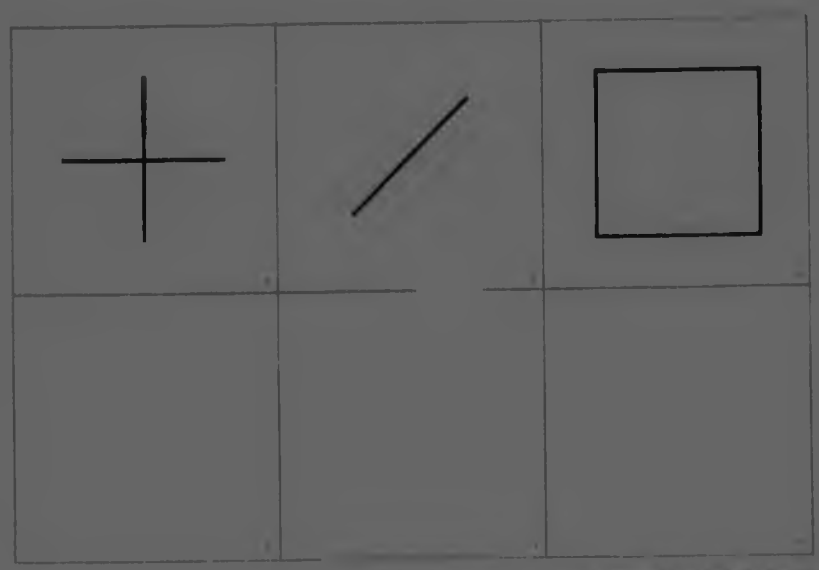
Visual Abilities and Needs

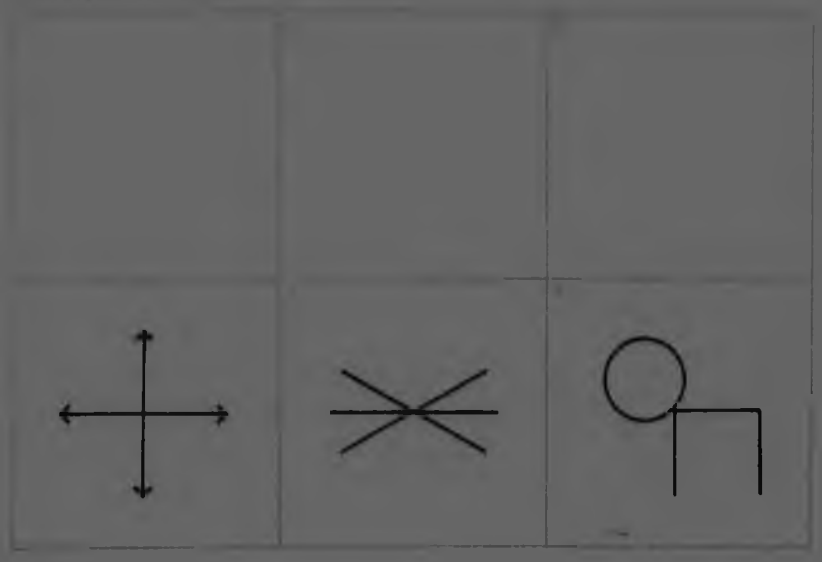
Motor Abilities and Needs

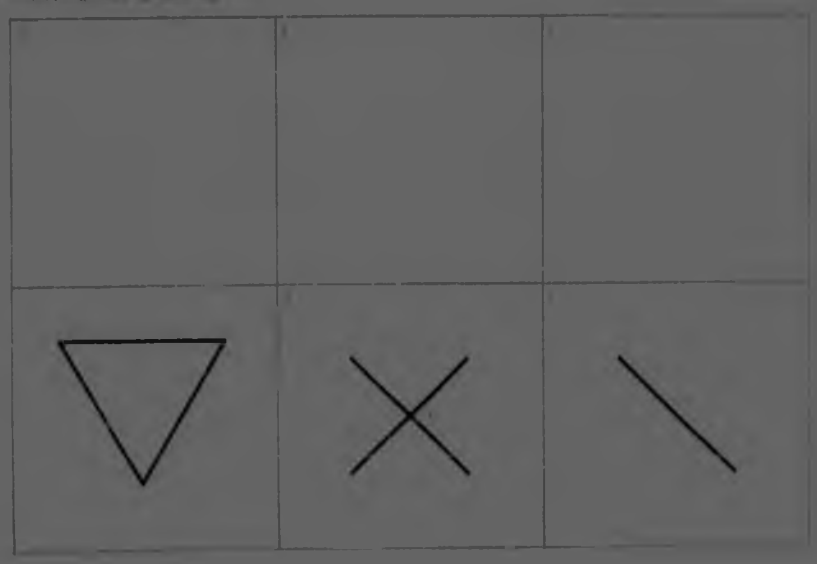
Note Data, Comments, and Recommendations

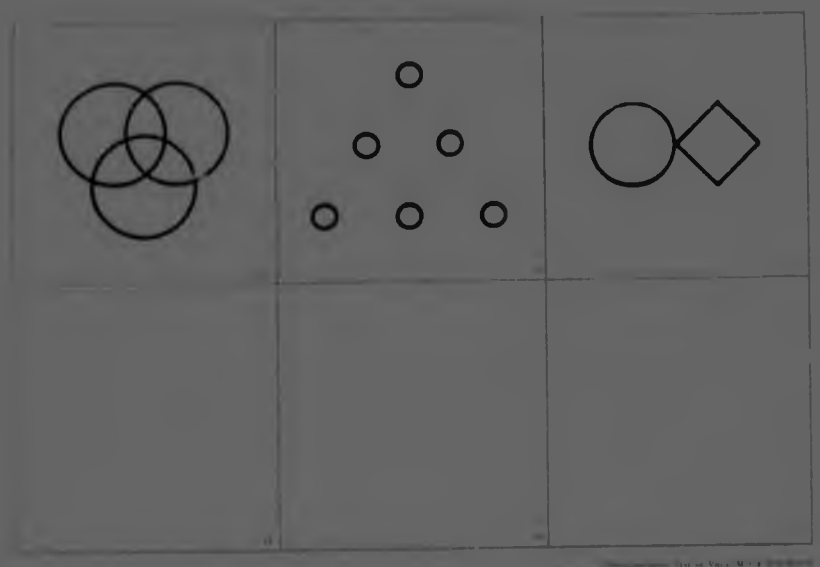
No.	Form	Observations and Comments
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

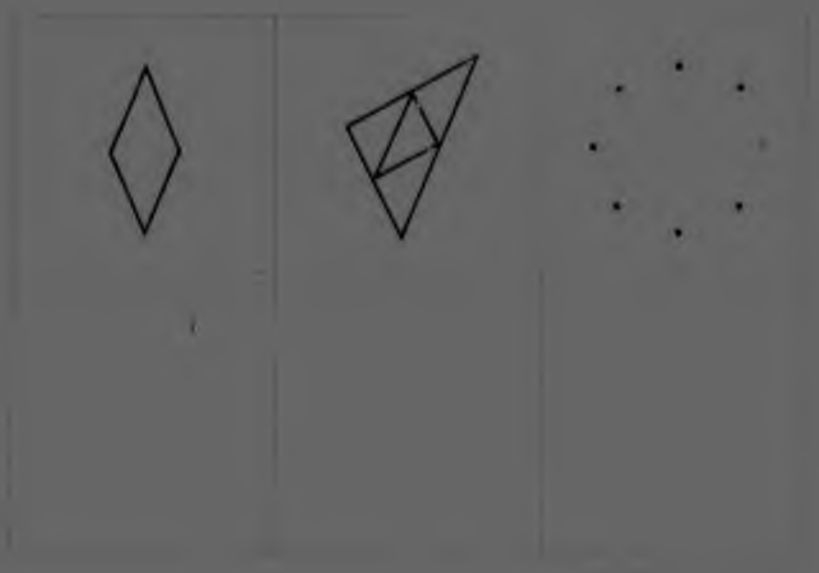


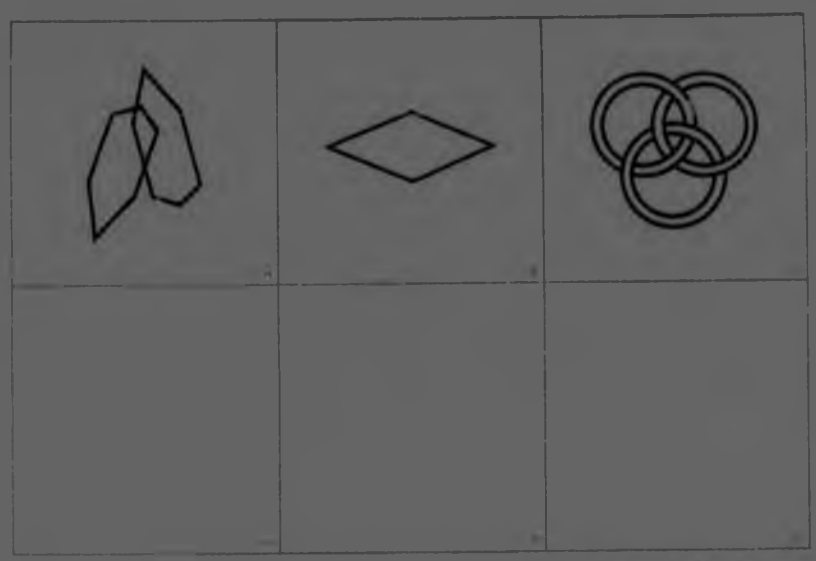


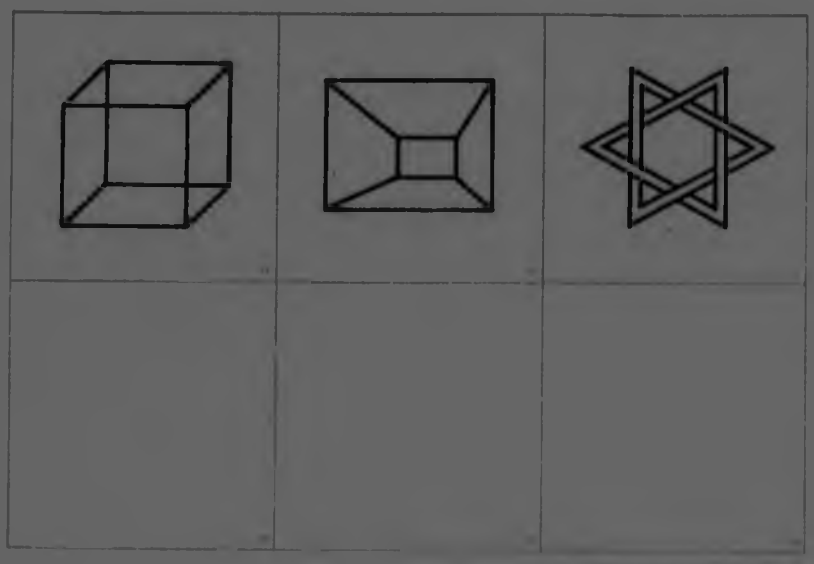












APPENDIX 10

The Developmental Test of Visual Motor Integration
English Instructions

Group Screening

The recommended steps for group screening follow:

1. The child should have a number 2 pencil without an eraser.

2. Distribute the test booklets. As you distribute them, say: Please wait to begin until you are asked to do so. Do not open your test booklets until I ask you to open them.

3. After the test booklets are distributed, say: The forms are to be copied in order. Only one try on each form is allowed.

4. Say: The blank line where you write your name should face you.

5. Have each child fill in the blanks at the top of the page if you have not filled them in previously.

6. As you demonstrate, say: Now open your booklets by turning from the top, like this.

7. It is important that the test booklets and each child's body be centered and squared with the desks throughout the testing. As you demonstrate, say: Does everyone have his or her booklet open correctly? This

is the way the booklets must stay on your desks until you are finished. This is the way you should sit.

8. Perhaps you will like to give a demonstration of form copying at the chalkboard. In your demonstration, do not use any of the test forms. Use one or more forms of your own design. Say: You are to copy what you see at the top of the page. Make your drawing of each shape in the space below it.

9. Say: Some of the forms may be hard for you to copy, but please try to copy each one of them. Just do the best you can without erasing.

10. Say: Are there any questions? Always do your own work. You may begin."(Beery, 1982;37)

APPENDIX 11

Developmental Test of Visual Motor Integration
Zulu Instructions

Uketho Lweqembu

Amanyathelo okufanelwe athathwe ahamba ngalendlela:

1. Umntwana ngamunye makabe nepeni lokubhala elingu nombolo wesebili, elingenanto yokusula.

2. Yaba izincwajana zesivivinyo. Njengoba uzaba ithi: Sizani nilinde ningaqali ukubhala ngize nginitshele. Ningazivuli izincwajana zenu zesivivinyo kuze kusho mina ukuthi zivuleni.

3. Emva kokuba izincwajana zesivivinyo sezabiwe ithi: Amafomu lawo mawabhalwe ngokulandelana kwawo. Ifomu livunyelwe ukugcwaliswa kanye kuphela.

4. Ithi: Isikhala leso okufuneka ubhale kuso igama lakho masibheke kuwe.

5. Umntwana ngamunye makagcwalise isikhala esiphezulu ekhasini uma ungazange uzigcwalise ngaphambidlana.

6. Njengoba ubabonisa ithi: Manje, vulani izincwajana zenu ngokuphenya kusukela phezulu, kanje.

7. Kuyisidingo esikhulu ukuthi izincwajana zesivivinyo zalowo nalowomntwana, nomzimba wakhe ubephakathi naphakathi netafula lakhe size siphele isivivinyo. Njengoba ubabonisa buza uthi: Ngabe wonke umuntu uyivule

ngendlela efanele incwajana yakhe? Nansi-ke indlela okufanele izincwajana zenu zihlale ngayo emadesikini nize niqede. Kufanele nihlale ngalendlela.

8. Mhlawumbe ungafuna ukwenza isiboniso sefomu ebhodini yokubhala. Esibonisweni sakho ungasebenzisi amafomu esivivinyo. Sebenzisa ibenye noma zibembili zamafomu ozenzele wona. Batshele uthi: Bhalani into eniyibona phezulu ekhasini. Yenzani umfanekiso wesibonelo esikhaleni esingaphansi kwaso.

9. Isho uthi: Amanye amafomu kuzoba nzima kini ukawabhala. Kodwa zamani ukuwabhala onke, zamani ngakho konke eningakwenza ngaphandle kokucima.

10. Ithi: Ngabe ikhona imibuzo eninayo? Njalonjalo zenzele umsebenzi wakho. Seningaqala-ke.

APPENDIX 12

Developmental Test of Visual Motor Integration

Sotho Instructions

Kgetho ya ditlopa

Ditlhokego tsa go laola bakwadi ke tse di latelang:

1. Bana ba tshwanelwa ke go nna le potleloto ya nomoro ya bobedi e esenang sephimodi.

2. Naya bana dibukana tsa teko. Fa o ntse o di ba naya, ere: ba seke ba simolola pele o ba raya gore ba dire jalo. Ba seke ba bula kgotsa go phutholola dibukana tsa teko pele o ba raya o re ba di bule.

3. Fa o setse o di ba file botlhe, ba reye o re: Diforor› di tshwanelwa go tladiwa ka tshwanelo. Leka nngwe fela ya foromo nngwe le nngwe.

4. Ere: mothala o o sa kwalwang sepe fa mongwe le mongwe a tshwanetseng go kwala leina la gagwe o lebe mo go ene.

5. Bona gore bana ba tladitse tsebe ya ntlha sentle, fa e le gore ga wa ba di tlaletsa.

6. Fa o ntse o tsamaatsamayaa fa gare ga bone, ere: Jaanong phetlang dibukana tsa teko jaana, go tswa kwa godimo.

7. Go botlhokwa gore bukana ya teko le mmele wa mokwadi di nne mo bogareng ga setulo go fitlhela bokgutlong ba teko. Fa o ntse o ba kaela, botsa gore a: Mongwe le mongwe o butse bukana sentle. Ba supetse gore

buka e nne jang, le mokwadi a nne jang mo setulong sa gagwe go fitlhela a fetsa go kwala.

8. Gongwe o tla rata go bontsha mo letlapeng la go kwalela gore foromo e tladlwa jang. O seke wa dirisa foromo eo ya teko. Dira nngwe fela ya diforomo tsa gago. Ere: Kopolola seo o se bonang kwa godimo ga letlhare. Tshwantsa sentshwantso sagago ka sebophego sengwe le sengwe fa photlheng e kwa tlase ga sentshivantso.

9. Gongwe dingwe tsa diforomo di tla nna thata gore o di kwalolole, fela leka bojotlhe jwa gago o di dire tsotlhe go fokotsa diphoso.

10. Ere: A gona le diputso? Dira tiro ya gago ka nako tsotlhe. Lo ka simolola.

APPENDIX 13

The Developmental Test of Visual Motor Integration

Xhosa Instructions

Ukhetho Lweqela

Amanyathelo ekucetyiswa ukuba makathathwe ekukhetheni iqela:

1. Umntwana ngamnye makabe nepensile engena rabha.

2. Babele incwadana zemvavanyo. Ngelixa ubanika, yithi: Ncedani nilinde phambi kokuba niqale de nixelelwe ukuba qalani. Ze ningazivuli incwadana zenu zemvavanyo ndide ndinixelele ukuba nizivule.

3. Emveni kokuba incwadana zemvavanyo zinikwe abantwana, yithi: Amaxwebhu makakhutshelwe ngokulandelana kwawo. Ixwebhu ngalinye maligcwaliswe kube kanye.

4. Yithi: Umgca ongabhalwanga nto apho ubhale igama lakho ujonga ngakuwe.

5. Yenza okokuba umntwana ngamnye azalise izithuba ezisemantla wephepha ukuba ubungekazigcwalisi.

6. Ngelixa ubabonisa, yithi: Ngoku ke vulani incwadana zenu niqale ngasentla. Ngoluhlobo.

7. Kubalulekile ukuba incwadana yemvavanyo ibesesiqingatheni sedesika nomzimba wakhe uthi ngqo xa ehleli edesikeni kulo lonke ixesha lemvavanyo. Ngelixa ubabonisa, yithi: Ingaba umntu wonke uyivule ngokusesikweni incwadana yakhe? Le yindlela incwadana

zenu ezifanele ukuhlala ngayo de nigqibe. Le yindlela ekufuneka nihlale ngayo.

8. Mhlawumbi uvakunqwenela ukubonisa indlela yokukhutshelwa koxwebhu ebhodini. Ekubaboniseni kwakho ungasebenzisi nalinye kulamaxwebhu emvavanyo. Sebenzisa ixwebhu libe linye okanye ngaphezulu kumaxwebhu ozenzele wona. Yithi: Khupheland okanye kopani loo nto eniyibonayo emantla ephepha. Imizobo yenu yenzeni kwisithuba esingaphantsi kwizimo enizizobileyo.

9. Yithi: Amanye amaxwebhu anganithwalisa ubunzima xa niwakhuphela, kodwa ke zamani ukuwakhuphela wonke. Zamani ukuwenza wonke kangangoko ninako ngaphandle kokucima.

10. Yithi: Ingaba nine mibuzo na? Umntu ngamnye makazenzele umsebenzi wakhe. Ningaqala ke ngoku.

Scoring Summary Card

| NAME | | |

APPENDIX 15

Raw Data - "Normal" Group

I.D.	Age	V.M.I.		V.P.									
		Raw	Std.	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
001	4. 1	4		5	5	5	3	0					
002	4. 3	9		12	14	2	4	1					
039	4.10	8		7	9	7	4	3					
003	5. 6	8		14	15	7	2	2					
004	5. 1	8		9	10	3	3	0					
005	5. 4	10		17	9	2	4	2					
006	5.11	11		13	15	3	6	6					
007	5. 8	12		12	11	2	4	4					
008	5. 7	8		11	15	3	0	0					
009	5. 9	12		14	18	9	7	6					
010	5. 5	8		5	14	7	3	4					
011	6.11	11	8	18	20	3	6	6	13	12	6	9	11
012	6. 7	11	8	12	19	8	6	4	9	13	9	10	9
013	6. 6	9	6	16	12	2	8	3	11	8	5	13	8
014	6. 7	10	7	15	18	14	4	3	11	11	15	8	8
015	6. 6	8	5	13	11	4	3	4	10	8	7	7	9
016	6. 5	8	6	9	15	2	2	6	8	9	6	6	12
017	6. 5	10	8	15	20	11	6	6	11	13	12	10	12
018	6. 3	12	10	7	19	8	7	6	7	13	10	11	12
019	6. 5	8	6	6	0	0	1	1	7	4	4	5	8
020	6. 6	11	8	11	19	7	6	6	11	19	7	6	6
021	6. 5	12	10	7	13	6	5	4	7	8	9	9	10
022	6.10	9	6	14	18	5	5	6	10	10	7	8	11
023	6. 6	8	5	12	18	6	5	6	9	11	8	8	11
024	6. 6	9	6	9	19	0	4	3	8	13	4	8	8
025	6. 8	11	8	11	18	3	6	7	9	11	6	10	13
026	6. 1	9	7	11	18	8	8	6	10	12	10	15	13
027	6. 7	13	11	12	17	6	5	3	9	10	8	8	8
028	6. 7	12	10	13	19	5	5	7	10	13	8	8	13
029	6.10	10	7	15	19	6	5	5	10	12	8	8	10
030	6. 6	10	7	12	19	8	6	6	9	11	9	10	11
031	6. 9	9	6	9	14	4	1	4	7	8	7	5	9
032	6. 9	8	5	9	20	7	4	5	7	12	8	7	10
033	6. 6	6	3	11	12	4	7	2	9	8	7	11	8
034	6. 6	10	7	14	18	8	3	6	10	11	9	7	11
035	6. 2	9	7	13	17	8	3	5	10	11	10	8	11
036	6. 6	6	3	9	14	6	5	3	8	8	8	8	8
037	6. 6	5	2	1	11	4	2	0	5	8	7	6	6
038	6.11	8	5	13	13	6	2	1	9	8	8	6	7
040	6. 0	8	6	14	13	3	3	1	11	9	7	8	8

I.D.	Age	V.M.I.		V.P.									
		Raw	Std	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
041	6. 7	11	8	4	19	8	4	2	6	13	9	8	8
042	6. 9	9	6	10	11	3	7	3	8	7	6	10	8
043	6. 7	9	6	8	18	8	7	5	7	11	9	11	10
044	6.10	11	8	11	13	6	7	5	9	8	8	10	10
045	6. 6	9	6	13	16	2	4	5	10	9	5	8	10
046	6. 7	8	5	12	15	5	6	7	9	9	8	10	13
047	6. 6	11	8	10	13	4	4	5	8	8	7	8	10
048	6. 2	5	3	13	18	4	2	3	10	12	8	7	9
049	6. 2	9	7	8	7	2	4	4	8	8	6	8	10
050	6. 3	10	8	4	10	0	3	1	9	9	6	0	9
051	6. 8	8	5	7	13	4	7	3	7	8	7	11	8
052	6. 7	8	5	14	3	2	4	2	14	5	5	8	8
053	6. 5	6	4	11	17	5	6	2	9	10	8	10	8
054	6. 9	12	10	10	19	2	3	6	8	12	5	7	11
055	6. 6	12	10	7	17	4	5	7	7	10	7	8	13
056	6. 6	12	10	20	18	7	7	6	15	11	9	11	11
057	6. 4	12	10	16	14	5	4	5	12	9	8	8	10
058	6. 1	6	4	11	8	6	0	0	10	8	9	4	7
059	6. 5	10	8	15	17	7	6	7	11	10	9	10	13
060	6. 6	12	10	18	18	9	5	6	13	11	10	8	11
061	6. 8	9	6	15	19	6	6	5	11	13	8	10	10
062	6. 0	10	8	12	10	8	5	5	10	8	10	9	11
063	6. 0	10	8	6	13	13	6	4	7	9	15	10	10
064	7. 7	14	9	18	20	7	6	7	11	11	8	8	11
065	7. 5	13	9	21	18	10	5	7	14	10	9	8	11
066	7. 6	10	5	8	18	7	7	7	6	9	8	9	11
067	7.10	8	3	9	15	9	1	0	6	7	9	4	5
068	7.10	8	3	12	13	11	6	5	8	7	10	8	8
069	7. 7	11	6	8	16	3	5	5	6	8	5	7	9
070	7. 6	10	5	15	12	7	6	3	10	7	8	8	7
071	7. 5	11	7	13	11	7	1	5	9	7	8	4	9
072	7. 2	19	16	21	18	16	8	7	14	10	14	13	12
073	7. 4	9	5	11	10	7	4	7	8	7	8	7	11
074	7. 5	10	6	19	18	5	5	6	13	9	7	7	10
075	7. 1	10	6	13	19	4	5	7	9	12	6	8	12
076	7. 1	10	6	8	17	2	5	6	7	9	5	8	11
077	7. 1	9	5	9	7	1	5	6	7	6	4	8	11
078	7. 0	9	5	7	17	6	7	6	6	9	8	10	11
079	7.10	12	8	17	11	1	4	2	9	6	3	6	6
080	7.11	9	4	11	20	9	4	6	7	11	9	6	10
081	7. 2	8	4	18	17	8	7	5	12	9	9	10	9
082	7. 4	15	11	13	20	5	6	4	9	11	7	9	8
083	7. 0	9	5	17	16	4	4	3	11	9	6	7	8
084	7.10	8	3	16	18	7	6	7	9	9	7	8	11
085	7.11	12	7	20	20	4	7	1	13	11	6	9	11
086	7. 0	11	7	18	17	5	4	4	12	9	8	7	9
087	7. 2	9	5	9	20	7	5	4	7	12	8	8	9
088	7. 6	8	3	9	9	0	3	3	7	6	3	6	7

I.D.	Age	V.M.I		V.P.									
		Raw	Std	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
089	7. 4	6	2	9	4	3	4	4	7	5	6	7	8
090	7. 7	7	2	14	12	1	4	2	9	7	4	7	7
091	7. 7	10	5	13	11	1	3	4	8	7	4	6	8
092	7. 3	10	6	15	12	0	3	3	10	7	3	7	8
093	7. 5	8	4	9	16	2	5	3	7	8	5	8	8
094	7. 0	9	5	11	18	7	4	5	8	10	8	7	9
095	7. 0	10	6	14	18	4	5	4	10	10	6	8	9
096	7. 8	9	4	20	14	4	5	4	13	7	6	7	8
097	7. 9	12	7	11	18	7	5	6	7	9	7	7	10
098	7. 3	9	5	16	20	13	5	7	10	11	12	8	11
099	7. 5	13	9	24	18	6	6	7	14	10	7	9	11
100	7. 8	13	8	14	13	4	4	7	9	7	6	7	11
101	7. 5	10	6	8	15	0	1	5	7	8	3	4	9
102	7. 5	9	5	19	13	4	5	4	13	7	6	8	8
103	7. 7	12	7	16	18	6	5	4	10	9	7	7	8
104	7.11	10	5	17	18	4	8	7	10	9	6	11	11
105	7. 3	7	3	9	17	8	5	5	7	9	8	8	9
106	7. 0	13	9	14	19	11	5	7	10	12	11	8	12
107	7.11	13	8	5	20	11	4	7	5	11	10	6	11
108	7. 7	7	2	10	16	8	5	4	7	8	8	7	8
109	7. 0	10	6	8	18	6	5	6	7	10	8	8	11
110	7.10	11	6	12	12	8	6	5	8	7	8	8	8
111	7. 0	8	4	9	2	2	1	1	7	4	5	5	7
112	7. 7	10	5	12	14	4	4	2	8	7	6	7	7
113	7. 5	7	3	13	18	6	6	4	9	10	7	9	8
114	7. 0	10	6	10	9	4	3	0	8	7	6	7	6
115	7. 6	11	6	13	17	4	4	5	8	9	6	7	9
116	7. 7	15	10	16	19	10	7	6	10	11	9	9	10
117	7. 3	11	7	5	18	2	5	2	6	10	5	8	7
118	7. 8	11	6	11	16	9	4	7	8	8	9	7	11
119	8. 7	12	6	19	19	8	6	7	11	10	7	7	10
120	8.11	8	2	19	15	2	3	3	11	6	4	5	6
121	8. 0	8	3	12	11	4	5	4	8	6	6	7	8
122	8. 5	11	5	16	17	10	5	7	9	8	8	7	10
123	8. 9	11	5	15	17	2	7	7	8	7	4	8	10
124	8. 7	13	7	22	20	13	7	7	10	10	10	8	10
125	8. 4	11	5	5	19	7	6	7	5	10	7	8	10
126	8. 4	12	6	16	19	9	6	7	9	10	8	8	10
127	8. 9	14	8	22	11	10	7	7	10	6	8	8	10
128	8. 5	9	3	11	17	0	6	2	7	8	3	7	6
129	8. 1	11	6	21	14	8	7	7	10	7	8	9	10
130	8. 6	9	3	17	18	6	5	2	9	8	6	6	6
131	8. 3	12	6	13	19	5	5	7	8	10	6	7	10
132	8. 4	13	7	19	20	6	7	7	11	10	7	8	10
133	8. 0	12	7	15	13	2	6	5	9	7	4	8	8
134	8. 0	12	7	10	17	1	7	7	7	8	4	9	10
135	8. 8	9	3	10	17	5	4	5	6	8	6	6	8
136	8. 4	13	5	10	19	7	2	5	6	10	7	5	8

I.D.	Age	V.M.I.		V.P.									
		Raw	Std	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
137	8. 0	13	8	7	17	6	2	4	6	8	7	5	8
138	8. 0	12	7	15	16	5	7	7	9	8	6	9	10
139	8. 5	11	5	7	14	2	6	7	5	7	4	7	10
140	8. 7	17	11	13	20	7	7	8	7	10	7	8	10
141	8.10	11	5	15	12	5	4	5	8	6	6	6	7
142	8. 6	14	8	22	19	7	6	4	10	10	7	7	7
143	8. 9	13	7	15	20	7	7	6	8	10	7	8	9
144	8. 8	9	3	9	15	2	3	5	6	7	4	5	8
145	8. 5	14	8	15	17	7	7	7	8	8	7	8	10
146	8. 2	12	7	16	17	8	7	7	9	8	8	9	10
147	8. 2	7	3	11	12	5	5	5	7	6	6	7	8
148	8. 0	14	8	13	19	9	8	7	7	10	8	10	10
149	8. 2	13	8	14	19	7	6	3	8	10	7	8	7
150	8. 2	14	8	9	20	8	6	7	6	10	8	8	10
151	8. 7	11	5	23	20	8	7	1	10	10	7	8	6
152	8. 0	14	8	20	18	12	6	7	10	9	10	8	10
153	8. 5	10	4	9	13	5	6	7	6	6	6	7	10
154	8. 6	12	6	4	19	6	6	6	8	10	6	7	9
155	8. 5	14	8	8	9	7	4	6	6	6	7	6	8
156	8.11	14	8	16	20	10	3	5	8	10	8	5	7
157	8. 0	13	8	22	13	8	6	5	10	7	8	8	8
158	8. 1	11	6	10	16	7	6	6	6	7	7	8	9
159	8. 6	15	9	14	20	9	6	7	8	10	8	7	10
160	8. 4	13	7	17	17	5	7	8	9	8	6	8	10
161	8. 9	15	9	16	20	14	7	8	8	10	10	8	10
162	8. 6	13	7	9	10	2	4	7	6	6	4	6	10
163	8. 4	13	7	15	16	3	3	4	8	7	5	6	7
164	8. 5	11	5	6	20	8	6	7	5	10	7	7	9
165	8. 9	14	8	20	20	9	7	7	10	10	8	8	10
166	8. 1	12	7	13	16	8	5	7	8	7	8	7	10
167	8. 3	12	6	14	19	2	7	6	8	10	4	8	9
168	9. 5	11	5	17	20	10	6	7	8	10	7	7	8
169	9. 1	12	5	21	20	5	7	7	10	10	6	8	10
170	9. 4	15	9	22	19	10	7	7	10	10	8	8	10
171	9. 3	13	7	11	17	2	6	5	6	7	4	7	7
172	9. 8	14	7	8	17	11	6	7	5	7	8	6	10
173	9. 0	13	6	9	16	2	5	6	6	7	4	6	8
174	9. 0	8	1	13	20	9	5	6	7	10	8	6	8
175	9. 0	14	7	13	17	10	6	7	7	7	8	7	10
176	9.11	11	4	15	18	8	6	7	7	7	6	6	10
177	9.11	13	6	25	19	13	7	7	10	10	10	7	10
178	9. 2	13	6	19	17	13	8	7	10	7	10	10	10
179	9. 4	11	5	21	18	7	4	7	10	8	6	5	10
180	9. 5	16	10	18	17	10	7	7	9	7	7	7	10
181	9.10	12	5	18	20	6	8	7	9	10	6	10	10
182	9. 6	16	9	14	15	7	6	3	7	6	6	7	10
183	9.10	13	6	10	18	11	6	6	5	7	8	6	8
184	9. 0	11	4	18	20	8	5	6	9	10	7	6	8

I.D.	Age	V.M.I. Raw	V.M.I. Std.	V.P. Raw 1	V.P. Raw 2	V.P. Raw 3	V.P. Raw 4	V.P. Raw 5	V.P. Scale 1	V.P. Scale 2	V.P. Scale 3	V.P. Scale 4	V.P. Scale 5
	Yr. Mth.												
185	9.11	14	7	17	20	12	7	7	8	10	8	7	10
186	9. 9	14	7	14	12	4	7	6	7	5	5	7	8
187	9.10	12	5	15	20	12	3	6	7	10	8	5	8
188	9.10	11	4	13	18	3	6	5	6	7	4	6	7
189	9. 8	12	5	13	20	9	8	7	6	10	7	10	10
190	9. 3	13	7	17	17	8	7	8	8	7	7	8	10
191	9. 8	15	8	20	20	7	7	7	10	10	6	7	10
192	9. 9	10	3	8	17	5	5	6	5	7	5	6	8
193	9.11	12	5	17	20	5	6	7	8	10	5	6	10
194	9. 8	9	2	14	3	2	3	6	7	4	4	5	8
195	9. 7	14	7	18	18	8	6	6	9	7	7	7	8
196	9. 7	8	1	14	19	13	8	7	7	10	10	10	10
197	9. 1	11	4	18	15	9	6	4	9	6	7	7	7
198	9. 6	11	4	6	20	10	7	7	4	10	7	7	10
199	9.10	10	3	3	20	1	7	6	4	10	3	7	8
200	9. 1	12	5	18	17	9	6	5	9	7	7	7	7
201	9. 8	11	4	18	18	5	5	6	9	7	5	6	8
202	9. 8	14	7	13	17	8	4	5	6	7	6	5	7
203	9. 4	16	10	13	14	5	6	7	7	6	5	7	10
204	9. 9	14	7	10	13	8	6	7	5	5	6	6	10
205	9. 4	17	11	18	15	0	7	7	9	6	3	8	10
206	9. 0	13	6	13	17	6	5	5	7	7	6	6	7
207	9. 0	15	8	18	19	9	8	7	9	10	8	10	10
208	9. 6	11	4	11	12	9	3	4	6	6	5	5	6
209	9. 1	14	7	12	19	12	6	7	7	10	9	7	10
210	9.10	14	7	15	18	4	6	6	7	7	5	6	8
211	9. 9	17	10	8	17	6	4	5	5	7	6	5	7
212	9. 8	12	5	16	17	4	5	5	8	7	5	6	7
213	9. 5	8	3	8	9	6	6	3	5	5	6	7	6
214	9. 7	20	13	16	20	7	6	7	8	10	6	7	10
215	10. 4	10	3	8	14	4	7	7					
216	10. 0	13	6	16	19	7	7	7					
217	10. 8	14	6	21	20	13	7	7					
218	10. 1	16	9	10	17	12	8	7					
219	10. 7	13	6	18	19	6	6	7					
220	10.10	13	6	14	20	3	4	7					
221	10. 1	14	7	21	19	10	7	7					
222	10. 1	12	5	14	15	5	6	6					
223	10. 0	10	3	17	20	8	7	7					
224	10. 0	14	7	22	20	8	8	6					
225	10. 0	14	7	20	20	15	6	8					
226	10. 9	16	8	23	20	14	7	5					
227	10. 6	14	8	12	20	5	7	7					
228	10. 5	13	6	6	20	11	7	7					
229	10. 6	14	6	21	20	7	5	6					
230	10.11	14	7	18	20	10	7	6					
231	10.10	8	2	14	20	7	7	8					
232	10. 4	14	7	20	20	11	8	7					

I.D.	Age	V.M.I.		V.P.									
		Raw	Std.	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
233	10. 0	13	6	12	18	5	4	7					
234	10. 3	14	7	23	20	10		7					
235	10.11	12	5	16	18	0	5	4					
236	10. 4	10	3	7	16	6	2	5					
237	10. 8	12	5	15	20	11	6	7					
238	10. 8	9	2	16	18	7	5	6					
239	10. 3	11	4	18	20	9	7	7					
240	10.10	13	4	17	19	3	2	6					
241	10. 7	11	7	12	16	10	5	5					
242	10. 1	14	7	13	18	12	5	6					
243	10. 7	20	12	16	18	6	4	6					
244	10. 1	12	5	12	20	6	6	0					
24	10. 1	15	8	18	19	9	4	7					
2[illegible]	10. 2	14	7	20	20	2	8	7					
2[illegible]	[illegible] 9	16	8	12	12	6	5	6					
248	[illegible]. 1	11	4	19	15	10	8	7					
249	0. 1	11	4	7	13	8	6	6					
250	7	17	7	17	19	13	7	4					
2[illegible]	7	13	6	11	10	8	6	7					
2[illegible]	.11	15	8	21	17	13	6	8					
2[illegible]	. 1	13	6	16	20	7	6	7					
254	10. 5	13	6	13	20	9	8	7					
255	10. 9	13	6	18	20	9	7	7					
256	10. 2	14	7	19	15	4	6	7					
257	10. 9	11	4	9	19	6	3	7					
258	10. 9	19	11	19	19	10	6	8					
259	11. 2	21	13	26	20	15	6	8					
260	11. 7	14	5	16	18	2	6	7					
262	11. 2	13	5	18	15	8	6	6					
261	11. 6	15	6	19	20	12	6	7					
263	11. 5	12	4	13	17	7	5	6					
264	11. 1	8	0	9	16	7	5	7					
265	11. 7	15	6	19	14	7	8	8					
266	11.11	18	9	21	20	10	7	7					
267	11. 1	16	8	21	20	12	7	5					
268	11. 9	14	5	16	10	6	7	7					
269	11. 6	14	5	20	19	0	3	5					
270	11. 9	15	6	12	15	8	7	8					
271	11.10	16	7	20	20	9	7	8					
272	11. 8	13	4	10	19	5	6	7					
273	11. 7	16	7	15	20	6	8	8					
274	11. 3	12	4	14	19	6	7	7					
275	11. 2	13	5	13	19	7	7	7					
276	11. 8	12	4	18	19	7	7	7					
277	11.11	17	8	20	20	11	8	7					
278	11. 7	15	6	10	20	10	7	7					
279	11. 6	18	9	23	18	10	8	7					
280	11. 4	12	4	10	18	6	7	7					

I.D.	Age	V.M.I.		V.P.									
		Raw	Std.	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
281	11. 5	8	1	12	9	4	4	6					
282	11. 1	13	5	15	19	10	8	6					
283	11. 4	14	6	24	18	1	6	7					
284	11. 9	14	5	22	18	7	6	7					
285	11. 0	12	4	24	20	5	5	7					
286	11. 6	8	0	15	14	3	5	6					
287	11. 6	13	4	17	20	13	8	7					
288	11. 2	9	1	19	20	8	6	5					
289	11. 7	12	4	19	20	8	5	7					
290	11. 1	12	4	20	18	8	8	6					
291	11. 8	14	5	17	18	13	7	7					
292	11. 4	11	3	14	20	6	1	6					
293	11. 1	13	5	19	19	6	5	5					
294	11. 2	14	6	16	17	3	5	6					
295	11. 7	12	4	13	20	4	[illegible]	4					
296	11. 7	12	4	19	20	10	7	7					
297	11. 1	15	7	18	19	8	7	7					
298	12. 9	16	5	17	18	6	6	7					
299	12. 5	9	1	17	18	1	6	6					
300	12. 6	12	3	2	15	4	5	7					
301	12. 6	13	4	2[illegible]	16	0	7	7					
302	12. 3	9	1	12	18	4	5	1					
303	12. 6	19	9	21	20	13	8	7					
304	12. 3	12	4	9	18	4	6	3					
305	12. 8	9	1	23	15	7	6	6					
306	12. 0	9	0	8	20	12	5	6					
307	12.11	13	1	14	18	2	3	6					
308	12. 5	11	3	15	19	8	5	5					
309	12. 3	18	9	22	20	7	8	8					
310	12. 9	12	0	15	19	5	7	3					
311	12. 6	13	4	23	19	11	7	7					
312	12. 5	13	5	18	17	10	7	7					
313	12. 1	13	4	12	15	3	3	5					
314	12. 6	15	4	14	20	6	7	7					
315	12. 2	21	11	25	20	13	8	7					
316	12. 1	14	5	16	19	8	6	7					
317	12. 7	12	3	16	20	7	6	6					
318	12. 8	14	5	21	20	11	7	8					
319	12. 8	14	5	20	17	10	8	7					
320	12. 8	9	0	20	20	6	7	7					
321	12. 8	20	10	19	20	12	7	7					
322	12. 8	13	4	15	10	8	5	7					
323	12. 1	20	10	22	20	7	7	6					
324	12. 5	11	3	14	20	0	7	5					
325	12. 3	13	5	18	16	10	8	7					
326	12. 5	12	4	16	20	9	5	6					
327	12. 9	17	6	13	20	10	8	7					
328	12. 8	14	5	17	17	8	7	7					

I.D.	Age	V.M.I.		V.P.									
		Raw	Std.	Raw					Scale				
	Yr. Mth.			1	2	3	4	5	1	2	3	4	5
329	12.11	14	3	21	20	12	8	7					
330	12. 6	11	2	18	16	6	4	3					
331	12. 1	14	5	18	7	4	6	7					
332	12.10	17	6	19	17	13	7	7					
333	12. 4	15	6	15	18	15	2	7					
334	12. 8	21	11	15	20	8	6	7					
335	12. 8	12	3	16	14	6	5	6					
336	12. 4	11	3	15	17	0	5	3					
337	12. 7	12	3	18	20	12	8	7					
338	12.10	13	1	17	20	2	4	3					
339	12. 6	13	4	14	15	6	4	7					
340	12. 9	15	4	17	20	11	6	7					
341	12. 8	12	3	13	13	7	5	5					
342	12. 8	17	8	21	20	15	8	7					
343	12. 0	12	3	4	17	8	4	5					
344	12. 2	20	10	24	19	5	7	8					
345	12. 3	14	6	16	20	2	7	6					
346	12.11	16	5	19	15	10	7	6					
347	12. 3	13	4	21	14	5	8	7					
348	12. 3	14	6	16	14	2	5	2					
349	12. 0	13	4	19	20	6	6	7					
350	13. 2	20	8	13	8	7	8	7					
351	13. 8	23	12	25	19	12	8	7					
352	13. 1	14	0	23	20	12	7	7					
353	13. 5	13	0	14	18	7	8	7					
354	13. 0	13	0	16	20	10	7	7					
355	13. 5	22	10	21	20	6	8	7					
356	13. 9	13	0	20	20	10	8	6					
357	13. 6	22	10	18	20	12	8	7					
358	13. 6	12	0	12	18	9	7	5					
359	13. 3	16	2	21	20	7	7	8					
360	13. 1	13	0	7	20	10	6	7					
361	13. 1	15	1	24	16	15	7	9					
362	13. 2	15	1	19	17	5	7	6					
363	13. 5	16	2	23	20	9	6	3					
364	13. 5	21	9	20	20	7	8	7					
365	13. 7	16	2	22	19	8	7	6					
366	13. 5	7	0	5	17	4	3	1					
367	13. 7	9	0	20	20	12	7	7					
368	13. 7	10	1	7	19	0	6	5					
369	13. 4	19	6	13	16	14	7	7					
370	13. 9	14	0	16	15	2	6	7					
371	13. 0	14	0	13	20	8	6	7					
372	13. 7	20	8	18	15	4	7	6					
373	13. 7	22	10	16	20	10	8	7					
374	13. 5	14	0	26	19	12	6	7					
375	13. 8	12	0	16	18	8	6	7					
376	13. 5	17	4	24	19	8	7	7					

I.D.	Age	V.M.I. Raw	V.M.I. Std.	V.P. Raw 1	2	3	4	5	V.P. Scale 1	2	3	4	5
	Yr. Mth.												
377	13. 9	18	5	23	20	13	8	7					
378	13. 0	21	9	16	20	13	8	6					
379	13. 2	18	5	21	20	11	8	8					
380	13. 6	20	8	18	16	9	5	7					
381	13.11	21	9	19	20	12	7	7					
382	13. 1	22	10	14	19	15	7	7					
383	13. 1	17	4	14	17	6	6	6					
384	13. 1	10	0	21	16	3	5	6					
385	13. 6	11	0	20	19	9	6	3					
386	13. 5	15	1	22	20	7	5	7					
387	13. 1	19	6	20	15	8	8	7					
388	13. 7	13	0	19	15	0	6	6					
389	13. 0	11	0	10	17	9	7	7					
390	13. 8	18	5	17	20	7	6	7					
391	13. 7	13	0	16	19	9	5	4					
392	13.11	15	1	18	20	6	7	7					
393	13. 9	16	2	15	15	9	8	7					
394	13. 3	16	2	22	16	14	7	7					
395	13. 5	13	0	17	19	6	4	6					
396	13. 2	18	5	21	20	10	5	6					
397	13. 3	16	2	18	18	5	5	7					
398	13. 2	16	2	20	17	4	6	7					
399	13. 3	17	4	23	20	9	8	8					
400	13. 1	13	0	17	17	5	6	7					
401	13. 9	16	2	17	19	10	8	8					
402	14. 2	12	0	19	17	13	8	7					
403	14. 4	17	4	21	15	8	8	7					
404	14. 3	14	0	11	18	9	5	7					
405	14. 7	10	0	22	18	12	7	7					
406	14. 6	11	0	11	16	6	3	1					
407	14. 2	19	6	23	20	10	7	7					
408	14. 4	14	0	15	20	15	6	4					
409	14. 6	19	6	17	19	12	7	8					
410	14. 8	18	5	24	20	12	7	8					
411	14. 7	15	1	14	16	4	4	6					
412	14. 4	12	0	17	20	2	5	7					
413	14. 2	13	0	18	17	6	8	7					
414	14. 0	9	0	13	12	2	5	7					
415	14. 9	21	9	25	16	12	8	7					
416	14. 6	19	6	12	15	6	6	8					
417	14. 5	15	1	14	20	8	6	2					
418	14.11	12	0	23	20	0	8	7					
419	14. 5	12	0	18	17	11	7	7					
420	14. 5	16	2	21	20	6	7	8					

Abbreviations

I.D.	Identification Number
V.M.I.	Developmental Test of Visual Motor Integration
V.P.	Developmental Test of Visual Perception
Raw	Raw Scores
Std.	Standard Scores
Scale	Scale Scores

APPENDIX 16

Raw Data - "Above Average" Group

I.D.	Age	V.M.I. Raw	V.M.I. Std.	V.P. Raw 1	V.P. Raw 2	V.P. Raw 3	V.P. Raw 4	V.P. Raw 5	V.P. Scale 1	V.P. Scale 2	V.P. Scale 3	V.P. Scale 4	V.P. Scale 5
501	6. 8	14	12	17	15	5	7	5	12	9	8	11	10
502	6. 7	12	10	9	12	8	5	6	8	8	9	8	11
503	5. 7	13	14	14	8	6	4	5	12	8	10	9	12
504	7. 7	13	10	12	20	3	6	6	8	11	5	8	10
505	7. 8	13	8	19	15	8	6	5	13	8	8	8	9
506	7.11	10	5	12	8	7	7	4	8	6	7	9	8
507	7. 2	9	5	14	20	8	5	6	10	12	9	8	11
508	7. 7	12	7	12	15	2	8	4	8	8	5	12	8
509	7.11	17	12	14	20	11	8	5	9	11	10	11	8
510	8. 0	17	11	16	17	11	6	7	9	8	9	8	10
511	8. 0	13	8	23	19	13	4	7	10	10	10	6	10
512	10. 0	14	7	16	20	8	8	7					
513	8. 6	11	5	13	17	1	6	7	7	8	4	7	10
514	8. 6	13	7	17	19	12	5	7	9	10	10	6	10
515	8. 8	9	3	14	11	6	5	7	8	6	6	6	9
516	8. 8	11	5	10	16	8	6	7	6	7	7	7	10
517	8. 8	11	5	18	20	8	7	7	10	10	7	8	10
518	8. 5	17	11	19	17	9	8	8	11	8	8	10	10
519	8. 7	12	6	22	19	10	6	6	10	10	8	7	9
520	9. 5	12	6	12	16	12	5	6	6	6	9	6	8
521	9. 3	13	7	17	20	10	6	6	8	10	8	7	8
522	9. 2	17	10	23	20	11	7	8	10	10	8	8	10
523	9. 9	17	10	21	20	1	7	6	10	10	3	7	8
524	8. 7	12	6	15	17	12	8	8	8	8	10	10	10
525	9. 9	17	10	21	20	1	7	6	10	10	3	7	8
526	9. 8	11	4	11	20	7	5	7	6	10	6	6	10
527	9.10	14	7	13	18	9	8	6	6	7	7	10	8
528	9. 3	7	2	12	19	13	6	8	6	10	10	7	10
529	10. 4	13	6	20	15	5	8	7					
530	10. 8	9	2	14	17	7	7	6					
531	10. 0	13	6	18	15	8	7	7					
532	10.11	16	8	24	17	10	7	8					
533	10. 1	12	5	22	20	10	5	6					
534	10. 6	14	6	11	20	8	8	7					
535	10. 1	12	5	20	12	1	7	7					
536	12.11	21	9	20	17	14	8	7					
537	7.11	10	5	24	17	5	7	7	13	8	6	9	11

Abbreviations

I.D.	Identification Number
V.M.I.	Developmental Test of Visual Motor Integration
V.P.	Developmental Test of Visual Perception
Raw	Raw Scores
Std.	Standard Scores
Scale	Scale Scores

APPENDIX 17

Raw Data - "Below Average - Learning Disabled" Group

I.D.	Age	V.M.I. Raw	V.M.I. Std	V.P. Raw 1	2	3	4	5	V.P. Scale 1	2	3	4	5
601	7. 6	11	7	13	17	1	5	4	9	9	4	8	9
602	9. 1	9	2	20	20	3	2	5	10	10	4	4	7
603	6. 6	9	6	4	15	6	6	4	6	9	8	10	9
604	10. 0	10	3	19	13	6	1	1					
605	6. 5	7	5	8	13	1	4	3	8	8	5	8	9
606	9. 6	21	14	20	20	15	6	7	10	10	10	7	10
607	9.10	18	11	23	20	12	5	7	10	10	8	6	10
608	9. 5	13	7	13	20	9	8	7	7	10	10	10	10
609	8. 5	11	5	21	15	10	6	6	10	7	8	7	9
610	8. 7	8	2	12	11	6	1	2	7	6	6	4	6
611	8. 1	2	0	8	0	1	0	1	6	3	4	3	6
612	6. 0	9	7	15	18	2	3	1	12	12	6	8	8
613	6. 0	7	5	12	13	2	3	1	10	9	6	8	8
614	6. 3	6	4	14	15	9	4	0	11	9	11	8	6
615	8. 0	11	6	16	16	7	5	2	9	8	8	7	6
616	7. 3	8	4	10	6	6	5	0	7	6	7	8	6
617	7. 0	12	8	16	18	5	3	4	10	10	8	7	9
618	6. 6	7	4	12	8	3	1	0	9	7	6	5	6
619	7. 1	1	0	4	0	0	0	0	5	4	4	4	6
620	6.11	7	4	16	19	4	5	3	11	12	7	8	8
621	6. 6	8	5	5	13	1	4	2	6	8	5	8	8
622	6. 6	1	0	6	5	0	0	1	7	6	4	4	7
623	6. 5	8	6	9	18	1	1	1	8	11	5	5	8
624	6. 7	10	7	9	0	0	1	3	8	4	4	5	8
625	6. 7	8	5	12	19	8	6	3	9	13	9	10	8
626	6. 5	8	6	11	18	8	2	0	9	11	10	6	6
627	6. 8	4	1	11	15	2	3	2	9	9	5	7	8
628	6. 5	9	7	6	16	3	5	1	7	10	6	9	8
629	6. 6	8	5	12	11	1	3	0	9	8	5	7	6
630	6. 6	8	5	10	15	3	3	2	8	9	6	7	7
631	6. 6	7	4	4	13	6	6	1	6	8	8	5	7
632	6. 6	6	3	10	17	2	2	0	8	10	5	6	6
633	6.10	9	6	11	16	0	1	2	9	9	4	5	7
634	6. 3	6	4	5	14	2	6	1	6	9	6	10	8
635	6. 4	6	4	9	1	6	4	4	8	5	9	8	10
636	6. 4	5	3	11	16	8	4	0	9	10	10	8	6

Abbreviations

I.D.	Identification Number
V.M.I.	Developmental Test of Visual Motor Integration
V.P.	Developmental Test of Visual Perception
Raw	Raw Score
Std.	Standard Score
Scale	Scale Scores

APPENDIX 18

Developmental Test of Visual Motor Integration

Percentile Ranks

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	10.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
7	10.0	9.1	2.0	0.0	0.0	0.0	0.0	1.9
8	33.3	21.8	6.1	6.4	2.3	7.7	0.0	1.9
9	51.7	40.0	14.3	8.5	4.5	10.3	9.6	3.8
10	68.3	63.6	16.3	12.8	11.4	10.3	9.6	7.7
11	81.7	76.4	36.7	31.9	22.7	12.8	17.3	11.5
12	98.3	83.6	57.1	46.8	31.8	35.9	34.6	15.4
13	100.0	92.7	75.5	61.7	54.5	51.3	55.8	30.8
14	100.0	94.5	93.9	80.9	81.8	69.2	71.2	38.5
15	100.0	98.2	98.0	87.2	86.4	82.1	76.9	46.2
16	100.0	98.2	98.0	93.6	93.2	89.7	80.8	61.5
17	100.0	98.2	100.0	97.9	95.5	92.3	86.5	67.3
18	100.0	98.2	100.0	97.9	95.5	97.4	88.5	75.0
19	100.0	100.0	100.0	97.9	97.7	97.4	90.4	78.8
20	100.0	100.0	100.0	100.0	100.0	97.4	96.2	84.6
21	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.4
22	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.1
23	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX 19

The Developmental Test of Visual Perception

Percentile Ranks

Subtest One

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.50	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.25	1.7	0.0	0.0	0.0	0.0	0.0	1.9	0.0
3.00	1.7	0.0	0.0	2.1	0.0	0.0	1.9	0.0
3.75	1.7	0.0	0.0	2.1	0.0	0.0	1.9	0.0
4.50	5.0	0.0	2.0	2.1	0.0	0.0	3.8	0.0
5.25	6.7	3.6	4.1	2.1	0.0	0.0	3.8	1.9
6.00	10.0	3.6	6.1	4.3	2.3	0.0	3.8	1.9
6.75	10.0	3.6	6.1	4.3	2.3	0.0	3.8	1.9
7.50	16.7	5.5	10.2	4.3	6.8	0.0	3.8	5.8
8.25	20.0	14.5	12.2	12.8	9.1	0.0	5.8	5.8
9.00	30.0	29.1	20.4	14.9	11.4	2.6	7.7	5.8
9.75	30.0	29.1	20.4	14.9	11.4	2.6	7.7	5.8
10.50	35.0	32.7	28.6	19.1	13.6	10.3	7.7	7.7
11.25	48.3	41.8	32.7	23.4	15.9	10.3	7.7	7.7
12.00	60.0	47.3	34.7	25.5	27.3	15.4	11.5	9.6
12.75	60.0	47.3	34.7	25.5	27.3	15.4	11.5	9.6
13.50	71.7	58.2	42.9	40.4	31.8	23.1	15.4	15.4

Subtest One Contd.

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
14.25	81.7	65.5	49.0	48.9	38.6	28.2	23.1	21.2
15.00	90.0	69.1	63.3	55.3	40.9	35.9	34.6	23.1
15.75	90.0	69.1	63.3	55.3	40.9	35.9	34.6	23.1
16.50	93.3	76.4	73.5	59.6	52.3	43.6	46.2	34.6
17.25	95.0	81.8	77.6	68.1	59.1	48.7	55.8	42.3
18.00	98.3	87.3	77.6	87.2	70.5	56.4	65.4	51.9
18.75	98.3	87.3	77.6	87.2	70.5	56.4	65.4	51.9
.50	98.3	90.9	83.7	89.4	77.3	71.8	73.1	57.7
20.25	100.0	94.5	87.8	91.5	84.1	82.1	78.8	69.2
21.00	100.0	98.2	89.8	95.7	93.2	87.2	88.5	78.8
21.75	100.0	98.2	89.8	95.7	93.2	87.2	88.5	78.8
22.50	100.0	98.2	98.0	97.9	95.5	89.7	92.3	84.6
23.25	100.0	98.2	100.0	97.9	100.0	92.3	96.2	92.3
24.00	100.0	100.0	100.0	97.9	100.0	97.4	98.1	96.2
24.75	100.0	100.0	100.0	97.9	100.0	97.4	98.1	96.2
25.50	100.0	100.0	100.0	100.0	100.0	97.4	100.0	98.1
26.25	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
27.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
27.75	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX 20

The Developmental Test of Visual Perception

Percentile Ranks

Subtest Two

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
.62	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.24	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.86	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.48	1.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0
3.10	3.3	1.8	0.0	2.1	0.0	0.0	0.0	0.0
3.72	3.3	1.8	0.0	2.1	0.0	0.0	0.0	0.0
4.34	3.3	3.6	0.0	2.1	0.0	0.0	0.0	0.0
4.96	3.3	3.6	0.0	2.1	0.0	0.0	0.0	0.0
5.58	3.3	3.6	0.0	2.1	0.0	0.0	0.0	0.0
6.20	3.3	3.6	0.0	2.1	0.0	0.0	0.0	0.0
6.82	3.3	3.6	0.0	2.1	0.0	0.0	0.0	0.0
7.44	5.0	5.5	0.0	2.1	0.0	0.0	1.9	0.0
8.06	6.7	5.5	0.0	2.1	0.0	0.0	1.9	1.9
8.68	6.7	5.5	0.0	2.1	0.0	0.0	1.9	1.9
9.30	8.3	9.1	2.0	4.3	0.0	2.6	1.9	1.9
9.92	8.3	9.1	2.0	4.3	0.0	2.6	1.9	1.9
10.54	13.3	10.9	4.1	4.3	2.3	5.1	3.8	1.9
11.16	20.0	16.4	8.2	4.3	2.3	5.1	3.8	1.9

Subtest Two Contd.

Age in Years								
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
11.78	20.0	16.4	8.2	4.3	2.3	5.1	3.8	1.9
12.40	23.3	23.6	12.2	8.5	4.5	5.1	3.8	1.9
13.02	35.0	29.1	18.4	10.6	6.8	5.1	5.8	1.9
13.64	35.0	29.1	18.4	10.6	6.8	5.1	5.8	1.9
14.26	41.7	32.7	22.4	12.8	9.1	10.3	11.5	1.9
14.88	41.7	32.7	22.4	12 8	9.1	10.3	11.5	1.9
15.50	50.0	36.4	26.5	19.1	15.9	15.4	21.2	11.5
16.12	51.7	45.5	34.7	21.3	20.5	17.9	26.9	21.2
16.74	51.7	45.5	34.7	21.3	20.5	17.9	26.9	21.2
17.36	60.0	56.4	53.1	46.8	25.0	23.1	38.5	32.7
17.98	60.0	56.4	53.1	46.8	25.0	23.1	38.5	32.7
18.60	78.3	81.8	59.2	61.7	36.4	41.0	50.0	40.4
19.22	95.0	87.3	77.6	72.3	54.5	61.5	59.6	59.6
19.84	95.0	87.3	77.6	72.3	54.5	61.5	59.6	59.6
20.46	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
21.08	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
21.70	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
22.32	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
22.94	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX 21

The Developmental Test of Visual Perception

Percentile Ranks

Subtest Three

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
.50	5.0	5.5	2.0	2.1	2.3	2.6	5.8	3.8
1.00	5.0	12.7	4.1	4.3	2.3	5.1	7.7	3.8
1.50	5.0	12.7	4.1	4.3	2.3	5.1	7.7	3.8
2.00	18.3	20.0	18.4	10.6	4.5	7.7	15.4	5.8
2.50	18.3	20.0	18.4	10.6	4.5	7.7	15.4	5.8
3.00	30.0	23.6	20.4	12.8	9.1	12.8	17.3	7.7
3.50	30.0	23.6	20.4	12.8	9.1	12.8	17.3	7.7
4.00	43.3	43.6	22.4	19.1	13.6	17.9	25.0	13.5
4.50	43.3	43.6	22.4	19.1	13.6	17.9	25.0	13.5
5.00	51.7	49.1	36.7	29.8	20.5	23.1	30.8	19.2
5.50	51.7	49.1	36.7	29.8	20.5	23.1	30.8	19.2
6.00	66.7	58.2	44.9	38.3	34.1	38.5	44.2	26.9
6.50	66.7	58.2	44.9	38.3	34.1	38.5	44.2	26.9
7.00	76.7	74.5	63.3	46.8	45.5	53.8	53.8	38.5
7.50	76.7	74.5	63.3	46.8	45.5	53.8	53.8	38.5
8.00	91.7	81.8	79.6	59.6	54.5	69.2	65.4	48.1
8.50	91.7	81.8	79.6	59.6	54.5	69.2	65.4	48.1
9.00	95.0	87.3	87.8	72.3	63.6	71.8	67.3	63.5

Subtest Three Contd.

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
9.50	95.0	87.3	87.8	72.3	63.6	71.8	67.3	63.5
10.00	95.0	90.9	93.9	83.0	75.0	84.6	76.9	75.0
10.50	95.0	90.9	93.9	83.0	75 0	84.6	76.9	75.0
11.00	96.7	96.4	93.9	87.2	81.8	87.2	82.7	76.9
11.50	96.7	96.4	93.9	87.2	81.8	87.2	82.7	76.9
12.00	96.7	96.4	95.9	93.6	86.4	92.3	90.4	88.5
12.50	96.7	96.4	95.9	93.6	86.4	92.3	90.4	88.5
13.00	98.3	98.2	98.0	100.0	93.2	97.4	96.2	92.3
13.50	98.3	98.2	98.0	100.0	93.2	97.4	96.2	92.3
14.00	100.0	98.2	100.0	100.0	95.5	97.4	96.2	96.2
14.50	100.0	98.2	100.0	100.0	95 5	97.4	96.2	96.2
15.00	100.0	98.2	100.0	100.0	97.7	100.0	100.0	100.0
15.50	100.0	98.2	100.0	100.0	97.7	100.0	100.0	100.0
16.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
16.50	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
17.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
17.50	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
18.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
18.50	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX 22

Developmental Test of Visual Perception

Percentile Ranks

Subtest Four

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
.25	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.50	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.75	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.00	6.7	7.3	0.0	0.0	0.0	2.6	0.0	0.0
1.25	6.7	7.3	0.0	0.0	0.0	2.6	0.0	0.0
1.50	6.7	7.3	0.0	0.0	0.0	2.6	0.0	0.0
1.75	6.7	7.3	0.0	0.0	0.0	2.6	0.0	0.0
2.00	15.0	7.3	4.1	0.0	4.5	2.6	1.9	0.0
2.25	15.0	7.3	4.1	0.0	4.5	2.6	1.9	0.0
2.50	15.0	7.3	4.1	0.0	4.5	2.6	1.9	0.0
2.75	15.0	7.3	4.1	0.0	4.5	2.6	1.9	0.0
3 00	28.3	14.5	12.2	6.4	6.8	5.1	5.8	1.9
3.25	28.3	14.5	12.2	6.4	6.8	5.1	5.8	1.9
3.50	28.3	14.5	12.2	6.4	6.8	5.1	5.8	1.9
3.75	28.3	14.5	12.2	6.4	6.8	5.1	5.8	1.9
4.00	46.7	38.2	20.4	12.8	15.9	10.3	11.5	3.8
4.25	46.7	38.2	20.4	12.8	15.9	10.3	13.5	3.8

Subtest Four Contd.

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
4.50	46.7	38.2	20.4	12.8	15.9	10.3	13.5	3.8
4.75	46.7	38.2	20.4	12.8	15.9	10.3	13.5	3.8
5.00	63.3	72.7	32.7	27.7	29.5	28.2	32.7	15.4
5.25	63.3	72.7	32.7	27.7	29.5	28.2	32.7	15.4
5.50	63.3	72.7	32.7	27.7	29.5	28.2	32.7	15.4
5.75	63.3	72.7	32.7	27.7	29.5	28.2	32.7	15.4
6.00	83.3	87.3	65.3	66.0	54.5	48.7	51.9	40.4
6.25	83.3	87.3	65.3	66.0	54.5	48.7	51.9	40.4
6.50	83.3	87.3	65.3	66.0	54.5	48.7	51.9	40.4
6.75	83.3	87.3	65.3	66.0	54.5	48.7	51.9	40.4
7.00	96.7	96.4	98.0	89.4	86.4	82.1	80.8	71.2
7.25	96.7	96.4	98.0	89.4	86.4	82.1	80.8	71.2
7.50	96.7	96.4	98.0	89.4	86.4	82.1	80.8	71.2
7.75	96.7	96.4	98.0	89.4	86.4	82.1	80.8	71.2
8.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8.25	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8.50	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
8.75	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
9.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
9.25	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX 23

The Developmental Test of Visual Perception

Percentile Ranks

Subtest Five

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
.25	6.7	3.6	0.0	0.0	2.3	0.0	0.0	0.0
.50	6.7	3.6	0.0	0.0	2.3	0.0	0.0	0.0
.75	6.7	3.6	0.0	0.0	2.3	0.0	0.0	0.0
1.00	13.3	7.3	2.0	0.0	2.3	0.0	1.9	1.9
1.25	13.3	7.3	2.0	0.0	2.3	0.0	1.9	1.9
1.50	13.3	7.3	2.0	0.0	2.3	0.0	1.9	1.9
1.75	13.3	7.3	2.0	0.0	2.3	0.0	1.9	1.9
2.00	23.3	14.5	6.1	0.0	2.3	0.0	3.8	1.9
2.25	23.3	14.5	6.1	0.0	2.3	0.0	3.8	1.9
2.50	23.3	14.5	6.1	0.0	2.3	0.0	3.8	1.9
2.75	23.3	14.5	6.1	0.0	2.3	0.0	3.8	1.9
3.00	36.7	23.6	10.2	2.1	2.3	0.0	13.5	5.8
3.25	36.7	23.6	10.2	2.1	2.3	0.0	13.5	5.8
3.50	36.7	23.6	10.2	2.1	2.3	0.0	13.5	5.8
3.75	36.7	23.6	10.2	2.1	2.3	0.0	13.5	5.8
4.00	50.0	43.6	18.4	6.4	6.8	2.6	13.5	7.7
4.25	50.0	43.6	18.4	6.4	6.8	2.6	13.5	7.7

Subtest Five Contd.

	Age in Years							
	6	7	8	9	10	11	12	13
Raw Score	Percentiles							
4.50	50.0	43.6	18.4	6.4	6.8	2.6	13.5	7.7
4.75	50.0	43.6	18.4	6.4	6.8	2.6	13.5	7.7
5.0	66.7	60.0	34.7	21.3	13.6	12.8	23.1	9.6
5.25	66.7	60.0	34.7	21.3	13.6	12.8	23.1	9.6
5.50	66.7	60.0	34.7	21.3	13.6	12.8	23.1	9.6
5.75	66.7	60.0	34.7	21.3	13.6	12.8	23.1	9.6
6.00	91.7	74.5	44.9	46.8	36.4	33.3	42.3	30.8
6.25	91.7	74.5	44.9	46.8	36.4	33.3	42.3	30.8
6.50	91.7	74.5	44.9	46.8	36.4	33.3	42.3	30.8
6.75	91.7	74.5	44.9	46.8	36.4	33.3	42.3	30.8
7.00	100.0	100.0	93.9	95.7	90.9	87.2	94.2	90.4
7.25	100.0	100.0	93 9	95.7	90.9	87.2	94.2	90.4
7.50	100.0	100.0	93.9	95.7	90.9	87.2	94.2	90.4
7.75	100.0	100.0	93.9	95.7	90.9	87.2	94.2	90.4
8.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.1
8.25	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.1
8.50	100.0	100 0	100.0	100.0	100.0	100.0	100.0	98.1
8.75	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.1
9.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
9.25	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX 24

Bibliography

ADLER, S. Data Gathering: The Reliability and Validity of Test Data from Culturally Different Children. Journal of Learning Disabilities. Aug./Sept. 1973. vol. 6, no. 7, pp. 30-35.

ALLAN, J.C. (1982). Learning About Statistics. Johannesburg: Macmillan South Africa (Publishers) (Pty.) Ltd.

AMERICAN PSYCHIATRIC ASSOCIATION. (1980). Diagnostic and Statistical Manual of Mental Disorders. 3rd. Editions. Washington, D.C.

AYRES, A.J. (1976). Southern California Sensory Integration Tests. Los Angeles, California: Western Psychological Services.

BECKER, J.T. and SABATINO, D.A., Frostig Revisited. Journal of Learning Disabilities. March 1973, vol. 6, no. 3, pp. 59-60.

BEERY, K.F. (1982). Revised Administration, Scoring and Teaching Manual for the Developmental Test of Visual Motor Integration. Chicago: Follett Publishing Company.

BEHR, A.L. (1980). New Perspectives in South African Education. 2nd ed. Durban: Butterworth Publishers.

BIESHEUVEL, S. The Ability of Africans. Occupational Therapy, Dec. 1972, pp. 10-11.

BRUININKS, R.H. (1978). Bruininks-Oseretsky Test of Motor Proficiency. Circle Pines, Minnesota: American Guidance Service, Inc.

CARTWRIGHT, J.D., JUKES, C., WILSON, A., XABA, D. A. Survey of Learning Problems in Black Primary School Children. S.A. Medical Journal, March 1981, vol. 59, pp. 488-490.

CHISSOM, B.S. and THOMAS, J.R. Comparison of Factor Structures for the Frostig Developmental Test of Visual Perception. Perceptual and Motor Skills, Dec. 1971, vol. 33, no. 3, pp. 1 015-1 019.

CHISSOM, B.S., THOMAS, J.R., and COLLINS, D.G. Relationships Among Perceptual Measures and their Correlations with Academic Readiness for Preschool Children. Perceptual and Motor Skills, Aug. 1974, vol. 39, no. 1 pt. 2, pp. 467-473.

COLARUSSO, R.P. and HAMMILL, D.D. (1972). MVPT Manual Motor-Free Visual Perception Test. Novato, California: Academic Therapy Publications.

COLE, M., and SCRIBNER, S. (1974). Culture and Thought. A Psychological Introduction. New York: John Wiley and Sons, Inc.

DE LANGE, J.P., Chairman. (1981a). Report of the Work Committee: Education for Children with Special Educational Needs. Pretoria: Human Sciences Research Council.

DE LANGE, J.P., Chairman. (1981b). Report of the Main Committee of the HSRC Investigation into Education: Provision of Education in the RSA. Pretoria: Human Sciences Research Council.

DE LEMOS, M.M., The Development of Spatial Concepts in Zulu Children. Culture and Cognition - Readings in Cross-Cultural Psychology, 1974, pp. 367-380.

DE MURRAY, C.H. (1969). Report of the Committee of Inquiry Into the Education of Children with Minimal Brain Dysfunction. Pretoria: Department of Higher Education.

DE WET, A. 'n Ondersoek na die Effek van 'n Terapeutiese Opleidingsprogram op die Motories Vermoens van Swart Graad 1 Kinders. M.At. Dissertation, Medical University of South Africa, Pretoria, 1986.

DEREGOWSKI, J.B. Difficulties in Pictorial Depth Perception in Africa. British Journal of Psychology, 1968, vol. 59, no. 3, pp. 195-204.

DIXON, W.J. and BROWN, M.B., Editors. (1979). BMDP-79 Biomedical Computer Programs P-Series. Los Angeles: University of California Press.

DIXON, W.J. (1983). BMDP-7D PROGRAM. Los Angeles: University of California Press.

DU BOIS, N.F. Selected Correlations Between Reading Achievement and Various Visual Abilities of Children in Grades 2 and 4. Perceptual and Motor Skills, Aug. 1973, vol. 37, no.1, pp. 45-46.

DUFFEY, F.B., RITTER, D.R. and FEDNER, M. Developmental Test of Visual Motor Integration and the Goodenough Draw-a-Man Test as Predictors of Academic Success. Perceptual and Motor Skills, 1976, vol. 43, pp. 543-546.

FROSTIG, M. (1976). Education for Dignity. New York: Grune and Stratton.

FROSTIG, M., LEFEVER, W., and WHITTLESLEY, J.R.B. Disturbances in Visual Perception. The Journal of Educational Research, 1963, vol. 57, no. 3, pp. 160-162.

FROSTIG, M., LEFEVER, W., and WHITTLESLEY, J.R.B. (1966). Administration and Scoring Manual for the Marianne Frostig Developmental Test of Visual Perception. Palo Alto, California: Consulting Psychologists Press.

FROSTIG, M., and MASLOW, P. (1973). Learning Problems in the Classroom. New York: Grune and Stratton.

FROSTIG, M., MASLOW, P., LEFEVER, W., and WHITTLESLEY, J.R.B. The Marianne Frostig Developmental Test of Visual Perception 1963 Standardization. Perceptual and Motor Skills, 1964, vol. 19, pp. 463-499.

GAMSKY, N.R. and LLOYD, F.W. A Longitudinal Study of Visual Perceptual Training and Reading Achievement. The Journal of Educational Research. July/Aug. 1971, vol. 64, no. 10, pp. 451-454.

GEORGAS, J.G. and PAPADOPOULOU, E. The Harris-Goodenough and the Developmental Form Sequence with 5 Year Old Greek Children. Perceptual and Motor Skills, 1968, vol. 26, pp. 352-354.

HALLAHAN, D.P., and KAUFFMANN, J.M. (1976). A Psycho-Behavioral Approach. Introduction to Learning Disabilities. Englewood Cliffs, New York: Prentice/Hall Inc.

HARTLAGE, L.C., and LUCAS, T.L. Differential Correlates of Bender-Gestalt and Beery Visual-Motor Integration Test for Black and White Children. Perceptual and Motor Skills, 1976, vol. 43, pp. 1 039-1 042.

HERBST, I., and BEUKES, R.B.I. Die Verryking van die Swart Kind se Visueel-Perceptuele Vermoe. S.A. Journal of Psychology, 1986, vol. 16, no. 3, pp. 98-103.

HUDSON, W. The Study of the Problem of Pictorial Depth Perception. International Journal of Psycholgy, 1967, vol. 2, pp. 89-107.

JOHNSON, D.J., and MYKLEBUST, H.R. (1967). Learning Disabilities, Educational Principles and Practices. New York: Grune and Stratton, 1967.

JORDAAN, W.J., JORDAAN, J.J., and NIEUWOUDT, J.M. (1975). General Psychology. Johannesburg: McGraw-Hill Book Company.

KAVALE, K. Meta-analysis of the Relationship Between Visual Perceptual Skills and Reading Achievement. Journal of Learning Disabilities, Jan. 1982, vol. 15, no. 1, pp. 42-51.

KEPHART, N.C. (1960). The Slow Learner in the Classroom. Ohio: Charles E. Merrill Publishing Company.

KLEIN, A.E. The Validity of the Beery Test of Visual Motor Integration in Predicting Achievement in Kindergarten, First and Second Grades. Educational and Psychological Measurement, 1978, vol. 38, pp. 457-461.

MARTIN, R., SEWELL, I., and MANNI, J. Effects of Race and Social Class on Preschool Performance on the Developmental Test of Visual Motor Integration. Psychology in the Schools, Oct. 1970, vol. 14, no. 4, pp. 466-470.

MEIER, J.H. (1976). Developmental and Learning Disabilities. Baltimore: University Park Press.

MORGAN, C.T. and KING, R.A. (1971). Introduction to Psychology. 4th ed. New York: McGraw Hill Book Company.

MUNDAY-CASTLE, A.C. Pictorial Depth Perception in Ghanaian Children, International Journal of Psychology, 1966, pp. 1 289-1 300.

NETER, J., and WASSERMANN, W. (1974). Applied Linear Statistical Models. Homewood, Illinois: Richard D. Irwin Inc.

PRYZWANSKY, W.B. The Use of the Developmental Test of Visual Motor Integration as a Group Screening Instrument. Psychology in the Schools, 1977, vol. 14, pp. 419-422.

SATZ, P., and FRIEL, J. Some Predictive Antecedents of Specific Reading Disability: A Preliminary 2 Year Follow-up. Journal of Learning Disabilities, Aug./Sept., 1974, vol. 7, no. 7, pp. 48-55.

SCHOOLER, D.L. and ANDERSON, R.L. Race Differences in the Developmental Test of Visual Motor Integration, the Slosson Intelligence Test, and the ABC Inventory. Psychology in the Schools, 1976, vol. 16, pp. 453-456.

SILVERSTEIN, A.B. Variance Components in the Development Test of Visual Perception. Perceptual and Motor Skills, 1965, vol. 20, pp. 973-976.

SMITH, D.A., and MARX, R.W. Some Cautions on the Use of the Frostig Test. Journal of Learning Disabilities, June/July 1972, vol. 5, no. 6, pp. 42-47.

SMITH, S.L. (1979). No Easy Answers. The Learning Disabled Child at Home and at School. New York: Bantam Books.

TEW, B. Some Doubts About the Frostig Test of Visual Perception. Remedial Education. 1976. vol. 11, pp. 32-35.

WEPMAN, J.M., MORENCY, A., and SEIDL, M. (1975). Visual Discrimination Test. Chicago: Language Research Associates, Inc.



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