

AN INVESTIGATION INTO THE SUITABILITY OF THE
NATIONAL BUREAU GROUP TEST FOR FIVE-AND-SIX-
YEAR-OLDS AS AN INSTRUMENT FOR MEASURING
SCHOOL READINESS AMONG A GROUP OF INDIAN
CHILDREN IN DURBAN.

by

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SPECIAL NOTE

In view of the instructions issued by the Human Sciences Research Council, it has not been possible to reproduce in this thesis items or sub-tests that appear in the National Bureau Group Test for Five-and-Six-Year-Olds. Information pertaining to this test may be obtained by writing to The Human Sciences Research Council, Private Bag 41, PRETORIA.

* * * * *

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DURBAN,

A. Ramphal

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CHAPTER ONE

THE PROBLEM OF SCHOOL READINESS

1. INTRODUCTION

The question of when children should begin formal schooling has challenged educators for many years and continues to be a problem for which there is no fully acceptable answer. ^(1,2)

As long ago as the seventeenth century, Comenius ⁽³⁾ expressed the view that nothing should be attempted with youth except that which was in keeping with their age and ability. Rousseau, ⁽⁴⁾ too, probably had the concept of readiness in mind when he suggested that the early education of a child should be deferred until the age of twelve.

Eventually, with the advent of state support for public education, there arose a need for laying down a fixed entrance age. The general view that seemed to prevail was that when a child had reached a certain chronological age, his level of achievement ("*prestatie-niveau*") would be such that he would be able to cope with the requirements of the formal school situation. ⁽⁵⁾ In America, according to Smith, ⁽⁶⁾ most states decided to give assistance to children at school from six years of age. During the 1920's, however, school authorities became greatly concerned about the large number of failures in the first grade. ⁽⁷⁾ A study of the problem indicated that not all six-year-old children were ready for what Gates ⁽⁸⁾ regards as "*the most important and the*

most/

most troublesome subject in the elementary-school curriculum", namely, reading. Studies were then undertaken to find out what factors contributed to reading readiness.

The publication of the Twenty-fourth Yearbook of the National Society for the Study of Education in 1925 increased interest in this field.⁽⁹⁾ It is believed that the first major experimental study of reading readiness was doctoral dissertation written by E.C. Deputy around 1930.⁽¹⁰⁾ Since then numerous experimental studies related to various aspects of readiness were carried out. Smith⁽¹¹⁾ points out that fourteen master and doctoral studies related to readiness were completed in 1937, fifteen in 1938, fourteen in 1939, and twelve in 1940. Since that time, however, only two or three academic studies on readiness have been reported each year. A similar trend is seen in published articles on reading readiness. Periodicals abounded with discussions on readiness topics from 1930 to 1940. Articles on this subject appear far less frequently in current literature.⁽¹²⁾

Recent research under Piaget's influence tends to show that children pass through decisive changes in their cognitive development in their fifth to seventh years. This period is generally characterised by a change from primarily associative learning and intuitive thought to the acquisition of concrete operational thought as revealed, for instance, in the concept of constancy. This finding, in Schmalohr's view⁽¹³⁾ would seem to justify the sending of children to school in their sixth year when they can cope with the teaching methods and the kinds of materials that are commonly used.

The lack of unanimity in regard to the optimum age of school entry, however, is reflected in the diversity of admission ages that exist in the different countries of the world today. In the United Kingdom, for instance, the age of admission is five,⁽¹⁴⁾ which is low when compared with most other countries. Most children in the United States go to school at the age of six or seven according to the State in which they happen to live.^(15,16) In the Netherlands,⁽¹⁷⁾ Norway,⁽¹⁸⁾ Sweden,⁽¹⁹⁾ and Denmark⁽²⁰⁾ they normally begin at the age of seven. It must be noted, however, that pre-primary classes exist in these countries.

The uncertainty as to when children are ready for formal schooling is revealed even further when one considers the fact that even within particular countries admission ages are often being changed from time to time. Sweden, for instance, has raised the entrance age to seven in the new nine-year comprehensive programme.⁽²¹⁾ In South Africa, the Transvaal Education Department ruled that from the beginning of 1967 no child was to be admitted to a provincial school unless he was due to attain at least six years of age on or before 30th June of the year in which he was brought to be admitted. The age of admission before 1967 was five years provided that the pupil turned six during the year in which he was brought for admission.⁽²²⁾ In explaining the reason for this change the Director of Education wrote:

"Research established the fact that pupils who are not school ready achieve lower than pupils of the same ability who enter school at a later stage. Therefore it can be assumed that all factors being equal, pupils who enter school at a younger age than five-and-a-half will achieve lower than those who enter school at five-and-a-half plus." (23)

In accordance with the provisions of the National Education Policy Act, No. 39 of 1967, the school entrance regulation that existed in the Transvaal became applicable to White children in the other three provinces as well from 1st January, 1970. (24)

A similar regulation exists for Indian schools in South Africa:

"No child may be admitted to school earlier than the year in which he attains the age of six years. A child who turns six years before 1st July during any year may be admitted to school only during January and February of that year. A child turning six on or after 1st July may be admitted to school only during January or February of the following year." (25)

Before proceeding any further, it is essential for us to have a clear understanding of what is meant by "school readiness". This will be discussed in the section that follows.

2. THE NATURE OF SCHOOL READINESS

2.1. Definition of School Readiness

A typical definition of school readiness is offered by Brenner. (26) He describes it as a stage of all-round development - physical, mental, emotional and social - at which a child can fulfil the demands of the school without undue difficulty. Seyfried, (27) in an Austrian study, expresses very much the same idea when he refers to school readiness as being that stage of a child's intellectual, emotional, social, and physical development when he becomes capable of taking part successfully in class instruction without overtaxing himself.

Readiness, say Townsend and Burke, ⁽²⁸⁾ is expressed in the child's "willingness to explore and discover, to learn to follow and be directed, yet still inquisitively develop his own way as he works with the assistance of others." For Haenen ⁽²⁹⁾ school readiness comes about when the child realises that he must grow up ("*groot-willen-worden*") and must accept the strictures and demands of the school.

From the foregoing, it is clear that school readiness involves more than reaching a certain state of biological maturation, i.e. neuro-anatomical and neuro-physiological development. It involves a disposition towards learning, including motivation. ⁽³⁰⁾ The school ready child *can* and *wants to* learn. This readiness, says Haenen, ⁽³¹⁾ occurs without pressure: it occurs as a result of the child's own volition. It is a state reached by a child when he is prepared to communicate and engage in dialogue ("*communicatie, ontmoeting en gesprek*") with his educators in order to explore the world. ⁽³²⁾ Such a child goes to school joyfully in order to learn with others, because there is now in the child, what Haenen calls "*lernlust*".

Readiness is a highly individual matter. ^(33,34) It is a function of development, and development in turn, proceeds at different rates in different individuals. ^(35,36) Whenever one considers any definition of readiness, therefore, it is important to specify what ground has already been covered by the child as well as the method of presenting the new subject matter. It becomes necessary, therefore, to ask: "*Ready (or not ready) for what? With what?*" ^(37,38) A child may be ready to "read"

a label on a piece of furniture, but not ready to read a story or evaluate a poem. The whole concept of readiness, as Gardner⁽³⁹⁾ says, should be related to the expectation of what kind of readiness (in his particular example, reading readiness) is required. Unless these objectives are clearly defined, the notion of readiness is vague and has little meaning.⁽⁴⁰⁾

Readiness, moreover, is a continuous process.⁽⁴¹⁾ Indeed, says Keliher,⁽⁴²⁾ it is "a lifetime matter". What a child brings to school is his readiness for present learning. It is the culmination of a very extensive and rapid period of learning throughout the preschool years.⁽⁴³⁾ What he learns today, the way he grows, and the things that happen to him in and out of school become his readiness for tomorrow's learning.⁽⁴⁴⁾

2.2. School Readiness versus School Maturity

The terms "school readiness" and "school maturity" cannot be used interchangeably. The latter is a more restricted term.⁽⁴⁵⁾ For this reason Haenen⁽⁴⁶⁾ draws a clear distinction between "schoolrijpheid" (school readiness) and "schoolbekwaamheid" (school maturity). "Schoolrijpheid" refers to the will to grow up and undertake the tasks imposed by the school. It is concerned with the child's *disposition* towards the acceptance of the school situation. "Schoolbekwaamheid", on the other hand, refers to a particular capability to achieve in relation to the concrete learning requirements of the first year at school. It is an important condition for school readiness and school readiness is a stage of development that includes school maturity.^(47,48)

Intellectual/

Intellectual stimulation, practice in social adaptability, the acquisition of a working attitude and school techniques such as the handling of a pencil and expression in language, are all conditions that bring about school readiness. School readiness concerns the total educational situation and means total school capability. (49)1.

School readiness manifests itself as a problem especially in countries where the school authorities provide only one date of entry each calendar year or where certain standards must be reached in a number of subjects at each class level before promotion to the next level is possible. (51)

2.3. The Unsuitability of Using Chronological Age as the Sole Criterion for Admission to the First Grade

Under the present system of using chronological age by itself as an entrance criterion, no account is taken of the fact that individuals grow, develop and mature at different rates and consequently differ in school readiness and differ in the capacity to learn when they begin formal lessons. (52)

Krech et al. (53) estimate that when a first-grade teacher meets her class of children, all about six years of age chronologically, she is in fact confronted with a group of pupils
who/

1. Hillebrand (50) uses the terms "*schulreife*" and "*schulfähigkeit*" to refer to "school readiness" and "school maturity" respectively. "*Schulreife*" has to do with the somato-psychic developmental stage (niveau) while "*schulfähigkeit*" refers to the "*Verfassung und Fähigkeiten*" (i.e. the psychological requirements) for carrying out the demands of the first year at school.

who differ in readiness from ages three to eleven. Yet they are all made to sit in the same room, are given essentially the same books and materials to use, and are expected to follow the same type of curriculum. In our educational system, they say, "*school is established: the child must fit the establishment*",⁽⁵⁴⁾ Garbers⁽⁵⁵⁾ and Wills⁽⁵⁶⁾ rightly criticise such a set-up being too rigid. Garbers suggests that in principle a school system should be flexible enough to absorb each child in an educationally sound manner. For this, the child's stage of development should be diagnosed and instruction should then be designed to harmonise with his own level of readiness.

Frandsen⁽⁵⁷⁾ warns that confronting a child who is not yet ready for school with tasks that are far beyond his capabilities is likely to lead to resistant behaviour as a result of lack of interest and failure to succeed. This may retard learning by creating feelings of inadequacy and dislike for the tasks. Bruner⁽⁵⁸⁾ also emphasises the futility of trying to teach a child by presenting "*formal explanations based on a logic that is distant from the child's manner of thinking and sterile in its implications for him*".

On the other hand, if the "*critical periods in learning*" hypothesis applies to human beings, care must be taken to guard against keeping learning experiences away from the child who has already attained the necessary level of maturation.^(59,60) Waiting too long might cause the child's interest to wane to such an extent that he would be unwilling to put forth the effort

needed/

needed later for successful learning. Also, as Harris⁽⁶¹⁾ has stressed, *"it is possible, indeed likely, that a person who comes late to his training will never realize the full measure of his potential"*. The teacher's task, therefore, becomes one of presenting each individual child with what for him are the right experiences at the right time. The problems she sets him must be of such a nature that they *"tempt him into the next stages of development"*.⁽⁶²⁾

Yet another factor that contributes to heterogeneity in readiness in Grade I is sheer chronological age difference. For example, under the existing regulations for Indian schools in South Africa, for instance, Child A who was born on 1st July, 1960 and was, therefore, just under the cut-off date the previous year will be almost a full year older, when he enters school, than Child B who was born on 30th June, 1960.⁽⁶³⁾ Hurlock⁽⁶⁴⁾ points out that in these early years development is rapid. A few months can, therefore, make a great deal of difference in physical and intellectual maturity, and thus affect what he is capable of learning.

Considerations such as these point to the need for some other entrance criterion which recognises the vastness of individual differences among children of more or less the same chronological age. Ilg and Ames⁽⁶⁵⁾ state the case most forcefully:

"Possibly the greatest single contribution which can be made toward guaranteeing that each child will get the most possible out of his school experience is to make certain that he starts that school experience at what is for him the "right" time. This should be the time when he is truly ready and not merely some time arbitrarily decided upon by custom or by the law."

Various investigations have made it clear that not all children who satisfy the uniform entry-age requirement are necessarily ready for school.

A recent study in Iowa⁽⁶⁶⁾ showed that 40% of the incoming pupils were inadequately prepared to cope with the rigours of formal schooling. Cooper⁽⁶⁷⁾ cites an investigation which was conducted by Ilg, Ames, and Apell. These workers aimed to find those children, who, after they had had kindergarten experience, were ready, questionable and not ready for the school grade placings corresponding to their chronological age. In a first study of 120 children, 46% showed readiness, 40% were questionable and 14% not ready. A later study, when judgment was "*more seasoned and less tentative*", showed 32% ready, 50% questionable and 18% not ready.

In South Africa, Coetzee⁽⁶⁸⁾ using the National Bureau Group Test for Five-and-Six-Year-Olds, studied the problem of school readiness among White children in the Durban and Pietermaritzburg areas. He found that 20% of those who attended school for the first time at the beginning of 1968 were not ready for the formal activities of the grade one class. A study in Holland⁽⁶⁹⁾ in 1960-1961 revealed that 11% of the children failed their first year at school. In 1967 the figures were lower, but not significantly so. Baar⁽⁷⁰⁾ indicated that, with the lifting of the minimum school entrance age in Austria by four months, the percentage of children not being ready for school, decreased from 24.3% to 6.4%.

Cognizance must be taken of Garber's observation⁽⁷¹⁾ that the research on the "*culturally deprived*" child "*has illuminated by implication the very intricate background and nature of the variations in the levels of maturity of children at school entrance*". Kephart⁽⁷²⁾ notes that when the environment is inadequate, the child will enter school with a lesser degree of skill and ability in one or more areas than the educational curriculum assumes. Deutsch⁽⁷³⁾ expresses similar sentiments. When the lower-class child gets into first grade, he says, his cognitive, sensory and language skills are often insufficiently developed to cope with what for him are the complex and confusing stimuli offered by the school. These children, he emphasizes, are simply less prepared to meet the demands of the school and the classroom situation than their middle-class colleagues for whom the school is, in many respects, an extension of the home.⁽⁷⁴⁾ Yet both sets of children, under our present educational system, "*are asked to climb the same mountain*"⁽⁷⁵⁾ purely because they happen to turn six years of age before 1st July during the year in which they were admitted to school! Once again, the unsuitability of using chronological age as the sole criterion for admission to Class I is revealed.

2.4. Readiness - Cues and Clues

In general, children displaying a greater number of the following characteristics will probably be ready to cope with the demands of the school situation: good physical health; sufficient physical and mental maturity to enable him to observe and listen

attentively/

attentively for more than a few minutes at a time; ability to recognise similarities and differences among persons, objects, colours, forms, sounds, numbers, and symbols; an adequate vocabulary so that he can share experiences, describe objects and events, and telling stories; reasonable facility in the use of common classroom equipment and materials, such as paper, pencils, crayons, scissors, clay, and so on; ability to participate in co-operative play and group activities and adequate independence from home and parents. (76,77,78,79,80,81) Children entering first grade vary enormously in the degree to which they have perfected these skills at home. (82)

2.5. Assessing School Readiness

In view of the complexity of the factors related to school readiness, writers such as Thompson⁽⁸³⁾ and Cooper⁽⁸⁴⁾ suggest a multiple-testing approach when assessing children. These scales include among others, tests of intelligence, emotional maturity, social maturity, and motor abilities. For an accurate evaluation, each child would have to be interviewed and tested individually.

To implement a programme of this type for all prospective entrants, however, would be difficult in view of the large numbers involved. Of particular relevance to the present study is the Indian situation. On the first Tuesday of June, 1968, there were 15 760 children in Class I in Indian schools in South Africa.⁽⁸⁵⁾ The implications of the individual testing programme becomes even more formidable when one realises that Asiatics as a race group

comprise/

comprise only 477 047 of South Africa's total population of 15 994 181.⁽⁸⁶⁾ The high costs involved, the shortage of trained personnel, and the considerable amount of time required, are some of the factors that need to be taken into account.

A more practical approach at the present time would be to use some kind of rough screening device such as a group school readiness test, preparatory to an individual examination of those children who have failed to gain a satisfactory score. A typical test of this type includes, among others, items involving visual and auditory discrimination, motor control, verbal comprehension, vocabulary, and quantitative concepts. Several group school readiness tests exist overseas. Some of the better-known German and Austrian ones include the Kettwig School Readiness Test,⁽⁸⁷⁾ the Frankfurt School Readiness Test, the Vienna School Readiness Test and the Munich School Readiness Test.⁽⁸⁸⁾ The Metropolitan Readiness Test⁽⁸⁹⁾ is a well-known American test.

In South Africa, the Human Sciences Research Council (formerly the National Bureau of Educational and Social Research) has standardised the National Bureau Group Test for use with five-and-six-year-old and another for seven-and-eight-year-old White children.⁽⁹⁰⁾ In 1968 a Group Test for Bantu Pupils (Sub. A and B) was prepared for assessing school readiness.⁽⁹¹⁾

3. THE PRESENT INVESTIGATION

3.1 Motivation

Until recently any question of school readiness, as far as Indian education in this country was concerned, was overshadowed by a problem of much greater magnitude, namely the elemental problem of school accommodation. In 1952, it was estimated that the number of Indian children for whom no school accommodation was available exceeded 37 000. By 1963 this number was still over 30 000.⁽⁹²⁾ According to the Director's Report of 1969, however, definite improvement was noted with regard to this problem.⁽⁹³⁾ As a result most children now begin school at more or less the same age chronologically, namely, at five-and-a-half and six years.⁽⁹⁴⁾

This situation has brought into prominence a question that hitherto had been in the background: Are all those children who are admitted to school for the first time ready to benefit from formal education? Investigations by Roth,⁽⁹⁵⁾ Baar,⁽⁹⁶⁾ Coetzee,⁽⁹⁷⁾ Ilg, Ames and Apell⁽⁹⁸⁾ indicate that this is not so. The work of Coetzee is particularly relevant to the present research. Using the N.B.G.T. for Five-and-Six-Year-Olds as one of his main instruments, he studied the problem of school readiness among White children in the Durban and Pietermaritzburg areas. He found that 20% of those who attended school for the first time at the beginning of 1968 were not ready for the formal activities of the grade one class. There is no reason to believe that this should not also be true of Indian children in

South Africa. Indeed, it seems reasonable to expect that, in view of the socio-economic and cultural factors peculiar to the Indian community, the percentage of entrants who are not ready for formal instruction in Class I will be higher than is the case among White children.¹ A test which can be used to differentiate between those children who are ready for school and those who are not would be invaluable and would go a long way towards giving children a favourable start in their school careers.

3.2. General Aims of the Present Investigation

- (a) The present investigation was primarily intended to serve as a preliminary study to ascertain whether there was any test already in existence in South Africa which was entirely suitable as a test of school/

1. A significant finding made by the Department of Economics, University of Natal, and which has direct relevance to the present study is the fact that approximately 50-60% of the households in their sample had incomes below the cost of living minimum and approximately 30-40% of the households had incomes above the minimum. (99)

In his address delivered at the conference of the South African Indian Teachers' Association in 1969, the principal social welfare officer in Natal of the South African National Council for Child Welfare described the situation in these terms: "If a pyramid were constructed from all the existing sources of information depicting the economic status of the total Indian population in this country, such a pyramid would have a base that is disproportionately broad in relation to its middle and upper reaches. Poor economic status is one dominant feature characterising the major proportion of the Indian people, and consequently, the Indian child in its home and the educational setting." (100)

school readiness with Indian children.

If there were no such test, the question would arise as to whether an existing test could be modified to make it suitable for use with Indian children? Or would a completely new test be indicated?

(b) As a secondary though intimately related matter, it was decided to discover to what extent factors such as

(i) schooling,

(ii) socio-economic status and

(iii) sex

affect an Indian's child's readiness for formal schooling.

The problems were investigated in the order in which they have been listed above.

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CHAPTER TWOSCHOOL READINESS : RELATED FACTORS AND
TECHNIQUES OF MEASUREMENT1. INTRODUCTION

When the child enters the regular primary school for the first time, he takes a new step in his life. Whereas previously he associated more with his parents and siblings (and if he went to a nursery school with a small group of playmates from the neighbourhood), he is now introduced to wider relationships outside the home circle. His world expands and becomes more complex. He has to become accustomed to being away from his family, his pets and his play things for a considerable part of each day. He has to learn to get along without his mother's personal attention to all his needs and problems. Moreover, he is expected to conform to a group pattern imposed by a teacher who is not able to give each child in her class the kind of individual attention he received from his mother at home. The child thus finds himself in a situation where uniform behaviour is expected and restrictions are placed on his speech and movements. The child goes through what Langeveld calls "*Umbildungen*" to "*Neubildungen*". (1)

Some children adapt to these new conditions imposed by the start of formal education, whereas others experience difficulty. (2)
How can these differences be explained? In order to gain some insight/

insight into this problem, it will be necessary to examine the basic criteria that help a child to make a satisfactory beginning in the formal school situation.

2. FACTORS RELATED TO SCHOOL READINESS

Various research workers^(3,4,5,6,7) in the field of school readiness have suggested different sets of criteria by which the readiness of a child for schooling can be recognized in practice. These lists generally include the following:

- 2.1. General physical development, including the adequate functioning of the eyes, ears, and limbs.
- 2.2. Intellectual development, frequently stated in terms of mental age.
- 2.3. The development of powers of visual and auditory discrimination.
- 2.4. Social and emotional maturity.
- 2.5. Experiential background, including the cultural and linguistic background of the home.

These factors are of a very complex nature and are often so involved and interwoven that it is very difficult to determine what single factor or group of factors can be regarded as being the most important.^(8,9)

In the discussion that follows, however, some of the more important factors will, for the sake of convenience, be dealt with separately.

2.1. Physical Factors

2.1.1. Motor skills:

The muscles of the hands and wrists should be sufficiently developed to control the child's handling of pencils and crayons at school, and the holding of books and turning of pages. Moreover, as Kephart⁽¹⁰⁾ notes, it is important that a child should have such control of the eyes, that he is able to accurately match the eye movements and the perceived visual stimulus; furthermore, that an adequate interrelationship between the movement of the eyes and the movements of other muscle groups in the body should exist. When drawing a square for example, the child must use his eyes to gauge the outline of the figure and then translate the various eye movements into a series of hand movements into a series of hand movements that will give him a result in the visual field that matches what he is copying. He should also be able to cut along a line with the aid of a pair of scissors and should have had experience in colouring in pictures. (11)

2.1.2. General health:

Physical vitality and reasonably normal health are necessary for good progress at school. If a Grade I child is physically below par, he will obviously be at a disadvantage in meeting the demands of the school situation. Tiredness and listlessness affect his span of attention, his interest and the amount of effort he makes. (12,13) As a result, he will have difficulty in making progress in his schoolwork.

It must also be remembered that good health will help the child to resist illness thereby reducing the possibilities of absence from school. (14) In Durell's opinion loss of school time during the first year is one of the commonest causes of reading difficulty. He believes that at no other time in school is long absence so disastrous. (15)

2.1.3. Vision:

The physical defects which most frequently interfere with early instruction in school are poor vision and poor hearing. (16,17,18) Impairment of the other senses has not been demonstrated to be a serious problem in learning academic skills. (19)

According to Monroe, (20) 23% of children who develop reading disabilities are visually handicapped

and/

and 52%, aurally. This does not necessarily mean that such children are all suffering from serious defects of sight or hearing; rather, it is likely that many have not learnt to make proper use of these senses.

Visual mechanism immaturity is one factor which can be responsible for ocular difficulty.⁽²¹⁾ Smith⁽²²⁾ points out that some authorities feel that, at first grade level, the muscles and nerves of the eyes are still immature. Only gradually do the child's eyes mature sufficiently for him to maintain them in focus at the distance required for reading. Nemir⁽²³⁾ estimates that almost 80% of children are born with hyperopia (farsightedness). In this regard Gray⁽²⁴⁾ comments:

"At birth the eye is only one-third of its adult size. Such under-development prevents perfect focus on the retina. While infantile farsightedness decreases gradually with the growth and lengthening of the eyeball, some children do not develop the ability to focus on objects at close range until they are seven or eight years old."

The majority of first-grade children, according to Betts⁽²⁵⁾ are farsighted but they tend to outgrow this condition as they grow older. This view is substantiated by Park and Burri⁽²⁶⁾ who found that the percentage of children with vision below 20/20 declined from approximately 50% in the pre-reading

stages to about between 20% to 35% in the early elementary and junior high school period.

Important also is the child's ability to make his eyes work together so that as both focus they send a clear single fused image to the brain. (27)

Reading English or Afrikaans requires a series of left-to-right eye movements across the page and an eye sweep back to the beginning of each new line. This ability must be sufficiently mastered if the child is to succeed in the complicated process of learning to read. (28,29,30)

2.1.4. Hearing:

Auditory processes play an important part in the activities related to the learning process. It is essential that when pupils are admitted to school, their aural ability should be sufficiently developed so that they are able to notice whether words are similar or different; to analyse words phonetically; and to detect rhyme words and distinguish between them. (31,32)

A child who does not have normal hearing will be denied the opportunity of receiving a clear presentation of sounds. This will probably make it difficult for him to associate spoken words with

visible/

visible forms and to follow oral lessons, explanations and instructions. In addition, he will lack the stimulus of the heard word to promote his own speech and may not relate his own speech to the pronunciation of others. As a result he will lack an auditory check on his own utterance and may therefore be prone to mispronunciations. (33)

Limited auditory experiences may also narrow the background of information and may increase the child's communication hazards in the classroom. (34) Gates (35) points out that even if he does not suffer seriously by the mere loss of what he fails to hear, he may be subject to emotional tensions resulting from mistakes in his comments.

2.2. Intellectual Factors

Certain intellectual factors, such as the capacity to think, to reason, to learn, to observe, to remember, to follow directions, and to deal with ideas on a six-year level of understanding, have a marked bearing on learning in the first grade. (36) If the child's maturation in these mental traits is below the average for his age, he will be slow to notice the features of things and to perceive the relationship between things in his experience. He will therefore be poorer in the process of developing percepts, concepts and general ideas which underlie a great deal of schoolwork, especially in language and number. (37)

It is important at this point to distinguish clearly between the processes of perception (which as Stones⁽³⁸⁾ says, is one of the most important elements in concept formation) and conceptualisation. Behr⁽³⁹⁾ explains that the sensations which our senses receive are subjected to some system of coding, i.e., selection and organisation, in the receiving areas of the central nervous system, and as a result perceptions are formed. It is through perception that one is able to identify colours, positions in space, shapes and forms. An individual's perception of an object is determined by his previous experience and learning.

By contrast, *"conceptualisation is an abstracting, generalizing, and categorizing process based upon sense perception."*⁽⁴⁰⁾ A concept is formed as a result of the perception of certain common properties or attributes of related objects, materials or phenomena.⁽⁴¹⁾ Concepts develop gradually and their formation depends on the type of experience to which the child is exposed.⁽⁴²⁾ Moreover, the level of a child's linguistic attainment will determine how well he will form and grasp concepts.⁽⁴³⁾ In this regard, Hurlock⁽⁴⁴⁾ observes that since children from lower socio-economic groups have, on the whole, more limited and less accurate vocabularies than children from higher socio-economic groups, the concepts developed by these children will be different.

The percepts of a very young child are simple. With maturation and the addition of continuing experience these percepts take on more and more new meanings.⁽⁴⁵⁾ Gesell⁽⁴⁶⁾ shows how the child in his early copying behaviour reveals with pencil and paper how he is differentiating details one at a time out of a formless mass. Thus, when he attempts to copy a square, the three-year-old makes roughly circular marks which may or may not close. At four years, he may draw a circle or may produce a roughly circular form, one side of which is straight, like a D. He may also execute one corner correctly, the remainder of the form being vague. At five years, he may draw three corners adequately, and at six years his square has four adequate sides and four adequate corners. He has been identifying and differentiating the details of the form little by little out of what was initially a vague mass.

Behr⁽⁴⁷⁾ points out that an interesting aspect of the perception of young children is the indifference which they attach to orientation. This is of importance when it comes to recognising letters. Children under six tend to confuse inverted letters (for example, b with p, q with d, or n with u) and reversed letters (for example, b with d or p with q). Davidson⁽⁴⁸⁾ has shown that the ability to discriminate adequately depends to some extent on mental age. Other errors which young children make include reversal errors and the lack of attention to the order of the letters in a word.

Concepts are important for comprehension in reading, since there can be no reading without meanings. (49)

There are many words which do not refer directly to particular things - words such as "metal", "tools", "transport" each refer to a *class* of different things. Other words are even further removed from the concrete and actual - words such as "honest", "truthful", "more", "less", "equal". Everyday speech and reading books which are used in schools are full of words which stand for concepts which are built up as the result of the processes of abstracting, classifying and generalizing. The less intelligent child finds this kind of thinking difficult. (50)

Piaget has studied the development of thought and the process of concept formation in children over a long period. The main stages of intellectual development in the child as Piaget sees it will now be considered. (51,52)

- (1) The sensori-motor stage. During this stage (from birth to two years) the child has not yet acquired language and can only perform motor actions. It is the stage at which the child develops his senses, and solves simple sensori-motor problems.
- (2) The pre-logical or pre-operational stage. At this stage (which lasts from about the age of two to four years) the child uses language to express thought, but his reasoning is transductive and is arrived at by direct analogy. The inaccuracies

of his concepts can often be detected in his errors in using words - for example, when he says "dog" for any four-footed animal, or calls "Dadda" after any man, or says "two" when he means any amount more than one.

- (3) The stage of intuitive thought. At this stage (from about four to seven years of age) children first start school. Here they begin to acquire the basic skills and effective communication. Piaget's work has suggested that these basic skills may be more complex than was originally thought. At this age children are introduced to such concepts as number, mass, length, height. Teachers sometimes take for granted children's grasp of spatial relationships. The idea of causality is so much part of the nature of adults that they rarely imagine that children may not have the same view of the world. Yet this, says Stones, ⁽⁵³⁾ is what seems to be the case at this stage. Children assess quantities on their most obvious perceptual appearances, not on the more complex qualities that adults use. For example, two sticks of equal length will be accepted as equal so long as they are parallel in line. If one is moved forward of the other the child will now say that one is the longer. Similarly a child will agree that two identical glasses filled

to the same level contain the same amount of liquid. If the liquid from one glass is now poured into a tall narrower glass, he will say that there is more liquid in the taller glass. This implies lack of *conservation*. The child does not see that although the outward form may have changed, the quantities involved are the same (i.e., they are conserved).

It is only when the child has discovered for himself the concepts of equivalence, conservation and reversibility that the teaching of arithmetic can be profitably undertaken.

It is at this stage, too, especially between the age of four and five years, that children use words in a much more restricted sense than adults do. The word "*dog*", for example, is used to label a particular dog and not necessarily dogs in general.

- (4) The stage of concrete operations. It is at this stage (roughly from seven to eleven years of age) that the concepts of equivalence, conservation and reversibility become firmly established. During this stage the child begins to make simple classifications - to put things together that are alike, or to put things in order - for example, he can make a series from shortest to longest or lightest to heaviest, and can begin to think about relationships between/

between number groups. These thought operations are concrete operations and apply only to the perceivable world of objects and events.

- (5) The stage of formal operational thought. This type of thought begins to develop during the eleventh or twelfth year when the child can think and reason in the abstract. In the case of some children this final stage is only reached at a later age or not at all. This is why formal logic and mathematical deduction is incomprehensible to some children.

The general outcome of Piaget's work suggests that what is so often accepted as thinking - the recognition of relationships, the association of ideas, the capacity to see the point, the ability to solve problems, the ability to make a sound judgment - are in reality the end-products of thinking. (54) The notions of space, time, mass and so forth are not innate, intuitive capacities, but are built up bit by bit, first slowly through the sensory and motor activities of early infancy, and then more quickly through social intercourse and language. (55)

Retardation in cognitive development may occur because opportunities to learn are not readily available. (56,57) According to Deutsch (58) a child who has been deprived of stimuli to which he is maturationally capable of responding is likely to be deficient in the equipment required for learning. Support for this is found in Hunt (59) who, in
discussing/

discussing Piaget's developmental theories, states,

"...the more new things a child has seen and the more he has heard, the more things he is interested in seeing and hearing. Moreover, the more variation in reality with which he has coped, the greater is his capacity for coping."

Hunt⁽⁶⁰⁾ believes that the failure to provide young children with the kinds of stimulation that are likely to result in the development of intelligence may be especially important during the preschool years, when the child's intelligence is rapidly developing on the basis of a wide variety of stimuli to his senses of sight, hearing, and feeling. He suggests that children from deprived environments do not get much opportunity to explore their surroundings nor do they get a variety of play things which help to expand their preverbal intelligence.

Bloom⁽⁶¹⁾ estimates that the long-term over-all effect of living in a culturally deprived as against a culturally enriched environment is about 20 IQ points. This difference is spaced as follows: from birth to four years of age, 10 IQ units; from four to eight years of age, 6 IQ units; from eight to seventeen, 4 IQ units. According to these figures, environmental factors that affect IQ have their greatest impact during the preschool years. As a result when a child from a low socio-economic home enters school, he has already fallen so far behind that the stage is set, not for learning, but for frustration.

A well-known study of the effect of a restricted environment is Gordon's study of intellectual growth of
English/

English children. ⁽⁶²⁾ He found that children who lived on canal boats, and who attended school only one or two days a month, showed a decline in IQ between the ages of four and fourteen. This phenomenon, says Lindgren, ⁽⁶³⁾ was due not so much to a loss of intellectual ability as it was to the fact that their rate of intellectual growth was retarded. The older children had no doubt developed skills well-suited to their particular canal-boat environment but their lack of schooling and other cultural experiences had limited the development of abstract and verbal concepts which were sampled by the Stanford-Binet test. ⁽⁶⁴⁾ There is similarity here with culturally disadvantaged children who have a meagre environmental basis for developing cognitive skills. Such children are often unprepared to cope with the formal intellectual and learning demands of school. ⁽⁶⁵⁾

Nel ⁽⁶⁶⁾ gives a good overview of some of the more important intellectual preconditions which characterise a child who is ready for school:

- (i) His memory - and, therefore, his retention and reproduction ability - has developed sufficiently so that:
 - (a) He can repeat sentences correctly - first shorter then longer ones.
 - (b) He can repeat stories correctly.
 - (c) He can carry out instructions in a sequence.

(ii)./....

- (ii) His ability to think in the abstract has reached the stage where:
- (a) He starts to discover rules.
 - (b) He starts to form ideas on a higher level.
 - (c) He sees that one thing depends on another.
- (iii) His ability to handle simple ideas has improved to such an extent that:
- (a) He is able to notice differences and starts comparing.
 - (b) He can sort out similar objects.
 - (c) He can define objects by giving their uses.
He may, for instance, describe a knife as *"something with which you cut."*
- (iv) He begins to interpret pictures. Behr⁽⁶⁷⁾ expresses a similar view when he suggests that the preschool child should have advanced well beyond the stage of merely identifying and enumerating single items in a picture. He should be capable of saying, *"This is a man reading a book"*, and not merely, *"This is a man."*

A majority of the investigators who have studied the relationship between mental maturity and success in beginning reading - *"a tool, the mastery of which is essential to the learning of nearly every other school subject"*⁽⁶⁸⁾ - agree that mental age is of great importance for success in beginning reading.⁽⁶⁹⁾ However, there is no agreement as to what specific mental age is necessary before a pupil will be able to read successfully.

In one of the earlier studies Morphett and Washburne⁽⁷⁰⁾ found that among the first grade children studied, 84 per cent of the pupils with a mental age above 6,5 and 91 per cent of those with a mental age above 7,0 were rated as successful readers. It appeared that children with mental ages between 6,5 and 7,0 years profited most from the initial reading instruction. Since then many writers have stated that there is a minimum mental age necessary for success in first grade reading. Some have placed the lower limit at a mental age of six years, some at six-and-a-half, some at seven years.

Certain authorities have questioned these attempts at laying down some specified mental age as the critical level for beginning reading. They feel that the mental age necessary for a pupil to learn to read under one programme or with methods employed by one teacher may be entirely different from the mental age necessary for a pupil to learn to read under other and different circumstances.

One of these studies, conducted by Gates,⁽⁷¹⁾ is especially interesting. He made a study of four different groups who were taught by different methods and materials. It was found that in one group, a mental age of five years was sufficient; in a second group, it was a half-year higher; the third group required a mental age of about six years; in the fourth group, children with a mental age of 6 years 5 months fared none too well, and even some of those with mental ages of 7 years or above had difficulty. Gates concluded that

"statements/

"statements concerning necessary mental age at which a pupil can be entrusted to learn to read are essentially meaningless."

In general, the teacher would be right "by and large" to expect that those pupils with high IQ's would make better progress in reading. (72,73,74)

However, Harrison⁽⁷⁵⁾ warns that it should never be assumed that a high IQ will necessarily ensure reading success. Studies have shown that many bright children are not reading as well as they should and that a number of them are seriously failing. (76,77) The implication of such studies is that other factors at times tend to overshadow intelligence in determining a child's readiness to read.

2.3 Visual and Auditory Discrimination

2.3.1 Visual perception

Reading demands the ability to distinguish between very small differences (u, n, h; l, t, f; and b, p, d, q) and between similar word patterns (went, want; big, dig). (78) Without the ability to discriminate accurately, recognition would hardly be possible. (79) Tansley and Gulliford⁽⁸⁰⁾ also regard visual perception and discrimination as being vital elements to consider for, as they point out, until these are sufficiently developed and refined so that the child can see likenesses and differences in shapes, letters and words, the beginning of reading may need to be delayed.

A child who is ready for reading in respect of visual perception is able to copy accurately, to distinguish one letter from another, to overcome the vexation of letters similar in appearance, and to match pictures and forms at a simple level. (81,82)

2.3.2 Auditory Perception

A high level of auditory discrimination is one of the most important requirements of learning to read. (83,84) If this ability is not sufficiently developed, the child may confuse sounds made by similar words, for example, set and sat, three and tree, ball and bell. (85) Durell and Murphy (86) found that almost every child who came to their reading clinic at Boston University with a reading achievement below first grade had a marked inability to discriminate sounds in words. Such mistakes can occur even though hearing may be quite adequate. (87)

Another important requirement in Harrison's (88) opinion, is that the child's "auditory span" should have reached a level whereby he is able to carry in mind a fairly complex sentence and to reproduce it orally without any errors, such as the substitution of words, reversals of words, confusion and reversal of the various portions of a sentence, or omissions.

Thackray (89) found that among a group of 182 infant school children in their second term at school (average age 5 years 4 months), reading age correlated more highly with tests of auditory and visual discrimination (0,53 and 0,50 respectively/

respectively) than it did with general ability (0,47), home environment (0,42) and emotional and personal attitudes (0,10 - 0,36). This evidence tends to confirm that an adequate level of auditory and visual discrimination must be available before reading is possible. (90)

2.4 Emotional and Social Factors

In order successfully to accomplish the tasks that he will encounter in the formal school situation, a child will need to have the qualities of persistence, concentration, self-reliance and independence. Tansley and Gulliford⁽⁹¹⁾ point out that these depend partly on a child's feeling of security and his relationship with the teacher.

According to psychoanalytic theory, the foundations of psychological stability are laid in infancy through good relationships within the family. Later mental health and stability acquired within the matrix of the family manifests itself outside in the manner in which the child adapts himself in his relationships with other adults and children. (92,93)

Lack of love and affection within the family circle, may cause a child to lack self-confidence and to be distrustful of others. This handicaps the child at school since learning in the classroom takes place in a group situation. (94)

According to Behr,⁽⁹⁵⁾ problems of social and emotional maladjustment are exhibited as nervous tension, anxiety, antagonism towards learning, malingering, antisocial behaviour, irresponsibility, chronic fear of failure, undue dependence upon approval, inadequate self-concept, and so on.

The/

The child who is emotionally secure is at an advantage since he is free to devote his attention to the job at hand.⁽⁹⁶⁾ He quickly learns to merge his own personality with the group and to share the teacher's attention with other children.^(97,98) Although he may transfer his feelings for his mother to his teacher, he accepts the fact that she cannot reciprocate in a similar manner. He thus learns to adapt himself to a far more impersonal situation without feeling rejected. A child who has been overdependent on his mother, on the other hand, may interpret the teacher's relative impersonality as "not loving".⁽⁹⁹⁾ He will probably find it difficult to tolerate separation from his parents and may feel lost in a crowd of strangers.⁽¹⁰⁰⁾

Several other characteristics - mentioned by different writers such as Russel,⁽¹⁰¹⁾ Nel,⁽¹⁰²⁾ Garbers,⁽¹⁰³⁾ Brenner,⁽¹⁰⁴⁾ and Haenen,⁽¹⁰⁵⁾ enable an observer to identify a child who is emotionally and socially ready for school. Such a child displays the following characteristics:

- (a) He is curious and wants to know more about the world around him.
- (b) He is able to feed himself, dress on his own with a minimum of help, and attend to his toilet needs. These activities give him a feeling of independence and a sense of mastery that will help him when he is faced with the newness of school.
- (c) He is able to repress his own impulses, such as the urge to talk and move about the classroom freely.

He is able to give voluntary attention when this is desired or asked for.

- (d) He has sufficient "maturity for work" ("werkreife"). He is able to tackle a particular task with a plan in mind. He should also be able to concentrate on it for a reasonable length of time, to persevere, and to have some degree of self-criticism.
- (e) He is able to accept school discipline and to abide by the class routine and routine and regulations. In general, he is able to fulfil the demands of the formal learning situation.
- (f) He is able to play creatively and to use his imagination.
- (g) He is able to share his toys, control his emotions, and to participate in co-operative play.
- (h) He has developed the correct attitude towards his own property as well as that of others.

2.5 Experiential Background

The general cultural level of a child's home is an important factor in determining the adequacy of his background of knowledge and experience and, therefore, his readiness for school. (106,107) Homes rich in cultural atmosphere provide children with definite preschool advantages over children whose home influences are barren of cultural background. In a very general way, this division follows socio-economic lines, the number of retarded and disadvantaged children being relatively greater in the lower than in the middle socio-economic group. (108)

By/



By and large, children who come from middle-class homes are surrounded by adults whose language and vocabulary are good and they tend to develop the same kind of speech; they have the opportunity of undertaking trips and excursions which provide them with broadening experiences; they have access to an abundance of books and magazines with bright and attractive pictures; their parents read stories to them and encourage them in their initial reading interests; they are supplied with educational toys which provide mediums of matching, constructing and experimenting; and they come in contact with visitors who have interesting things to tell and show, ^(109,110,111,112) These children, moreover, are likely to have the importance of school impressed upon them from an early age. ⁽¹¹³⁾ As most schools are oriented to the needs, interests and values of the middle-class there are hardly any incongruities between their home and school experiences. ^(114,115,116) This enables the, children to adjust to their first school experiences. ⁽¹¹⁷⁾

Children from underprivileged environments on the other hand, tend to come to school with a qualitatively different preparation. Although they may be well-equipped with the techniques for meeting their needs in an economically poor community, these skills generally are not the ones which are required for success in the formal school situation. ⁽¹¹⁹⁾ Since birth they have lived in a socio-economic group which differs in codes of behaviour, patterns of language and modes of living from the middle-class group. As a result, when lower-class children enter school, they often step into a "subcultural realm" that is quite foreign to them. The lack
of/

of continuity between their training at home and the demands made by the school add to their problems of settling down when they enter Class I. (120,121)

Deutsch⁽¹²²⁾ makes a number of interesting observations related to the disadvantaged child's learning environment. He sees the home as being disorganised, overcrowded and generally lacking in many of the conditions associated with the development of school readiness.

Visual stimuli, he says, are generally of a limited range. (123) For instance, there are hardly any pictures on the walls and the objects in the home - such as toys and utensils - tend to be few in number, repetitious, and lacking in form and colour variations. It is possible that a child brought up in this type of environment, because of inadequate training and stimulation, may not have developed to the required level those skills, such as form discrimination and visual spatial organisation, which are so necessary for success in reading.

With respect to the development of auditory discrimination skills, Deutsch⁽¹²⁴⁾ notes that while the lower-class home is a noisy one, the noise is, for the most part, meaningless to the child - for him, most of it becomes background noise. Deutsch suggests that like most of us, the lower-class child has learned to tune out distracting noise in the environment. The difference is, however, that he probably continues to tune out in the classroom - the very place where he should be

narrowing/

narrowing and focusing his attention on what the teacher is saying. In studies at the Institute for Developmental Studies at New York University, Deutsch and his associates found significant differences in auditory discrimination between middle-class and lower-class children in the first grade. (125)

Of all the environmental factors differentiating the lower- from the middle-class child, language seems to be the most important as far as learning is concerned. (126) It is generally agreed that there is a close link between language and thought, particularly the kind of abstract thought that our educational system demands. (128, 129, 130) When language development is retarded it usually results in some form of intellectual deficiency. (132) Luria, (133) for instance, found that a pair of twins brought up with little contact with adults, developed a form of speech in which words had virtually no symbolic content. They merely acted as signals. This very primitive speech resulted in a low level of mental development. However, marked changes appeared when the children's speech became normal through their being separated and placed in nursery schools where they had to communicate using accepted forms of speech. The implication that underlies this study is that the teacher can intervene to improve the language and thereby improve the intellectual life of the child. (134)

Investigations carried out by Bernstein, (135) the British educational sociologist, have complemented the work of Luria and/

and his co-workers. Whereas Luria was concerned with younger children, Bernstein examined similar processes in older children.

Bernstein describes two types of language: restricted and elaborate. Working-class speech, according to Bernstein, is characterised by a restricted style that is stereotyped and condensed. Sentences are short, dependent clauses are few, vocabulary is small, and gesture is commonly used in addition to or in place of speech. Moreover, this type of speech lacks in precision and is composed of cliches that are readily understood by the listener. The elaborate code, used by the better-educated middle-class, is more specific, precise, individualised, and flexible. Since children tend largely to internalise the spoken language of their home environment, especially that of their parents, the lower-class child comes to acquire an inferior set of verbal techniques to apply to his own learning at school. (136)

While the middle-class child has merely to develop his linguistic skills, the lower-class child has to change them. This makes it very difficult for the latter to schematize the learning which the teacher expects him to make since it is presented to him in the elaborate code, and form of speech which is unfamiliar to him. Consequently, the learning of these children will tend to be mechanical. (137) They may be able to produce the correct answers but these answers do not emerge from an understanding of the basic concepts involved. Rather, they are "surface responses mechanically acquired, rootless and short-lived." (138)

Some writers point out that the stress that is placed on the transmission of an elaborated code and on the moral code associated with the middle-class may be interpreted by the lower-class child as a rejection of his own background. The teacher does not understand him nor does he understand the teacher. The child is bewildered, his self-respect is damaged and thus begins "the alienating process in the direction of the apathetic and disgruntled fifth grader."⁽¹³⁹⁾

Another area in which the lower-class child lacks pre-school orientation is the ability to use the adult as a source of information and correction.⁽¹⁴⁰⁾ Whereas middle-class children are generally brought up in homes in which conversation, reasoning, questioning and explaining are continually going on, Lower-class children do not often enjoy these advantages.⁽¹⁴¹⁾ Their parents, tired from long hours of hard work away from home and burdened with the problems which stem from poverty, have little time to spend with their children. They are too preoccupied with the business of just living and surviving. As a result, communication tends to be brief, to the point, and frequently restricted to situations demanding direction and correction.⁽¹⁴²⁾ There is hardly any patience with childish talk and questions. The child who is passive is considered to be the good child.⁽¹⁴³⁾ In the child's formation of concepts of the world, the ability to formulate questions is an essential step in data-gathering. If questions are not encouraged or if they are not responded to, this function does not mature.⁽¹⁴⁴⁾ Such a child will be handicapped at school/

school for, if he is not prepared to demand clarification, he will find himself falling behind more and more. Failure will become frequent and this in turn will cause motivation to decrease and the school to lose its effectiveness.

Also related to the question of motivation is the extent of parental interest shown in a child's school work. Behr⁽¹⁴⁵⁾ points out that where parents neither praise success nor deplore failure, the children are not likely to develop much intrinsic motivation for learning. Indeed, the situation becomes even more alarming when one considers the fact that many parents, especially in the lower-income groups, and particularly if they themselves have experienced school failure, view schools as "hostile and forbidding institutions".⁽¹⁴⁶⁾

3. School Readiness Tests

3.1 Purpose of School Readiness Tests

Readiness tests are designed to determine how well an individual will profit from some subsequent course of instruction.^(147,148) Most such tests are used in educational settings. It has already been indicated that children grow, develop, and mature at different rates. No two children, therefore, are quite alike developmentally at the time of entrance into first grade. Consequently they will differ in the degree of school readiness and in capacities to learn.⁽¹⁴⁹⁾ School readiness tests can be of great value in aiding the Class I teacher in determining to what extent the children in her group are ready for formal instruction. She

can/

can also gain useful information about the abilities and limitations of individual pupils and will therefore be in a position to plan learning experiences accordingly and group them according to their needs. Moreover, much guesswork can be eliminated in sizing up the class as a whole. (152) Seyfried (153) proposes that school readiness tests can also assist in the early recognition of children in need of special education.

3.2 Types of School Readiness Tests

It is possible to divide school readiness tests broadly in two types:

(a) General, Composite Readiness Tests

These tests determine readiness for learning by measuring a number of different traits and skills which contribute to success in schoolwork. (154)

Examples of tests which fall in this category are the N.B.G.T. 5/6, (155) the Metropolitan Readiness Tests (156) (both of which are group tests); and the Gesell Institute Developmental Examination (157) (which is essentially an individual clinical examination).

(b) Specific Readiness Tests

These tests are used to measure readiness for specific subjects, such as reading, number work, and so on. (158) Examples of tests which fall in this group are the Harrison-Stroud Reading Readiness Tests (159) and the Lee-Clark Reading Readiness Test. (160)

Both types of tests are useful. The choice of one type or the other depends on the purpose of the testing. At the beginning of the year, for instance, Grade I teachers will probably concentrate mainly on overall readiness factors that affect learning in general. They will not concern themselves about specific traits that indicate the child's readiness for reading, writing, or other particular subjects.⁽¹⁶¹⁾ General readiness tests will help to identify children who are outstanding or relatively weak in such basic factors as vocabulary, comprehension, perceptual discrimination, motor control, information, and so on.

3.3 Features of Readiness Tests

In general, according to Hildreth,⁽¹⁶²⁾ all good readiness tests have the following characteristics:

- (i) If they test general readiness, they contain a variety of materials that measure several different traits or skills closely related to success in first-grade work. There should be evidence of the test's validity.
- (ii) If they purport to measure separate skills, they are long enough and have a wide enough range to test the skills accurately.
- (iii) They are interesting to young children.
- (iv) They can be scored objectively. Scores should be amenable to easy translation into letter ratings, percentile ranks, or other meaningful ratings.

Normally/

Normally, group readiness tests should be administered by the class teacher herself since she is the one who will make the most immediate use of the results. Moreover, as Baron and Bernard⁽¹⁶³⁾ point out young children are sometimes disturbed by the presence of unfamiliar persons.

The norms on which a good readiness test is based makes it possible to draw comparisons between the average readiness score for a given class and that of a larger normative population on which the test has been standardised. This information is useful in determining the extent to which individuals or groups deviate from the population of school beginners as a whole.⁽¹⁶⁴⁾

Readiness tests also have diagnostic possibilities.⁽¹⁶⁵⁾ An analysis of the results may reveal a child's limitations that are likely to hinder him in the formal learning situation. The separate scores on the subtests can provide the teacher with valuable information about the areas which need to be strengthened. A low score on a test of knowledge of numbers or number concepts, for example, indicates the need for experiences in this area before formal teaching in arithmetic can begin.⁽¹⁶⁶⁾ In addition to measuring such specific traits as vocabulary, visual perception, and number knowledge, readiness tests furnish the teacher with information related to other more general traits needed for success in beginning schoolwork, such as the child's ability to use crayons or pencils, the ability to find and keep the place indicated in a book, and the ability to give sustained attention for a short period.⁽¹⁶⁷⁾

Another/

Another important feature of readiness tests is that they tend more largely than intelligence tests to reveal the extent of the learning the child derives from his background. In this regard Hildreth⁽¹⁶⁸⁾ points out that children with rich experiential backgrounds are able to work successfully with readiness tests earlier than those with limited backgrounds. First-grade intelligence tests, on the other hand, are more apt to be "culture free".

Special attention should be given to all low-scoring pupils. Low scores on a general readiness test, says Hildreth, are danger signals indicating possible failure unless the first-grade programme is modified in the direction of kindergarten activities for the first few months of school. Similarly, those who score very highly on initial tests should be observed with care. These children may have latent talents and assets that need to be drawn out. (169)

As is the case with most psychological tests, paper-and-pencil readiness tests are by no means infallible nor do they measure all the components of school readiness. (170) A child's day-by-day behaviour might give a different picture of readiness than that furnished by tests. Caution should therefore be exercised in the interpretation of the results. Writing with specific reference to reading readiness, Russell⁽¹⁷¹⁾ advises that a reading-readiness test as well as an intelligence test should be administered so as to come to a more reliable estimate of the child's capacities. Moreover, the teacher should observe the child's behaviour closely

and/

and he should have some system of recording these observations. The form which follows has been proposed by Schonell and adapted by Gray: (172)

TABLE 2.1
READING READINESS CHART

Name of Child

Date of Birth Age in Years and months

Results of tests, if any are given:

Mental age Intelligence quotient

Reading readiness score

ESTIMATES OF CHILD'S DEVELOPMENT:	1	2	3	4	5
General mental ability					
Background of previous experience					
Range of speaking vocabulary					
Accuracy of pronunciation and related speech habits					
Ability to express oneself clearly to others ...					
Habit of observing details and forming associations with things seen or heard					
Ability to perceive likenesses and differences ..					
Ability to recognise relationships.....					
Ability to keep in mind a series of events or other items					
Ability to think clearly and in sequence					
Ability to make good choices and decisions					
Good health					
A well nourished body					
Freedom from undue fatigue					
Visual efficiency and discrimination					
Auditory efficiency and discrimination					
Emotional balance					
Social adjustment and feeling of security					
Ability to focus on specific learning activities.					
Ability to follow directions					
Ability to work effectively in a group					
Interest in pictures and the meaning of written or printed symbols.....					
KEY:					
A desire to learn to read					
1	= well below average				
2	= below average				
3	= average				
4	= above average				
5	= well above average				

3.4 The National Bureau Group Test for Five-and-Six-Year Olds

The details which appear in this section are based on the contents of the manual which accompanies the National Bureau Group Test for Five-and-Six-Year-Olds (N.B.G.T. 5/6) and for Seven-and-Eight-Year-Olds (N.B.G.T. 7/8)⁽¹⁷³⁾

3.4.1 Introduction

It has already been pointed out in Chapter One that the Human Sciences Research Council began research some years ago with a view to preparing and standardising tests for measuring school readiness among White children in South Africa. This was undertaken at the request of the various Education Departments in South Africa.

While emphasising that the concept of school readiness was in itself a difficult one, the authors of the test, after reviewing pertinent literature, concluded that mental aptitude and the level of its development are the main determining factors of progress at school. Consequently, the preparation of a test for measuring these aspects was given priority. However, the social, emotional and motor maturity of beginners have not been ignored. Efforts are being made to measure these aspects as well.⁽¹⁷⁴⁾

3.4.2 Description of the Test

Identical tests were prepared for Afrikaans- and English-speaking children. Provision was made for two age ranges, namely, five-and-six-year-olds (N.B.G.T. 5/6) and seven-and-eight-year-olds (N.B.G.T. 7/8).

It has already been noted that the present investigation is concerned with the study of the first of the abovementioned tests, viz., the N.B.G.T. 5/6.

The N.B.G.T. 5/6 was released for use in 1960 and consists of six subtests made up as follows:

SUBTEST 1.

The child is expected to mark in each of the eight items those objects which look like the given object. The objects are varied from known things such as flowers to two-dimensional figures.

Success in this test requires good visual powers of analysis, understanding, an ability to carry out oral instructions and the ability to concentrate.

Similar items appear in the Metropolitan Readiness Test, The California Test of Mental Maturity, The Flensburger Schulreife, and the Dominion Group Test of Learning Capacity (Primary).

SUBTEST 2

This test consists of a maze with 10 segments and two practice exercises which are similar to the main test. This is based on Portan's view of intelligent behaviour, namely, *"the capacity for making planned responses to an increasing range of relevant stimuli."* Success in this test demands planning and foresight.

The/

The test gives an indication of the ability to handle a pencil and hand-eye co-ordination. The same kind of items are to be found in the California Test of Mental Maturity.

SUBTEST 3

The child is expected to put a pencil mark through objects and representations that are described. This test presupposes a good grasp of language, an understanding of spoken instructions, memory for hearing (acoustical memory) and an extensive repertoire of understanding.

Similar items appear in the Metropolitan Readiness Test, the Lee Clark Reading Readiness Test (Primary) and the Pintner-Cunningham Intelligence Test (Primary).

SUBTEST 4

In this test the child is presented with a series of objects in picture form. He has to choose the one that does not belong. Success in this test requires a capacity for refined analytical perception and inductive thinking.

Similar items appear in the SRA Primary Mental Abilities and the Durost se Test bij Schoolbegin

SUBTEST 5

This test is designed to give an indication of the child's concepts of quantity, ratio and number.

Similar items appear in the Metropolitan Readiness Test, the Grundleistung Test of Kern, The Primary Mental Abilities (5 to 7 years), The Dominion Group Test of Learning Capacity, and the California Test of Mental Maturity (Grade I).

SUBTEST 6

The child is required to complete schematic representations of objects and geometric figures according to an example which is contained on a matrix of dots, freehand. By this means horizontal, vertical, curved and diagonal lines have to be copied in the figures that are provided.

Similar items appear in the Pintner-Cummingham Test.

The test booklet consists of eight pages, On the front page, space is provided for information concerning the testee, raw scores, IQ, mental age, percentile rank, and for additional information concerning incidents which could affect the results of the subtests, e.g., copying, leaving the room, and so on.

On page 2, items A to F are all practice examples. Item G of Test 1 is a practice example, as are items H and I of Test 2, item J of Test 3, item K of Test 4, item L of Test 5, and item M of Test 6. The practice examples A to F on page 2 are examples of Tests 1, 3, 4, 5, and 6, while the practice example at the beginning of each subtest applies to that particular test only.

3.4.3 Standardisation of the Test

Preliminary Form

On the basis of existing tests and literature on school readiness and the measurement of intelligence of young children, the Human Sciences Research Council decided to compile seven subtests consisting of 75 items per age range.

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The tests were applied in Pretoria to 400 5/6 year-old pupils and 240 7/8 year-old pupils. One half of each age range was English-speaking and the other half Afrikaans-speaking.

For each age group in each of the two series an item analysis was carried out. After this analysis it was decided to use the tests in their original form from their semi-final application.

Semi-Final Form

The preliminary form was reprinted and applied to a representative random sample of approximately 3 000 pupils throughout the country. Enough time was allowed for each pupil to complete all the items.

Item analyses were carried out for each age group in both series, and discrimination and difficulty values were obtained for each item.

Final Form

Items for the final series were selected to conform to the following:

- (a) High correlation between the item and the total test score.
- (b) Grading of age groups so that an item became easier for the child as he got older.
- (c) Suitable range of difficulty values so that the items for each age group varied from easy to difficult.

In each subtest the items were arranged from the easiest to the most difficult. The final tests consisted of six subtests with a maximum total raw score of 50.

The Random Sample

For the final calculation of norms a stratified random sample of + 4 000 testees was drawn proportionally from the schools of the four provincial education departments. The aim was to obtain a representative random sample of the total school population between the ages of 5 and 8 years in provincial lower and junior schools.

Since the actual numbers of Afrikaans- and English-speaking children were not in the right proportion, it was decided to inflate the Afrikaans random sample statistically in order to obtain the correct proportion.

The statistically altered numbers according to which the norms were calculated are shown in Table I.

TABLE 2.2

COMPOSITION BY AGE AND LANGUAGE OF STATISTICALLY
ALTERED RANDOM SAMPLE

	5 years	6 years	7 years	8 years
AFRIKAANS	980	948	966	1 004
ENGLISH	448	486	387	485
T O T A L	1 428	1 434	1 353	1 489

Calculation/

Calculation of Norms

It is generally accepted that the abilities which are measured by this kind of test are normally distributed in the population. The results of the N.B. Group Test for 5/6 and 7/8-year-olds showed this normal distribution.

On this assumption tables have been drawn up by means of which raw scores can be converted to IQ's, percentile ranks, and mental ages.

3.4.4 Application of the Test

2.3.4.4.1 General Instructions

Detailed instructions for the application of the N.B.G.T. 5/6 are supplied in the manual that accompanies the test.

It is not desirable to test more than ten children at a time unless the tester has an assistant. The assistant's duties are limited. He may help to fill in the particulars on the front page, to ensure that the children turn over the pages correctly and work at the right place. Under no circumstances should he repeat or give instructions. This is the tester's duty. The assistant should not help the children to answer questions; he may aid them in the practice examples only.

Testing-Times

There is no fixed time within which the test must be completed since separate instructions are given for each item. The manual states that apart from the intervals the test takes approximately 50 to 60 minutes.

An/

An interval of at least ten minutes should be allowed after Test 2 and another of at least five minutes after Test 4.

3.4.5 General Information and Suggestions Concerning the Application of the Test

Although the instructions for the practice examples have been drawn up as fully and clearly as possible, so that the children can understand them, it is permissible to vary the given instructions should this be necessary.

It is necessary to explain the practice examples to the children slowly and thoroughly, because once they understand the general idea of the test they will experience no difficulty with the rest of the test. The tester is expected to use his discretion in the practice examples on page 2 as well as in the additional practice examples at the beginning of each subtest. For the remaining items, however, he should adhere strictly to the instructions.

At the top of each page there is a picture. The child is asked to draw a line through the picture to ensure that he is at the right page.

Next to each item at the side of the page there is a circle containing a picture on which the child must put his finger to ensure that he is doing the right item.

In/

In the practice examples A to E, and in subtests 1, 3, 4 and 5, the child is required to mark a picture (or pictures) in accordance with the tester's instructions. Similar tasks are set in the Metropolitan Readiness Test. For example, the child is presented with 4 pictures - a feather, a pillow, a twig and a bed. The child is told:

"Look at the first row of pictures here. I'm going to tell you to mark one of the pictures in this row by drawing a cross on it. Look at each picture as I name it. Now make the bed."

In subtest 2, viz., the Mazes, the child is expected to trace a correct path while keeping within certain lines.

The opportunity to repeat the instructions is limited only to the practice examples. This must be done until the children understand.

In subtest 6 the child is required to complete schematic representations of objects and geometric figures according to an example which is contained on a matrix of dots, freehand.

3.4.6 Directions for Scoring

The correct answers are given in the manual on pages 22 and 23.

Usually, each item has only one correct answer and counts only one mark. Some items have two correct answers and sometimes count two marks, and sometimes one mark. When pupils have marked too many (or too few figures as correct for a specific item in Tests 3, 4, and 5, no marks are to be allocated for that item. This does not however, apply to Test 1, where the score is obtained by subtracting the total number of incorrect figures marked from the total number of correct figures marked.

The scoring procedure for Test 2 is as follows: A path is marked as incorrect if the testee has entered a wrong passage for $\pm \frac{1}{4}$ inch or further.

- (a) One mark is awarded for each maze done correctly.
- (b) In items 14 to 16, a mark is still awarded if the child follows only one wrong path in each maze, before he solves it.
- (c) In items 17 to 20 two wrong paths per maze are allowed without deducting a mark.
- (d) In items 21 to 23 three wrong paths per maze are allowed without deducting a mark.
- (e) The testee immediately loses a mark if he crosses

a line, even if he has followed the correct path. This applies to all the items from 14 to 23.

The scoring procedure for Test 6 is as follows: One mark is awarded for each correct item. The total score is then multiplied by 2 to obtain the final score. The maximum score in this test is therefore 10 raw scores, i.e. $5 \times 2 = 10$.

Marks are awarded as follows:

- (a) Award one mark for each dot-drawing drawn exactly like the example.

A mark is awarded for each figure which is duplicated correctly.

- (b) If any additional lines are drawn, the item is incorrect.
- (c) If the dots are linked incorrectly, the item is incorrect.
- (d) If lines are omitted between dots which should be linked, the item is incorrect.
- (e) The item is incorrect if there is a single error.

The total marks for the tests is as follows:

Test 1	13 marks
Test 2	10 marks
Test 3	6 marks
Test 4	5 marks
Test 5	6 marks
Test 6	10 marks
Total	<hr/> 50 raw scores <hr/>

2.3.4.7 Norms

As has already been mentioned raw scores of the N.B.G.T. 5/6 can be converted to IQ's, percentile ranks, and mental ages. The norm tables appear on pages 30 and 31 of the manual.

2.3.4.8 Interpretation of Test Results

The IQ should be regarded as a rough indication only of a person's general intellectual level correct within five to ten points. Too much importance should not be attached to slight differences between IQ's since a difference of a few IQ points between two persons may be due purely to chance and on retesting their positions may be reversed.

Reliability: The reliability index of the N.B.G.T. 5/6 was calculated according to the Kuder-Richardson Formula 21, which gives an under-estimate of the reliability. This formula was also used in calculating the standard error of measurement. The reliability, error of measurement, standard deviation and mean for the Afrikaans and English-speaking groups combined, are given in Table 2.3.

TABLE 2.3

RELIABILITY, ERROR OF MEASUREMENT, STANDARD DEVIATION AND MEAN:

AFRIKAANS AND ENGLISH COMBINED

No. of pupils	Reliability	Error of Measurement		Standard Deviation		Mean	
	K.R21	Raw Scores	I.Q. points	Raw Scores	I.Q. points	Raw Scores	I.Q. points
1849	.91	3.1	5.1	10.2	17.0	20.5	100

3.4.9 General

Apart from the fact that this test will be used mostly to determine school readiness, it is important not to lose sight of the fact that it is an intelligence test and may be used for the purpose of measuring intelligence.

The test results, however, must be used with extreme care and only in conjunction with all other available information concerning the testee such as his interests, personality tendencies, school achievement, specific aptitudes, environmental influence.

No decisions which may have far-reaching consequences for any person, should be based on this test alone at this stage.

3.5 Other Approaches to the Problem of Measuring School Readiness

3.5.1 The Gesell Institute Developmental Behaviour Tests

Another approach in ascertaining a child's readiness for school is to give developmental examinations.

Ilg and Ames⁽¹⁷⁶⁾ argue against the use of the usual intelligence test to measure a child's readiness for school on the grounds that intelligence is only one part of the child's total personality. They point out that a child may possess superior intelligence but may at the same time be behind others of his age in either physical or behavioral maturity. Nor are these writers happy about the use of the usual school readiness tests for, in their opinion,

these/

these tests fall far short of an evaluation of the total child. Some of these tests, they say, measure only reading readiness as such while others turn out to correlate more closely with the IQ than with the total developmental level of each child.

Instead, Ilg and Ames propose that every child should be given an individual behaviour examination and that his level of performance be determined at the time he is being considered for school entrance. Developmental behaviour tests have been designed for this purpose at the Gesell Institute and are made up of the following parts: (177)

1. *The Initial Interview.* The child is asked questions about his age, birth date, birthday party including favourite activity and presents received, names and ages of siblings and father's occupation.
2. *Pencil and Paper Tests.* Writing name, address, date, and numbers; copying six basic geometric forms (circle, cross, square, triangle, divided rectangle, diamond in two orientations), and two three-dimensional forms (cylinder and cube in two orientations); completing an unfinished drawing of a man and answering questions about him.
3. *Right-and-left Orientation Tests.* Naming parts of the body to which the examiner points; executing simple motor activities; giving both visual and motor responses to pictures of right and left hands in various positions.

4. *Visual Form Tests.* Matching forms; memory for designs; projective responses to designs (what does each form look like, what does it remind you of?)
5. *Naming all the animals a child can think of in 60 seconds.*
6. *Concluding interview.* The child is asked about his favourite indoor and outdoor activities in school and home.
7. *Examination of teeth.* Recording of both eruption and decay or fillings.

As useful adjuncts to evaluation, Ilg and Ames also recommend observation of the child's teething, a check on his vision, an evaluation of his reading ability through the use of the Gray Oral Reading Test and the Iota Word List, and a simple measure of individuality and level of emotional development through the Lowenfeld Mosaic Test. (178)

The authors provide normative portraits of behaviour which can be expected at each age level from five to ten years, so that the tester can match any given child's performance against these age norms. (179)

3.5.2 The New York City Board of Education and Educational Service Testing Procedure

Still another approach to the evaluation of school readiness is a joint project of the New York City Board of Education and Educational Testing Service entitled "*Let's Look at First Graders.*" (180) Here assessment and instruction are combined in a continuous programme

conducted/

conducted by the teachers themselves in the course of daily classwork. Placing tests in such a natural situation has the advantage of reducing much of the tension that is often present in the formal testing situation.

"*Let's Look at First Graders*" incorporates Piaget's views on child development and focuses on the transition from prelogical to logical concrete thinking - a transition typically occurring at first-grade level. After specific instances of behaviour reported by teachers as signs of intellectual development were collected, a *Guide* for use by teachers in both assessment of pupil developmental level and instruction was prepared. The *Guide* provides descriptions of six major areas of intellectual development, together with behaviour illustrating each. The six areas and the developmental concepts included within each area are as follows:

1. *Basic Language Skills.* Auditory discrimination and attention, listening comprehension, learning to communicate, language for thinking.
2. *Concepts of Space and Time.* Learning shapes and forms, spatial perspective, the notion of time.
3. *Beginning Logical Concepts.* Logical classification, concepts of relationship.
4. *Beginning Mathematical Concepts.* The conservation of quantity, one-to-one correspondence, number relations.
5. *The Growth of Reasoning Skills.* Understanding cause and effect, reasoning by association, reasoning by inference.

6. *General Signs of Development.* Growing awareness and responsiveness, directed activity, general knowledge, developing imagination.

In addition, there is a set of instructional and assessment materials, providing more or less standard tasks that can be used by the teacher to elicit behaviour within each area. A typical task is Piaget's "*conservation problem*".

A series of written exercises are also available. The child, for example, is shown pictures of three faces and he is asked to mark the youngest face.

"*Let's Look at First Graders*" provides no norms or other psychometric data. It is designed to yield only qualitative descriptions of the child's developmental level in basic intellectual skills. In contrast to standardised tests such as the National Bureau Group Test for Five-and-Six-Year-Olds, and the individual clinical evaluations such as the Gesell Institute Developmental Behaviour Tests, "*Let's Look at First Graders*" is an attempt to combine assessment with teaching.

4 Evaluation

Good readiness tests, if employed properly, assist the teacher in the evaluation of group and individual abilities and limitations. The information the tests provide is further extended by day-to-day observations and home conferences. The test results can, however, play a major role in curriculum planning, in confirming the teacher's judgment of individual pupils, in grouping, and in predicting probable success in first-grade learning.

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CHAPTER THREETHE PRESENT INVESTIGATION1. THE NATURE OF THE PRESENT RESEARCH

Helmstadter⁽¹⁾ classifies methods of research along the following lines:

- (a) Historical and Case Study approaches
- (b) Descriptive approaches
- (c) Experimental approaches.

The present study falls into the second category. More specifically, it is a normative survey and comprises the following steps:

- (a) the translation of the problem into the specific characteristics to be measured;
- (b) choosing a test to measure the traits of concern;
- (c) gathering data by administering the test;
- (d) analysing the data by computing various descriptive indexes and by making appropriate comparisons among groups.

The chief advantage of the normative survey approach is that it can make use of all the technical knowledge and experience which has been gained in the field of educational and psychological measurement.

2./.....



2. THE CHOICE OF THE LOCALE

The geographical division of Durban adopted by the Department of Economics, University of Natal, in its socio-economic investigation of the Durban Indian Community in 1969 was considered to be a convenient one for the present study. (2)

According to this division, Durban was stratified into four broad areas as follows:

(i) The Northern Area

This includes all those Indian areas north of the Umgeni river and the north coast railway line and includes the following suburbs:

Riverside, Umgeni, Prospect Hall, Avoca, Effingham, Greenwood Park, Red Hill, a portion of Durban North, Briardene, Rosehill, Kenville, Sea Cow Lake, Newlands and Parlock Township.

(ii) The Western Area

This area extends from the Berea Ridge to the borough boundary in the west, with the Umgeni and Umbilo Rivers as the northern and southern limits, respectively. The area includes Manor Gardens, Stella Hill, Overport, Sydenham, Puntans Hill, Quarry Estate, Springfield, Asherville, Mayville, Cato Manor, Candella, Clare Estate and Reservoir Hills.

(iii)./......

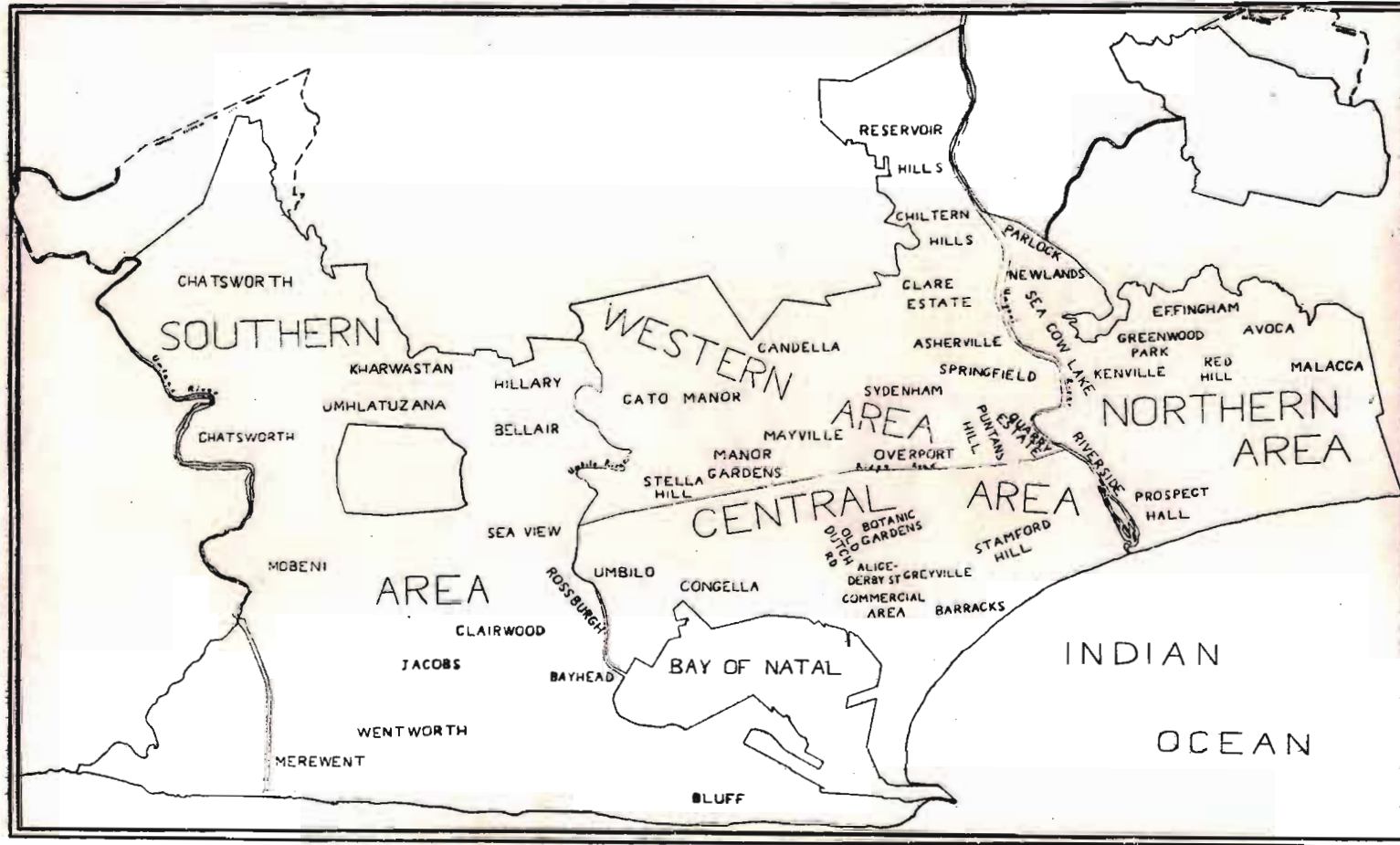


Fig.3.1. Durban: Showing Areas of Indian Settlement
 (Reproduced by kind permission of the Department of Economics,
 University of Natal)

(iii) The Southern Area

Suburbs south of the Umbilo River are included in this area, embracing Rossburgh, Sea View, Bellair, Hillary, Chatsworth, Merebank, Clairwood, Jacobs, Wentworth, the Bluff, the Bayhead area, "Happy Valley", and the private townships of Umhlatuzana and Kharwastan.

(iv) The Central Area

For all practical purposes the Central Area is identical to the old borough area of Durban. This area extends from the Umgeni River in the North to the Umbilo River in the South, and from the sea in the east to the crest of the Berea Ridge to the West. This area includes the central business area, Greyville, Stamford Hill, the Magazine and Railway Barracks, the Old Dutch Road area, Botanic Gardens area, and the Umbilo-Congella complex.

It might at first seem that it would have been wiser to have drawn a representative sample from all four areas. The investigator explored this possibility but found that this would be impractical since such a project would have necessitated engaging the services of a team of testers, more time and more funds. The pilot study had revealed that at least two-and-a-half hours, on an average, would be required to test each child. It was therefore essential that the size of the sample should not be too large.

For/

For these reasons it was decided to locate the present investigation in only one of the four areas mentioned above.

The Western Area was eventually chosen for the following reasons:

- (a) There were a sufficient number of primary schools in the area. The task of obtaining a group of six-year-old children in Class I would, therefore, be relatively easy.
- (b) The fourteen play centres which had their headquarters at the David Landau Community Centre, Asherville, provided a readily available pool of preschool children. None of the other three areas possessed this advantage.
- (c) The investigator had lived in this area for several years and knew the locality intimately. This, to some extent, eased the problem of tracing those children who had to be tested at their homes.

3. THE SELECTION PROCEDURE

3.1. Background

Owing mainly to the Group Areas Act of 1950 and expropriations of land for industrial expansion, major population shifts are presently taking place in a large number of Indian areas in Durban. (3)

New/

New residential areas are being provided with mass housing schemes by the Durban City Council and the Department of Community Development. Private township developers are also establishing new townships such as those at Reservoir Hills and Parlock.

These substantial population resettlements have had a direct bearing on the sampling procedure used in the present investigation. Reference will be made to this point later in the discussion.

3.2. Principles Guiding the Composition of the Sample

In his discussion of the Vienna School Readiness Test, the group test most frequently used in Austria, Seyfried⁽⁴⁾ points out that various studies have shown the following significant differences between the test performance of different groups:

- (a) Younger children obtain lower scores in school readiness tests than older children.
- (b) Children who have attended nursery school obtain higher scores than children who have not attended nursery school.
- (c) Children whose parents are professionally skilled and well qualified obtain higher scores than children whose parents are less well qualified.
- (d) In individual sub-tests significant differences exist in the performance of

boys/

boys and girls, but these differences are balanced almost completely in the total score.

It was against the background of these findings that it was decided that the random sample being used in the present investigation should satisfy the following criteria:

- (a) Only those children who turned six years of age in the month of testing were considered. This was done in order to equalise, as far as possible, maturational and experiential effects due to chronological age alone.
- (b) The choice of three groups of children with differential amounts of learning experience would make it possible to discover whether there was any significant relationship between the level of learning experience and scores gained on the tests that were administered.
- (c) An equal number of boys and girls were chosen. This would help in minimising the influence of the sex variable on the test results. Such an arrangement would also make it possible to examine any differences which might be attributed to the sex factor.
- (d) An equal number of children from both the upper and lower socio-economic groups were included in the sample. This would help in minimising

the/

the influence of the socio-economic variable on the test results. Such an arrangement would also make it possible to examine any differences which might be attributed to the socio-economic factor.

3.3. The Sample

The (total) sample consisted of 156 six-year-old children made up of the following three groups:

- 3.3.1. Schoolers. This group comprised those children who were in school and turned six years of age between 1st June, 1969 and 30th June, 1969, inclusive. At the time of testing they had had about six months of formal schooling.
- 3.3.2. Preschoolers. This group comprised those children who turned six years of age sometime between 1st July, 1969 and 30th September, 1969. At the time of testing these children attended one or another of the fourteen play-centres in the Asherville area. Details related to these play-centres are given in Appendix
- 3.3.3. Nonschoolers. This group comprised those children who turned six years of age sometime between 1st July, 1969 and 30th September, 1969. At the time of testing these children

had/

had had no schooling, either formal or of the play-centre type.

Owing to circumstances peculiar to each of the abovementioned groups, the manner in which the three samples were chosen needs explanation.

3.3.1. Schoolers

Questionnaires (see Appendix) were handed out to teachers of Class I, one for each child who, according to the class register, was born between 1st June, 1963 and 30th June, 1963. These were the only pupils who would turn six years of age in the month of testing. Each child had been asked, on the previous day, to find out exactly what his or her father's occupation was. Where the father had died, his occupational level was secured from relatives, but such cases were very few in number.

As soon as all the questionnaires had been filled in by the class teachers, they were collected and checked for omissions. They were then divided into two sets on the basis of sex. Each of these two sets was then divided into two further sets on the basis of socio-economic status, high and low.

It was decided to use the father's occupation as the indicator of socio-economic background. The grouping was done according to a status classification

by/

by Glass, ⁽⁵⁾ modified for use by the Institute for Social Research, University of Natal. The table below shows the various categories of occupations.

TABLE 3.1.

CLASSIFICATION OF OCCUPATIONS

GROUP	NATURE OF OCCUPATION
I	Manual Unskilled
II	Manual Semi-skilled
III	Routine Grades of Non-Manual and Skilled Manual
IV	Inspectional Supervisory and Other Non-Manual (Lower Grade)
V	Inspectional Supervisory and Other Non-Manual (Higher Grade)
VI	Managerial and Executive (with some responsibility for directing and initiating policy)
VII	Professionally Qualified and High Administrative

For the purpose of the present study, Occupational Groups I, II and III were taken as representing Low Status and IV, V and VI, High Status.

From the four sets of questionnaires thus obtained, fifteen were randomly chosen from each. This gave a total of sixty Schoolers comprising an equal number of boys and girls, drawn equally from the high and low socio-economic groups. The table below describes the school sample.

TABLE 3.2./....

TABLE 3.2.

DISTRIBUTION OF SCHOOLERS ACCORDING TO SCHOOLS

NAME OF INSTITUTION FROM WHICH TESTEES WERE DRAWN	NUMBER
1. Ahmedia State-Aided Indian Primary School	4
2. Andhra Vishnu Trust State-Aided Indian Primary School	1
3. Arya Yuvuk Sabha State-Aided Indian Primary School	1
4. Candella Samalan State-Aided Indian Primary School	2
5. Clareville State-Aided Indian Primary School	6
6. Essendene Road State-Aided Indian Primary School	3
7. Hindu Sungan State-Aided Indian Primary School	3
8. M.E.S. State-Aided Indian Primary School	3
9. Manor Gardens State-Aided Indian Primary School	1
10. Nagari Pracharni Sabha State-Aided Indian Primary School	3
11. P.P. Chetty Family State-Aided Indian Primary School	2
12. Reservoir Hills State-Aided Indian Primary School	3
13. Resmount State Indian Primary School	2
14. St Aidan's Boys' State Indian Primary School	5
15. St Aidan's Girls' State Indian Primary School	6
16. Springfield Flats No. 1 State Indian Primary School	3
17. Springfield Flats No. 2 State Indian Primary School	5
18. Springfield Hindu State-Aided Indian Primary School	2
19. Springfield Model State Indian Primary School	5
T O T A L	60

.3.3.2. Preschoolers

Questionnaires were handed out to the teachers of the various play groups, one for each child who, according to the class register, was born between 1st July, 1963 and 30th September, 1963. It will be noted that the children who fell in this group narrowly failed to satisfy the chronological age criterion laid down by the Division of Education, Department of Indian Affairs. Moreover, the testing in the case of the preschoolers had to be staggered over a period of three months as it was not possible to find a sufficient number of children from whom the required sample could be chosen. The investigator had to wait for some of these children to turn six years of age before testing them.

From this point on, the sample selection procedure was similar to the one followed in the case of the Schoolers except that twelve, not fifteen subjects were randomly chosen from each of the four sets of questionnaires. This gave a total of forty-eight preschoolers comprising an equal number of boys and girls, drawn equally from the high and low socio-economic groups on the same basis referred to in paragraph 3.3.1. These children were then tested.

Owing to practical difficulties such as finding a sufficient number of six-year-old preschoolers within

a reasonable period of time, it was decided to reduce the size of the sample of this group from the originally-planned total of sixty to forty-eight.

3.3.3. Nonschoolers

Since no class registers existed in the case of these children, it became necessary to make use of the Register of Births of Indian Immigrants in the Province of Natal⁽⁶⁾ in order to draw up a list of those children who were born in the Western Area of Durban between 1st July, 1963 and 30th September, 1963. The Register furnished the following information:

the child's name,
his address,
his date of birth,
his sex, and
his father's occupation.

The children whose names appeared on the list were then divided into two groups on the basis of sex. Each of these two groups was then sub-divided into two further groups on the basis of socio-economic status, high and low, as determined by the father's occupation referred to in paragraph 3.3.1.

From the four sets of names thus obtained, twelve were randomly chosen from each. This gave a total of forty-eight nonschoolers comprising an equal number of

boys/

boys and girls, drawn equally from the high and low socio-economic groups. The original intention had been to test sixty nonschoolers. However, the problem of "tracking down" the children singled out for testing forced the investigator to reduce this number by twelve.

No sooner had the testing begun than it was realised that it would not be possible to adhere strictly to those forty-eight children whose names appeared on the final list of testees. In many cases, circumstances had changed with the passage of time. Fathers had been promoted or demoted, families had moved out of the Western Area, and some children had begun to attend private schools. Factors such as these disqualified a number of the children who had originally been selected for testing purposes on the grounds of changed socio-economic status, residential and non-schooling requirements. This situation called for a revision of plans. It was decided to continue visiting the homes of those children whose names appeared on the original list. In a case where the *status quo* was maintained, the child was tested. Whenever it was found that a particular child had become ineligible, he was replaced by another child of the appropriate sex and socio-economic group chosen at random from the complete list of nonschoolers. This procedure was

continued/

continued until the required number of forty-eight nonschoolers was tested, comprising an equal number of boys and girls, drawn equally from the high and low socio-economic groups.

The following table describes the sample of schoolers, preschoolers and nonschoolers:

TABLE 3.3.

DISTRIBUTION OF THE SCHOOLERS, PRESCHOOLERS
AND NONSCHOOLERS BY LEARNING EXPERIENCE,
SOCIO-ECONOMIC STATUS, AND SEX

SCHOOLING	<u>SOCIO-ECONOMIC STATUS</u>				TOTAL
	H I G H		L O W		
	Boys	Girls	Boys	Girls	
SCHOOLERS	15	15	15	15	60
PRESCHOOLERS	12	12	12	12	48
NONSCHOOLERS	12	12	12	12	48
T O T A L	39	39	39	39	156

4 THE INSTRUMENTS USED

The instruments used in this study comprised a questionnaire, a scale for the measurement of socio-economic status, a test of school readiness, a non-verbal test of intelligence and a picture vocabulary test.

4.1. The Questionnaire

Care was taken to ensure that the Questionnaire (see Appendix) was brief and straightforward and that the instructions were kept simple.

4.2. The Socio-Economic Status Scale

It has already been mentioned earlier in the chapter that the father's occupation was used as the indicator of the socio-economic status of the children's homes. Although, as Nisbet and Entwistle⁽⁷⁾ point out, this system of measurement has certain shortcomings, the writer was convinced that too much of accuracy was not being sacrificed for the sake of convenience. It was necessary to avoid questions to which young children would not be expected to know the answers, such as questions related to family income or parental participation in community activities through clubs and societies. Furthermore, it was important that parents should not be made suspicious of or antagonistic to the research, because this would have jeopardised their co-operation and that of the principals of the schools used.

4.3. The Test of School Readiness

Details related to the National Bureau Group Test for Five-and-Six-Year-olds have already been presented in Chapter Two.

4.4./...

.4.4. The Non-Verbal Test of Intelligence

Raven's Coloured Progressive Matrices (RCPM)⁽⁸⁾ was prepared in 1947 as a downward extension of the original 1938 version of the Matrices. It was designed to allow for a wider range of scores for children in the 5 to 11 age group and for use with groups considered intellectually impaired or subnormal. The scale as a whole is described as "*a test of observation and clear thinking*". By itself, it is not a test of "*general intelligence*". For this purpose it should be used in conjunction with a vocabulary test.

The child is shown a series of patterns with parts removed. The missing part is shown at the bottom of the page among other figures of similar shape which do not complete the pattern and the child is asked to indicate the correct part. The problems are arranged in order of increasing difficulty within each set so that the relatively easy solution to the first item helps to show the subject the way in which the more difficult problems are to be answered. In fact, as Cronbach⁽⁹⁾ points out, the test can be administered in pantomime so that the verbal ability is entirely eliminated. The score is based on the total number of matrices correctly completed.

In commenting on the Progressive Matrices (1938 version), Cronbach⁽¹⁰⁾ notes that this non-verbal score has one special function in school testing:

"It/

"It calls attention to pupils who have good reasoning ability but who are below standard in reading and verbal development. Such cases are obscured by a test that mixes verbal and non-verbal components together."

Martin and Wiechers⁽¹¹⁾ found that the RCPM correlated with an r of 0,91 with the Full Scale WISC when subjects in the normal range of intelligence are involved. With children of limited intelligence, correlations appear to be considerably lower. Correlations with WISC subtest scores ranged from 0,74 (Block Design) to 0,47 (Picture Arrangement).

4.5. The Picture Vocabulary Test

The ability to communicate verbally is basic to academic success.⁽¹²⁾ It was, therefore, considered necessary to obtain an estimate of the *"hearing vocabulary"* of the subjects who were being studied in the present investigation. For this purpose the Peabody Picture Vocabulary Test (PPVT), an American test of verbal intelligence developed by Dunn,⁽¹³⁾ was used.

This test has two forms (Form A and Form B) and consists of 150 plates on each of which is a line drawing of increasing difficulty. The subject is shown four pictures on a page and he is then told:

"I will say a word, then I want you to put your finger on the picture of the word I have said."

Two modifications were made to suit present purposes:

- (a) Only the first sixty plates were used since a pilot study had shown that six-year-old Indian children generally found those plates beyond the first fifty too difficult. As a result they resorted to wild guessing. In order to accommodate very bright children, however, it was decided to include the next ten plates in the test as well, thereby giving a total of sixty plates.
- (b) Stimulus words from Form A were chosen. However, wherever the word referred to a picture that was likely to be out of the range of experience of the Indian child, that word was replaced by a corresponding one from the alternate form of the test, Form B. In this way, sixteen words were replaced in Form A. The three sets of stimulus words - those which appear in Form A and in Form B, together with those used by the investigator in the present study, have been included in Appendix

Anderson and Flax⁽¹⁴⁾ attempted to assess the agreement between the PPVT and the Wechsler Intelligence Scale for Children (WISC). Among the correlations of the PPVT with the three WISC scores the highest relationship is found for the WISC verbal score. The correlations of the separate

age level groups fall about a median of 0,66 which is in comparison to a median of 0,54 for the correlations between the Verbal and Performance scores on the WISC. Thus the PPVT appears to agree more closely with the WISC Verbal scale than does the WISC Performance scale.

In another study Himmelstein and Herndon⁽¹⁵⁾ correlated WISC and PPVT IQ's and found an r of 0,642 for the verbal IQ, 0,552 for the performance IQ and an r of 0,620 for the verbal full scale IQ. They concluded that the *"correlations were neither so low nor so high that the PPVT can be used as a replacement with confidence."*

Experience with the PPVT and the English Picture Vocabulary Test (EPVT) at the Durban-Westville Children's Guidance Centre, indicates that the latter, being relatively free of *"Americanisms"* would have been a more suitable test for use with Indian children in South Africa. This test, however, was not readily available when the present study was undertaken.

The EPVT⁽¹⁶⁾ has been based on the PPVT and depends upon it for some of the preparatory constructional data. Form I of this test covers the age-group between 5 years 0 months and 8 years 11 months. It is designed to assess levels of listening vocabulary and can be administered irrespective of reading level.⁽¹⁷⁾ The test has been used experimentally with top infants in one of the London boroughs.⁽¹⁸⁾ Correlations of 0,7 were found between

standard/

standard scores on the EPVT Form I and IQ on the Stanford-Binet L-4. Moreover, a small but significant sex difference in favour of boys was found, irrespective of socio-economic level.

A major difficulty with tests of the Peabody type, as Mittler⁽¹⁹⁾ notes, is that the very young child often tends to point to the picture that first captures his attention, and sometimes does so even before the examiner has had the chance to say the stimulus word. It is almost impossible to hold visual variables constant, so that one picture does not prove to be more salient or prominent to the child than any other.

5. THE PILOT STUDIES

As this was the first study of its type to be carried out among Indians there was a formidable number of "unknowns" to cope with. In order to identify as many of the difficulties as possible it was decided to carry out pilot studies. Two studies were carried out as follows:

- 5.1 The application of the N.B.G.T. 5/6 to five-year-olds.
- 5.2 The application of the N.B.G.T. 5/6 to six-year-olds.

5.1 The Application of the N.B.G.T. 5/6 to Five-year-olds

The National Bureau Group Test for 5-and 6-year olds was originally applied to twelve five-year-old

Indian/

Indian children, five boys and seven girls. They were divided into two groups of six children each for testing purposes. Within a very short while it became clear that in most cases there was a total lack of understanding of what was required of them. Group testing of the type that was originally planned, therefore, had to be discontinued.

As a matter of interest, it was decided to find out if, in the first place, the children recognised the pictures which were placed before them. In other words, the NBGT 5/6 was now being used as a picture vocabulary test. The performance of those who came from the upper socio-economic group was satisfactory while those who came from the lower socio-economic group, by and large, performed very poorly. Often they would refer to mice as dogs, cats or rabbits; a pram was described as a "grasscutter"; a teddy bear as a baby; a bunny as a rat; a kennel as a garage; a fox as a horse. Responses such as these called for further investigation.

The pictures in the NBGT 5/6 consist of two-dimensional line drawings. A list was drawn up of each child's responses to certain pictures in the NBGT 5/6. The same children were then presented with concrete objects (three-dimensional) of what they had just seen in two-dimensional form. There was/

was a marked improvement in the number of objects they could recognise on the second occasion. This difference in performance was probably due mainly to the childrens' lack of experience with two-dimensional pictures. This view is in line with Vernon's view⁽²⁰⁾ that pictures are a problem to cultures unaccustomed to representative drawings, as the latter are simply clues leading to a perception of the object. In a complex picture, the clues would be greatly reduced, and if the necessary experience is lacking, there may be no resulting recognition or perception. Bishevel,⁽²¹⁾ for instance, describes the inability of Bantu subjects to connect a two-dimensional line drawing with the object itself. And if Hudson's claim⁽²²⁾ that Indian children are poorer than Bantu children at seeing depth in outline drawings is true, Behr's plea for training in the accurate perception of pictorial material from the very earliest stages gains added importance. Hudson⁽²³⁾ offers the following explanation for the relative superiority of White children in this regard:

"Western culture is primarily a visual culture. We specialize in pictures, diagrams, and illustrations. We emphasize visual perception generally. We teach our children through visual media. Early in their lives we start by showing them picture books and by telling them how to look at pictures."

It is the experience of the writer of this report that a large number of Indian homes are lacking in

these/

these respects. The whole question of cultural problems in pictorial perception is of such importance that it merits a careful and detailed study in its own rights.

5.2. The Application of the N.B.G.T. 5/6 to Six-Year-Olds

After the attempt to test five-year-olds with the N.B.G.T. 5/6 had failed, it was decided to use the test as a group test with six-year-olds. These children were also tested on the Raven's Coloured Matrices and the Peabody Picture Vocabulary Test. Twelve Class I children were chosen.

They were divided into two groups of six children each for testing purposes. The following observations were made:

- (i) Although there was a marked improvement in the case of the six-year-olds (when compared with the five-year-olds) in understanding what was required of them, this understanding was still too vague and insufficient for an adequate performance on the test. The potential for a better understanding of the instructions was present but the giving of these instructions in a group situation (small though the groups were) was a definite handicap. What was needed was
individual/

individual attention when working through the practice examples with the child. Full advantage had to be taken of the concession granted to the tester on page six of the Manual accompanying the N.B.G.T. 5/6.¹ Only by going through the practice examples with each child, slowly and thoroughly was it possible to give him a better grasp of the general idea of the test.

In the light of this experience, it was decided to use the N.B.G.T. 5/6, a group test of school readiness, as an individual test with six-year-old Indian children.

Since individual tests are more time-consuming than group tests, it became necessary to reduce the sample size from what was originally envisaged. On closer examination, it can be seen that this was not really a disadvantage for, as has already been suggested, it would have been well-nigh impossible to do justice either to the test or to the testees in a group situation.

The/

1. "Although the instructions for the practice examples have been drawn up as fully and clearly as possible, so that the children should understand them, you may deviate from the given instructions here if you find it necessary." (Manual, p. 6).

The advantages of individual testing are well known. Writers such as Anastasi⁽²⁴⁾ and Horrocks and Schoonover⁽²⁵⁾ point out that individual tests permit close observation of the subject's work methods and his social and emotional reactions. They also give the examiner a better opportunity to establish rapport, obtain co-operation and maintain the interest of the subject in the test. Any special conditions that may handicap the subject in his performance are also more readily noted and remedied in an individual testing situation. Ross notes that the individual testing situation gives the tester considerably more information than the formal results of the test itself.

- (ii) The PPVT was voted by the children as "*the most liked*" test. It proved to be particularly valuable in establishing rapport. Shy and timid children were immediately put at ease when shown the pictures and their curiosity was aroused when the test was presented to them as a game. The PPVT began at such a simple level that even the duller children started off with a few correct answers. This

served/

served to whet the intellectual appetite and prevented frustration through initial difficulty.

On the basis of these observations during the course of the pilot study, it was decided to administer the tests in the main investigation in the following sequence:

- (a) the PPVT;
- (b) the N.B.G.T. 5/6;
- (c) the RCPM.

The pilot studies indicated that certain precautions, in addition to the usual, should be taken in the main study. These will now be described.

6. CONTROL PRECAUTIONS

Each child was tested in his own school or in his own home thereby ensuring a degree of familiarity with the physical surroundings. In some instances, noise, interruption, insufficient space and other mechanical limitations were unavoidable. However, if there was any evidence that these conditions were interfering with the child's performance, testing was postponed. Generally, a quiet or secluded room was made available so that the child was alone with the examiner.

Fatigue/

Fatigue, hunger and other temporary indispositions (such as a cold) obviously have some impact on test performance. When the tester received information of such conditions from the teacher or observed signs of them directly, testing was curtailed. All sessions were completed within ten days for administrative purposes.

The investigator was also alert to the possibility that a child might be suffering from a physiological or emotional disturbance that was more than transient. There was one such case when the Schoolers were being tested. The investigator's impression was confirmed by the Principal and the class teacher. This child was excluded from the study and another child who satisfied the four criteria - age, schooling, socio-economic status, and sex - was tested instead.

All the tests were administered individually. No reading or writing was required of the child. To assist the child in understanding the requirements of the tasks, sample items were often repeated.

No time limits were placed though it must be admitted that the tester's patience was severely taxed when one child took as much as fifty minutes to complete Subtest 6 of the N.B.G.T. 5/6.

7. TESTING PROGRAMME

As mentioned earlier, there was a definite order in which the tests were presented. The PPVT came first because the pilot study had shown that this was the most popular test and was very useful in establishing rapport. It took about ten minutes to administer this test.

The N.B.G.T. 5/6 came second. Since this was the main test under consideration, it was desirable that it should be introduced at a time when the child had more or less adjusted himself to the testing situation on the one hand, and was not yet showing signs of fatigue, on the other. On the average, this test took about 90 to 100 minutes to administer. This is much longer than the expected time of approximately 50 to 60 minutes mentioned in the Manual (page 5).

The RCPM which came last required a testing time of about ten minutes. The duration and the spacing of the intervals allowed were as follows:

- (i) Five minutes between the PPVT and N.B.G.T. 5/6
- (ii) Ten minutes after Test 2 of N.B.G.T. 5/6 (as prescribed in the Manual page 2).
- (iii) Five minutes after Test 4 of N.B.G.T. 5/6 (as prescribed in the Manual page 2).

(iv) ./....

- (iv) Five minutes between the N.B.G.T. 5/6 and the RCPM.

On an average, it took about two-and-a-half hours to test each child. The Nonschooler generally took longer to complete his tasks than the Schooler or the Preschooler. In the case of the Schoolers and Preschoolers, a great problem was that of resolving the disappointment of the children who were not included in the study.

As many of the Schoolers as possible were tested at school. However, since the normal school day is limited to about five-and-a-half hours, it was not possible to test all of them at school. A number of them had to be tested at their homes after school hours or over week-ends. Irrespective of the venue, care was taken to ensure that the subjects worked under optimum conditions.

In the case of the Preschoolers, there was time enough to test only one child at the play centre on any one day.

All the Nonschoolers were tested at their homes.

* * * * *

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CHAPTER FOUR

RESULTS OF THE PRESENT INVESTIGATION

1. GENERAL AIM (a):

The Suitability of the National Bureau Group Test
for Five-and-Six-Year-Olds as a Test of School
Readiness for use with Indian Children

It will be remembered that the first general aim of the present study was to ascertain whether there was any group test already in existence in South Africa which was entirely suitable as a test of school readiness for use with Indian children. If there were no such test, the question arose whether an existing test could be modified to make it suitable for use with Indian children? Or was a completely new test indicated?

As has already been mentioned in Chapter One, the Human Sciences Research Council has standardised three group tests of school readiness. Two of these (the N.B.G.T. 5/6 and the N.B.G.T. 7/8) are meant for use with White children while the third test (Group Test for Bantu Pupils - Sub. A and B) has been designed for use with Bantu children.

The N.B.G.T 7/8 was eliminated at the outset since a study of a random sample of Grade I registers showed that by far the greater number of Indian children enter school between the ages of five-and-a-half and six years. A careful examination of

the/

the other two tests as well as discussions with knowledgeable colleagues led the investigator to conclude that the N.B.G.T 5/6 was more likely to be suitable for use with Indian children than the test which was standardised for Bantu children. Cognizance had to be taken of the fact that Indians in South Africa have been influenced to a greater extent by Western culture than they have been by Bantu culture. However, research in the future directed at finding out to what extent the Group Test for Bantu Pupils (Sub. A and B) is a suitable instrument for measuring school readiness among Indian children will certainly yield interesting results.

The hypothesis that the N.B.G.T. 5/6 is a suitable instrument for measuring school readiness among Indian children was investigated through an analysis of quantitative and qualitative data.

1.1 The Quantitative Analysis comprised the following aspects:

1.1.1. The means of the schoolers, preschoolers and nonschoolers (taken separately) were compared with the means of White five-and-six-year-olds to ascertain which pairs of means differed significantly. The test would be regarded as being unsuitable for use with those groups where significant differences appeared since such differences in performance would be due to factors other than chance alone.

1.1.2./...

1.1.2. The distribution of the mental ages and IQ's of the schoolers, preschoolers, and nonschoolers (taken separately) according to White norms were studied so as to ascertain to what extent the distributions of each of the Indian groups approximated the ideal of a normal distribution curve. According to the Manual, ⁽¹⁾ the results of the N.B.G.T. for Five-and-Six-Year-Olds showed a normal distribution. The lesser the extent to which the distribution curves of the Indian groups conformed to the curve of normal distribution, the less suitable would the test be for the group concerned.

1.1.3. The order of difficulty of the items for White and Indian children in each subtest was studied. The smaller the correspondence, the less suitable the subtest.

TABLE 4.1

COMPARISON OF THE DIFFERENCE BETWEEN THE MEANS AND STANDARD DEVIATIONS OF THE RAW SCORES AND IQ'S OF WHITES AND INDIAN SCHOOLERS, PRESCHOOLERS, AND NONSCHOOLERS ON THE NATIONAL BUREAU GROUP TEST 5/6, RESPECTIVELY¹

	N	RAW SCORES				IQ'S			
		\bar{X}	s	z	P	\bar{X}	s	z	P
Whites	1849	20,5	10,2	-	-	100	17	-	-
Schoolers	60	15,18	5,85	6,68	.01	92,7	10,03	5,16	.01
Preschoolers	48	12,17	5,61	9,79	.01	87,52	10,37	7,98	.01
Nonschoolers	48	9,48	4.51	15,80	.01	82,46	8,84	13,00	.01

From Table 4.1 it can be seen that the differences between the means were highly significant for both raw scores and IQ's, all the Indian groups showing inferior performances. The increasing z-values indicate that the test becomes more and more unsuitable as one goes from schoolers to preschoolers to nonschoolers.

1. See Appendix E, p for statistical information related to Table 4.1.

1.1.2. Distribution of Mental Ages and IQ's

In relation to the European norms given in the Manual⁽²⁾ accompanying the N.B.G.T. 5/6, the distribution of the Mental Ages and IQ's of the Indian children based on their performance in the test were as follows:

TABLE 4.2

FREQUENCY DISTRIBUTION OF MENTAL AGES AND IQ's OF INDIAN SAMPLES BY EUROPEAN NORMS

F R E Q U E N C I E S					
RAW SCORES (Max. 50)	MENTAL AGE	I Q	SCHOOLERS (N=60)	PRESCHOOLERS (N=48)	NONSCHOOLERS (N=48)
2					2
3				1	3
4		70		3	3
5	4 - 0	74	1	0	1
6	4 - 2	76	1	3	3
7	4 - 3	78	1	4	4
8	4 - 5	80	3	3	7
9	4 - 6	82	5	4	3
10	4 - 8	84	4	3	0
11	4 - 10	86	5	3	3
12	4 - 11	88	5	2	9
13	5 - 1	90	3	4	3
14	5 - 2	92	4	3	0
15	5 - 4	94	1	4	2
16	5 - 6	95	1	0	2
17	5 - 7	96	5	2	1
18	5 - 9	98	3	3	1
19	5 - 11	100	7	2	1
20	6 - 0	102	0	0	0
21	6 - 2	104	2	1	0
22	6 - 3	105	1	1	0
23	6 - 5	106	0	1	0
24	6 - 7	108	2	0	0
25	6 - 8	109	0	0	0
26	6 - 10	110	4	0	0
27	6 - 11	112	1	0	0
28	7 - 1	114	1	0	0
29	7 - 3	115	0	0	0
30	7 - 4	116	0	1	0

It will be noticed from Table 4.2 that only eleven schoolers and four preschoolers had a mental age of 6 years or above by White standards. Not a single nonschooler reached this level.

In so far as IQ was concerned, eighteen schoolers, six preschoolers, and one nonschooler were found to have an IQ of 100 or above according to the norms for White children.

The raw-score frequencies in Table 4.2 were next converted to percentages and super-imposed graphs drawn (Fig. 4.1, .4.2, and 4.3).

It can be seen that all three polygons are seriously skewed to the right, indicating that the N.B.G.T. 5/6 proved progressively too difficult for the Indian schoolers, preschoolers and nonschoolers, respectively. All contrast to a marked degree with the normal distribution curve obtained for White scores. The curves for the other two tests used in this investigation, namely, the RCPM and the PPVT are more 'normal'.

1.1.3. Order of Item Difficulty

In assessing the suitability of a test prepared for one population group for use with another group, the order of difficulty of the items comprising the test is of crucial importance. The researcher

surmised/



KEY

Red : Schoolers
Black : Preschoolers
Blue : Nonschoolers

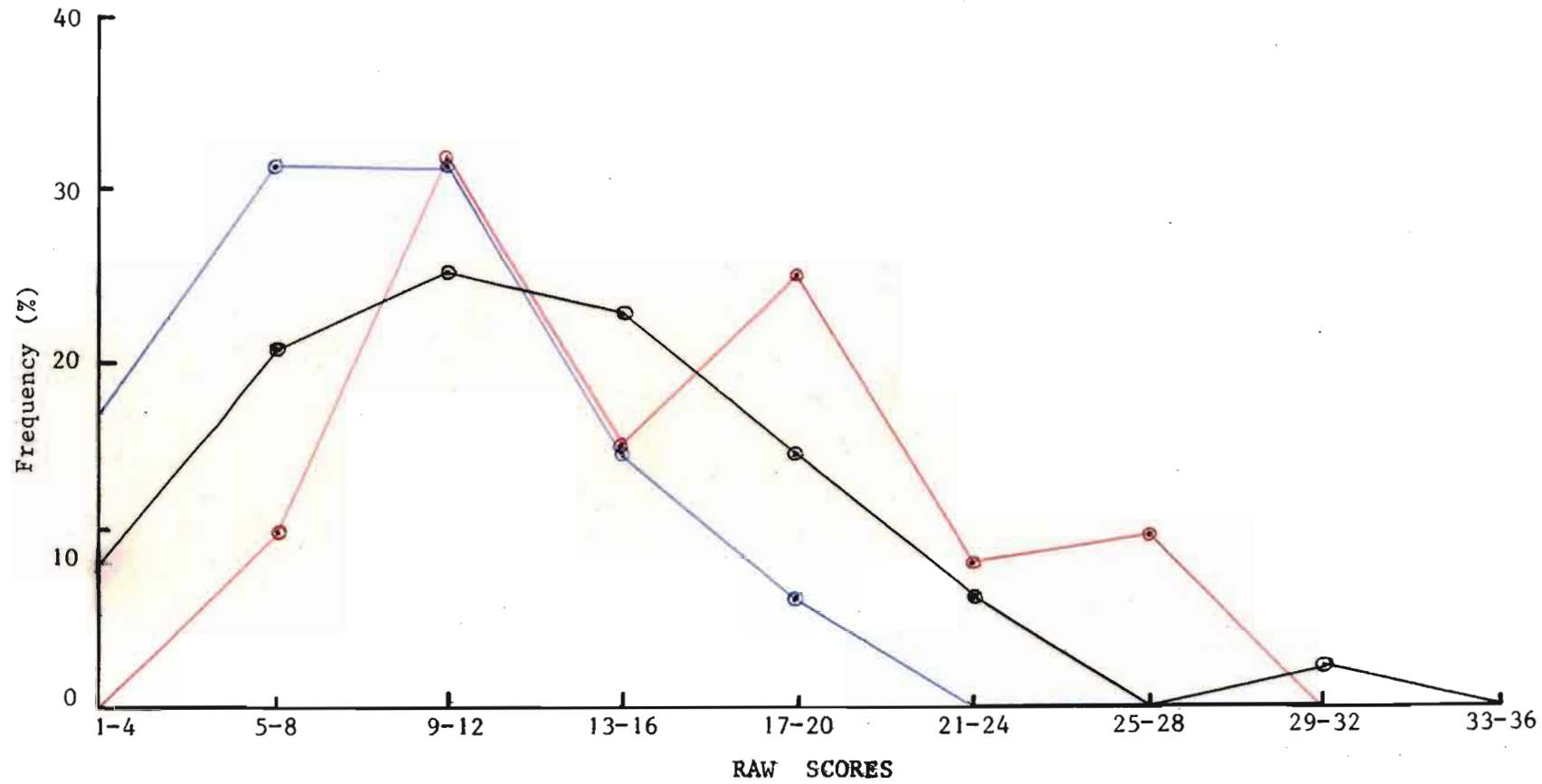


Fig. 4.1 Graphs Showing Distribution of Raw Scores of Schoolers, Preschoolers and Nonschoolers on the N.B.G.T. 5/6

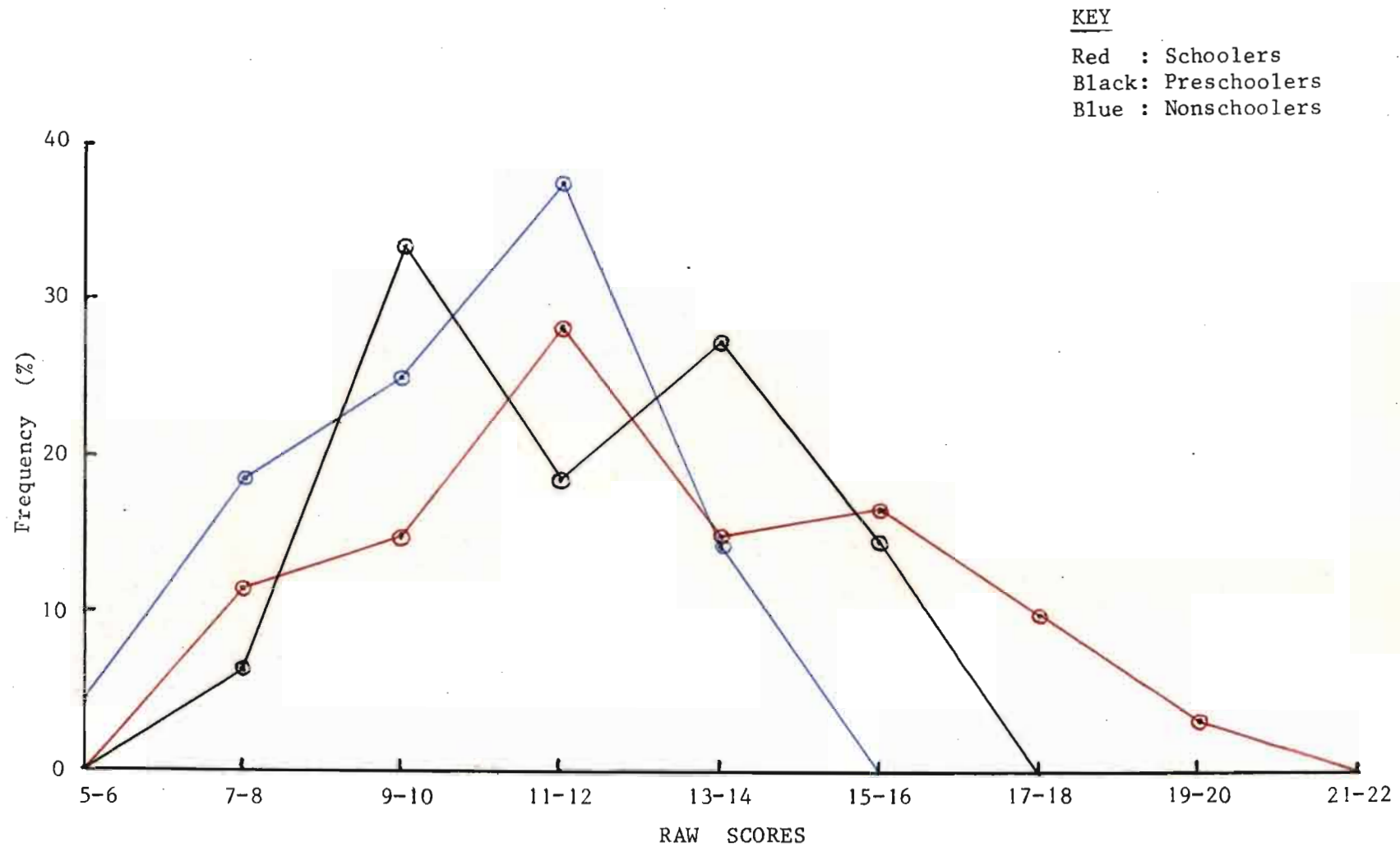


Fig. 4.2. Graphs Showing Distribution of Raw Scores of Schoolers, Preschoolers and Nonschoolers on the RCPM

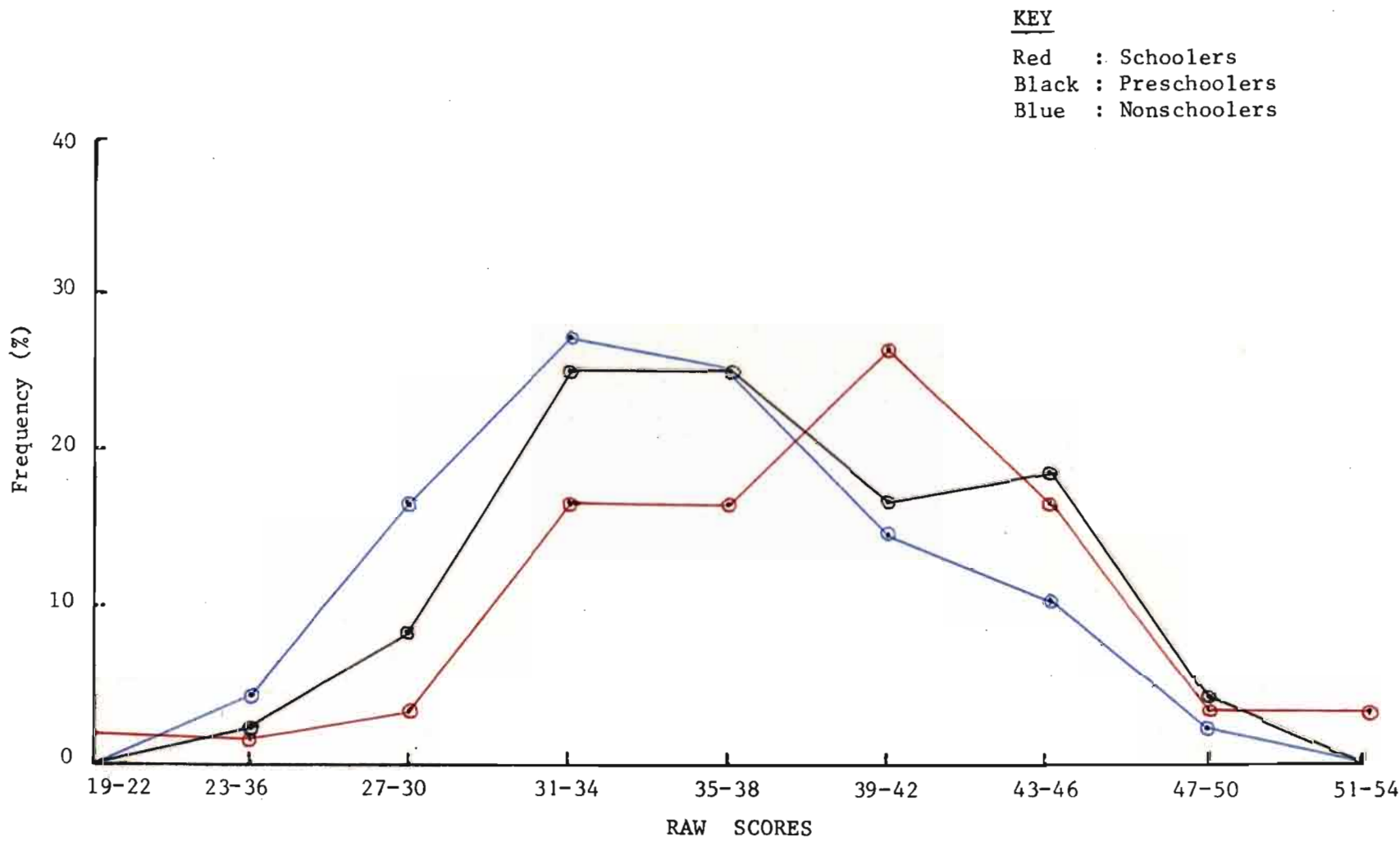


Fig.4.3. Graphs Showing Distribution of Raw Scores of Schoolers, Preschoolers and Nonschoolers on the PPVT.

surmised that the Indian children (whose scholastic, cultural and environmental background were different from those of the White children on whom the test was originally standardised) would find it relatively difficult to deal with items that have proved easy for most White children. It was also likely that those items which the average White child found too difficult, would fall well beyond the level of ability of the average Indian child.

In order to get the best out of both the test and the child, it is vital that those items in which he is likely to succeed be placed as near the beginning of the test as possible. The fact that a child may be discouraged by one or two "snags" early on must not be discounted.

Table 4.3 indicates the percentage of correct responses for each item in each subtest. This information was used as the basis for deciding the order of difficulty of the items for Indian children. The easier the item, the larger the percentage of children who answer it correctly. As far as the White children are concerned, the items are already arranged from the easiest to the most difficult.

TABLE 4.3./...

TABLE 4.3

COMPARISON OF ORDER OF ITEM DIFFICULTY FOR WHITE
AND INDIAN CHILDREN ON THE N.B.G.T. 5/6

<u>SUBTEST 1</u>	Order of Difficulty for White Children (N=1849)	Order of Difficulty for Indian Children (N=156)	Percentage of Indian children who answered item correctly (N=156)
1	1	1	54,5
2	2	2	35,9
3	3	6	8,3
4	4	8	5,1
5	5	7	7,7
6	6	3	17,9
7	7	5	10,9
8	8	4	12,2
<u>SUBTEST 2</u>			
14	1	1	64,7
15	2	2	49,4
16	3	3	41,0
17	4	5	23,7
18	5	4	24,4
19	6	6	18,6
20	7	7	18,0
21	8	8	8,3
22	9	9	7,1
23	10	10	5,1
<u>SUBTEST 3</u>			
24	1	1	82,7
25	2	2	72,4
26	3	4	27,6
27	4	6	21,8
28	5	3	51,9
29	6	5	25,0
<u>SUBTEST 4</u>			
30	1	3	42,3
31	2	1	52,6
32	3	5	21,8
33	4	4	27,6
34	5	1	52,6

TABLE CONTINUED..../

TABLE 4.3. CONTINUED.....

Item	Order of Difficulty for White Children (N=1849)	Order of Difficulty for Indian Children (N=156)	Percentage of Indian children who answered item correctly (N=156)
SUBTEST 5			
35	1	5	16,7
36	2	2	21,8
37	3	1	41,0
38	4	2	21,8
39	5	4	18,6
40	6	6	14,7
SUBTEST 6			
41	1	1	17,9
42	2	2	6,4
43	3	3	3,8
44	4	5	2,6
45	5	4	3,2

It is obvious that there is very little wrong with the grading of the items in Subtest 2 (Mazes) and in Subtest 6 (the joining of dots). In the case of the other four subtests, however, the present arrangement of the items is not wholly appropriate for use with Indian children as it does not represent a smooth ascending order.

White and Indian rank-order correlations were then computed for each subtest to ascertain the degree of correspondence or divergence. The results are indicated Table 4.4.

TABLE 4.4/...

TABLE 4.4.

SPEARMAN RANK-ORDER CORRELATION COEFFICIENTS OF
WHITE AND INDIAN RANK ORDERS ON N.B.G.T. 5/6
SUBTESTS¹

SUBTESTS	RHO	P
1	0,310	> ,05
2	0,988	< ,05
3	0,714	> ,05
4	,250	> ,05
5	0,286	> ,05
6	0,900	< ,05

It will be seen that significant correlations were obtained in only two of the six subtests, namely, subtests 2 and 6.

The non-significant correlations obtained in the case of the other four subtests clearly show that the order of difficulty of the items are significantly different for Whites and Indians.

The finding is a further indication of the unsuitability of the N.B.G.T. 5/6 in its present form for use with Indian children.

Thus all three quantitative analyses show that the N.B.G.T. 5/6 is unsuitable for Indian children.

1.2. The Qualitative Analysis of the data in respect of General Aim (a) entailed an examination of the contents and instructions of the N.B.G.T. 5/6. The fact that the

1. See Appendix ? for statistical information related to Table 4.4.

investigator was compelled to use the N.B.G.T. 5/6 as an individual rather than as a group test proved to be a blessing since a number of observations, which would otherwise have escaped notice, were made when the tester and the child were placed in a face-to-face situation. Questions put to the child enabled the tester to make a qualitative assessment of his responses and provided many valuable clues as to the pitfalls which should be avoided when standardising this test for Indian children, if a standardisation is considered worth the while.

Some of the more important observations which were made will now be discussed with a view to determining the suitability of the test for use with Indian children from the qualitative point of view.

It was found that the following three sources were responsible for the wide differences in the scores of White and Indian children:

- 1.2.1. Weakness in the test itself
- 1.2.2. Cultural differences and environmental factors
- 1.2.3. Difficulties in regard to the instructions.

Each of these aspects will now be considered.

1.2.1. Weaknesses in the Test Itself from the Point of View of the Indian Child

1.2.1.1./...

1.2.1.1. Quality of the Pictures

Some of the subjects found that the pictures which appear in the test, lacked in clarity and were often ambiguous. The following are examples:

Item 4: The fourth key in the large box is intended to be similar to the key in the first box. The fact that this is not really so was brought out by an observant child who pointed to a distinct "hook" towards the centre of the fourth key. This causes it to look different from the key in the first box as the hook in the latter is less pronounced.

Item 6: According to the Manual⁽³⁾, the second set of lines, when turned, will look just like the one in the first box. However, when one compares the two pictures, one finds a perceptible difference of about two millimeters between the lengths of the centre lines in the two diagrams. There is also the suggestion that the lines of the picture in the larger box are thicker and darker than those of the picture in the first box. These factors, in all likelihood do, to some extent, influence the child's perception and, therefore, his response. A child who perceives these differences and then concludes that differences in the lengths of the lines do not seem to matter may well be influenced to mark the fourth picture in the large box as well.

Item 27: Some children found that the drawings of the pear, the beans and the apple were not clear enough. As a result they marked the pear as being the thing which is not a fruit but can be eaten.- they interpreted the picture as representing a calabash (or as one child put it, a "loki", the Hindi word for this vegetable).

Other children marked the apple since they misinterpreted it to be a tomato.

In the case of the beans responses such as chillies, snakes and bananas were received. One testee referred to them as "sheep's legs"! Incidentally, curried trotters is a much enjoyed dish among most Indians.

Item 28: Often the comb was mistaken for a brush and the toothbrush for a hairbrush.

Item 33: There was one case of a child who marked the first hand as being different from the others instead of the third because the nail on one of the fingers of this hand is missing. He was penalised for being a little too observant (and intelligent?)!

Items M, 41, 42, 43, 44, 45: Children, whether nonschoolers, preschoolers, or schoolers, who were

left-handed, were handicapped on these items. They tended to block the models which they were supposed to copy. The tester overcame this difficulty by pasting the models on pieces of cardboard and presenting them to children who suffered this disability.

1.2.1.2. Size of the Pictures

Some children were puzzled by the fact that a kennel, a camping tent, and a hut (as depicted in Item B) are almost of the same size as a house. The same comment applies in the case of the drawings of the animals in Items A, J, 29 and 31.

1.2.2. Cultural Differences and Environmental factors

Cultural differences and environmental factors render some of the items that appear in the Test unsuitable for use with Indian children. Examples include:

Item B: Some children were clearly bewildered when it was pointed out to them that the fourth picture in box B was a tent. The only type of tent with which they were familiar was the one used at Indian weddings. This tent is constructed by placing a large sheet of tarpaulin over a more or less rectangular bamboo framework. Its shape differs considerably from the bivouac presented in the test. The children who gave incorrect answers to this item came mainly from the

lower socio-economic group. While some children from the higher status group did have first-hand experience of tents which were used during picnics, a greater number of them had come to know about tents because they had seen them pitched on the beaches along the Natal North and South Coasts. It is clear that the ignorance of the lower class child in this respect stems from experiential deprivation.

Items A, C and D: Objects such as bunnies, prams and teddy bears are far too expensive for average Indian parents to purchase. As a result, these items often fall outside the range of experience of their children. Even if they have had the privilege of inspecting and handling a pram, it is rarely one of the expensive types as depicted in the picture. The same comments apply to the picture of the pair of binoculars in Item 24.

Items C, L and 36: It was interesting to find a Muslim child starting to count and mark the mice, bunnies and shoes that appear in these items from the right-hand side and then proceeding to move towards the left. This procedure was probably carried over from the vernacular classes where the direction followed in reading Arabic and Urdu is from left to right.

Item 27: Here the child is presented with pictures of a pear, a rose stem, two pods of green beans, and

an apple. He is asked to mark the thing which is not a fruit but can be eaten. According to the Manual,⁽⁴⁾ the third item in the large box (i.e., the green beans) is the correct answer. Some children marked the rose. This is also correct since rose petals are often used in the preparation of Indian sweetmeats.

Item 29: Here the child is presented with pictures of a lion, a dog, a deer, and a cow. He has to mark the tame animal which we do not eat. As far as the Hindu child is concerned, there are two possible answers, namely, the dog and the cow. The Hindu religion forbids the eating of meat since the cow, being the giver of milk, symbolises one's mother, and is regarded as a sacred animal.¹

Item J and 31: In each the child is presented with the picture of a fox. The fox, to many a White child is a familiar animal since it often features in the bed-time stories that he is told. Moreover, it is likely that his parents have shown him the picture of a fox in a book that they have probably bought him.

Many/

1. "Hindus do not partake of beef. The principal explanation for this is based on religious ethics, viz., the cow provides milk, cream and butter in return for pasturage alone. The ox serves in the agrarian life of the Hindu. Symbolically the cow is like a 'mother'." (Personal correspondence with Hindu Priest), 30th November 1971.

Many Indian children, particularly those from the lower socio-economic classes, are not told bed-time stories because many of the parents are illiterate. Nor are they able to afford books containing pictures of animals.

Item J also contains the picture of an elephant. This animal figures prominently in Indian folklore but, even if they have been fortunate enough to hear stories about it in English or in the vernacular, many of them are not able to recognise it when presented in picture form.

Item 34: The child is presented with pictures of a plate, a table, a spoon, and a cup and saucer. He is required to mark the thing that does not go with the others. One schooler who marked the spoon instead of the table justified his choice as follows:

*"When we sit to eat, there's a table,
a plate and a cup."*

This response needs to be explained. Generally, in Indian families, children of about five or six years of age are not allowed to help themselves at table. Instead, the mother serves the rice and curry in the same plate and then hands it to him. The child then begins to eat, making use of his fingers. At no time, as far as he is concerned, does a spoon figure in the process.

1.2.3. Difficulties in regard to the Instructions:

The use of the N.B.G.T. 5/6 as an individual test clearly revealed the need for modifying the instructions in certain respects.

The instructions to all the questions in Test 1⁽⁵⁾ are framed in a uniform manner. The child is asked, for instance, to mark:

1. All the flowers that look just like the one in the first box;
2. All the cups that look just like the first one;
3. All the dogs that look just like the first one;
4. All the keys that look just like the first one.

Although great care was taken to explain to the children, by means of Example G, that they were required to mark only those cats that looked just like the cat in the first box, the value of this lesson was lost in the case of two children when they began to work Items 1 to 8 on their own. They gave the impression that they were only concerned with the first part of the instruction, the second part (i.e., "...that look just like the one in the first box") did not seem to have registered. As a result they kept marking every one of the four items in each of the eight large boxes. It must be mentioned here that the tester took care not to

give/

give undue emphasis to the word "all". It is unfortunate that these children had to pay the penalty eight times for a single type of mistake. If the manner of wording the questions had been varied, it is possible that such a situation would not have arisen.

It is interesting to speculate, however, about the reasons behind the responses of these two children. Was it that they were not sufficiently familiar with the English language as to be able to register fast enough what was being said to them with the result that they were still too busy interpreting the first part of the instructions when the second part was being read to them, which would explain the "loss" of this section of the instructions on them? Or was it that their attention-span was too short? Or was it that the children acquired a mental set as soon as they heard the first part of the instructions, a state of mind which caused the second part of the instructions to make no impression on them? Any one of these possibilities could have been responsible for the childrens' reactions.

The instructions to all the questions in Test 4,⁽⁶⁾ as well, are framed in a uniform manner.¹ The child is asked/

1. At the time of testing a previous edition of the N.B.G.T. 5/6 Manual was used. The instructions given above appear in this issue. It has been learnt subsequently that the instructions have been made clearer in the more recent edition of the Manual. It is likely that if the new set of instructions had been followed, the children would have responded better.

asked, for instance, to mark:

1. the man that does not go with the others;
2. the thing that does not go with the others;
3. the hand that does not go with the others.

Once again, greater variety in the way in which the questions are worded, is desirable.

Moreover, the use of Item K (a box comprising pictures of four men, three of whom are standing and one sitting) is unfortunate as it helps to stamp into some children the idea that the idiomatic "go" in the instructions literally implies physical movement. As a result, it becomes the tester's task to explain to the child that the phrase "does not go" as used in the present context means "is different from" or "is not similar to". Perhaps another example which gives no indication of physical movement would have been more suitable. Or better still, why not get rid of all idiomatic language in the instructions?

Other words which appeared in the instructions and presented a number of Indian children with some difficulty were "bunny" in Items A, J, and L, "tame" in Item 29 and "pipe" and "furthest" in Item 38.

1.3. SOME INTERESTING RESPONSES

The individual test situation presented the tester with the opportunity of questioning the children regarding their responses. In this section an attempt is made to recount some

of/

of the more interesting responses. The writer's comments are not necessarily criticisms of the test.

Items G and 3: In Item G the child is asked to mark all the cats that look just like the cat in the first box while in Item 3 he is asked to mark all the dogs that look just like the dog in the first box. Some children, in both these instances, began to look for similarities solely in terms of facial appearance. Other features such as posture and the fact that one dog had a longer tail than the others were completely overlooked.

Item 4: Only about 5% of the subjects were able to respond to this item correctly. The children were asked to mark all the keys that looked just like the first one. Most of them tended to use the number of openings in the keys as the only criterion by which to judge similarity. The possibility that the sides of the keys could be serrated differently did not occur to them.

Item 24: Here the child is asked to mark "*the thing you take with you to see what the time is*". One child during the pilot study marked the pair of spectacles. Further questioning confirmed the tester's suspicion that this child was thinking in terms of his father who was so short-sighted that he could not tell, by looking at his watch, what the time was unless he had his glasses on.

Item 28./...

Item 28: Here the child is presented with pictures of a comb, a razor, a toothbrush and a pendant. He is asked to mark the thing used by a woman only.

One child marked the razor. Further questioning revealed that his mother used this object when removing the hair on her legs. As for his daddy, the child replied:

"My daddy has an electric shaver."

The response suggests that this particular item would probably not have been out of place in a test constructed in earlier times, before the advent of the electric shaver!

The wisdom of including the pendant can also be criticised on similar grounds. Who can blame a child for not marking this item in these days of the hippie cult?

Item 31: Pictures of a fox, a lion, a horse and a rooster appear in this item. Some children regarded the picture of the fox, (an unfamiliar animal to Indian children) as being that of a dog. When this happened, the reasoning process in the case of at least one child underwent an interesting change: He marked the lion. The dog, the horse and the rooster were for him familiar objects but not so the lion which, quite rightly from the point of view of his own experience, did not "go" with the others! A mistake of this type

can be eliminated if the pictures of the fox and the lion were replaced by, say those of a dog and a cat— from the point of view of the Indian child.

Item 32: In this item the child is shown pictures of a bird, a butterfly, an egg and a bee. Again, he is asked to mark the thing that does not "go with" the others. One of the testees marked the bee. He gave the following explanation for his answer:

"Only the bee stings."

Perhaps he had been stung by a bee at some time in the past, hence the unusual answer!

Items 41 to 45 : These five items make up Test 6 in which a child is required to draw a picture on a given grid. This picture has to look just like the picture that has already been drawn for him on the grid on the left-hand side of the page. Simplified pictures of a motor-car, a man's head, a star, a boat and a bird are presented in the form of a grid.

Of all the items that were drawn correctly, 68% belonged to the schoolers. This group understood more easily what was required of them. Moreover, they tended to draw straighter lines and neater figures. Generally, they did not overrun the dots. It seems that their superiority over the other two groups is the result of the greater amount of practice they have had with paper and pencil. Frequently, the tester had to teach the preschooler, and particularly the nonschooler, the correct manner of holding a pencil when drawing.

R E F E R E N C E S

1. NATIONAL BUREAU OF EDUCATIONAL AND SOCIAL RESEARCH (Department of Education, Arts and Science) : *Manual to National Bureau Group Test for Five-and-Six-Year-Olds and for Seven-and-Eight-Year-Olds*, p. 3.
2. NATIONAL BUREAU OF EDUCATIONAL AND SOCIAL RESEARCH (Department of Education, Arts and Science) : *Op.cit.*, pp. 30-1.
3. NATIONAL BUREAU OF EDUCATIONAL AND SOCIAL RESEARCH (Department of Education, Arts and Science) : *Op.cit.*, p. 22.
4. NATIONAL BUREAU OF EDUCATIONAL AND SOCIAL RESEARCH (Department of Education, Arts and Science) : *Op.cit.*, p. 22.
5. NATIONAL BUREAU OF EDUCATIONAL AND SOCIAL RESEARCH (Department of Education, Arts and Science) : *Op.cit.*, pp. 9-10.
6. NATIONAL BUREAU OF EDUCATIONAL AND SOCIAL RESEARCH (Department of Education, Arts and Science) : *Op.cit.*, pp. 12-13.

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CHAPTER FIVERESULTS OF THE PRESENT INVESTIGATION (CONTINUED)2. GENERAL AIM (b):

The Effects of Schooling, Socio-Economic Status, and Sex on Indian Childrens' Readiness for Formal Schooling as Reflected in their Test Performances on the National Bureau Group Test for Five-and-Six-Year-Olds, the Raven's Coloured Progressive Matrices, and the Peabody Picture Vocabulary Test.

It will be remembered that the second general aim of the present study was to discover to what extent factors such as

- (i) schooling
- (ii) socio-economic status
- (iii) sex

affect an Indian child's readiness for formal schooling.

In order to shed some light on these problems, it was decided to use the N.B.G.T. 5/6 together with two other mental tests, one largely non-verbal and the other largely verbal (in contrast to the N.B.G.T. 5/6 which is partly verbal and partly non-verbal). The decision to use the two additional tests was motivated by a desire to obtain a broader basis for conclusions than the N.B.G.T. 5/6 by itself would have provided.

The/

The following tables are largely self-explanatory

TABLE 5.1

ANALYSIS OF VARIANCE OF THE RAW SCORES OF
60 INDIAN SCHOOLERS ON THE N.B.G.T. 5/6¹

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	0,016	1	0,016	0,001	>,05
B : STATUS	360,150	1	360,150	12,091	<,01
A x B : SEX x STATUS	22,817	1	22,817	0,766	>,05
ERROR : WITHIN GROUPS	1668,000	56	29,786		
TOTAL	2050,983	59			

TABLE 5.2

ANALYSIS OF VARIANCE OF THE RAW SCORES OF
48 INDIAN PRESCHOOLERS ON THE N.B.G.T. 5/6¹

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	10,084	1	10,084	0,471	>,05
B : STATUS	300,000	1	300,000	14,017	<,01
A x B : SEX x STATUS	4,083	1	4,083	0,191	>,05
ERROR : WITHIN GROUPS	1198,500	56	21,402		
TOTAL	1512,667	59			

TABLE 5.3

ANALYSIS OF VARIANCE OF THE RAW SCORES OF
48 INDIAN NONSCHOOLERS ON THE N.B.G.T. 5/6¹

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	15,187	1	15,187	1,385	>,05
B : STATUS	256,687	1	256,687	23,408	<,01
A x B : SEX x STATUS	6,021	1	6,021	0,549	>,05
ERROR : WITHIN GROUPS	614,084	56	10,966		
TOTAL	891,979	59			

1. See Appendix for Statistical Information related to Table 5.1.

TABLE 5.4

ANALYSIS OF VARIANCE OF THE RAW SCORES OF
60 INDIAN SCHOOLERS ON THE RAVEN MATRICES

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	0,149	1	0,149	0,0156	>,05
B : STATUS	66,149	1	66,149	6,9280	<.05 >.01
A x B : SEX x STATUS	,017	1	0,017	0,0017	>,05
ERROR : WITHIN GROUPS	534,668	56	9,548		
TOTAL	600,983	59			

TABLE 5.5

ANALYSIS OF VARIANCE OF THE RAW SCORES OF 48
INDIAN PRESCHOOLERS ON THE RAVEN MATRICES

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	1,020	1	1,020	0,179	>,05
B : STATUS	1,687	1	1,687	0,296	>,05
A x B : SEX x STATUS	22,688	1	22,688	3,978	>,05
ERROR : WITHIN GROUPS	250,917	44	5,703		
TOTAL	276,312	47			

TABLE 5.6

ANALYSIS OF VARIANCE OF THE RAW SCORES OF
48 INDIAN NONSCHOOLERS ON THE RAVEN MATRICES

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	7,521	1	7,521	1,733	>,05
B : STATUS	13,021	1	13,021	3,001	>,05
A x B : SEX x STATUS	3,521	1	3,521	,811	>,05
ERROR : WITHIN GROUPS	190,916	44	4,339		
TOTAL	214,979	47			

TABLE 5.7./....

TABLE 5.7
ANALYSIS OF VARIANCE OF THE RAW SCORES OF
60 INDIAN SCHOOLERS ON THE PPVT

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	2,816	1	2,816	0,107	>,05
B : STATUS	464,816	1	464,816	17,639	<.05 <.01
A x B : SEX x STATUS	98,817	1	98,817	3,750	>,05
ERROR : WITHIN GROUPS	1475,734	56	26,352		
TOTAL	2042,183	59			

TABLE 5.8
ANALYSIS OF VARIANCE OF THE RAW SCORES OF
48 INDIAN PRESCHOOLERS ON THE PPVT

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	14,083	1	14,083	0,518	>,05
B : STATUS	385,333	1	385,333	14,166	<,01
A x B : SEX x STATUS	6,750	1	6,750	0,248	>,05
ERROR : WITHIN GROUPS	1196,834	44	27,201		
TOTAL	1603,000	47			

TABLE 5.9
ANALYSIS OF VARIANCE OF THE RAW SCORES OF
48 INDIAN NONSCHOOLERS ON THE PPVT

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SEX	0,208	1	0,208	0,012	>,05
B : STATUS	595,022	1	595,022	34.378	<,01
A x B : SEX x STATUS	42,188	1	42,188	2,437	>,05
ERROR : WITHIN GROUPS	761,562	44	17,308		
TOTALS	1398,980	47			

Tables 5.1 to 5.9 show that on all three tests used in this investigation - the National Bureau Group Test for Five-and-Six-Year-Olds, Raven's Coloured Progressive Matrices, and the Peabody Picture Vocabulary Test - and in the case of each of the three groups tested - schoolers, preschoolers, and nonschoolers - significant differences associated with sex are consistently lacking. The same holds true for the interaction between sex and socioeconomic status.

In respect of socioeconomic status, however, highly significant differences ($p < .01$) on the N.B.G.T. and PPVT in the case of all three groups appeared.

On the Matrices on the other hand, there is a significant difference ($p < .05$) only in the case of the schoolers. In this connection it is interesting to note that the means of the high status children in both the preschool and nonschool groups was consistently better than that of the children from the low status groups though not significantly so. The respective means are presented in the table below:

TABLE 5.10

MEANS OF THE RAW SCORES OF PRESCHOOLERS AND NON-SCHOOLERS ON THE RAVEN'S MATRICES BY SES

GROUP	HIGH S-E S	LOW S-E S
Preschoolers	23.70 (N = 24)	23.00 (N = 24)
	21.80 (N = 24)	19.70 (N = 24)

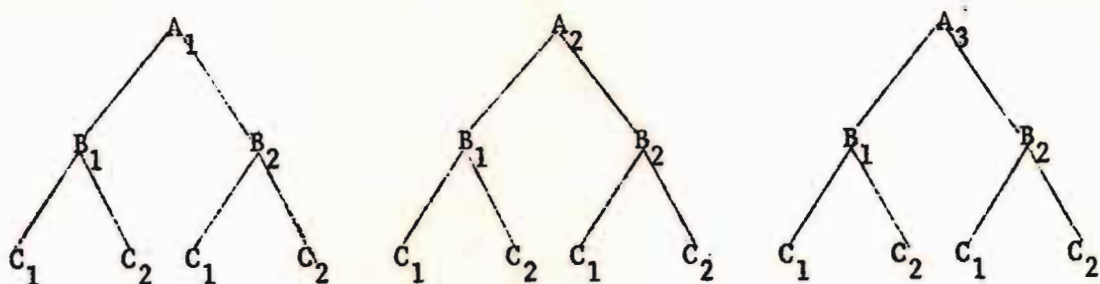
The fact that a significant difference on the Matrices emerged only in respect of the schoolers suggests that the test involves thought processes that are susceptible to development by the stimulation provided by the school. This supports Ramphal's finding⁽¹⁾ that pupils who received a greater amount of schooling than other children of the same age scored progressively higher with increasing increments of education. The findings of Omberdane in Central Africa and Weil in Brazil (reported by Vernon⁽²⁾) are also interesting. Omberdane found a rise in performance on the RCPM with age, but among Africans receiving no schooling there was no rise beyond twelve years, and those aged seventeen scored no better than six-year-olds. Weil used a test similar to the Matrices with large numbers of Brazilians and found that the completely unschooled made no progress beyond the normal six-year-level. Bradford⁽³⁾ has also expressed doubts about the independence of the test of schooling.

The scores of the total sample were then considered in respect of each of the three main variables and their interactions on the three tests separately.

A 3 x 2 x 2 factorial design was used. The pattern of the analysis was as follows:

TABLE 5.11/

TABLE 5.11

A 3 x 2 x 2 FACTORIAL DESIGN

KEY: A_1 : Schoolers B_1 : High Socio-economic Status C_1 : Boys
 A_2 : Preschoolers B_2 : Low Socio-economic Status C_2 : Girls
 A_3 : Nonschoolers

This is a modification of the $2 \times 4 \times 3$ design presented by Lindquist⁽⁴⁾. Edwards⁽⁵⁾ is another useful source authority.

The results are presented in Tables 5.12 to 5.14 below:¹

TABLE 5.12/

TABLE 5.12

ANALYSIS OF VARIANCE OF THE RAW SCORES OF 156 INDIAN
SCHOOLERS, PRESCHOOLERS AND NONSCHOOLERS ON THE N.B.G.T. 5/6¹

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SCHOOLING	875,371	2	437,686	18,108	<.01
B : STATUS	915,923	1	915,923	37,893	<.01
C : SEX	14,769	1	14,769	0,611	>.05
A x B : SCHOOLING x STATUS	0,915	2	0,458	0,019	>.05
A x C : SCHOOLING x SEX	10,518	2	5,259	0,218	>.05
B x C : STATUS x SEX	10,256	1	10,256	0,424	>.05
A x B x C : SCHOOLING x STATUS x SEX	22,665	2	11,333	0,469	>.05
ERROR : WITHIN GROUP	3480,583	144	24,171		
T O T A L	5331,000	155			

TABLE 5.13/

1. See Appendix *x* for statistical information related to Table 5.12.

TABLE 5.13

ANALYSIS OF VARIANCE OF THE RAW SCORES OF 156 INDIAN
SCHOOLERS, PRESCHOOLERS AND NONSCHOOLERS ON THE RAVEN MATRICES

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SCHOOLING	125,283	2	62,642	9,238	<.01
B : STATUS	60,314	1	60,314	8,894	<.01
C : SEX	1,443	1	1,443	,213	>.05
A x B : SCHOOLING x STATUS	20,545	2	10,272	1,515	>.05
A x C : SCHOOLING x SEX	7,249	2	3,624	,534	>.05
B x C : STATUS x SEX	2,314	1	2,314	,341	>.05
A x B x C : SCHOOLING x STATUS x SEX	23,910	2	11,955	1,763	>.05
ERROR : WITHIN GROUP	976,500	144	6,781		
TOTAL	1217,558	155			

TABLE 5.14

ANALYSIS OF VARIANCE OF THE RAW SCORES OF 156 INDIAN
SCHOOLERS, PRESCHOOLERS AND NONSCHOOLERS ON THE P.P.V.T.

Source of Variation	Sum of Squares	df	Mean Square	F	P
A : SCHOOLING	313,588	2	156,794	6,575	<.01
B : STATUS	1428,110	1	1428,110	59,884	<.01
C : SEX	1,640	1	1,640	,069	>.05
A x B : SCHOOLING x STATUS	17,060	2	8,530	,358	>.05
A x C : SCHOOLING x SEX	15,477	2	7,739	,324	>.05
B x C : STATUS x SEX	125,641	1	125,641	5,268	<.05 >.01
A x B x C : SCHOOLING x STATUS x SEX	22,084	2	11,042	,463	>.05
ERROR : WITHIN GROUP	3434,150	144	23,848		
TOTAL	5357,750	155			

It will be seen from Tables 5.12 to 5.14 that there are highly significant differences ($p < .01$) on all three tests and in all three groups in respect of schooling and socioeconomic status. The results are consistently positive in respect of the first two variables involved in hypothesis (b), namely that significant differences exist between groups of Indian children arising out of both schooling and socioeconomic status. Since, as Lordhal⁽⁶⁾ points out, the F-ratio tests a rather global hypothesis, it became necessary to perform a series of t-tests with respect to the main instrument under consideration, the N.B.G.T., in order to ascertain which groups differed from each other with regard to schooling. Since socioeconomic differences were found to be significant, this factor was held constant. There was no need to do this in the case of sex since this variable showed no significant differences. It therefore became possible to combine the sexes. The following t-values were obtained:

TABLE 5.15

COMPARISON OF THE MEANS OF THE RAW SCORES OF
INDIAN SCHOOLERS, PRESCHOOLERS AND NONSCHOOLERS
ON THE N.B.G.T. BY SES¹

	S-E S	t	P
Schoolers (N = 30) vs Preschoolers (N = 24)	High	1.74	>.05
	Low	2.77	<.01
Preschoolers (N = 24) vs Nonschoolers (N = 24)	High	1.92	>.05
	Low	2.38	<.05
Schoolers (N = 30) vs Nonschoolers (N = 24)	High	4.20	<.01
	Low	5.18	<.01

These/

1. See Appendix for statistical information related to Table 5.15.

These results show that children from the lower socioeconomic class benefit from schooling, formal or otherwise, to a greater extent than children from upper-class homes. This is indicated by the fact that low status yielded significant differences when schoolers and preschoolers were compared as well as when preschoolers and nonschoolers were compared and the absence of significance for high status children in both cases. In addition, when schoolers and nonschoolers were compared, the t-value for the two low status groups was higher than the t-value for the high status groups (even though both were significant).

As far as the third variable, sex, is concerned there are no significant differences on all three tests. This is consistent with what was found when each of the three groups was studied separately.

There are two particularly interesting features to note when the performance of the total sample is compared with the results obtained when the groups were studied separately:

- (a) Whereas earlier (vide Table 5.4) it was found that the socioeconomic differences on RCPM were significant at the .05 level only in the case of the schoolers, the level of significance jumps up to the .01 level when the entire group is considered;
- (b) Whereas earlier (vide Tables 5.7 to 5.9) it was found that sex x status was not significant for any of the

three groups on the P.P.V.T., this interaction emerges as being significant at the .05 level when the entire group is considered.

These findings indicate that the influence exerted by variables is highlighted more sharply when a heterogeneous sample is tested, rather than a homogenous one. Greater variability among a sample permits sharper focus. For this reason the analyses of the total sample is more productive of positive results.

3. CORRELATIONS

According to the manual, the N.B.G.T. 5/6, besides being used to determine school readiness, can also be used as a test of intelligence. In order to get some idea of the validity of this test as a test of intelligence, the scores that were obtained on the N.B.G.T. 5/6 were correlated with the scores obtained on the two other tests of intelligence, namely, the R.C.P.M. and the P.P.V.T.

In the case of the schoolers and the preschoolers another fruitful avenue for investigation presented itself, namely, the relationship between teachers' ratings and performance on the N.B.G.T. 5/6, the main test under consideration in the present study.

In all these instances, product-moment correlations were computed and the results are presented in Table 5/6.

TABLE 5.16

INTERCORRELATIONS AMONG TESTS AND TEACHERS' RATINGS WITH
SCHOOLERS, PRESCHOOLERS AND NONSCHOOLERS

	Schoolers	P	Preschoolers	P	Nonschoolers	P
N.B.G.T. 5/6/RCPM	0,460	<.01	0,353	<.05	0,354	<.05
N.B.G.T. 5/6/PPVT	0,613	<.01	0,670	<.01	0,498	<.01
N.B.G.T. 5/6/TEACHERS' RATINGS	0,275	<.05	0,355	<.05	-	
RCPM/PPVT	0,483	<.01	0,350	<.05	-0,294	

The table shows the following:

Performance on the RCPM is correlated significantly with performance on the N.B.G.T. 5/6, more so in the case of schoolers ($p < .01$) than in the case of the other two groups ($p < .05$).

Performance on the PPVT is correlated with performance on the N.B.G.T. 5/6 consistently at the .01 level of significance for all three groups.

Since all these correlations are significant, it may be concluded that the N.B.G.T. 5/6, with all its defects, possesses validity as a mental test for Indian children but the coefficients are too low for it to be regarded as a good test per se for the purpose

It is interesting to note that the RCPM and the PPVT also show a low but significant correlation with Indian children.

Further evidence on the validity of the N.B.G.T. 5/6 comes from teachers' ratings which show a significant correlation with the test for both schoolers and preschoolers although the coefficients are again low.

The message of this correlational study confirms the previous conclusion that the N.B.G.T. 5/6 is of limited usefulness for use with Indian six-year-olds even as a test of intelligence.

CHAPTER SIXGENERAL CONCLUSIONS AND RECOMMENDATIONS1. RELEVANCE OF THE PRESENT STUDY

The results of the present investigation have practical value in view of the fact that it has revealed that a group test of school readiness suitable for use with Indian children in South Africa does not yet exist. It is likely that the information gained from this preliminary investigation with the N.B.G.T. 5/6 will prove useful when such a task is attempted.

It has already been mentioned that the present system of using chronological age as the sole criterion for entrance into Grade I is unsatisfactory since it largely ignores individual differences among children. Studies in Austria, for example, suggest that in the age group 5 years 9 months to 5 years 11 months at least 7 to 10 per cent of the children are ready to start school and, according to Seyfried, they would certainly suffer no harm from starting school before reaching the official school age.⁽¹⁾ In a similar way, it is not unlikely that there are some Indian children who are ready for formal instruction in Grade I even before they have reached the minimum entrance age requirement. If, as Vernon⁽²⁾ says, the possibilities of mental growth deteriorate when schooling is delayed, is true, these children are at a disadvantage.

On the other hand, it is also possible that there are some Indian children who, though they have reached the statutory entrance age are not yet ready for the formal school requirements of Grade I. Such children find it difficult to meet the demands of the school situation and, as Kephart⁽³⁾ points out, since later learning is based to a large degree upon earlier learnings, these children find themselves in ever-increasing difficulty as their school experience continues.

In view of these considerations, the value of a test of school readiness becomes obvious. Such a test should be able to screen children for placement in a regular Grade I class, in an accelerated Grade I class, or in a class preparatory to Grade I.

Further discussion will proceed under the respective general aims of this research.

2. GENERAL AIM (a)

It will be recalled that of the three South African group tests of school readiness standardised by the Human Sciences Research Council, the N.B.G.T. 5/6 was considered as being the one which would most likely be suitable for use with Indian children. Alternatively, this test was considered to be the one which would require the least number of changes to make it suitable for use with Indian children.

Quantitative and qualitative analysis of the data related to the N.B.G.T. 5/6 show clearly that this test, unmodified, is unsuitable for use with Indian children. However, in view of
the/

the large number of modifications that will be necessary to make the test useful, the writer considers that it will be more practical to create an entirely new test. The main basic principles underlying the construction of the N.B.G.T. 5/6 should, however, be retained - testing, for example, the child's powers of visual analysis, his capacity for making planned responses, his concepts of quantity, ratio and number, and his ability to carry out spoken instructions.

3. GENERAL AIM (b)

3.1 Schooling

The fact that significant differences were found with respect to school experience indicates that experiences related to the classroom learning situation, formal or otherwise, exert an influence on a child's readiness for school.

TABLE 6.1

MEANS AND STANDARD DEVIATIONS OF THE RAW SCORES OF SCHOOLERS, PRESCHOOLERS AND NONSCHOOLERS ON THE N.B.G.T. 5/6 BY SEX AND SES (MAXIMUM RAW SCORE : 50)

	SCHOOLERS		PRE-SCHOOLERS		NON-SCHOOLERS	
	Mean	SD	Mean	SD	Mean	SD
Boys : High Status	17,0	5,73	15,42	5,88	12,0	3,51
Girls : High Status	18,27	6,48	13,92	6,20	11,58	4,10
Boys : Low Status	13,33	3,94	9,83	3,13	8,08	3,67
Girls : Low Status	12,13	4,57	9,50	4,13	6,25	2,95
N :	60	60	48	48	48	48

The table shows that the means of the schoolers in each group are consistently higher than those of the preschoolers, and those of the preschoolers consistently higher than those of the nonschoolers.

The superiority of the schoolers, and to a lesser degree of the preschoolers, over the nonschoolers can, to some extent, be attributed to certain learning experiences that the first group, particularly, and to a lesser degree the second group, had but which the third group lacked. These include experiences such as following instructions given by relatively strange adults, undertaking tasks requiring discipline, being familiar with a teacher figure and a test situation. Considerations such as these point to the need for preschool enrichment programmes where children could be prepared by informal means to meet the demands of the school before they enter first grade.

3.2 Socio-Economic Status

The fact that significant differences were found in this respect indicates that socio-economic factors have a marked influence on a child's readiness for school.

An examination of Table 6.1 reveals that the means of the high status groups are consistently and appreciably higher than those of the low status groups. As Vernon⁽⁴⁾ points out, it is practically impossible to pin-point any single factor as being responsible for this. Generally, there is a syndrome of mutually interacting factors that can inhibit the test and school performances of children

from/

from lower-class homes. These include poor nutrition and health, overcrowded homes, lack of intellectual stimulation, inferior language background, lack of parental interest in education, and insecure economic future.

These observations bear relevance to the present investigation in view of the fact that the Department of Economics, University of Natal, found that 50-60 per cent of the Indian households in their study had incomes below the cost of living minimum.⁽⁵⁾ Further evidence that "Indian household incomes are relatively low, and a substantial amount of poverty exists amongst the community" is provided in Table 6.1⁽⁶⁾ In this table the income-earners are shown in the various income groups.

TABLE 6.2

PERCENTAGE DISTRIBUTION OF INCOME-EARNERS BY
INCOME GROUPS - NATAL 1960¹

Income Groups (R per annum)	Whites	Coloureds	Indians
Under 200	3,6	23,9	22,8
200 - 399	8,1	22,4	30,2
400 -	6,1	17,9	19,2
600 - 799	10,2	10,1	10,5
800 - 999	7,8	5,4	4,6
1 000 - 1 199	6,7	4,4	3,4
1 200 - 1 599	12,0	6,2	2,5
1 600 - 1 999	14,4	3,3	1,4
2 000 - 2 999	18,1	1,1	0,8
3 000 +	10,4	0,1	0,7
Unspecified	2,6	5,2	3,9
	100,0	100,0	100,0

(Original Source: 1960 Population Census, Sample Tabulation No. 4)

In presenting Table 6.1, McCrystal and Maasdorp wrote:

"Although this information is six years old, the general relative pattern as between the various racial groups is unlikely to have changed to any significant extent. The figures do demonstrate the low incomes, and therefore purchasing power, of the Indians relative to the Whites. Estimated mean per capita incomes in Natal in 1960 were: Whites R803, Coloureds R157, Indians R110, and Africans R59." (7)

It is against this background that the question of school readiness, in the case of a large proportion of Indian children, should be viewed. All evidence today indicates/

1. The official census figures for 1970 have not as yet been analysed insofar as comparative incomes of the various race groups is concerned.

indicates that the child from the lower economic and social class enters the school situation poorly prepared to produce what the school demands. (8)

According to the Plowden Report (Report of the Central Advisory Council for Education, England, 1967) (9) there was strong support among witnesses for the view of Bernstein (10) and Deutsch (11) that poverty of language is a major cause of poor achievement. Insofar as language usage among Indians in Durban is concerned Ramphal (12) and Logue (13) have made certain interesting observations. Ramphal comments as follows:

"...the standard of English in Indian homes in Durban is generally low and provides little or no incentive to children to aspire to heights of linguistic excellence. Very often the English used by elders in the home is crude and elemental. Literal translations of the mother tongue into English are common, resulting in (often amusing) distortions of idiom. Even in those Indian homes where the members speak little else but English the range of vocabulary, idiomatic usage and refined manipulation of expression are, on an average at a much lower level than in an average English-speaking European family. The English language is in the process of being acquired by Indians and, although great progress is being made, ungrammatical forms, poor pronunciation and weak diction are still the general rule. The Indian home has not yet reached a stage where it could decisively influence the English of the child for the better."

Logue writes:

"For most of them, English falls somewhere between a first and a second language. Even though many Indians use English in the local public examinations with tolerable success, it is in the finer shades of word meaning that they are weak. They lack that intangible, but very real knowledge of the language which comes, not from a study of grammar books, but from the daily contact of individuals mixing from birth in an environment which uses English as its means of communication."

More recently, an article on the teaching of reading to beginners which appeared in the *Education Bulletin* (an official publication of the Division of Indian Education) carried the following comment:

"You (referring to Indian teachers) have an enormous problem to face. To many of your pupils the language of instruction at school is not their home language.... When children can scarcely express themselves in a language, they are not ready to learn that language in printed form." (14)

In accordance with the views of Bernstein and Deutsch, the Report of the Central Advisory Committee (England)⁽¹⁵⁾ notes that thought is dependent on language and that some working class children have insufficient encouragement, example and stimulus in the course of their daily lives to build up a language which is rich and wide ranging in vocabulary, is a tool for categorisation and generalisation, and which develops concepts such as those of space and time. Considerations such as these, the report continues, lead to the conclusion that *"since development in communication begins in the earliest years, one way in which the consequences of social deprivation may be overcome is to provide richer experience as soon as children are ready for nursery education"*.⁽¹⁶⁾

In his call for preschool education as a means of reconciling to some extent, the wide discrepancies between the low-status home and school milieus, Deutsch⁽¹⁷⁾ suggests that organised and systematic stimulation, through a structured learning programme should be introduced at the three-to four-year-level (i.e., that period which roughly coincides/

coincides with Piaget's "preoperational stage"). Moreover, at this early age there will be considerably less that will have to be compensated for than when the child gets to the first grade. In any case, at this stage, the child will have become a "less plastic organism". (18)

Recognition of the facts of deprivation has led to a high level of interest in many overseas countries in pre-school programmes as an antidote to the learning problems of the disadvantaged.

The largest and the best-known of these is the Project Headstart in America, a federally financed programme. (19)

It began as a crash project in the summer of 1965. By the end of the second year 1,3 million children had participated in Head Start. Headstart attempts to duplicate for the deprived child the early childhood experiences of middle-class children, on the assumption that those same experiences which contribute to the school readiness of middle-class children will be equally effective in overcoming the deficiencies of lower-class children. Project Headstart has the following aims:

- (a) to help children to learn to work and play independently in a school setting;
- (b) to learn to live effectively with other children, respecting each other's rights;
- (c) to develop a self-identity of competence and worth;
- (d) to have many opportunities to succeed physically, intellectually and socially;

(e) ./...

- (e) to develop language skills, both listening and speaking;
- (f) to develop the curiosity to seek answers to questions;
- (g) to strengthen physical skills and co-ordination;
- (h) to express inner creativity through songs, painting and handicraft;
- (i) to involve parents in the school at meetings and on field trips.

Puzzles, games, flannel board stories, books, music, art, rhythmic activities, opportunities for talking, visits by local policemen and firemen are some of the means used by Headstart to help culturally deprived children.

Other United States programmes include those headed by Martin Deutsch, Susan Gray, Samuel Kirk, Carl Bereiter and Sigfried Engelmann. (20)

In Israel, Moshe and Sarah Smilansky (21) have done a great deal of work in the preschool period for disadvantaged children. They have started a preschool programme to remedy the disadvantage the low socio-economic status children face when they enter primary school by developing children's powers of perception (visual, auditory, sensory-motor co-ordination); the power to think of given developments in a story, arrange pictures in a logical sequence; vocabulary and linguistic ability; general knowledge and its active use (labelling, occupations of various people, knowledge of the time of day); numerical concepts; concepts of place and direction (over, under, beside, less, enough, etc.)

In England, as a result of the Newsom and Plowden reports, attention has been drawn to the need for more and better programmes for educating the disadvantaged.⁽²²⁾ Preschool education has been singled out as having great potential for influencing the child's future attitudes for success in school. Several programmes concentrating on preschool education for the disadvantaged child have begun recently. The University College of Swansea, for instance, is developing screening techniques to select children in need of compensatory education. The aim is to locate those aspects of the environment most debilitating to the children and then to conduct a longitudinal infant-school study to counteract the negative effects of disadvantage. Other preschool programmes in Britain include those of the National Foundation for Educational Research at Slough and the Didsbury College of Education in the educational priority areas of Manchester. One of the most widespread programmes in educational priority areas which has just been started is the Oxford University programme being supported by the Social Science Research Council.

In South Africa,⁽²³⁾ the development of preschool education for Whites received an official boost through Act 39 of 1967. The Administrator is empowered to establish and maintain provincial nursery schools in areas where they are warranted, provided he is satisfied that the enrolment in such a school will not be less than 20. Insofar as Indians are concerned, neither the Coloured Persons Education

Act/

Act, i.e., Act 47 of 1963, nor the Indian Education Act, i.e. Act 6 of 1965, provides for the establishment of State nursery schools. Both Acts, however, provide for the award by the State, subject to certain conditions as determined in every particular instance, of "grants-in-aid" or subsidies and loans to the governing body of any school, including any nursery school, or of a hostel used in connection with such a school. (24)

Up to recent times, interest in nursery school education on the part of the Indian community has been negligible. (25) By 1969 only three nursery schools had been created, of which two were in the Transvaal, and one in Natal. The total enrolment was 89. In 1970 the position remained more or less static. (26) Sure signs that efforts are being made to put an end to this unsatisfactory state of affairs can be seen in the recommendation made by the Consultative Committee for Teacher Training (Division of Education, Department of Indian Affairs) that a course for the training of nursery school teachers be instituted with effect from 1972. (27)

3.3 Sex

The absence of significant differences in this respect indicate that, according to the present investigation, a child's sex does not have any influence on his readiness (or unreadiness) for school. The suggestion that girls are more ready for school than boys of the same chronological age (28) - based on the fact that girls mature (linguistically at least) more rapidly than boys has not been supported.

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4. CONCLUSIONS

The main conclusions that have been reached with respect to this study may be summarised as follows:

- 4.1 The N.B.G.T. 5/6, in its present form, is an unsuitable test to use with Indian children for the purpose of measuring school readiness. So many modifications are necessary to make it useful that a new test specially prepared for and standardised on Indian children should be the aim.
- 4.2 The experiences that result from schooling - whether of the formal or of the preschool type - are the best means of assisting a child on the road to greater readiness for school.
- 4.3 More children from high status Indian homes are ready for school than are children from low status homes at the age of six.
- 4.4 A child's sex does not determine his readiness (or unreadiness) for school.

5. RECOMMENDATIONS

In the light of the findings of the present investigation, the following recommendations are suggested:

- 5.1 A new test of school readiness geared to the needs of Indian children should be prepared and standardised. Such a test should retain the basic principles upon which the N.B.G.T. 5/6 is built.

5.2/...

5.2 Greater attention should be given to the implementation of a preschool programme to make up for the missing stimulation of good homes so as to make these children ready for school. This point has also been stressed by the Director of Education, Natal, in respect of White children. (29,30)

Where no nursery schools exist, reception classes should be established.

Full advantage should be taken of the provisions in the Coloured Persons Education Act (i.e., Act 47 of 1963) and the Indian Education Act (i.e., Act 61 of 1965) whereby the State is prepared to make awards (subject to certain conditions as determined in every particular instance) of "grants-in-aid" or subsidies and loans to the governing body of any school, including any nursery school.

Hopefully, at least as far as school beginners are concerned, prevention, rather than remediation, should be the trend of educational thought and practice in the future.

6. ABSTRACT

This study was primarily intended to ascertain whether there was any test already in existence in South Africa which was entirely suitable as a test of school readiness for Indian children. If there were no such test, could an existing test not be modified to make it suitable for use with Indian children? Or would an entirely new test be indicated?

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As a secondary, though intimately related matter, it was decided to discover to what extent factors such as schooling, socio-economic status and sex affect an Indian child's readiness for school.

An examination of the existing group tests of school readiness in this country, showed that the National Bureau Group Test for Five-and-Six-Year-Olds (N.B.G.T. 5/6) was the one which was most likely to be suitable for use with Indian children. This test was therefore chosen for a more detailed study.

In pursuit of the secondary aim it was decided to use two additional tests - the Raven Coloured Progressive Matrices (1947) and the Peabody Picture Vocabulary Test - so as to provide a broader basis for the conclusions than the N.B.G.T. 5/6 by itself would have provided.

The total sample of 156 six-year-old children, chosen from the Western Area of Durban, comprised three groups:

- (a) Schoolers (N = 60) : At the time of testing this group had had about six months of formal schooling.
- (b) Preschoolers (N = 48) : At the time of testing these children were attending a play-centre.
- (c) Nonschoolers (N = 48) : At the time of testing these children had had no schooling, either formal or of the play-centre type.

Each of these three groups consisted of an equal number of boys and girls. In each of these sub-groups there was an equal number of children of each sex from the high and the low socio-economic/

economic groups. A random selection procedure was used throughout.

The study of the primary aim involved quantitative and qualitative analyses of the data. Spearman's rank-order correlation coefficients and z-tests were computed. In the case of the secondary aim the statistical procedures included the use of 2×2 and $3 \times 2 \times 2$ analyses of variance in addition to t-tests and product-moment correlations.

The results of the study were as follows:

General Aim (a) : The N.B.G.T. 5/6, unmodified, is unsuitable as a test of school readiness for use with Indian children.

General Aim (b) : (i) Experiences related to the classroom learning situation, formal or otherwise, exert an influence on a child's readiness for school.

(ii) Socio-economic factors have a marked influence on a child's readiness for school.

(iii) A child's sex does not have any influence on a his readiness (or unreadiness for school).

It was recommended that every opportunity for the advancement of preschool education among Indian children should be siezed. This would compensate to some extent for the missing stimulation of a good home, an important factor for the promotion of school readiness.

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APPENDIX A

A SURVEY RELATED TO THE AGE OF ADMISSION INTO THE
FIRST GRADE IN WHITE SCHOOLS IN THE
REPUBLIC OF SOUTH AFRICA

In January 1970, a letter was addressed to the Directors of Education in the Transvaal, Cape Province, Orange Free State and Natal. The following questions were asked:

1. At what age are children first admitted to the schools (European) under your control?
2. When did this ruling come into force?
3. What was the age of admission before this?
4. What factors motivated this change?

The following replies were received:

TRANSVAAL EDUCATION DEPARTMENT:

1. A child is of compulsory school-going age at the beginning of the year in which he turns seven. From the beginning of 1967 no child may be admitted to a provincial school unless he has reached the age of at least six years on or before 30th June of the year in which he is brought to be admitted. From the beginning of 1969 the lower permissive limit of school age also applies to private schools

(iii)

2. The age of admission before 1967 was 5 years provided the pupil had turned six years during the year he was brought for admission.
3. Research established the fact that pupils who are not school ready achieve lower than pupils of the same ability who enter school at a later stage. Therefore it can be assumed that all factors being equal, pupils who enter school at a younger age than five and a half will achieve lower than those who enter school at five and a half plus.

CAPE PROVINCE EDUCATION DEPARTMENT:

1. The position at present is that no child whose birthday falls before the first day of July in the calendar year is admitted to a school earlier than the year in which he attains the age of six years and no child whose birthday falls after the thirtieth day of June in the calendar year is admitted to such a school earlier than the year in which he attains the age of seven years.
2. 1st January, 1957.
3. Between 1st January, 1951 and 31st December 1956 a child was not admitted to a school until he had attained the age of five years and six months.
4. At this stage it is not possible to say what factors motivated the change.

(iii)

ORANGE FREE STATE DEPARTMENT OF EDUCATION:

1. The Education Ordinance, 1954, as amended, reads:
"A child shall not be admitted to a school before the beginning of the first school term of the year following upon the year in which he has attained the age of six years: Provided that a child may be admitted to a school at the beginning of the first school term of the year in which he attains the age of six years if his birthday falls before the first day of July."
2. This ruling has been in force for the past fifty years or more and it is not possible to determine when it was first introduced.

NATAL EDUCATION DEPARTMENT:

1. Children who turn six before the end of June of the year in which they seek admission may be admitted.
2. The previous rule, that is prior to 1969, was that children who turned six during the year (i.e. up to December 31st) in which they sought admission were to be admitted.

The reason for this change was primarily to bring Natal into step with the other provinces. In my view, the justification for the change was administrative rather than educational.

THE DAVID LANDAU COMMUNITY CENTRE PRESCHOOL

Mrs S. Pevsner, Supervisor of the David Landau Community Centre Preschool, provided the investigator with the following report related to the activities of the play-groups:

As at 30th September 1969, there were 14 play centres under the control of the David Landau Community Centre - Preschool Section with a total enrolment of 554 children. At each centre there were about 40 children placed under the charge of a single teacher. These teachers did not undergo any specialised training in nursery education.

Daily routine: The preschool begins at 8.30 a.m. and lasts till 12.30 p.m. Immediately after the cleanliness parade, the teachers arrange a variety of activities for the children - activities such as painting, drawing and the construction of articles like masks, sandals, dolls, hats, and flags. At 9.30 a.m. the children are served with fruit juice.

Ring-time lasts from 10.00 to 10.30 a.m. The children are told a specially chosen story or nursery rhyme. They repeat and learn the rhymes often dramatising them with hand and finger movements. The aim is to broaden their general knowledge and to increase their vocabulary.

For the next half-hour the children participate in vigorous play. They can be seen moving up and down climbing frames, riding bicycles and scooters and keeping themselves occupied with other outdoor play things. At

about/

about 11.10 a.m. the children wash themselves in preparation for their mid-day meal, and recite a prayer. They then settle down to lunch. This consists of a glass of milk and brown bread sandwiches containing cheese, peanut butter or margarine. During the period after lunch the children are given an opportunity of discussing various items of news in their little lives. At 12.30 p.m. they leave for home.

General Information: The fee which the children pay varies from 25c to R1 depending upon the father's income. If the father is unemployed, the child does not pay a fee. It is estimated that at any particular time about 10 per cent of the children do not pay fees.

Excursions to places such as the fire station, the railway station, the beach and the museum are arranged from time to time. On those days when the weather is particularly hot, the children are taken to the paddling pool at the nearby Balkumar Singh Swimming Pool, Springfield. A concert and a mini-sports meeting are organised each year and the parents are invited to attend these functions.

Children are weighed twice a year. An interesting observation has been made in this regard in that many of the children, when weighed after the school holidays, show a significant drop in weight. This suggests that the meals which the children are given at school play an important part in their lives.

Q U E S T I O N N A I R E

NATIONAL BUREAU GROUP TEST
FOR 5-AND-6-YEAR OLDS

Child's Name:

Father's Name:.....

Home Address:

Father's Occupation (in detail, please):

Date of Birth: Telephone Number (if any):.....

Teacher's Rating:

Please place a check mark (✓) in the appropriate box below to indicate your opinion whether the child is physically, mentally and emotionally ready for formal schooling.

CHECK ONE ONLY

<u>STATUS</u>	<u>CHECK</u>
Very Good	<input type="checkbox"/>
Good	<input type="checkbox"/>
Average	<input type="checkbox"/>
Weak	<input type="checkbox"/>
Very Weak	<input type="checkbox"/>

School Marks:

.....

.....

A P P E N D I X D

PEABODY PICTURE VOCABULARY TEST

<u>FORM A</u>	<u>FORM B</u>	<u>ADAPTED FORM</u> (Used in Present Investigation)
1 car	1 table	1 car
2 cow	2 bus	2 cow
3 baby	3 horse	3 baby
4 girl	4 dog	4 girl
5 ball	5 shoe	5 ball
6 block	6 finger	6 block
7 clown	7 boat	7 clown
8 key	8 children	8 key
9 can	9 bell	9 bell
10 chicken	10 turtle	10 chicken
11 blowing	11 climbing	11 blowing
12 fan	12 lamp	12 fan
13 digging	13 sitting	13 digging
14 skirt	14 jacket	14 skirt
15 catching	15 pulling	15 catching
16 drum	16 ring	16 drum
17 leaf	17 nail	17 leaf
18 tying	18 hitting	18 tying
19 fence	19 tire	19 fence
20 bat	20 ladder	20 ladder
21 bee	21 snake	21 bee
22 bush	22 river	22 river
23 pouring	23 ringing	23 pouring
24 sewing	24 baking	24 sewing
25 wiener	25 cone	25 cone
26 teacher	26 engineer	26 teacher
27 building	27 peeping	27 peeping
28 arrow	28 kite	28 arrow
29 kangaroo	29 rat	29 kangaroo
30 accident	30 time	30 accident
31 nest	31 sail	31 nest
32 caboose	32 ambulance	32 ambulance
33 envelope	33 trunk	33 envelope
34 picking	34 skiing	34 skiing
35 badge	35 hook	35 badge
36 goggles	36 tweezers	36 goggles
37 peacock	37 wasp	37 peacock
38 queen	38 barber	38 queen
39 coach	39 parachute	39 parachute
40 whip	40 saddle	40 saddle
41 net	41 temperature	41 net
42 freckle	42 captain	42 captain
43 eagle	43 whale	43 eagle
44 twist	44 cash	44 teist
45 shining	45 balancing	45 shining
46 dial	46 cobweb	46 dial
47 yawning	47 pledging	47 yawning
48 tumble	48 argument	48 tumble
49 signal	49 hydrant	49 hydrant
50 capsule	50 binocular	50 capsule

FORM A

51 submarine
52 thermos
53 projector
54 group
55 tackling
56 transportation
57 counter
58 ceremony
59 pod
60 bronco

FORM B

51 locomotive
52 hive
53 reel
54 insect
55 gnawing
56 weapon
57 bannister
58 idol
59 globe
60 walrus

ADAPTED FORM
(Used in Present
Investigation)

51 submarine
52 thermos
53 projector
54 group
55 tackling
56 transportation
57 counter
58 idol
59 pod
60 walrus

APPENDIX E

SUMMARY : COMPOSITE MASTER SHEET

	SCHOOLING	A ₁				A ₂				A ₃			
		B ₁		B ₂		B ₁		B ₂		B ₁		B ₂	
	STATUS	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂
	SEX												
	MEAN AGE	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0	6-0
	N	15	15	15	15	12	12	12	12	12	12	12	12
N.B. GROUP TEST FOR 5-6-YEAR-OLDS	ΣX	255	274	200	182	185	167	118	114	144	139	97	75
	\bar{X}	17.0	18.27	13.33	12.13	15.42	13.92	9.83	9.5	12.0	11.58	8.08	6.25
	s	5.727	6.475	3.944	4.573	5.88	6.198	3.131	4.133	3.512	4.092	3.662	2.947
RAVEN'S COLOURED PROGRESSIVE MATRICES	ΣX	204	203	173	171	149	136	128	148	132	129	126	110
	\bar{X}	13.6	13.5	11.5	11.4	12.4	11.3	10.7	12.3	11.0	10.8	10.5	9.2
	s	2.56	3.86	2.19	3.07	2.47	2.25	2.17	2.25	2.61	1.64	1.89	1.68
PEABODY PICTURE VOCABULARY TEST	ΣX	601	646	556	524	483	479	424	402	456	477	394	370
	\bar{X}	40.1	43.1	37.1	34.9	40.2	39.9	35.3	33.5	38.0	39.8	32.8	30.8
	s	4.12	4.92	3.84	6.51	4.60	5.87	5.14	4.21	3.63	5.07	3.18	3.80

A₁ CLASS I
A₂ NURSERY
A₃ NON-SCHOOLERS

B₁ HIGH (OCCUPATIONS 4,5,6,7)
B₂ LOW (OCCUPATIONS 1,2,3)

C₁ BOYS
C₂ GIRLS

APPENDIX F

EXAMPLES OF THE COMPUTATIONAL PROCEDURES
FOLLOWED IN THE PRESENT STUDY

TABLE

Testing the Significance of the Difference
between the Means of the Raw Scores of Whites
and Indian Schoolers on the N.B.G.T. 5/6
(Uncorrelated Data)

$$z = \frac{\bar{X}_1 - \bar{X}_2}{S_{D\bar{X}}}$$

(Downie, N.M. and Heath, R.W.:
Basic Statistical Methods.
Harper and Row, N.Y., 1965,
p. 133)

$$\bar{X}_1 = 15.183$$

$$s_1 = 5.8466$$

$$n_1 = 60$$

$$S_{\bar{X}_1} = .7611$$

$$\bar{X}_2 = 20.5$$

$$s_2 = 10.2$$

$$n_2 = 1849$$

$$S_{\bar{X}_2} = .233$$

$$\begin{aligned} S_{D\bar{X}} &= \sqrt{S_{\bar{X}_1}^2 + S_{\bar{X}_2}^2} \\ &= \sqrt{.7611^2 + .233^2} \\ &= \sqrt{.5793 + .0543} \\ &= \sqrt{.6336} \\ &= .7959 \end{aligned}$$

z = /...

(ii)

$$z = \frac{|15.183 - 20.5|}{.7959}$$

$$= \frac{5.317}{.7959}$$

$$= \underline{\underline{6.6804}}$$

$$p < .01$$

(iii)

TABLE

Computation of the Spearman Rank-Order
Correlation Coefficients of White and Indian
Rank Orders on the N.B.G.T. 5/6 Subtests

$$\text{Rho} = 1 - \frac{6 \sum D^2}{N(N^2-1)} \quad (\text{Downie, N.M. and Heath, R.W.} \\ \text{Op. cit., p. 207.})$$

<u>Whites</u>	<u>Indians</u>	<u>D</u>	<u>D²</u>
1	1	0	0
2	2	0	0
3	6	3	9
4	8	4	16
5	7	2	4
6	3	3	9
7	5	2	4
8	4	4	16
			<hr/> $\Sigma D^2 : 58$ <hr/>

$$\text{rho} = 1 - \frac{6 \times 58}{8 \times 63}$$

$$= 1 - \frac{348}{504}$$

$$= 1 - .691$$

$$= \underline{\underline{.309}}$$

$$p > .05$$

TABLE

Computation of the Analysis of Variance of
the Raw Scores of 60 Indian Schoolers on the

N.B.G.T. 5/6

Reference: Edwards, A.L. : *Experimental Design in Psychological Research* (Third Edition).
Holt, Rinehart, and Winston, 1968, Ch. 11.

	<u>Boys</u>		<u>Girls</u>	
	A ₁		A ₂	
	High	Low	High	Low
	B ₁	B ₂	B ₁	B ₂
	13	15	10	9
	19	19	24	12
	11	17	19	8
	17	14	18	14
	9	10	14	16
	21	8	9	8
	26	6	18	10
	9	19	26	5
	21	13	27	22
	17	17	19	19
	11	11	14	11
	24	12	13	12
	12	18	28	12
	19	11	9	7
	26	10	26	17
ΣX	255	200	274	182
ΣX^2	4827	2900	5634	2522

$$\Sigma (\Sigma X) = 255 + 200 + 274 + 182 = 911$$

$$\text{OCT} = \frac{\Sigma (\Sigma X)^2}{N}$$

$$= \frac{911^2}{60}$$

$$= \frac{829921}{60}$$

$$= \underline{13832.017}$$

(v)

$$\begin{aligned}\text{Total } \Sigma x^2 &= \Sigma X^2 - \text{OCT} \\ &= 15883 - 13832.017 \\ &= \underline{2050.983}\end{aligned}$$

$$\begin{aligned}\text{Between Group } \Sigma x^2 &= \Sigma \left(\frac{(\Sigma X)^2}{n} \right) - \text{OCT} \\ &= \frac{255^2 + 200^2 + 274^2 + 182^2}{15} - \text{OCT} \\ &= \frac{213225}{15} - \text{OCT} \\ &= 14215 - 13832.017 \\ &= \underline{382.983}\end{aligned}$$

$$\begin{aligned}\text{Within Group } \Sigma x^2 &= \text{Total } \Sigma x^2 - \text{Between } \Sigma x^2 \\ &= 2050.983 - 382.983 \\ &= \underline{1668.000}\end{aligned}$$

Partitioning Groups Σx^2

1. Main Effects

$$(a) \Sigma A_1 = 255 + 200 = 455$$

$$\Sigma A_2 = 274 + 182 = 456$$

$$\begin{aligned}\Sigma x^2 \text{ for A} &= \frac{455^2 + 456^2}{30} - \text{OCT} \\ &= \frac{207025 + 207936}{30} - \text{OCT} \\ &= 13832.033 - 13832.017 \\ &= \underline{.016}\end{aligned}$$

(b) /...

(vi)

$$(b) \quad \Sigma B_1 = 255 + 274 = 529$$

$$\Sigma B_2 = 200 + 182 = 382$$

$$\begin{aligned} x^2 \text{ for B} &= \frac{529^2 + 382^2}{30} - OCT \\ &= \frac{279841 + 145924}{30} - OCT \\ &= \frac{425765}{30} - 13832.017 \\ &= 14192.167 - 13832.017 \\ &= \underline{360.150} \end{aligned}$$

Interaction

	B ₁	B ₂	Σ
<u>A x B</u>			
A ₁	255 a	200 b	455
A ₂	274 c	182 d	456
Σ	529	382	911

$$\begin{aligned} \Sigma x^2 \text{ for A x B} &= \frac{[(a + d) - (b + c)]^2}{N} \\ &= \frac{[(255 + 182) - (200 + 274)]^2}{60} \\ &= \frac{(437 - 474)^2}{60} \\ &= \frac{37^2}{60} \\ &= \frac{1369}{60} \\ &= \underline{22.817} \end{aligned}$$

(vii)

SOURCE OF VARIATION	$\sum x^2$	df	Mean Square	F	P
A : Sex	.016	1	.016	.001	> .05
B : Status	360.150	1	360.150	12.091	< .05 < .01
A x B :	22.817	1	22.817	.766	> .05
Error : Within Group	1668.000	56	29.786		
	2050.983	59			

TABLE

Computation of the Analysis of Variance of the
Raw Scores of 156 Indian Schoolers, Preschoolers
and Nonschoolers on the N.B.G.T. 5/6

References: Lindquist, E.F. :

Edwards, A.L. :

	A ₁				A ₂				A ₃			
	B ₁		B ₂		B ₁		B ₂		B ₁		B ₂	
	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂	C ₁	C ₂
	13	10	15	9	18	18	13	3	12	18	6	3
	19	24	19	12	6	22	11	4	8	15	2	3
	11	19	17	8	30	21	7	14	7	11	5	6
	17	18	14	14	8	17	10	15	16	4	12	11
	9	14	10	16	15	9	8	13	16	8	13	8
	21	9	8	8	12	4	8	11	13	8	12	4
	26	18	6	10	13	7	9	9	19	11	9	7
	9	26	19	5	19	23	7	15	12	7	7	8
	21	27	13	22	17	6	10	7	8	17	9	6
	17	19	17	19	19	14	18	10	12	12	8	3
	11	14	11	11	13	14	6	9	12	13	2	4
	24	13	12	12	15	12	11	4	9	15	12	12
	12	28	18	12								
	19	9	11	7								
	26	26	10	17								
ΣX	255	274	200	182	185	167	118	114	144	139	97	75
ΣX ²	4827	5634	2900	2522	3267	2785	1278	1288	1876	1811	945	573

$$\Sigma (\Sigma X) = 1950 \quad \text{and} \quad \Sigma X^2 = 29706$$

$$\text{OCT} = \frac{\Sigma (\Sigma X)^2}{N} = \frac{1950^2}{156}$$

$$= \frac{3802500}{156} = \underline{24375}$$

(ix)

$$\begin{aligned}\text{Total } x^2 &= \Sigma X^2 - OCT \\ &= 29706 - 24375 \\ &= \underline{5331}\end{aligned}$$

$$\begin{aligned}\text{Between Group } \Sigma x^2 &= \frac{(\Sigma X)^2}{n} - OCT \\ &= \frac{255^2 + 274^2 + 200^2 + 182^2}{15} + \frac{185^2 + 167^2 + 118^2 + 114^2 + 144^2 + 139^2 + 97^2 + 75^2}{12} - OCT \\ &= \frac{213225}{15} + \frac{144125}{12} - OCT \\ &= 14215 + 12010.417 - 24375 \\ &= 26225.417 - 24375 \\ &= \underline{1850.417}\end{aligned}$$

$$\begin{aligned}\text{Within Group } \Sigma x^2 &= \text{Total } \Sigma x^2 - \text{Between } \Sigma x^2 \\ &= 5331 - 1850.417 \\ &= \underline{3480.583}\end{aligned}$$

Partitioning Groups

(1) Main Effects

$$(a) \Sigma x^2 \text{ for A} = \frac{\Sigma A_1^2}{n} + \frac{\Sigma A_2^2}{n} + \frac{\Sigma A_3^2}{n} - OCT$$

$$\Sigma A_1 = 255 + 274 + 200 + 182 = 911$$

$$\Sigma A_2 = 185 + 167 + 118 + 114 = 584$$

$$\Sigma A_3 = 144 + 139 + 97 + 75 = 455$$

Σx^2 for A /...

(x)

$$\begin{aligned}\sum x^2 &= \frac{911^2}{60} + \frac{584^2 + 455^2}{48} - OCT \\ &= \frac{829921}{60} + \frac{341056 + 207025}{48} - OCT \\ &= 13832.017 + \frac{548081}{48} - OCT \\ &= 13832.017 + 11418.354 - 24375 \\ &= 25250.371 - 24375 \\ &= \underline{875.371}\end{aligned}$$

$$(b) \sum x^2 \text{ for B} = \frac{\sum B_1^2 + \sum B_2^2}{78} - OCT$$

$$\sum B_1 = 255 + 274 + 185 + 167 + 144 + 139 = 1164$$

$$\sum B_2 = 200 + 182 + 118 + 114 + 97 + 75 = 786$$

$$\begin{aligned}\sum x^2 \text{ for B} &= \frac{1164^2 + 786^2}{78} - OCT \\ &= 25290.923 - 24375 \\ &= \underline{915.923}\end{aligned}$$

$$\sum x^2 \text{ for C} = \frac{\sum C_1^2 + \sum C_2^2}{78} - OCT$$

$$\sum C_1 = 255 + 200 + 185 + 118 + 144 + 97 = 999$$

$$\sum C_2 = 274 + 182 + 167 + 114 + 139 + 75 = 951$$

$$\begin{aligned}\sum x^2 \text{ for C} &= \frac{999^2 + 951^2}{78} - OCT \\ &= \frac{998001 + 904401}{78} - 24375 \\ &= \frac{1902402}{78} - 24375 \\ &= 24389.769 - 24375 \\ &= \underline{14.769}\end{aligned}$$

(2) /...

(xi)

(2) Interactions

A X B	A ₁	A ₂	A ₃	Σ
B ₁	255 + 274 529 / 30	185 + 167 352 / 24	144 + 139 283 / 24	1164
B ₂	200 + 182 382 / 30	118 + 114 232 / 24	97 + 75 172 / 24	786
Σ	911	584	455	1950

$$\begin{aligned}\Sigma x^2 \text{ for A x B} &= \frac{529^2 + 382^2}{30} + \frac{352^2 + 232^2 + 283^2 + 172^2}{24} - OCT \\ &\quad - \Sigma x^2 \text{ for A} - \Sigma x^2 \text{ for B} \\ &= 14192.167 + 11975.042 - (24375 + 875.371 + 915.923) \\ &= 26167.209 - 26166.294 \\ &= \underline{.915}\end{aligned}$$

A x C	A ₁	A ₂	A ₃	Σ
C ₁	255 + 200 455 / 30	185 + 118 303 / 24	144 + 97 241 / 24	999
C ₂	274 + 182 456 / 30	167 + 114 281 / 24	139 + 75 214 / 24	951
Σ	911	584	455	1950

$$\begin{aligned}\Sigma x^2 \text{ for A x C} &= \frac{455^2 + 456^2}{30} + \frac{303^2 + 281^2 + 241^2 + 214^2}{24} - OCT \\ &\quad - \Sigma x^2 \text{ for A} - \Sigma x^2 \text{ for C} \\ &= 13832.033 + 11443.625 - (24375 + 875.371 + 14.769) \\ &= 25275.658 - 25265.140 \\ &= \underline{10.518}\end{aligned}$$

B x C	B ₁	B ₂	Σ
C ₁	255 + 185 + 144 584 a	200 + 118 + 97 415 b	999
C ₂	274 + 167 + 139 580 c	182 + 114 + 75 371 d	951
Σ	1164	786	1950

Σx^2 for B x C / ...

(xii)

$$\begin{aligned}\tau x^2 \text{ for } B \times C &= \frac{\{(a + d) - (b + c)\}^2}{N} \\ &= \frac{\{(584 + 371) - (415 + 580)\}^2}{156} \\ &= \frac{(955 - 995)^2}{156} \\ &= \frac{1600}{156} \\ &= \underline{10.256}\end{aligned}$$

$$\begin{aligned}A \times B \times C \quad \Sigma x^2 &= \text{Between Groups} - \tau x^2 \text{ for } (A, B, C, A \times B, \\ &\quad A \times C, B \times C) \\ &= 1850.417 - (875.371 + 915.923 + 14.769 + \\ &\quad .915 + 10.518 + 10.256) \\ &= 1850.417 - 1827.752 \\ &= \underline{22.665}\end{aligned}$$

SOURCE OF VARIATION	Σx^2	df	Mean Square	F	P
A : Schooling	875.371	2	437.686	18.108	<.05 <.01
B : Status	915.923	1	915.923	37.893	<.05 <.01
C : Sex	14.769	1	14.769	.611	>.05
A x B :	.915	2	.458	.019	>.05
A x C :	10.518	2	5.259	.218	>.05
B x C :	10.256	1	10.256	.424	>.05
AxBxC :	22.665	2	11.333	.469	>.05
Error : Within Group	3480.583	144	24.171		
	5331.000	155			

TABLE

Testing the Significance of the difference
between the Means of the Raw Scores of
Schoolers and Preschoolers on the N.B.G.T.

5/6

$\bar{X}_1 = 17.64$	$\bar{X}_2 = 14.67$
$N_1 = 30$	$N_2 = 24$
$s_1 = 6.145$	$s_2 = 6.087$
$S_{\bar{X}_1} = 1.1411$	$S_{\bar{X}_2} = 1.2692$

$$S_D = 1.7067$$

$$t = \frac{|\bar{X}_1 - \bar{X}_2|}{S_{D\bar{X}}}$$

(Downie, N.M. and
Heath, R.W.:
Op.cit., p. 141)

$$= \frac{2.97}{1.7067}$$

$$= \underline{1.740}$$

$p > .05$