

THE STANDARDISATION OF A BATTERY OF INTELLIGENCE
AND ACHIEVEMENT TESTS SUITABLE FOR INDIAN PRIMARY
SCHOOL CHILDREN IN DURBAN.

by

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CHAPTER 1 : THE INTRODUCTION TO THE PROBLEM.

a) The origin of the Indian in Natal.

The immigration of indentured Indians into Natal began in the year 1860 (28 , p.11). These labourers were originally imported to serve on the sugar plantations because it was found that the local native was unsuited to the type of regular employment demanded by this promising young industry. Thereafter, and except for a few intervening years, there was a steady flow of Indian settlers to our shores. As periods of indenture expired and the workers chose to remain in this country, their places on the farms were taken by further waves of newcomers from the same source. Thus by the end of the century the small stream of 1860 had become a strongly running river and a new ethnic group had arrived, settled, and established itself as a large and productive section of Natal's population. Today the Indians are more numerous than the Europeans in this province.

(1) Population of Natal - 1951.

Indian - approximately 300,000.

European - approximately 275,000.

b) The development of Indian education.

The emancipation from indenture engendered a new outlook in the Indian worker. It inspired in him a desire for progress and upliftment, for education and higher standards of living (18 , p.383); and it comes as no surprise to find the local community petitioning the Colonial Secretary to initiate the development of educational facilities for their children (62). At first the response was slow but gradually the Natal Provincial Administration, working hand in hand with certain public-spirited groups in the Indian community itself, has succeeded in breaking the back of the problem and today the majority of Indian children are at school.

Some idea of the growth of Indian education may be gathered from the table below:

(2) Indian Government and Government-aided schools in Natal

1911 - 36

1921 - 47

1931 - 85

1941 - 115

1946 - 144

(18 , p.511)

The phenomenal development of Indian education

However, not only is there the fact of retardation but there is also the problem that in any particular class in the Indian school there may be an age-range, from the youngest to the eldest pupils, of eleven or twelve years. This has been a persistent characteristic of Indian classes from the very beginning. As far back as 1902 the Superintendent of Education in Natal reported as follows:

" Regarding the higher grade schools we think it is most inadvisable that arrangements should be so lax as to permit small boys to sit in a class and be subject to a common discipline with grown young men, and the latter should waste their time in a curriculum fitted only for small boys."

(23)

Although the position is much better today, the difficulty still exists. It is due principally to the lack of school accommodation and the need for pupils' names to remain on waiting lists until a school seat is available. At a later stage in this dissertation it will be pointed out that a considerable number of pupils might be reallocated to classes more commensurate with their level of achievement. For such a task, standardised

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achievement tests are necessary.

In passing, it is interesting to note that the Natal Education Department is at present tackling this problem of mixed age groups by giving priority of admission in Class 1 to pupils of normal school age. From the beginning of 1955 pupils were admitted to school in the following order: 7 years, 8 years, 9 years, 10 years, 6 years. (22)

The lack of psychological services.

There are pupils in the Indian schools who are not capable of doing the work required of them. Such children would naturally not be promoted; but at the end of the following year in the same class they must be moved into the next higher standard. This is done in conformity with departmental regulations (60 , p.176). However the regulations also lay down that pupils who fail the same class twice should be referred to the departmental psychologist. Unfortunately this aspect of the regulations cannot be carried out because there is no psychologist to deal with Indian cases. Furthermore, even if there were, he would have no suitably standardised intelligence and achievement tests for the purpose. Thus, quite clearly, the first step is to prepare such tests

for Indian children.

Defects of vision and hearing.

In the Indian schools there are pupils, otherwise normal, who are suffering from defects of vision or hearing. In a recent routine examination of five large Indian schools in the Durban area it was found that 6% of the pupils suffered from apparent defects of vision (24 , p.42).

The report of a survey carried out in Natal Indian areas by the National Council of the Blind in 1954 stresses the point that the incidence of eye weakness and eye disease is apparently not uniform. In one school visited the eye-health of the pupils was " particularly good", but the eye-hygiene at another left much to be desired. The report continues:

" Current reports on ophthalmic work in India refer to the high incidence of operable cataract there. This seems to suggest that it has a racial rather than any other significance. The other eye diseases, especially those caused by malnutrition and smallpox, prevalent in India are entirely absent in the South African Indian population." (63 , p.3)

It is clear that there is insufficient evidence

to generalise finally in this matter and that further investigation is desirable.

Poverty and general ill-health.

The general physical condition of the pupils must also be considered. In the first of the two surveys mentioned above it was noted that the incidence of nits and vermin among the pupils ranged from 23.6% to 95%, and that 5% of the group suffered from scabies and other skin diseases. (24 , p.42). Such figures may in part be attributed to the fact that the social development of the Indian community has not been quite so rapid as the growth of the school system. It is a matter of educating the parents in health habits through their school-going children.

There is also the matter of general health. With half of the Natal Indian population living in Durban, the health reports of this city are of particular interest in this connection. The Mayor's Minute for 1951 provides the following information:

(4) Causes of death in Durban - 1951.

	<u>European</u>	<u>Indian</u>
<u>Broncho-pneumonia</u>	26	256
<u>Diarrhoea and enteritis</u>	9	145
<u>Tuberculosis</u>	35	163 (96 , p.78)

Since the Indian and the European sections of the city's population are roughly equal in number, it is quite evident that the Indian falls more readily a prey to sickness than does the European. There is no doubt that poverty is a prime cause of this.

The differential health levels of the two sections is reflected too in the ratio of Indian to European infantile deaths. In this connection the Mayor's minute reports as follows:

(5) Infantile deaths in Durban - 1951.

Indian - 653

European - 88

(96 , p.78).

In order to ensure that every school-child obtains a certain amount of daily nourishment, the Schools' Meals System provides light and nutritious lunches throughout the province. (6 , p.41). For a certain number of the Indian children this food is probably their sole daily sustenance and may be one of the reasons why, despite poor health conditions, the school attendance of Indian pupils is so satisfactory. The percentage attendance rates of the three sections of the Natal school-going population have been set down below:

(6) School attendance in Natal - 1949.

<u>European</u>	-	93.18
<u>Indian</u>	-	93.76
<u>Coloured</u>	-	92.00

(24 , p.3)

Undoubtedly there are a number of ^{other} possible factors that may influence school attendance rate. However such considerations fall outside the purview of this dissertation.

The effect of this below the breadline existence on classroom performance has still to be ascertained. Various workers in the field of educational retardation have commented on the subtle influence of a lowered vitality on school achievement (9 , p.164). How far this factor is operative in the present context is unknown.

d) The educational standard of Indian children.

Although it should be accepted that the Indian school system has not yet reached the standard of the European, it is not so easy to establish the point quantitatively. In the primary school there is no common public examination to serve as a basis for comparison. However at the secondary level, all the

pupils write the same Junior Certificate and Matriculation examinations. In these the Indians certainly do not fare as well as the Europeans. To illustrate the point, the figures for a typical year have been analysed below:

(7) Public examination passes in Natal - 1949.

	<u>European</u>	<u>Indian</u>
<u>Junior Certificate</u>	83%	79.3%
<u>Matriculation</u>	52.6%	35.0%

(24)

These figures simply affirm the tendency to regard the level of Indian achievement in school as lower than that of the European at the present time. To investigate the causes of this difference does not form part of the present investigation. Probably the most important is that Indian pupils have to do all their learning through the English medium rather than through their own vernacular.

e) The approach to the problem.

The aim of this investigation is to prepare the ground for a more detailed study of the abilities and achievement^s of the Indian school-child. The suitability of a number of instruments for measuring Indian intelligence and achievement will be considered. Once this has

been accomplished the way will be clear for studies of all the various aspects of the problem.

Before any tests are even considered, however, an effort will be made to learn as much as possible about the background and outlook of the children to be tested. There is a tendency among outsiders to speak of "The Indian "; but nothing could be less accurate. The Indian community, with its Tamil, Telegu, Hindi, and Moslem-Gujerati sections, presents an array of people who differ not only in language and social custom, but possibly even in racial origin. Accordingly it is necessary to learn a little about the ethnology of these various sections of the Indian community. Thereafter a study of their background, both in India and Natal, is necessary to round off the picture.

In the next two chapters some attempt will be made to answer the following questions:

" Are there any other than cultural differences among the various groups in the Indian community ? "

" How has their history affected the outlook of the Indian people ? "

" Have their experiences in Natal resulted in any modifications in attitude ? "

Of the three questions the last is probably of the greatest importance in the present context. What is really called for here is a survey of Indian attitudes. Unfortunately none is available and thus the goal must be reached by a more devious route. In other words, the method to be adopted consists of a survey of incidents and conditions likely to modify a people's outlook, and an attempt to assess their attitudes on this basis. It is freely conceded that this is far from the best approach to the problem; but it should at least point the way to later workers in this field.

Once some answer to the above questions has been obtained, the suitability of sundry intelligence and achievement tests for Indian pupils will be investigated. The interrelationship of these tests, with reference to Indian children will also be considered. Finally, some of the tests will be standardised on the group under consideration. Standardisation tables will be included in the Appendix ^{ces} to this dissertation.

CHAPTER II : THE PEOPLES OF INDIA.

a) The Pre-Dravidians.

There is considerable evidence to support the view that the original inhabitants of India were of Negroid stock. H.A.Rose classifies them as Melanoderms and, as typical of this strain, he quotes the Andamanese whom he describes as Negritos. They are short in stature, with longish heads, curly, frizzy hair, and even everted lips (80 , p.158). It is also held that these people are ethnically related to the aborigines of Ceylon, Sumatra, and even Australia (55 , p.157). Under the pressure of later invasions these people were driven into the wild hill country where, even today, their purest survivals are still identifiable e.g. the Santals and the Bhils (55 , p.164). Elements of this strain are also noticeable among the lower castes of Western Bengal and even slightly among the lower castes in Upper India. (80 , p.158). For practical purposes they may be classified as the Aboriginal or Pre-Dravidian type. They made no significant contribution to Indian civilisation, being extremely primitive and of low culture (55 , p.157).

b) The coming of the Dravidians.

Also in prehistoric times there were invasions

that appear to have billowed through India from the north in two distinct waves. By far the most important was the gradual penetration from Western Asia, through Baluchistan, to the far south of the peninsula of a people loosely called the Dravidians. About the same period, but far less extensive in its scope, there was an infiltration of Mongoloid types from the north-east. These peoples seem to have absorbed and been absorbed by the aborigines; but elements of the Dravidian type are observable in Ceylon and all over the southern peninsula up to the Gangetic plain. The Mongoloid type exist in Assam and the foothills of the eastern Himalayas, and there is evident a clear affinity with the peoples of China and Tibet. There is also an admixture of the two strains, the Mongol-Dravidian type, of which the people of Bengal are unmistakable representatives (55 , p.157).

Contrary to what was once believed, the Dravidians were far from being a primitive people. J.S. Meston defends them in the following terms:

" Discoveries in the Indus valley indicate the existence of great cities with traces of luxury and refinement Some revision is therefore needed of the old conception of the Indo-Aryans finding

themselves in a land of primitive savagery." (55 , p164)
W.Durant echoes a similar sentiment in the following
quotation:

" They were a civilised people when the Aryans
broke down upon them;their adventurous merchants
sailed the sea,even to Sumeria and Babylon,and
their cities knew many refinements and luxuries.
It was from them,apparently,that the Aryans took
their village community and their systems of land-
tenure and taxation. To this day the Deccan is
essentially Dravidian in stock and customs,in
language,literature and the arts." (26 , p.396)

It would appear that some final decision on these early
immigrants from the north must be postponed until more
facts have been assembled. Of significance at this stage
is the fact that the Dravidians did,to a greater or
lesser degree,become assimilated with the aboriginal
Negroid stock and that the languages Tamil and Telegu
developed from the tongue spoken by the product of this
fusion (27 , p.625). Later it will be shown that many of
the indentured labourers who arrived in Natal were Tamil
or Telegu-speaking people.

c) The Aryan invasion.

Between 2400 and 1500 B.C. India was subjected to an invasion of Aryan people through the passes of the North-West Frontier. These newcomers were settlers rather than invaders,immigrants rather than conquerors. According to W.Durant:

" They brought with them strong physiques,a hearty appetite in both solids and liquids,a ready brutality,a skill and courage in war which soon gave them the mastery of Northern India. " (26 , p397)

It was mainly in the central part of India that they settled in force,roughly between the two rivers,Indus and Jumna. When they did push further to the east it was as small colonies in the midst of the older inhabitants, and on such occasions,despite the inhibitions of earlier days,the purity of their blood slowly disappeared. Although they do not appear to have penetrated southward to any great extent,what did ultimately permeate through Lower India was the Hindu scheme of life which emerged from the racial blends that had matured in the north (55 , p.164)

The origin of the term 'Aryan' is rather obscure. J.H.Breasted states that the word appears first in the Harri,one of the tribes of Mitanni,who were among the

first Indo-European peoples known to us in Asia.

Generally it was the self-chosen name of peoples living near or coming from the shores of the Caspian Sea (56 , p.277). Monier Williams suggests two alternative Sanskrit sources for the word - "arya" meaning noble, or "ri-ar" meaning to plough. He therefore concludes that Aryan may mean either nobleman or peasant (56 , p.277). Whatever the origin of the word, its use today is chiefly in relation to the Hittites, Medes, Persians, and Vedic Hindus i.e. only to the eastern branch of the Indo-European peoples, whose western branch populated Europe (4 , p.192).

The mingling of Aryan blood with that of the indigenous population gave rise to new strains. Through Kashmir and tailing off into the Punjab, elements of the Aryan people survived - tall and fair, with long and straight noses. Of particular reference to this investigation was the product of absorption by a mainly Dravidian population of peoples who settled in the Gangetic valley (55 , p.157). Today this group is known as the Hindustani people and many of the Indentured Indians who came to Natal were descendants of this racial admixture.

The invasion of India by the Aryans is probably the most important event in her social and cultural history, not only because it brought with it an entirely new civilisation, but also because it created the pattern of Indian cultural evolution even until the present day. However it should not for one moment be considered that this process was entirely one-sided. Reference has already been made to the civilisation of the Dravidians, and where there is contact between two groups there must surely be influences travelling in both directions. D. Friedman sums up the position in the following way: " If it is true that the Aryans during a development of 1000 years imposed their religious and social views on this sphere of life (i.e. on the Pre-Vedic or Dravidian Age of India), it is equally true to say that the latter grafted many of its traditions, customs, and primordial religious attitudes on these forms of Vedic civilisation for which scholars of a past generation have coined the term, 'Brahminism' ". (32 , p.231).

One of the most significant contributions of the Aryans in this field was the development of the caste system. W. Durant explains it in the following

way: " Outnumbered by a subject people whom they considered inferior to themselves, they foresaw that, without restrictions on intermarriage, they would soon lose their identity; in a century or two they would be assimilated or absorbed. The first caste division was, therefore, not by status but by skin colour - it divided the long noses from the broad noses, Aryans from Nagas and Dravidians". (26 , p.398). The Nagas were the inhabitants of Northern India prior to the arrival of the Aryans.

That the caste system may have originally been based on skin colour rather than socio-economic status is reflected by the early Hindu word for caste - varna - meaning colour. This word was later translated by the Portuguese as 'casta'. (Latin, castus - pure) (26 , p.398). The term came to the English language first as - cast - borrowed from the French 'caste' an adaptation of the Portuguese ..'casta' (78 , p.977).

J.S.Meston describes the caste system as having the following characteristics; a common name, the same traditions and occupation, a theory of some common origin and of some tutelary deity, the same social status and the same family priests (55 , p.158). Such a definition suggests a certain fundamental confusion in the usage of

and traders;and their responsibility is to provide for the sustenance of the race. The Sudras fulfil all the menial functions of society (59 , p.576).

By the development of the caste system,Brahminism made sure of its own position in Indian society. Its acceptance of the four original social classes (Varna), provided a spiritual justification for the caste system as a whole. Further divisions of this graded discipline of life were the four ends of human endeavour (Purusartha), and the four stages of life (Asrama). Purusartha was made up of pleasure or happiness in all its aspects (Kama), wealth and worldly power (Artha),virtue and duty (Dharma), and salvation or spiritual emancipation (Moksa).Asrama comprised the stages of Brahmacharin or student,Grhastha or householder, Vanaprastha or anchorite,and Sannyasin or spiritual mendicant (32 , p.234). The details of this rigid and highly ordered way of life have been provided to illustrate the social system of which the Indian immigrants who came to Natal were a product.

The link between this social organisation of Hinduism and the ideal state as envisaged by Plato is apparent (70). Both have their rigid and discrete social classes,their prescribed ends of human endeavour,and their

inelastic system for the education of citizens. At times the similarity between Greek and Hindu thought is too close to be regarded as mere coincidence. Did the Greek philosopher borrow the ideas from the Indian system, or was Indian society a practical application of a plan of which "The Republic" was the blueprint ? Perhaps a common source may be found in minds and traditions of the Indo-Europeans when they dwelt on the eastern shores of the Caspian Sea. Such considerations lie outside the scope of this investigation; but they do tend to emphasize the possibility of a link between those early invaders of Europe and the Aryans of North India.

d) The coming of the Moslems.

The Moslem invasions of India began with minor raids in the Western Punjab about 664 A.D. (26 , p.459). In 997 A.D. a Turkish chieftan named Mahmud became sultan of the little state of Ghazni in Eastern Afghanistan and he began a very profitable series of raids across the border into India (26 , p.460). However, the first invasion of any permanence was that of 1186 when the Ghuri, a Turkish tribe of Afghanistan, established the Sultanate of Delhi. These intruders maintained their

regime by excesses of cruelty and succeeded in temporarily demolishing much of the existing structure of government.

Of their rule V.A.Smith says: "No Hindu could hold up his head and in their houses no sign of gold or silveror of any superficiality was to be seen.....

Blows,confinement in the stocks,imprisonment and chains were all employed to enforce payment."

(85 , p.234).

Such excesses could not continue and when Tamerlane the Turk,having gained the throne of Samarkand,challenged their authority they could find little local support and they were easily defeated. However Tamerlane stayed only long enough to pillage and plunder and,carrying away with him as much of India's riches as he could,he left the centre of the stage to his recent victim,the Delhi Sultanate,which continued with its excesses for yet another century (26 ; p.463).

It was then that the real conqueror of India arrived. He was Babur,founder of the mighty Mogul Dynasty, a soldier as brave and talented as Alexander the Great (26 , p.464). At Delhi he established,"the greatest and most beneficent of the foreign dynasties that have ruled India" (26 , p.464). He was succeeded by a colourful

procession of rulers, either famed for their piety or notorious for their wickedness - Akbar, Jehangir, Shah Jehan, and Aurangzeb. The last-named was a religious bigot who strove throughout his reign to eradicate all religions but his own. Hindu schools were closed, idols were smashed, and temples were destroyed. All public worship in the Hindu faith was forbidden. Durant sums up his rule in the following way:

" As a result of his fanaticism, thousands of temples which had represented or housed the art of India through a millennium were laid in ruins. We can never know from looking at India today what grandeur and beauty she once possessed." (26 , p.475).

Aurangzeb was the last of his line and, within two decades of his death, the Moslems had lost the force and military vigour of their predecessors. Thus was the stage set for the last great invasion of India, heralded by Vasco da Gama's discovery of the sea-route to India.

The present Moslem population of India may be divided into two groups; the pure Moslems descended from the Moguls and Pathans, and the converts to Islam who differ racially very little from the surrounding Hindu

population out of which they originally emerged. The so-called "pure" Moslems may be subdivided into four types;

Moguls who are descendants of the last invading race.

Afghans and Pathans in the Punjab.

Saiyads who claim to be lineally descended from the Prophet.

Sheikhs. However this is a name often adopted by a number of converts to Islam.

(55 , p.157).

e) The British occupation of India.

The pro's and con's of this last great taking over of India by a foreign power are of no relevance to this investigation. Sufficient be it to state that the British Raj helped Indian development in a number of ways; yet at the same time held up development in others. India was a suitable market for all the goods produced by England's many new factories and it was, perhaps, only natural that local crafts should suffer to a greater or lesser degree. W. Durant regards this influence as more harmful than some other historians do. He says: " India was subjected to an economic despotism that ruined her industries and threw her

millions of artisans back upon an inadequate soil; and a political despotism that, coming so soon after the narrow tyranny of Aurangzeb, broke for a century the spirit of the people."

(26 , p.615).

After the famous despatch of Sir Charles Wood in 1854, the British Government developed a system of education for India (53 , p.189). Despite the fact that the best teachers and methods were well-meaningly applied to the problem, there were three grave defects in the system established, defects that have had a significant effect on the mind of enlightened Indian youth. G.F. MacMunn sums them up as follows:

First, by making its own type of education the qualification for government service, it tended to concentrate the energies of the youth of India on the search for public offices rather than on learning for its own sake or on that general development of intelligence that would serve the industrial growth of the country.

Secondly, the mass of the students who clamoured for a purely literary education as the doorway to official employment was so great that the vast

majority of them absorbed only a shallow and mechanical smattering of knowledge. To those who failed in securing government posts, their education proved of no commercial value and in this way a class of unemployable and half-educated lads grew up, who became ready vehicles for political unrest and, in some cases, for revolutionary crime.

Thirdly, purely secular instruction which ignored the vernacular would neglect the indigenous ethos and culture of India and become in time largely responsible for the reaction against western civilisation.

(53 ; p.190).

f) The languages of India.

In this brief survey of the main invasions of India it has been noted that certain new ethnic groups arose. From the intermarriage of the original stock with the Dravidians there arose, among others, the Tamil and Telegu peoples in the south. Some time later the Hindi-speaking group emerged as the product of fusion between the Dravidians and the Aryan invaders from the north-west. The establishment of the Mogul Empire resulted in

the conversion of one quarter of the population to Islam. However, as was previously noted, the great majority of Moslems in India are actually of Hindustani stock (76 , p.287).

The story of all these great migrations is reflected in the languages of India. Sanskrit was the main vehicle of thought for all the great classical writers but, by the fifth century B.C., this language had changed to Prakrit in very much the same way as Latin developed a local character and became Italian. After certain other metamorphoses these "Middle Indian" languages had given birth to a number of vernaculars, chief of which was Hindi. By the twelfth century A.D. Hindi had become Hindustani, the lingua franca of North India. With the Moslem invasion, Hindustani became filled with Persian words and an additional dialect, peculiar to the Moslems, arose. This was Urdu. Meanwhile, in the south, the Deccan kept its old Dravidian languages, among which were Tamil and Telegu. (26 , p.555).

These four languages; Tamil, Telegu, Hindustani, and Urdu, together with Gujerati, were the tongues used by the Indian immigrants to Natal (59 , p.582).

g) The mind of the Indian.

An effort must be made to ascertain what effect these great changes in India's history have had on the mind of the people. This is necessary because some knowledge of the outlook of the Indian immigrant to Natal is required before it will be possible to assess how much conditions in this province have caused him to modify existing attitudes and to develop new ones.

Perhaps the most outstanding quality of what might loosely be called 'Hinduism' is its vagueness and its great ability to absorb and reconcile with itself tendencies that might at one time have appeared diametrically opposed to its own tenets. It is perhaps more a way of living than a religion, ".....tolerating several creeds - pantheism, polytheism, monotheism, and atheism; yet intolerant of foreign monotheists and of its fellow Indians who have rebelled against the caste system." (79 , p.160).

The ordinary Hindu worships a plurality of gods, regards the cow as sacred, looks upon certain pools as holy and accepts both brahminical supremacy and the caste system (55 , p.157). The acceptance of the graded order of society is as fundamental to Hindu belief as is

the doctrine of Karma, by which the immortal soul of man must reap the fruits of his deeds and misdeeds either in this life or in some future birth. It is a man's deeds that shape not only his nature but also his destiny. Man is born into a particular caste because of his actions in a previous incarnation (32 , p.237) The Law of Karma is coldly logical and acts as a great stabilising force in society. It is the life-blood of the great system of classes, keeping each man in his place and stressing ever the insignificance of the individual's material existence in relation to both the development of his own soul and the vastness of the real universe that lies behind the transitory things of this life.

Such a creed, with its emphasis on the importance of the inner life, may not necessarily have developed out of the sufferings of the people during the various foreign invasions of their country; but at least it showed them the direction in which they should turn. As Muller says: " History supplies no second instance where the inward life of the soul has so completely absorbed all the other faculties of a people " (57 , p.78). A fuller realisation of this turning away from material

reality is the key to an appreciation of how millions of people for countless centuries have been prepared to accept all the exclusiveness of caste - the prohibitions on intermarriage and on mixing and working with men of castes other than one's own. By cutting down individual choice as much as possible, even in such mundane matters as food, daily habits, and dress, the caste system succeeded in crushing individuality and reducing the people to little more than cogs in a social machine (78 , p.979).

There is, of course, a wide gap between the behaviour-patterns, group customs, religious forms, and ways of thinking of the higher cultured classes and the lower uneducated masses. Although the bulk of the population do accept some of the tenets of the higher Hinduism like the idea of Karma, the transmigration of souls, and the caste system, paying lip service to the official gods like Vishnu, Siva, and Kali, they still adhere to the practices and primitive beliefs centering in local deities, demons, and sanctuaries foreign to Brahminical canon (32 , p.230). The amazing quality of Indian philosophy is that, despite its subtlety, it could still stimulate the growth of local popular beliefs. It has already been pointed out that the Dravidians gave to,

as well as received from, the culture of the conquering Aryans. This may be seen particularly in the field of religion, where the beliefs of the masses are still rooted in the pre-Vedic "puja", the cult of the idol with its own ritualism, so different from the Vedic ceremonial. As D. Friedman says: "Today the religion of the masses is predominantly "puja", ceremonialism, rather than "bhakti", a spiritual love of god" (32 , p.239).

This very elaborate social order was conceived in terms of a static agricultural society. It overstressed social responsibility at the expense of individuality, which was suppressed to an irreducible minimum. It held out little promise to unpedigreed genius, little incentive to ambition, and little stimulus to invention and enterprise. However, the very nature of the system contributed to its downfall. It was too rigid, too inflexible to adapt itself to the irresistible growth of industrialisation in India. W. Durant comments on its decay as follows:

" The machine does not respect persons.....Trains and trams give standing room to all who can pay.... and in the congestion of the urban theatre or street, Brahmin and Pariah rub shoulders in unexpected fellowship.....Slowly the machine lifts a new class

to wealth and power, and brings the most ancient of living aristocracies to an end."

(26 , p.623).

However, tradition born in antiquity and strengthened by observance over countless centuries dies hard. Economic change may undermine existing social practice and enlightened legislation may sweep aside social inequalities, but it takes more than this to storm the citadel of the mind, to modify and change habits and prejudices, rendered sacred by their longevity. The caste system may be dying, but caste consciousness in its most obnoxious form is still a potent force in Indian life today. G.T. Garratt says: "The guiding principles of humanity and social service and social justice, and the accepted criteria of nationalism have been forgotten. Doubtless so-called nationalists and national organisations abound, but real national spirit and unity are lacking. A healthy, vigorous national life is still a dream. Caste feeling is not solely responsible for this state of affairs; but it has certainly failed to generate a robust sense of nationality." (33 , p.157).

h) Summary.

It is now possible to draw together the various strands of the chapter and to embark on certain generalisations about the Indian people, both in their motherland and here in Natal. Quite clearly, there exist among them differences in racial stock, and to classify the group simply as Indian would represent an oversimplification of the true position. Apart from any racial differences, there are differences in language, culture, and outlook among the various ethnic groups that make up the whole.

What Indians would appear to hold in common is a respect for social tradition, the ramifications of caste and class, and the intricate ceremonials of religious practice. They are the products of a way of life that has always undervalued the things of this life because of the promise of great spiritual riches in the next. They are members of a religion that is at the same time many religions, exacting in its demand for the observance of ritual, yet ready to embrace and absorb any new philosophies that might emerge.

CHAPTER III : THE INDIAN IN NATAL.

a) The aim of the chapter.

The aim of this chapter is certainly not a history of Indian settlement in Natal but rather a reflection, in so far as it is possible, of how experiences in his new home have affected the Indian's ways and attitudes. For such a purpose it is important to have facts relating to the type of indentured labourer that came here, the feelings and reactions of the local Europeans towards this new group, the effect of western ways of life on such a typically eastern people, and the facilities that are available for Indian advancement - socially, economically, and culturally. These facts will be studied from the Indian point of view and the selection of incidents for consideration does not necessarily reflect the sympathies and attitudes of the investigator in any way whatsoever. If all the counter-arguments to the points about to be raised were set down *pari passu*, it would certainly present a truer picture of what has transpired; yet at the same time it would completely cloud the main issue of the chapter. It is only the Indian point of view that is required at this stage. Only

philosophers see both sides of every argument. The people actually involved are seldom prepared to be so broadminded.

b) The arrival of the indentured labourers.

Many of the immigrants were agricultural labourers or members of the depressed classes. There were a few Moslems and a fair number of Brahmins. Altogether, they appear to have been a rather motley group. S.Cooppan describes them as follows: " In the first two decades it

would appear that a queer assortment of adventurers, fugitives from justice, women of loose character, industrious and educated family men, and even some of strict caste and high code of morality entered the country." (18 , p.5).

The main languages used by these people were Tamil, Telegu, and Hindi (59 , p.582). Such were the indentured labourers that had come to work on the sugar plantations.

Some twenty-five years later, they were followed by a different type of immigrant - the trader. These people, although originally from Bombay, came to this country from Mauritius. Most of them were Moslems (10 , p10; They were a rather mixed group, however. There was an Urdu-speaking section, almost entirely Moslem, and a

Gujerati-speaking section, predominantly Moslem but containing also a number of Hindus (59 , p.582). Most of these later immigrants settled in the towns. Even by 1936 only 25% of the Moslems lived in the country districts, as opposed to 40% of the Hindus (59 , p.578).

G.H. Calpin comments on the nature of the Indian immigrants to Natal in the following terms:

" One of the most unfortunate things about the coming of the Indians is that the country did not receive a representative cross-section of India. I have already remarked on the absence of Indian artists but must add that neither did we receive scholars, writers, artisans, and members of the professions; no middle classes in fact. Indians were conspicuously coolies or conspicuously traders and being so, were easier targets for hostility." (10 , p117).

c) Legislation relating to Indians.

Law 14 of 1859 which allowed the immigration of Indians into Natal laid down the following conditions of indenture. They were bound over to their employers for three years at a wage of 10/- a month, rising by 1/-

a month with each year of service. At the end of their contracts the labourers had three choices. They could return to India at the expense of the government, they could reindenture for a further term of service, they could accept a piece of crown land in lieu of the passage home (10 , p.6).

Originally, European opinion was very favourable towards this introduction of labour from the East. In 1845, when the manager of the Umzinto Sugar Company brought into the Colony a few Chinese and Malays, the "Natal Mercury" expressed itself as follows:

" This first introduction of Eastern labour we hail with satisfaction as the thin end of the wedge. We are satisfied that the presence of a few thousands of such labourers in the Colony will operate most beneficially as an example to our own natives besides affording relief and a guarantee of success to the operations of the planters." (10 , p.2).

In 1865, as the result of some dissatisfaction on the part of the Government of India over the treatment of Indians in Natal, immigration was stopped but, after urgent representations by the sugar farmers, the supply of

Indian indentured labourers was resumed in 1874. The period of contract was extended from three to five years and ^{no} one was allo^wed to return to India until he had resided in the Colony for ten years, despite the fact that after five years he could be a free man (10 , p.6). G.H.Catpin comments on this amendment to the conditions of indenture in the following manner:

" It is difficult to conceive of a more certain way of establishing an Indian community in Natal; for the conditions made it inevitable that successive inflows of labourers should fill the gaps as the indentured labourers became free. As if to clinch matters beyond doubt, the law laid down that for every hundred men imported forty women should accompany them." (10 , p.8).

Most of the Indians stayed on in Natal after the term of their indenture had expired. Some became small farmers on their own and the rest entered the labour market where they were much in demand. Because they were not a seasonal labour force, as was the case with the local native, they were soon absorbed into the various commercial, agricultural, and industrial functions of the young colony. In 1909 the Clayton Commission

reported the following distribution of Indian labour in Natal:

(8) Indian labour in Natal - 1909.

General farming.....	6,149
Sugar farming.....	1,006
Coal mines.....	3,239
Tea estates.....	1,722
Railways.....	2,371
Domestic.....	1,949
Corporations.....	1,062
Brickyards.....	740
Wattle plantations.....	606
Shipping agents.....	442
Miscellaneous.....	313
	25,599

(15).

It is quite clear that the new immigrants had not taken long to find their feet. This is well reflected in the following extract from a report to the Colonial Secretary in 1872. " The children born or reared here

are growing up a far better race than their parents in matters of physique and have less of the servile air that clings to their parents." (16).

The stream of immigrants continued unabated and, by

1891, two-thirds of the Indian labourers in Natal were already free. The growth of the Indian community in relation to its European neighbours may be seen in the following table:

(9) Population of Natal 1876 - 1891.

<u>Year.</u>	<u>European</u>	<u>Indian</u>
1876	18,846	6,787
1884	35,435	27,206
1891	46,788	35,763 (10 , p.10).

Soon the Europeans began to feel the competition of the Indian workers in the labour market and also in business. The high Indian birth rate did little to allay the fears that it would only be a matter of time before the whites would be swamped by the new immigrants. To meet this contingency, the Indian Immigration Act of 1891 was passed. Among other things it included the following:

" Every indentured Indian who shall fail, neglect, refuse to return to India or to become re-indentured in Natal shall take out year by year a pass or licence to remain in the Colony and shall pay for such a pass or licence a yearly sum of three pounds." (10 , p.14).

Five years later the tax was also levied on the man's

wife and children. Furthermore the parliamentary franchise for Indians was abolished (10 , p.17). Although the tax was never strictly enforced, it did prove a great hardship to many. No Indian could be employed by a European unless he produced his licence. After about twenty year^s the tax was finally suspended (10 , p.16).

Such legislation reflects in no uncertain terms the change in European attitude towards the Indian. The imposition of such difficulties was probably to make the permanent settlement of Indians in Natal impossible. They certainly had the effect of crystallizing Indian political opinion and of reinforcing their determination to raise their status, politically, educationally, and socially as near to the level of the white man's as possible (18 , p.252).

Similar restrictions exist at the present time and tensions between the two groups have festered for many years (6 , p.28).

d) The economic position of the Natal Indian.

Most of the invested Indian capital is in business undertakings. Commenting in 1949 on the lack of Indian economic development in other directions,

G.H.Calpin said: " European policy excludes the Indian, rich or poor, from opportunities that would tend to divert his energies into other channels. He cannot obtain industrial sites in economic proximity to railways and transport. He cannot put his own or his children's abilities into any of the professions on the same terms as the Europeans. There are no Indian chartered accountants, no engineers, no chemists, no dentists; there is no access to positions in the public services and where a profession - such as medicine - is open, university doors are half-closed to Indian entrants." (10 , p.105).

Since 1949 the position has eased somewhat but it is still very difficult for the educated Indian youth to find openings in anything other than commerce or teaching.

Roughly one third of the present Indian labour force is employed in industry. There is a more than adequate supply of applicants for the lower grades of semi-skilled work but, due to keen competition on the part of the Africans and also to the lack of opportunity for further advancement in the plant, the bulk of Indian industrial workers draw very low wages (96 , p.21).

There are some 15,000 Indians engaged in commerce. In order to assess the income of this group, C.A. Woods undertook an investigation of 425 retail shops in 1952. The 1,805 people employed therein were interviewed and it appeared that the average monthly wage of the higher-paid group was £30, and of the lower-paid group, £14/3/- (96 , p.20). It would appear that many of the commercial workers fare little better than those employed in industry.

Probably one half of the 14,000 Indian agricultural workers are engaged in the sugar industry. Most of them are in the mills, receiving not more than £160 per annum. A smaller number work as field hands for an annual wage of £78, plus rations and housing (96 , p.25). Many other Indian agricultural workers are engaged as small-holders in market-gardens on the outskirts of the larger towns, particularly Durban. In a survey in 1949, it was established that the average annual income per plot was in the neighbourhood of £123 (96 , p.23).

Commerce, industry, and agriculture account for at least 70% of Natal's Indian labour force. Apart from those in the professions it may safely be assumed that most of the remaining 30% fare little better than those

already mentioned. In fact, when the most recent figures from the State Information Office are considered, it may be seen that, if anything, the latter group would bring down the average income. These figures for 1947 indicate that of an earning force of 53,000, more than 30,000 were receiving less than £100 per annum (96 , p.37). The fact of this extremely low income becomes even more significant when it is realised that, with one half of the Indian population of Natal under the age of 15 years (as compared with one quarter of the Europeans), the burden of providing the needs of life falls even more heavily on the limited number of breadwinners (6 , p.6). Added to this is the Indian tradition of keeping the womenfolk within the home and thus, except in agriculture, the earning power of the women is negligible (96 , p.17).

Probably a fair indication of the financial level of the Indian community may be gained from a comparison of the value of property owned in Durban by each^h race group.

(10) Ownership of property in Durban - 1951.

<u>Group</u>	<u>Size</u>	<u>Value of property</u>	<u>Per capita average</u>
<u>European</u>	132,788	£113,879,110	£858
<u>Indian</u>	146,825	£24,541,060	£167

(96 , p.34).

These figures show very clearly the low level of Indian ownership of property.

Further information relating to the socio-economic level of the Indian is provided by a study of a representative cross-section of Indian families in Durban.

(11) Socio-economic survey of Indian homes in Durban.

Average number of persons per home.....	7.6
Average number of wage earners per home.....	1.6
Average number of persons per wage earner....	4.7
Approximate income per wage earner.....	£15/5/4.
Approximate income per person.....	£3/4/3.
Average number of persons per room.....	3.1
	(96 , p.51).

The low subsistence level of most Indian families is obvious. This fact may also be illustrated by a comparison between income and size of family.

(12) Income and size of Indian family.

<u>Monthly income range</u>	<u>Average number per household</u>
Under £2	8.7
£2 - £3	7.8
£3 - £4	7.5
£4 - £6	6.7
Over £6	5.5 (96 , p.55).

Presumably the Indian family follows the usual pattern. Those least able to afford them have the most children.

One of the greatest fears of any family is loss of income due to the unemployment of its supporters. This fear is very prevalent in the Indian community where the unemployment rate is very high. Department of Labour statistics for 1950 reveal that two out of every six Indian factory workers applied for unemployment insurance during the year. The corresponding figure for Europeans is two out of eleven (21). It is possible that unemployment rates in other types of employment are not so serious. However, this factor of a large unemployment rate, coupled with the general shortage of work and the fact that those capable of earning have such a large number of mouths to fill, does certainly tend to make the existence of the rank and file of Indian families a very precarious one.

It is obvious that the Natal Indians are not one of the more prosperous sections of the community. Quite often there is a tendency for others to generalise on the wealth of all Indians whenever some rich Indian businessman, and there are numbers of these, is seen

moving swiftly along the road in one of the latest and most luxurious American cars. This is the exception, and it is safe to say that many Indians are struggling to maintain themselves and their families above the breadline. Such people are looking forward to the day when they can escape "that state of misery which is always one month behind"(96 , p.36).

Coupled with economic poverty is also the general illiteracy of the older Indians. The Adult Education Commission of 1945 gives a figure of 70 - 75% of adult Coloureds and Asiatics who are illiterate in the official languages (1 , p.34). There is no doubt that this ignorance is a great handicap in an environment where the ability to read and write English is a sine qua non of social and economic advancement. Such a condition renders even more barren the home surroundings of the Indian schoolchild - the object of study in this investigation.

e) The outlook of the Indian.

It is unfortunate that there is so little available information on Indian attitudes in Natal. No research in this field has yet been published and the only facts available have been gleaned piecemeal, as

incidental to studies of other aspects of Indian life. One thing is cer^tain, however; there is no such thing as one, single, Indian point of view. Differences among the various language groups and differences among the economic classes, particularly the merchant as opposed to the industrial and agricultural worker, do not allow for any great uniformity in this matter, even though certain trends may at times be observable.

There is, first of all, a growing sense of frustration due to restriction in employment opportunities. This may in part be due to the spread of education among the people and the consequent desire for something more than semi-skilled occupations. Mention has already been made of the lack of openings into the professions; but there are also very few trades open to Indians. At the present time there are only four in which Indian youths may be apprenticed - cabinet-making, printing, bricklaying and motor engineering (96, p.40). There is also the not inconsiderable unemployment among the semi-skilled workers (21). This lack of work develops habits of idleness and it is quite the accepted thing to see many strong and healthy Indian youths clustered around the local tea-rooms, idly watching the world go by.

Secondly, there is anxiety about the future. Will the Africans riot again as they did in Durban in 1949 ? Will Indians in certain unproclaimed areas suddenly find that the latest decisions under the Group Areas Act place their properties in zones of development set aside for race groups other than their own ? (6 , p.29). Will Indian shopkeepers discover that they must move their premises from their present profitable sites to others where ruin may stare them in the face ? Worse. probably than all such fears for the future are those vague, ill-defined feelings of anxiety born out of a lack of trust in the authorities and a memory of what has transpired. Such feelings are infectious and so powerful because, since their roots are so deeply buried in the past, it is not easy to reach them in order to halt the growth.

Finally, there is a lack of direction in the lives of many Indians, particularly among the younger generation. This is probably due, in the main, to the fact that the seedling was transplanted from its own mother-soil to a place where there were so many new influences, both from the West and from Africa itself. The fact that the status of the Indian woman is steadily

rising and that the authority of the joint-family system is slowly disintegrating, are only symptomatic of a much more profound change - the submergence of a way of life that has for countless centuries been supported and nourished by the Hindu religion (6 , p.27). Probably the beginning of the end has been the failure on the part of the Indian to develop an effective scheme of vernacular education among the young of the community. Because of their inability to read in their mother tongue, most of the great Hindu religious literature has been lost to the coming generation and the religion of their forefathers will soon become a closed book to them. All that is left is mere ritual, meaningless in the main to the majority of those that participate therein (59 , p.582). "Then, inevitably, Utopia filled the place of Heaven, democracy became a substitute for Nirvana, liberty replaced God." (26 , p.625).

With their religion has fallen the well-ordered conception of society - the caste system. The influence of caste on modern Indian social life is negligible and it is still uncertain what will take its place. True enough, Western styles of architecture in houses and furniture have been universally adopted, and Western

dress has become the order of the day (59 , p.585). But there is still the feeling that in the great metamorphosis of the last century, the Indian in Natal has discarded far too much of his own culture before he has absorbed adequately the spirit underlying that of the land of his adoption.

f) The Indian school-child.

The Indian school-child is the product of a community that is growing and changing very rapidly. It is a community that is, generally, a poor and often illiterate section of the country's population. In it exist great differences in mother-tongue, in customs observed, in income earned, and in stage of social advancement reached. It is a community with roots penetrating back far into the dim ages of unwritten history; yet it is a community that is quickly and successfully adapting itself to Western ways, quite ready to shed its own cultural traditions with hardly a second thought.

In the environment of the Indian child there is considerable frustration, considerable anxiety, and considerable indifference about the ancient social disciplines by which it was once maintained. Such is

the background of the children - poor homes, illiterate parents and a circle of associates who have a vague fear that they will not like whatever the morrow is to bring forth.

CHAPTER IV : CONTROL FACTORS IN SAMPLING.

It has already been pointed out that the local Indian community is anything but homogeneous. Apart from such usual differences arising from economic status and place of residence, there are several others that must receive serious consideration when selecting a sample group for the purpose of standardising a test.

a) Sex differences.

In the Western world much of the earlier prejudice relating to feminine inferiority has been dispelled; but to assume such an equality in an environment where social tradition still assigns to the woman an inferior position is unjustifiable. We do not know, for example, how far the restricted educational facilities for girls have affected their mental development. Accordingly it is necessary to have equal numbers of both sexes in the sample group.

b) Differences in educational opportunity.

The shortage of school accommodation and the consequent late starting of many Indian children has already been mentioned. The result of this is that in

any Indian class there is a far wider age-range than in a normal European class. This is illustrated in the table below in which the age distribution for a standard in the middle of the primary school course has been analysed.

(13) Age distribution of Standard 3 pupils in Natal - 1949.

Age	<u>European</u>	<u>Indian</u>
8	31	2
9	969	43
10	1,939	297
11	803	840
12	250	1,189
13	74	1,004
14	15	595
15	4	298
16	0	124
17	0	34
18	0	4
19	0	2

(24 , p.88).

Since the median age for European standard three pupils at the end of June is 10years 6months, it is quite clear that, according to such a criterion, the vast

majority of the Indian pupils would be classified as retarded or backward. That a certain number of them are in need of psychological attention is quite possible, because there are at present no channels for removing Indian pupils of subnormal intelligence from the ordinary schools. The Natal Education Department has concentrated on the development of schools for the normal child and has hesitated to divert much needed money from this project to the more expensive task of providing special education for the intellectually backward Indian child.

It is reasonable to assume that most of these pupils are above the median age for standard three simply because they started school later than the usual school age. When selecting cases for sampling purposes, it is of vital importance to give full consideration to this fact. Quite clearly, there should be a great difference between two sixteen year olds - one in standard eight and the other in standard one. Therefore, to arrive at a more realistic picture of what exists, it is necessary to consider Indian pupils in relation to the median class ages for Indians. In the table below, derived from figures published by the Natal

Education Department, the great discrepancy in median class ages between Indians and Europeans is apparent.

(14) Median class ages of Natal pupils - 1949.

<u>Class</u>	<u>European</u>	<u>Indian</u>
Class 1	6.31	8.68
Class 2	7.43	10.10
Std I	8.49	11.14
Std II	9.52	12.05
Std III	10.54	12.88
Std IV	11.56	13.74
Std V	12.63	14.51
Std VI	13.62	15.44

(24).

Clearly, the Indian child is on the average somewhat over two years older than his European counterpart in any particular class. Quite naturally consideration has to be given to this fact in the choice of cases for each age group.

The next problem is to decide from what classes each age group should be selected. A study of the previous table reveals in which classes each particular age group tends to cluster. The most common classes for each age group have been set down below.

(15) The most common classes for each age group.

<u>Age</u>	<u>Standards</u>
12	2 & 3
13	3 & 4
14	4 & 5
15	5 & 6
16	6 & 7

The above standards may now be regarded as the "normal" ones for each age group respectively. When this classification is applied to the Indian school population of Durban the result is as follows :

(16) The number of "normal" pupils in each class.

<u>Age</u>	<u>1 Class Below</u>	<u>Normal Class</u>	<u>1 Class Above</u>	<u>Total in Age Group</u>
12	848	2,346	834	5,237
13	735	2,067	714	4,649
14	395	1,578	565	3,670
15	505	1,202	228	2,594
16	289	674	110	1,553
Total	<u>2,972</u>	<u>7,867</u>	<u>2,451</u>	<u>17,703</u>

(24)

Since the number of "normal" pupils, 7,867 out of a total of 17,703, accounts for only 45% of the school population within the age-range 12 to 16 inclusive,

it was decided to bring into the sample group all cases one standard below and one standard above the "normal" standards. This adjustⁿment raised the sample group from 45% to 75% of the total school population. It was decided that any cases falling outside this grouping would not be considered for sampling purposes because, since they would all be at least two years outside the "normal" classes, it would serve no good purpose to have tests standardised on such extreme cases. Furthermore, since the average age of school entry is steadily dropping in Indian schools, such extreme cases should soon disappear from Indian schools (22).

The objection may be made that, as the result of the excl^sion from the sample group of some 25% of the cases, the test may not reflect the extremes at either end of the intellectual ability of Indian pupils. It is true that it may not. The arguments in favour of leaving out the pupils who deviate by more than one standard from the average or "normal" classes appropriate to the age seem to be strong, however. Firstly, as long as Indian pupils are not compelled by law to enter school at a given age, common to all, and as long as the actual possibility of being admitted to a school at the

"right" age varies widely, it cannot be said whether those who, for this age, are two classes ahead, are ahead because of superior intellectual ability and whether those who are two classes behind, are behind because of inferior intellectual ability (or whatever it is that the intelligence test measures). In the second place, only a very detailed examination of the school records would have shown which pupils were more than one class below the class for their age because of failure in their school work and the consequent repetition of a standard and which not. As such scholastic records were not always readily available, such detailed examination was not undertaken.

Having decided to use this group of 13,290 out of the school total of 17,703 for sampling purposes, the next problem was to decide on what basis the cases for each age group should be selected from the sample chosen. From Table 16 it will be seen that the original "normal" class of 7,867 constitutes almost 60% of the final sample group of 13,290, and that the numbers in the two bordering groups, one class above and one class below, are almost the same - 2972 and 2451 respectively. Accordingly it was decided to select the cases for each

age group on the following basis.

(17) The basis on which cases were selected.

One standard below.....20%

The "normal" standard....60%

One standard above.....20%

It was felt that this manner of grouping would reflect fairly accurately the school level of each age group without allowing the extreme cases, which are rapidly disappearing, to vitiate the results.

c) Differences of ability among the language groups.

It has already been noted that the local Indian community is divided into the following language groups :

(18) Language grouping of Durban Indians.

Tamil.....44%

Hindi.....33%

Telegu.....11%

Moslem-Gujerati.....12% (96 , p.5).

The possibility that such factors as racial outlook, social customs, religious traditions, and educational opportunities very subtly, but decisively, influence the growth of intelligence has already been stressed.

Accordingly it was decided to reflect the language group

ratios shown above in the final sample chosen.

d) Principles underlying the sampling technique.

A random sample of the Indian population of Durban would allow every school-child an equal chance of being selected. In other words no child, for any reason whatsoever except "chance" would be excluded from the group or universe (68 , p.305). However selection of cases is seldom carried out to the last letter because there are generally sound reasons for excluding certain sections of the universe. E.F.Lindquist justifies this practice as follows :

" In general, the best we could do would be to prepare a list of schools which we know in advance might be willing to co-operate in our investigation, and then select ten schools at random from this list. If then, we have no reason to suppose that the schools in our list differ systematically from the other schools in the state with reference to the characteristics we are investigating, we might be justified in considering our sample of ten schools as equivalent to a random

sample from all the schools in the state".

(51 , p.21).

The main practical difficulty to be encountered in a number of the local Indian schools is in the matter of suitable testing conditions. It was felt that at a number of the schools, particularly the smaller ones, little reliability could be attached to the results of testing because of the utterly uncongenial environment - old and dingy buildings, distracting noises, overcrowded classrooms, rickety desks and the like. Accordingly it was decided to use only those schools with a pupil enrolment of over 300. There were 29 of such schools available and it was ascertained that in 18 of these testing conditions were satisfactory. This total included all seven government primary schools, nine government-aided primary schools, and the two government high schools. There is no reason to believe that the primary schools chosen are not representative of the schools in the Durban area, so far as the quality of the pupils is concerned. They are scattered throughout the city in both urban and peri-urban areas, they are situated in both poor and

better districts, they tap sufficiently all the main language groups of the community. When all these factors had been considered, the sample group comprised 75% of the Indian pupils in the Durban area that were eligible for sampling purposes (25).

e) The sampling technique.

Thus the method of sampling employed consists of three random samples, drawn from three subdivisions of the group, on the basis of sex, educational level and language group. The size of the sample from each subdivision corresponds to the proportionate weight of these control factors in the universe being studied. This technique can be called the process of stratified random sampling. J.G. Peatman suggests the following :

" It would be better to call a stratified sample a typical cross-section of the sampling units of the universe, and then describe the control factors used in the stratification, than to refer to such samples as representative samples" (68 , p.312). This point is of significance because it stresses the danger of introducing too many control factors into sampling

techniques. However the controls used in this investigation were regarded as essential. Nevertheless the possibility that a truly representative sample has not been obtained must not be overlooked.

f) The application of the sampling technique.

In order to illustrate the application of the principles enunciated above, the procedure for selecting the group of twelve year-old girls is explained below :

(19) Selection cell for twelve year-old girls.

<u>Language Group</u>	<u>Std I</u>	<u>Stds II & III</u>	<u>Std IV</u>	<u>Total</u>
<u>Tamil</u>	9	26	9	44
<u>Hindi</u>	7	20	7	34
<u>Telegu</u>	2	7	2	11
<u>Moslem-Gujerati</u>	2	7	2	11
<u>Total</u>	<u>20</u>	<u>60</u>	<u>20</u>	<u>100</u>

The operation of the three control factors is now apparent.

All the schools selected for the sample were asked to submit class-lists of all their pupils, on which were noted details of sex, date of birth, and language group. All cases that fell outside the categories fixed above, were excluded and the necessary number of cases for each sub-section of any selection

cell was chosen from the total number of cases eligible for that sub-section, by a random selection based on a table of random numbers. The schools were then notified of children required for testing. The selected cases were thenⁿ tested as a group at each school.

g) The testing of the pupils.

The techniqueⁿ outlined above was used for the choosing of cases for testing on a non-verbal group test of intelligence. In all, one thousand pupils were selected for this purpose - two hundred from each of the five age groups already mentioned. Owing to a certain number of absentees and to spoilt papers, the number finally used for each age group was one hundred and sixty, a total of eight hundred cases altogether.

The pupils appeared to have little difficulty in following the instructions of the standardised pattern, which has been included in the Appendix of the dissertation. The testees showed interest, attention and enthusiasm.

No difficulties were experienced either in the marking of the test papers or in the collation of the results. In the next chapter there will be a description of the test and the statistics arising from its application will be studied.

CHAPTER V : THE CONSTRUCTION OF A NON-VERBAL GROUP TEST.

a) The limitations of non-verbal intelligence tests.

The non-verbal group test discussed in this dissertation was devised in order to provide for Indian children a relatively culture-free intelligence test of the pencil and paper variety. The intention was that it be used for screening purposes, preparatory to an individual examination of pupils that failed to reach a satisfactory level of attainment in class. It was recognised at the outset that it would be impossible to eliminate entirely the effects of nurture on any child's performance on the test. As R.B.Cattell observes : " To advocate the use of

culture-free tests as a means of overcoming the difficulty (of testing intelligence) is greatly to misapprehend the extent to which the growth of intelligence and the skills through which it expresses itself are culturally determined."

(13 , p.136).

However it was felt that to eliminate the language factor as far as possible would add to both the reliability and validity of a test for a school population where one can't assume some minimum common competency in the English

language. Failure to recognise this point in the past has often resulted in investigators jumping to unwarranted conclusions. P.M.Symonds quote^s such a case: "The more familiar the experiences involved in the test, the more reliable e.g. the Army Alpha was unsuitable for civilians because it drew so heavily on military experience"(89 , p.73).

There are a number of non-verbal tests available and it might have been possible to use one of them for the present purpose. Serious consideration was given to the Progressive Matrices Test;but it was decided ultimately to construct an entirely new test (77). It was felt that, because of the relative similarity in form of all the problems in the Progressive Matrices Test, reliability would tend to be lowered. Such a danger has been voiced by J.L.Mursell in the following terms: " Interdependant items tend to lower reliability i.e. those items that present the same problem in different forms" (58 , p.48). True enough, the principle of the Progressive Matrices Test was used in the Inductions sub-test of the new test;but an effort was also made to introduce non-verbal forms of some of the sub-tests of the South African

Group Test (95). This was achieved in the Classifications and the Analogies sub-tests. To these three non-verbal sub-tests was added a Numbers sub-test, a modification of the same test in the South African Group Test (95).

b) The initial form of the new non-verbal group test.

There have been three forms of the test since its inception. Originally the test had only one section, containing a variety of questions involving words, numbers, and drawings. This was a purely exploratory stage in the development of the test. It was applied to some two hundred primary school pupils in order to note their reactions and also to study the suitability of the various types of questions. This was carried out in 1951 and the following conclusions were reached :

Verbal questions should be eliminated.

More difficult problems involving drawings should be developed.

Use should be made of a blackboard for each occasion on which the test was given in order to ensure that the pupils really understood what was required of them.

A test of mechanical arithmetic might be included temporarily; both to give the pupils confidence for

the subsequent sub-tests and also to provide some initial basis for comparison between the sub-tests and an aspect of school achievement.

c) The second form of the new non-verbal group test.

The second form of the test included all the modifications listed above. There were five sub-sections: Mechanical Arithmetic, Classifications, Analogies, Inductions, and Numbers. This new form was administered in the first instance to a small group of pupils in order to fix times for the various sub-tests. Ultimately the following time-allocations were used:

(20) Times for the second form of the non-verbal group test.

<u>Sub-test</u>	<u>Minutes</u>
Mechanical Arithmetic	5
Classifications	20
Analogies	20
Inductions	10
Numbers	10

A group of 230 pupils in the range standards one to six inclusive was given the new form of the test. Explanations of the various sub-tests were carefully made with the aid of a blackboard. However the drawing of all the trial examples on the blackboard for each application

of the test proved cumbersome and it was obvious that a set of charts was necessary for the purpose.

A study of the items of each sub-test was made and a split-half test of reliability was done, with the following result :

(21) Reliability - second form of the non-verbal group test.

Reliability Coefficient - $+ .92$. P.E. - $\pm .012$

By applying the Spearman-Brown Prophecy Formula (Appendix), it was found that if the test contained only half the number of items, the reliability coefficient would still be sufficiently high (87 , p.281).

(22) Reliability of the shorter form of the test.

Reliability Coefficient - $+ .85$. P.E. - $\pm .021$

Since this test was to serve as a screening test, it was decided to act on the result given above, and to create a shorter version of the test. In this way, the time needed for administering the test would be appreciably shortened.

The various sub-tests were inter-correlated and the resultant coefficients have been set down below. In passing it may be noted that all the correlations were both positive and significant.

(23) Intercorrelations - second form of the non-verbal test.

<u>Sub-test</u>	1	2	3	4	5
1. <u>Classifications</u>	.	.41	.39	.22	.17
2. <u>Analogies</u>	.41	.	.49	.41	.36
3. <u>Numbers</u>	.39	.49	.	.56	.59
4. <u>Induction</u>	.22	.41	.56	.	.38
5. <u>Arithmetic</u>	.17	.36	.59	.38	.

C.Spearman's formula (Appendix) was used in order to estimate the G-saturation of each of the sub-tests (86). The G-saturations have been set down below:

(24) G-saturations - second form of the non-verbal test.

Classifications.....	.4273
Analogies.....	.6701
Numbers.....	.8863
Inductions.....	.6095
Arithmetic.....	.5679

The residual correlations were calculated but there were no significant residues. The variance attributable to G was 42.3%.

A rough check on the validity of the test was made at this stage. Teachers were asked to rate each pupil's classroom ability on a seven-point scale, and this rating was correlated with the score of the pupil on the test.

(52 , p.47).

(25) Class rating and second form of the non-verbal test.

Correlation $-.47$. P.E. $-.04$.

This correlation is consistent with the general pattern of relationship between examination marks and intelligence test performance (97 , p.112). It might even reflect more than that when it is remembered that the test is of a non-verbal nature and consequently holds little in common with the subject matter of the school curriculum.

d) The third form of the new non-verbal group test.

Two alternative forms of the test were built up from the items of the second form. The sub-tests, Classifications, Analogies, and Inductions were reduced from twenty items to ten in each case. The Numbers sub-test was left with twenty items for two reasons. In the first place it had the highest G-saturation of all the sub-tests and, secondly, it was felt that adequate representation should be given to the arithmetical side of mental ability, particularly since it was deemed expedient at this stage to exclude the Mechanical Arithmetic sub-test from the test itself. As mentioned earlier, there was no intention at any stage of the investigation to retain this sub-test in the test. Thereafter it was considered solely as an

achievement test and used in conjunction with tests of other aspects of classroom performance.

It proved relatively easy to match questions in the two alternative forms of the test; because the nature of the material therein lends itself to subtle alterations which can result in apparently different questions having absolutely equal difficulty. A study of the items in any one of the first three sub-tests will illustrate this point quite clearly.

In order to reach a decision on the time allocation for each sub-test, the two alternative forms of the test were administered to small groups of pupils in the range, standards two to six inclusive. As a result, the following new times were established :

(26) Times for the third form of the non-verbal group test.

<u>Sub-test</u>	<u>Minutes</u>
Classifications	5
Analogies	4
Inductions	5
Numbers	7

At this stage of the investigation considerable thought was given to the manner in which the test should be explained to the pupils. A set of charts was prepared

in order to reduce the time devoted to explanation. Then careful attention was given to the patter by having an observer make a verbatim report on everything said by the tester during the administration of the test. This was done on five separate occasions. Thereafter a uniform patter for the test was laid down. Although a fixed patter had been used previously, it was felt that certain inflections of the voice or certain reframing of sentences on some occasions and not on others might detract from a standardised presentation of the test material. The instructions, the standardised patter, and the directions for marking the test are included in the Appendices.

A group of 418 pupils from urban and peri-urban schools, and ranging from standards two to six inclusive, was selected for an application of this latest form of the test. The group was split into two equal sections with the help of a table of random numbers. One half of the group wrote the A form of the test and the other half the B form. A comparison of the difficulty of the two forms of the test was made by working out the mean score for each of the sub-tests. This has been set down below :

(27) Comparison of the forms of the non-verbal group test.

<u>Sub-test</u>	<u>Form A</u>	<u>Form B</u>
<u>Classifications</u>	3.961	3.835
<u>Analogies</u>	3.663	3.770
<u>Inductions</u>	4.248	4.221
<u>Numbers</u>	8.116	7.662
Total	<u>19.988</u>	<u>19.488</u>

There is a close correspondence between the mean scores of each sub-test in the two forms of the test. The exception is in the Numbers sub-test where the Form B version appears to be slightly more difficult than the Form A. However, the difference between the two means is not statistically significant.

The sub-tests within each form were inter-correlated and the co-efficients are set down below. All the co-efficients were positive and significant.

(27a) Intercorrelations - non verbal group test - Form A.

<u>Sub-test</u>	1	2	3	4
1. <u>Classifications</u>	.	.36	.38	.41
2. <u>Analogies</u>	.36	.	.50	.41
3. <u>Numbers</u>	.38	.50	.	.43
4. <u>Inductions</u>	.41	.41	.43	.

The residual correlations were calculated but there were no significant residues. The variance attributable to G was 41.8 %.

(28) Intercorrelations - non verbal group test - Form B.

<u>Sub-test</u>	1	2	3	4
1. <u>Classifications</u>	.	.37	.40	.35
2. <u>Analogies</u>	.37	.	.52	.45
3. <u>Numbers</u>	.40	.52	.	.42
4. <u>Inductions</u>	.35	.45	.42	.

The residual correlations were calculated but there were no significant residues. The variance attributable to G was 42.4 %.

A study of the two tables reveals that the correlations are relatively consistent for the corresponding sub-tests. The largest difference between any pair is .06 and this difference is comfortably within the range of probable errors of the two correlations concerned.

When these figures are compared with the inter-correlations derived from the sub-tests of the second and longer form of the test, there is only one important discrepancy viz. the correlation between Inductions and Classifications. The index has risen from

+ .22 in the second form of the test to somewhere between + .35 and + .41 in the third form. This fact, and also the exclusion of Mechanical Arithmetic as a sub-test, has resulted in the correlations between Classifications and the remaining sub-tests taking on a magnitude more in keeping with those of the other sub-tests. From the table below it is quite clear that these changes have favourably affected the G-saturation of the Classifications sub-test. It has, in fact, assumed a size more comparable with those of the other sub-tests.

(29) G-saturations - second and third forms of the test.

<u>Sub-test</u>	<u>Second Form</u>	<u>Third Form A</u>	<u>Third Form B</u>
<u>Classifications</u>	.4273	.5737	.5478
<u>Analogies</u>	.6701	.6625	.7120
<u>Numbers</u>	.8863	.6947	.7132
<u>Inductions</u>	.6095	.6485	.6183

It was decided to investigate the value of some form of weighting of the raw scores on the basis of G-saturations. The following weights were used for Classifications, Analogies, Numbers, and Inductions respectively 5, 7, 7, 6. (40, p. 459). In order to test the value of such a weighting system, the weighted and unweighted scores of a random sample that wrote the test were correlated.

(30) Relationship between weighted and raw scores.

Correlation - $r = .97$. P.E. - $\pm .005$.

Since there is such a high correlation between the two sets of scores, it is quite clear that an elaborate weighting system is hardly worth the candle. Accordingly it was decided to extract the intelligence quotients directly from the raw scores - a decision which, in such circumstances, would appear to be the best one (41, p.448).

e) Summary.

Certain types of non-language questions have been applied to Indian pupils. A number of these questions were woven into a non-verbal intelligence test, with alternative forms, A and B. The forms appeared to be equal in difficulty.

It has been shown that there is a common factor running through all four sub-tests. When a proposed weighting system on the basis of G-saturation was tried out, it was shown to be not worth the trouble. Consequently, the decision was taken to calculate intelligence quotients directly from the raw scores. Such a standardisation will be discussed further in Chapter XI.

CHAPTER VI : A STUDY OF NON-VERBAL GROUP TEST SCORES.

a) The scores of the different age groups.

Since no weighting of the raw scores was used and since there are fifty items in the test, the maximum score is fifty. The range of scores of the pupils tested in the final application of the test (p.66) was 0 - 44. Thus there would still appear to be room at the top of the scale for the rare and unexpected genius.

The performance on the test of the various age groups has been set down below.

(31) N.V.G.T. - Scores of the various age groups.

<u>Age Group</u>	<u>Mean Score</u>	<u>S.D.</u>
16	26.6	7.0
15	23.0	7.0
14	20.3	6.1
13	16.9	6.6
12	13.9	6.2

The means fall into a graded series with roughly three points difference between each. The standard deviations vary slightly between the older and the younger age groups; but this fact need occasion no alarm (7 , p.61). Quite clearly the test does discriminate between the

different age levels and thus an attempt to standardise the test is justified.

The distribution of the scores of the entire sample has been set out below.

(32) N.V.G.T. - scores of the entire group tested.

42 - 44.....	1
39 - 41.....	3
36 - 38.....	15
33 - 35.....	36
30 - 32.....	51
27 - 29.....	71
24 - 26.....	106
21 - 23.....	91
18 - 20.....	113
15 - 17.....	105
12 - 14.....	99
9 - 11.....	48
6 - 8.....	44
3 - 5.....	13
0 - 2.....	4

800

Mean - 20.16.

Standard Deviation - 7.95.

The test of chi-square was applied to the distribution of raw scores and it is clear from the value obtained that we have no grounds for regarding the distribution as normal.

(33) N.V.G.T. - test for goodness of fit.

X^2 - 23.44

Degrees of freedom - 11

P - .01

It was noted that there were too few cases in the upper half of the distribution, and that there are also too few cases at both extremes. This would seem to indicate that the sample taken is not truly representative, or that the test does not discriminate sufficiently accurately or that, whatever it is that the test is measuring is not normally distributed among the children tested.

It is interesting to note that psychologists have departed somewhat from the theory that intelligence is normally distributed in the population (92 , p.126). The more modern view is expressed in the following quotation :

"nor do psychometrists simply assume that intelligence is normally distributed; by

actual investigation they have proved that the distribution is not strictly normal, but follows a hypergeometric curve, slightly curved for well-known reasons " (7 , p.61). Thus, the third alternative listed in the paragraph above should not be overlooked as a suitable explanation for the discrepancy between the present distribution and the normal probability curve.

b) A comparison of the scores of the two sexes..

The separate scores of the boys and the girls have been set down below.

(34) N.V.G.T. - scores of the boys and the girls..

	<u>Mean</u>	<u>S.D.</u>
<u>Girls.....</u>	19.47	7.91
<u>Boys.....</u>	20.47	8.02

This difference in mean scores is not statistically significant ($t = 1.739$) and thus it may be assumed that the boys do no better on the test than the girls. This result is of some importance in that it is probably the first occasion that it is possible to make a reliable and quantitative statement of the mental ability of Natal Indian boys and girls respectively. True enough, this matter of sex difference in intelligence was

raised in connection with the South African Group Test when a difference in the performance of boys and girls was noted. However, due to the verbal nature of that test, no conclusion on the intelligence of Indian girls could be reached (52 , p.33).

c) A comparison of the alternative forms of the test.

A further comparison of the two forms of the test was made. Previously it was noted that the apparently slight difference in difficulty was not statistically significant (p.76).

(35) N.V.G.T. - comparison of difficulty of the two forms.

	<u>Mean</u>	<u>S.D.</u>
<u>Form A</u>	19.51	7.96
<u>Form B</u>	20.66	7.98

This difference is just significant at the 5 % level of confidence ($t = 1.99$) and from this it would appear that Form A is slightly more difficult than Form B. Previously the difference, albeit not significant, was in the opposite direction. It is suggested that a final decision on this matter be postponed until further testing results are available. For the present it may be recorded that a slight difference in difficulty between the two forms has been noted.

d) The performance of the various language groups.

It has already been pointed out that the children of the various language groups in the Indian community are not all products of the same social background, and that there may still exist differences arising from the various racial strains that comprise the Indian people. Accordingly a comparison of the various ethnic groups on the test is not without interest.

(36) N.V.G.T. - performance of the various language groups.

<u>Language Group</u>	<u>Mean</u>	<u>S.D.</u>
<u>Tamil</u>	20.03	8.04
<u>Hindi</u>	19.85	7.79
<u>Telegu</u> ,.....	19.42	7.02
<u>Moslem-Gujerati</u>	21.61	8.97

None of these differences is statistically significant. The largest difference, that between the Telegu and the Moslem-Gujerati groups, almost reaches the 5 % level of confidence ($t = 1.907$). However, the rather large standard deviation of the Moslem-Gujerati group, in comparison with the rather low one of the Telegu group, suggests the possibility that the samples of these two minority sections of the Indian community may not have been truly representative. Accordingly, further facts are needed before a final decision can be made.

e) The reliability of the non verbal group test.

In order to decide on the reliability of a test, it is first of all necessary to know what factors are of importance in this connection. P.M. Symonds sets them down in the following terms :

" The causes of unreliability may be classified as those which are in the test itself, those which are in the person who takes it, and those which are in the person who gives it" (89 , p.73).

Factors in the test itself.

There must be an adequate range of difficulty and the items must be suitably scaled from the easiest to the most difficult. Items should be independent of each other, because those that present the same problem in different forms tend to lower reliability. Multiple-choice items are far more reliable than the true-false type of question. Catch questions, introducing obviously irrelevant elements and emotionally loaded items, e.g. those involving racial prejudice, also work against a high reliability (58 , p.47).

The Non-Verbal Group Test may not be criticized on any of the grounds listed above. There is an adequate range of difficulty in the items and considerable care

has gone into the scaling of the items for the final form of the test. The items are generally independent and at least four choices are offered in every question. There are no catch questions and, since it is a non-verbal test, there is no danger of any item impinging on the racial prejudices of the testees.

Factors in the testee.

The test should not provide situations that are unfamiliar to those that are taking it. The testees should not be negative, unduly shy, or unwilling to co-operate. The explanations to the various sub-tests should be adequate (58 , p.48).

The Non-Verbal Group Test is a pencil and paper test and there is no reason to believe that any pupil should not be used to such a test, particularly since the lower limit of the test is standard two. As the need to excel is engendered by the present examination system, there are no grounds for assuming inadequate motivation on the part of the testees. The directions are given with extreme care and, in fact, occupy 46 % of the entire testing time.

Factors in the tester.

Under this heading may be listed inaccurate or

prejudiced scoring, a lack of skill in applying the test, and a failure of the tester to establish proper rapport with the testees (58 , p.50).

Since the Non Verbal Group Test is entirely objective, prejudice cannot enter into the assessment of marks. Furthermore, every test paper was double-checked to ensure accuracy of scoring. Only one person applied all the tests and adequate care was taken to see that all the pupils were at ease before the test papers were set before them.

f) Statistical checks on the reliability of the test.

Test reliability may be measured by assessing its correlation with itself. There are three possible ways of doing this:

Repetition of the test on different occasions,
use of parallel forms of the same test,
use of the split-half correlation technique.

(41 , p.411).

All these methods were used in order to assess the reliability of the Non-Verbal Group Test.

Repetition of the test on different occasions.

A group of 100 cases was selected at random from the entire sample group(p.66) and they repeated the form

of the test that they had already written. The lapse of time between the first and the second testing was 30 days. The pairs of scores of each pupil were then correlated.

(37) N.V.G.T. - test-retest correlation.

Coefficient of Reliability $-.81$. P.E. $-.023$.

More desirable than the coefficient of reliability, however, is the index of reliability, because the latter reflects the reliability of the test on the basis of the testees' true scores, as opposed to their actual scores. Such an adjustment is necessary because the coefficient of reliability is very dependent on the range of talent represented in the group being tested. J.P. Guilford says: "Generally the wider the range of talent in the group tested, the higher the self-correlation will be". (41, p. 413). The formula for deriving the index of reliability is contained in the Appendix.

(38) N.V.G.T. - test-retest index of reliability.

Index of Reliability $-.90$.

This index may be considered satisfactory. At this level, according to S. Biesheuvel, error accounts for one fifth of the test variance. "This is due less to imperfections in the tests themselves than to variability

on the part of the candidates." (3 , p.6). W.S.Neff, after extensive experimental work, found that this range of candidate variation in test and retest scores was never less than 20 points (64 , p.727). Thus, the index of reliability for the Non-Verbal Group Test may be regarded as satisfactory.

The standard error of measurement, probably the best indication of test reliability, was also ascertained. The necessary formula is included in the Appendix.

(39) N.V.G.T. - test-retest standard error of measurement.

Standard Error of Measurement - 3.947.

Thus, so far as the Non-Verbal Group Test is concerned, the chances are 2 : 1 that any individual's scores will be in a range of 7.894 points.

Use of parallel forms of the same test.

A group of 100 cases was selected at random from the entire sample group (p.66) and they wrote the alternative form of the test 30 days after their initial testing. The pairs of scores for each pupil were then correlated.

(40) N.V.G.T. - correlation between parallel forms.

Coefficient of Reliability - $+.84$. P.E. - $\pm .02$.

Index of Reliability - $+.92$.

Once again, the test is shown to be adequately reliable.

Use of the split-half correlation technique.

This is probably the most common reliability check because it obviates the necessity for an alternative form of the test (68 , p.474). The technique was applied to both forms of the test (Appendix).

(41) N.V.G.T. - split-half correlation

Form A coefficient - $+.90$. P.E. - $\pm .02$.

Form B coefficient - $+.88$. P.E. - $\pm .025$.

Once again, the test is shown to be adequately reliable.

The "foot-rule" coefficient of reliability.

A fourth measure, the so-called "foot-rule" coefficient of reliability was also used. It is not a common one and is used only on certain occasions when only one form of a test is available. It was chosen for this investigation because it provides a measure of reliability based on the arithmetic mean, the standard deviation, and the number of items in the test (50 , p.387). The formula necessary for this calculation is included in the Appendix.

(42) N.V.G.T. - "foot-rule" coefficient of reliability.

Coefficient of Reliability - $+.83$.

This coefficient is somewhat smaller than the

others but, even yet, in terms of A.N. Jorgenson's classification it may be described as "evidence of a marked relationship" (48 , p.384).

g) Summary.

Certain statistics relating to the Non-Verbal Group Test have been studied. The test appears to discriminate adequately for the different age levels. There are no significant differences between the performance of the boys and the girls, or between the samples taken here of the ethnic groups within the Indian community.

Some doubt still exists as to whether the two parallel forms of the test are of equal difficulty; but a final decision in this matter awaits the result of further testing.

A number of checks on the reliability of the test were also made. It would appear that the Non-Verbal Group Test is adequately reliable.

CHAPTER VII : AN ANALYSIS OF THE TEST ITEMS.

There are a number of ways of analysing the validity of test items^{described by} e.g. E.L.Clark (14 , p.263), D.G.Paterson (67), J.C.Flanagan (30 , p.674), J.P.Guilford (39 , p.367), and F.B.Davis (20 , p.266). Each method aims either at establishing the relationship between the number of testees getting each item right and the number who get it wrong ; or at comparing the success on each item of those who did best on the test as a whole with those who did worst on the test. Both approaches have much to commend them. The first enables a simple order of difficulty for the items to be worked out ; while the second brings into prominence the discriminative power of each item. In this investigation it was decided to use both techniques - the first to seek the best possible arrangement of the items and the second to ascertain the proportion of items with high discriminative power.

a) An analysis of the order of item difficulty.

The method of F.B.Davis was used for this purpose (20 , p.266). The weighting for each item is the difference between the percentage of testees that

get it right and the percentage who get it wrong, after a suitable adjustment for chance success has been made. The necessary formula has been included in the Appendix.

A random selection of 100 cases, twenty for each of the five age groups, was made from the total sample (66). Success in each item was analysed and tabulated. The complete analysis may be found in the Appendix. Below is listed the order of item difficulty for both forms of the test.

(43) Classifications sub-test - order of difficulty.

<u>Item</u>	-	1	2	3	4	5	6	7	8	9	10
<u>Form A</u>		4	3	2	1	5	9	6	8	10	7
<u>Form B</u>		2	3	1	4	5	10	8	9	7	6

(44) Analogies sub-test - order of difficulty.

<u>Item</u>	-	1	2	3	4	5	6	7	8	9	10
<u>Form A</u>		6	4	2	1	9	7	3	5	9	8
<u>Form B</u>		5	1	2	4	9	3	6	7	7	9

(45) Inductions sub-test - order of difficulty.

<u>Item</u>	-	1	2	3	4	5	6	7	8	9	10
<u>Form A</u>		1	2	2	7	4	5	10	9	6	8
<u>Form B</u>		1	2	3	7	5	4	10	8	6	9

(46) Numbers sub-test - order of difficulty.

<u>Item</u>	-	1	2	3	4	5	6	7	8	9	10
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<u>Form A</u>		4	1	3	1	6	9	8	5	7	10
---------------	--	---	---	---	---	---	---	---	---	---	----

<u>Form B</u>		3	2	1	3	5	10	8	6	7	9
---------------	--	---	---	---	---	---	----	---	---	---	---

.....

<u>Item</u>	-	11	12	13	14	15	16	17	18	19	20
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<u>Form A</u>		13	16	14	11	17	12	18	19	15	19
---------------	--	----	----	----	----	----	----	----	----	----	----

<u>Form B</u>		14	12	16	11	13	15	18	20	17	19
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Of significance is the fairly similar order of difficulty for the two forms of the test. This is to be expected because, as was pointed out earlier, the two forms of the test were built up simultaneously and each item was carefully matched with its counterpart in the other form.

There is no doubt that the present order of difficulty can be improved, and this might well be done when the test is printed. However, the order is not so badly out as to prevent its use in the present form.

b) An analysis of item discriminative power.

J.P. Guilford's method was used for this purpose, particularly because there is a standard error of the weight for each item. Because of this it is relatively easy to sort out all the significant items (39, p. 367). The formula necessary for this method

is included in the Appendix^{ces} at the end of the dissertation.

A random selection of 100 cases, twenty for each of the five age groups, was made from the total sample (p.66). Thereafter the top and bottom 27 %'s of the group were ascertained and their performance on each item of the test tabulated. Thereafter the discriminative index of each item was calculated. The complete analysis of the items is included in the Appendix. Below is a summary of the results.

(47) N.V.G.T. - distribution of significant items.

<u>Sub-test</u>	<u>Number of Items</u>	<u>Form A</u>	<u>Form B</u>
<u>Classifications</u>	10	4	3
<u>Analogies</u>	10	9	3
<u>Inductions</u>	10	6	4
<u>Numbers</u>	20	19	19
<u>Total</u>	<u>50</u>	<u>38</u>	<u>29</u>

The difference between the number of significantly discriminative items in the two forms is surprising. The greatest difference is in the Analogies sub-test. No explanation can be offered at this stage.

There are altogether 100 items in the two forms of the test. Of these, 67 have indices of validity that are statistically significant i.e. the indices fall

outside the necessary two standard errors from four. (39 , p.367). However, another twenty-two items fall between one and two standard errors from four. It is submitted that these items may provisionally be regarded as statistically significant on account of the smallness of the group taken. However, this small group is in fact, representative of a much larger group. The fifty-four cases used were the best and worst sections of a group of one hundred, chosen by random selection from the original sample (p.66). It is the small number of cases taken that has been mainly responsible for the unduly large standard errors and the consequent lack of significance of certain items. With a larger group it is quite likely that many more items would be significant. However, only when a larger group has been taken will more reliable information be available.

In only one instance did an item fall below four in its index. However it did not fall outside one standard error below four.

It was noted that the majority of the non-significant items are in the latter parts of the sub-tests, and it was particularly among such items that the large standard errors made themselves felt. This was because

the number of correct responses even in the top 27 % was small. Thus in Form A, Numbers, Item 20, three out of the top 27 %, and none out of the bottom 27 % had the correct response. Surely, for an extremely difficult item at the end of a graded scale of items, such a difference may be regarded as in some measure discriminative.

c) Summary.

Two methods of analysis were employed to study the items in the Non-Verbal Group Test. From the first, it was noted that the present arrangement of items might be adjusted in order to represent the true order of difficulty. From the other it could be concluded that most of the items are adequately discriminative. A certain number of items were shown to be insufficiently discriminative; but it was submitted that a final decision on the latter be postponed, pending further investigation with a larger number of cases.

CHAPTER VIII : A CONSIDERATION OF THE SUITABILITY OF
CERTAIN INTELLIGENCE TESTS FOR INDIAN CHILDREN.

The main object of this investigation was the construction of a non-verbal group test of intelligence suitable for Indian children. In the process, a number of other intelligence tests were applied in order to assess their relationship with the test under consideration. As a result, it is now possible to make certain statements relating to the value of these tests in the present context and to offer standardisations for some of them. The tests investigated were as follows :

The Knox Cube Test,

The Porteus Maze Test,

The Draw-a-man Test of Goodenough,

The South African Individual Scale,

The South African Group Test.

The investigation of each of these tests was generally undertaken in two stages. If a pilot survey suggested that any particular test might be of value, then a more intensive study of it was made on a representative group of Indian children.

a) The Knox Cube Test.

For this test, five one-inch blocks of the same colour and material are required. Four are placed in a row in front of the subject, about two inches apart. The examiner then taps the blocks in certain sequences of gradually increasing difficulty and the testee must do the same after him. A scale for converting test scores into mental ages is given below. It reflects a rise in mental age from four to sixteen years, for an increase in score from one to eight points.

(48) Knox Cube Test - conversion table.

Mental Age - 4 5 6 7 8 9 10 11 12 13 14 15 16

Score - 1 3 4 5 6 6 7 7 7 7 8 8 8 (12, p.49).

No great claims are made for this test. It has little discriminative power and is generally employed as a sub-test in a battery (69).

The test was applied to a small group of Indian children of various ages. They showed interest in the test and, generally, seemed to enjoy the experience. There were clearly no linguistic difficulties. It was then decided to apply the test more widely. Some 350 pupils, with an age range of 10 - 16 years inclusive, were then tested. The means for the various age levels were

extracted but no statistically significant differences were observed. Even when the pupils were placed together into an older and a younger group, the difference between the means of the respective distributions of their scores was not significant. Because of this, it was decided to investigate this test no further.

b) The Porteus Maze Test.

The Maze Test has often been regarded as excellent for the purpose of inter-cultural comparisons of intelligence (12 , p.43). It was originally devised for the more accurate diagnosis of feeble-mindedness. It was created by S.D.Porteus in 1912 because he was dissatisfied with the Binet Scale which he felt did not reflect adequately the practical intelligence of mentally defective pupils (73 , p.9). He points out that the Maze Test differs from the Binet Scale because, in the latter, success is more significant than failure; whereas, in his test, it is the other way round. In this quality lies the great value of the Maze Test, particularly when what is wanted is a screening test for low intelligence. It was for this very reason that the test was applied to a small group of Indian pupils. Use was made of C.Burt's instructions for the administration

of the test(8 , p.254).

It was noted that most of the group did very well on the test. In fact, the distribution was negatively skewed. Of significance, however, was the fact that some obviously dull children had failed badly on the test. This seemed to confirm in some small way the claim of Porteus himself (72).

The test was then given to some 400 Indian pupils in the age-range 9 - 16 years inclusive. They had no difficulty in following what was explained to them and they showed interest in carrying out the instructions of the test. It was noted that the distribution of scores was, once again negatively skewed. The performance of each age group on the test has been set down below.

(49) Porteus Maze Test - mean age scores.

<u>Chronological Age</u>	-	9	10	11	12	13	14	15	16
<u>Mental Age</u>	-	11.1	11.8	12.2	12.4	12.8	13.0	13.1	13.1

It is noted that there is an upward trend in the mean scores from year 9 to year 15. At year 14, the Indian child achieves a score equivalent to that of an English child of 13; but at year 9 his score is 2 years ahead of his English counterpart. Quite clearly, further investigation is needed before any conclusions are drawn.

The Maze Test appears to be a rather blunt instrument for the measurement of Indian intelligence. Even though the mean scores do increase with each age level, there is no statistically significant difference between any two that are adjacent. However, when the pupils are divided into two groups, ages 9 - 12 and 13 - 16 inclusive, the difference between the mean scores is statistically significant at the five per cent level. ($t = 1.997$).

In order to test the claim of Porteus that his test is a suitable screening instrument for low intelligence, the test performance of 30 educationally backward pupils was compared with that of 30 educationally normal pupils. The pupils were assessed in terms of their school records by their school principal. There was a statistically significant difference in the mean scores of the two groups at the five per cent level. ($t = 2.005$). It would seem that the Maze Test does sort out cases of low intelligence to a greater or lesser degree. There is no doubt that further investigation in this connection would not be a waste of time.

There are other reasons too why this test should be given further careful consideration.

Investigators have reported statistically significant differences in the test-performance of socially maladjusted and socially well-adjusted school-children, when no such differences in the performance of the groups on the Binet Scales were apparent (74). Thus, the Maze Test may well prove valuable when studies of juvenile delinquency in the Indian community are undertaken at a later date.

Another argument in favour of the Maze Test is provided by Porteus himself (73 , p.6). He says :

" In the recent National Institute of Mental Health Conference on psycho-surgery which the writer (i.e. Porteus) attended in New York, it was affirmed repeatedly that the Porteus Maze Test was the only test in standard use that consistently reflected personality changes that follow brain damage in the frontal lobes(of the brain) (73). Then, to define the frontal lobes of the brain, he quotes W.Freeman and J.Watts.

" Truly if there is any way of summing up in one word the function of the frontal association areas, that one word should be foresight." (31)

Porteus claims that his own investigations have led him

to regard with great confidence the value of the Maze Test in this connection (73 , p.18).

Having shown that the Binet, Wechsler-Bellevue, and Koh's Blocks Tests indicate no pattern of loss after operation, he describes the application of the Maze Test to 17 lobotomy patients, both before and after the operation. The net loss in mental age was, on the average, about two years (71). It would appear that the Maze Test is able to measure something that is not measured by other tests. As Porteus says, :

" The Maze Test is the one standardised test that is consistently sensitive to any mental changes that follow any severe surgical interference with the frontal lobes.....Since feeble-mindedness is a condition of social insufficiency, dependent on demonstrable mental defects, it follows that the application of the Maze is always indicated whenever diagnosis of feeble-mindedness is attempted " (73 , p.25).

In passing, it is of interest to refer to a previous investigation of the performance of Indian children on the Maze Test (54 , p.450). M.L. Fick applied the test to groups of European, Indian, African, and Coloured school-children in this country before the

last war, 1939 - 1945. His figures show what percentage of each non-European group reached or passed the median score of the European group on the test.

(50) The Maze Test - scores of the different racial groups.

	<u>African</u>	<u>Coloured</u>	<u>Indian</u>
<u>Percentage reaching</u>			
<u>European median</u>	- 10.66	14.9	20.8

(54 , p.450).

Fick's finding conflicts with that of the present investigation in which it has been shown that Indian performance would not appear to differ very much from the white norms. Perhaps the discrepancy is due to the fact that in the earlier investigation it was mainly non-Natal Indians that were used and then only 91 cases in all (54 , p.450).

It would appear that there is as yet not enough evidence to reach a final conclusion about the value of the Maze Test in the present context. Because of its possible value as a sieve for cases of low intelligence, a standardisation for the two groups, 9 - 12 and 13 - 16 years respectively, has been attempted. This will be discussed further in Chapter XI. .

c) The Draw-a-man Test of Goodenough.

For many years there has been considerable speculation about the relationship between children's intelligence and their drawings. As early as 1885, a certain E. Cooke described in some detail the successive stages in the development of children's drawings (17). G. Rouma later set these stages down as follows :

First tentative steps at representation,

The tadpole stage,

Transitional stage,

Complete representation of the human figure as seen in full face,

Transitional stage between full face and profile. (81).

F. Goodenough, working on this basis, developed her Draw-a-man Test (36). In this test the child is given a sheet of paper and simply asked to draw a man as well as he can. There is no time limit for the test. The drawings are marked on 51 points and at no stage is consideration given to artistic excellence in the allocation of marks. It is purely a test of observation, memory of what has been observed, and ability to render what has been retained. The marking procedure for each point has been described as objectively as possible, in

order to eliminate the human factor in the marking of the drawings. The present investigator experienced difficulty in the marking of only six of the points, 14a - f inclusive. V.Hunkin reported that she encountered trouble in all but one of these, 14b, and in 17a besides (45).

F. Goodenough used a group of 3,593 children, with an age-range of 4 - 10 inclusive, for her first standardisation of the test. A division of the scores into the various age groups revealed that the test was highly discriminative. The actual scores were as follows :

(51) Draw-a-man Test - mean scores for American children.

<u>Chronological Age</u>	- 4	5	6	7	8	9	10	
<u>Mean score</u>	- 6	10	13	18	22	25	31	(45).

By the process of extrapolation, the following table of norms for U.S.A. children was produced.

(52) Draw-a-man Test - norms for American children.

<u>Score</u>	- 2	6	10	14	18	22	26	30	34	38	42
<u>Mental Age</u>	- 3	4	5	6	7	8	9	10	11	12	13

Goodenough claimed that the test was highly reliable. When a group of 194 children was retested, the correlation between their first and second scores was :

(53) Draw-a-man Test - reliability.

Reliability Coefficient - +.937. P.E. - $\pm .006$ (45).

Such a high co-efficient naturally reflects two aspects of reliability - the reliability of the test so far as the testees are concerned and the objectivity of the marking system itself. The latter is probably of more importance in that so many doubts have been cast on the system of marking because of the subjective element involved.

Goodenough validated the test by finding its correlation with the Stanford-Binet Scale.

(54) Validation of the Draw-a-man Test.

Correlation - .741. P.E. - .016. (45).

This is a relatively high correlation between a non-verbal test and a recognised individual scale of general intelligence. From these figures, the Draw-a-man Test, with its applicability to very small children, would appear to be a useful and a reliable measuring instrument.

The test was administered to some eight hundred Indian children between the ages of eight and thirteen inclusive. In only one or two cases was there any difficulty in the following of instructions for the test. Perhaps the most common error was the tendency for some to draw half a man, the prototype of the seated images often found in Indian temples. Frequently, the "dhoti" was

the sole garb of the character drawn. Apart from this, there was the usual sprinkling of cowboys, boxers and tailor's dummies, so typical of the drawings of children exposed to the influences of a western environment.

When the mean scores for the different age groups were extracted, it was clear that this test was less discriminative for Indian children than it was for Goodenough's group of American pupils. The mean scores, together with the standard deviations, for the various age-groups have been set down below.

(55) Draw-a-man Test - mean scores for Indian children.

<u>Chronological Age</u>	-	8	9	10	11	12	13
<u>Mean Score</u>		-20.37	23.25	24.87	26.4	27.99	29.28
<u>Standard Deviation</u>	-	5.91	6.07	6.48	5.34	5.8	6.23

Unfortunately, it was not possible to obtain suitable groups of pupils below the age of eight years, due to the generally late school starting of Indian children. However, the above figures would suggest that this test is applicable to Indians between the ages of eight and thirteen years inclusive. The means rise only slightly for the different age groups, but this rise is certainly uniform and does suggest that the test discriminates between the achievement of adjacent age

levels. Furthermore, apart from the apparent elimination of the language factor, the subject matter of the test is universally familiar. It is an economical test and can be applied and marked by any interested teacher.

Not without interest is an effort to compare the performance of different racial groups on the test. In the table below have been set down Goodenough's figures for American whites, Hunkin's figures for African children, and the figures for Indian children, arising from the present investigation.

(56) Draw-a-man Test - comparison of various racial groups.

<u>Chronological Age</u>	6	7	8	9	10	11	12	13
<u>Mean Score.</u>								
American whites	13.3,	18.0,	21.8,	25.7,	30.8.			
Indians			20.4,	23.3,	24.9,	26.4,	28.0,	29.3.
Africans	11.9,	14.3,	15.9,	17.5,	20.1,	22.2,	22.7,	23.8.
<u>Standard Deviation</u>								
American whites	4.3,	4.3,	5.3,	7.1,	6.7.			
Indians			5.9,	6.1,	6.5,	5.3,	5.8,	6.2.
Africans	4.6,	5.5,	5.5,	6.9,	6.3,	6.1,	7.2,	7.4.
<u>Number of Cases</u>								
American whites	515,	457,	298,	329,	213.			
Indians			100,	100,	100,	100,	100,	100.
Africans	91,	174,	262,	250,	290,	238,	239,	182.

Although there are no results for Indians for years six and seven, or for Americans for years eleven, twelve, and thirteen, it is apparent that both non-white groups have not achieved the same level of performance as the white group. This difference would appear to be less evident in the earlier years. In fact, when Indian and white scores are compared for the eight year olds, the difference in means is only just significant at the five per cent level. ($t = 1.966$).

In an effort to gauge for each of the three groups the relative increase in mean score from one age level to the next, the non-white scores were expressed as percentages of the white scores. This is set down below.

(57) Draw-a-man Test - relative increase in score with age.

<u>Year</u>	<u>American</u>	<u>Indian</u>	<u>African</u>
6	100		89.4
7	100		79.4
8	100	93.4	73.0
9	100	90.5	68.1
10	100	80.7	65.5

With the American white group held constant, the progressive decline in relative score is apparent. L.E.Oates, who also applied the Draw-a-man Test to a non-European

group in this country reports a similar finding :

" The important fact to be noted, however, is that this difference in performance is scarcely noticeable at the five and six year levels but it becomes considerably greater as chronological age increases." (66). This observation supports the view held, among others, by L.R. Wheeler (94 , p.351), T.R. Garth (34 , ch.5), B.L. Wellman (93 , p.97), N.D.M. Hirsch (43 , p.189), B.S. Burks (5 , p.219), and H. Gordon (37). All these workers stress the deleterious effects of a poor early environment on later intellectual development. There is no doubt that such an environment is characteristic of the type in which most of the non-white children in Durban live and grow up.

Of recent years the Draw-a-man Test has come to be regarded as not so entirely culture-free as was once claimed (36). R.J. Havighurst, who applied the test to American Indian children, states :

" There is some reason to believe that it (i.e. the test) is definitely affected by environmental influences for Indian children, particularly boys from six to eleven chronological age who proved to be decidedly superior to whites. This is

thought to be due to emphasis on visual values in the upbringing of Indian children" (42 , p.50).

Goodenough herself, in 1950, reviewing many of the investigations made with her test, concludes that there is a definite indication of the influence of culture and previous training on the results obtained. She states that her own earlier study, reporting differences among the children of immigrants to the United States, was no exception to the rule, and she withdraws certain previous conclusions that she made in this respect (35 , p.369).

Although this test may no longer be regarded as culture-free, it would appear to have value in the testing of Indian children. It has been shown that the means for the various age groups fall into what might be termed a normal sequence. Thus, a standardisation of the test for Indians would be quite feasible. This will be discussed in Chapter XI.

d) The South African Individual Scale.

This scale was constructed and standardised for local use by M.L.Fick in 1939 (29). The items were borrowed for the most part from Terman's Revision (90) and from Burt's Individual Scale (8). The test consists of 93 items and extends from year three to year twenty.

When examined for reliability by the test-retest method, the following result was obtained :

(58) South African Individual Scale - reliability test.

Reliability Coefficient $-+.93$. P.E. $- \pm .015$. (29).

The test is used by all the provincial education departments in this country. It is obtainable in both official languages and is generally regarded as better suited to South African children than any of the other developments of the Binet-Simon Scale. When Fick applied a less extensive form of the test, The Official Mental Hygiene Individual Scale, to African children, he found that as many as 69 of the 77 items therein were absolutely unsuited for them (54 , p.449). There appears to be no record of the test ever having been applied to Indian pupils in Natal prior to the present investigation, and some preliminary study of the test in this particular context was considered desirable.

A group of 250 Indian children was tested on the South African Individual Scale and a record kept of questions which appeared to present considerable difficulty. Out of the 75 items between years three and fifteen inclusive, there were nine items that would quite clearly not conform to Fick's criterion for the inclusion

of any test item i.e. that it must be passed by 50 % of the children who are nominally of the year below (29 , p.3). All nine of these items were of a verbal nature, calling for considerable facility in the use of English. Five of the nine items involve the repetition of statements, ranging from : "I am cold and hungry" at year four, to: "We should never be cruel to birds. It is night and we are all going to bed" at year eleven. Rather strange responses were made to Item 35, where it would appear that it is the virtue of the tester and not his intelligence that is being assessed. The item in question is: "What should you do if a playmate hits you without meaning to do so ?"

Item 56 calls for words rhyming with certain given words. Item 63 involves the rearrangement of jumbled sentences and Item 67 requires the testees to define such abstract ideas as justice, envy, and pity. After year fifteen the verbal factor becomes so pronounced that the remainder of the test is clearly unsuited for Indian children. It would appear that, with a suitable standardisation, this test could be used for Indian children up to the age of fifteen years. So far as the diagnosis of mental deficiency is concerned, it could be used for Indian pupils of all ages.

Before the test could be standardised for Indian pupils, a far larger and more representative sample would have to be taken. Of interest in this connection is a survey of the performance on the test of just over one hundred cases, made up of equal numbers of eleven, twelve, and thirteen year-olds. The mean raw score of the group was 57 points, as compared with the European norm of 61 points (29 , p.27). It can be argued that the difference may be due to the nine items listed above that proved unduly difficult for Indian children.

However, this was not a representative group, and little importance should be attached to the result. Nevertheless the figures do supply some hint of what may be expected when a more thorough study is made.

e) The South African Group Test.

A consideration of the suitability of the South African Group Test for Indian children is one aspect of the present investigation; but, since a report on this matter has already been submitted, the test will not receive a full treatment in the present text (52). It has been suggested that, with certain reservations, the South African Group Test is suitable for school-going Indian children from standard two upwards (52 , p.79).

The Indian weighted scores do not reach the same level as those of the European on the test. This may be clearly seen from the table below in which the weighted scores for the different age groups have been set down.

(59) South African Group Test - European and Indian scores.

<u>Age Group</u>	<u>European Mean</u>	<u>Indian Mean</u>
11	27	28
12	36	31
13	44	34
14	51	39
15	57	44
16	62	48 (52 , p.34).

It is noted that, with one exception, age eleven, the Indian means are certainly not so high as those , offered by R. Wilcocks for Europeans (95 , p.22). The various possible reasons for this have already been enumerated (52 , p.77). Of significance is the fact that the Indian scores once again reflect a relatively poorer performance by the older pupils. This may be more clearly seen when the Indian mean score at each age level is expressed as a percentage of the European score for that particular age.

(60) S.A.G.T. - relative increase in score with age.

<u>Age Group</u>	<u>European</u>	<u>Indian</u>
11	100	104
12	100	86
13	100	77
14	100	77
15	100	77
16	100	77 (52 , p.37).

This progressive decline in the relative performance of older Indian children on certain intelligence tests has already been discussed (p.113). It is sufficient to note that this tendency is present in the South African Group Test as well.

f) Summary.

Certain intelligence tests have been considered in relation to Indian children. Of these, the Maze Test and the Draw-a-man Test would seem to be useful for the younger Indian pupils; whereas the South African Group Test could be used in schools from standard two upwards. The South African Individual Scale, even in its present form, might be used for Indians up to fifteen years of age.

CHAPTER IX : THE MEASUREMENT OF INDIAN ATTAINMENT.

a) The value of standardised attainment tests.

F.Schonell suggests the following uses for attainment tests :

To differentiate between pupils who are generally backward and pupils who are backward in only one aspect of the school course.

To yield preliminary information on the nature of the child's backwardness. In reading, for example, tests might show whether the difficulty is primarily one of word recognition or, simply, some weakness in comprehension.

To point out those parts of the school course in which the pupils do best and even to reveal the subjects in which they have the greatest interest (82 , p.96).

So far as Indian children are concerned there is an additional use. Mention has already been made of the varying quality of Indian primary schools - a characteristic of any rapidly-developing system of education (p.63).

Attainment tests may be used to establish norms for the different classes in the Indian school. This would allow the clinical investigator to ascertain the true educational level of any pupil in relation to others of the same age or of the same class. Such assessments would be of greater value than simply a teacher's evaluation of a pupil in relation only to the other thirty or forty scholars in the class.

Such an objective grading is of particular value in the Indian school system where a low educational quotient need not necessarily be due to some defect in the pupil. It has already been shown that the standard in which any Indian child is may not be truly representative of his true level of achievement(p.60). There are two possible sources of error : In the first place, due to the child's advanced age on entering school and the pressure of applications for enrolment in the infant classes, he may find it too easy to gain promotion from one standard to the next. Such a possibility is exemplified by a certain Indian school which, when asked to submit for investigation its most backward pupils, sent along a list of twenty children out of which only three had ever failed a class. Furthermore, none of the

three had failed more than once. Thus in the case of such pupils at certain schools, an assessment of their knowledge on the basis of the standard of their own school only would be unduly flattering.

In the second place, owing to a natural conservatism on the part of the authorities in the matter of double promotions, there may be pupils whose level of attainment in the basic subjects is well above that of their present class. That such cases exist will be shown a little later in the present chapter.

Suitably standardised achievement tests would be of value in tackling such problems as those outlined above. In the case of some pupils the tests would reduce to more reasonable proportions an inflated educational quotient. In the case of certain others they would present a more accurate picture of an educational quotient that is unrealistically low.

b) The choice of achievement tests.

There is probably no limit to the number of tests that might be included in an attainment test battery. In this instance it was felt that tests in the following three branches of knowledge would reflect adequately a pupil's proficiency in the basic subjects :

English Comprehension,
Problem Arithmetic,
Mechanical Arithmetic.

It should be added that a certain amount of use was made of a reading vocabulary test. A report on this will be made later in the chapter.

English Comprehension.

Schonell's Silent Reading Test A, Test R3, was used for this purpose (83 , p.45). Apart from the fact that it appeared well suited to the group to be tested, there was the added advantage that it does not take long to administer.

Problem Arithmetic.

The two forms of Schonell's Essential Problem Arithmetic Test were used (83 , p.87). It was felt that it would not be possible to find a test, similar in nature and standard, that could be administered in a shorter time.

Mechanical Arithmetic.

It was desired to test both speed and accuracy in the basic arithmetical processes. No available existing test was regarded as suitable. Schonell's Essential Mechanical Arithmetic Test calls for a

knowledge of the parts of a pound (83 , p.71),and Burt's arithmetic tests appear unduly long (8 , p.394). It was then decided to compile a short test of mechanical arithmetic for the range standards two to six inclusive. The test comprised forty-eight calculations,due consideration having been given to the requirements of the Departmental Arithmetic Syllabus (61 , p.5).No knowledge beyond the four basic processes is needed to do the test. Furthermore,the time limit of five minutes stresses the need for speed as well as accuracy. Considerable care was given to the grading of the items in the test.

c) The application of the achievement tests.

As in the case of the Non-Verbal Group Test, pupils falling outside certain limits were not considered as suitable for selection in the sample group. Those from each school that were eligible for selection were listed and each child was assigned a number. Thereafter a random selection of 100 cases was made for each age level.

Apart from selection on the basis of age,it was also decided to make a selection on the basis of school class. In this instance,every pupil was included in the sample group. Thereafter,a random selection of

100 cases was made for each class from standard two to standard six inclusive.

There were no difficulties in the application of the tests because the pupils appeared to view them as ordinary school examinations. The scores of the children will be considered first in relation to chronological age and then in relation to school standard.

d) A consideration of the scores according to age.

The achievement of the pupils on the tests according to their age grouping has been set down below. It should be noted that the ages stated in the table are, in fact, the mid-points for each age level. Thus, age twelve, for example, runs from eleven years, six months to twelve years, five months.

(61) English Comprehension - scores according to age.

<u>Age</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
12	7.38	3.38
13	8.34	3.79
14	9.76	3.36
15	11.50	3.36
16	12.50	3.53

(62) Problem Arithmetic - scores according to age.

<u>Age</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
12	11.14	5.03
13	14.18	6.58
14	18.94	5.67
15	22.10	7.00
16	27.18	8.02

(63) Mechanical Arithmetic - scores according to age.

<u>Age</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
12	25.6	7.23
13	29.7	8.13
14	34.05	7.30
15	38.15	5.12
16	39.25	5.46

The fact that the mean scores for all three tests rise smoothly from age twelve to age sixteen inclusive, suggests that it would be relatively easy to standardise the tests. The standard deviations of the thirteen year-olds does not conform to the general pattern. In each instance it is larger than the standard deviations of adjacent age groups. Furthermore, in the case of two of the three tests, it is the largest of the standard deviations. No explanation can be offered for this.

e) A consideration of the scores according to standard.

All the pupils in this sample were tested during the last term of the school year. Thus the score for standard two, for example, represents the average score gained by standard two pupils in the last term of that standard. The mean scores for all the standards have been set down below.

(64) English Comprehension - scores according to standard.

<u>Standard</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
II	6.68	2.79
III	8.62	3.50
IV	9.96	2.97
V	11.38	3.29
VI	13.36	2.95

(65) Problem Arithmetic - scores according to standard.

<u>Standard</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
II	10.42	5.06
III	13.46	5.54
IV	19.54	5.04
V	21.66	5.91
VI	26.62	5.88

(66) Mechanical Arithmetic - scores according to standard.

<u>Standard</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
II	24.50	7.73
III	28.60	7.85
IV	35.03	5.62
V	36.85	5.22
VI	40.00	4.33

Once again, the means for each test conform to a regular order. It will be noticed that there is a fairly close correspondence between the "age" and the "standard" scores, starting with age twelve and standard two, and proceeding upwards to age sixteen and standard six. Force is added to the similarity when it is noted that the standard deviations for standard three behave in a similar manner to those for age thirteen, the observed counterpart of standard three. Since this is the case it would appear that the abnormal standard deviations for these two groups is due to sampling error.

f) The Graded Reading Vocabulary Test.

It was also decided to investigate the suitability of a vocabulary test for Indian children. Schonell's Graded Reading Vocabulary Test was used (84 , p.40). The Graded Reading Vocabulary Test of Burt might have been

applied instead had it not contained several initial rows of words that were obviously too simple for the group under consideration (8 , p.367).

The Graded Reading Vocabulary Test was given to representative groups of standard two and three pupils with the following result :

(67) Graded Reading Vocabulary Test - mean scores.

<u>Standard</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
II	33.9	9.33
III	49.4	15.07

It would appear that this test has some value in relation to Indian children. Further investigation should be undertaken and, if necessary, the test might be standardised for all classes in the primary school, from standard two upwards.

g) A study of Indian school achievement.

The above achievement tests were applied to all the pupils from standard two upwards in four of the larger Indian primary schools in Durban. The intention was to study the relationship between success on the tests and grading according to the school promotion system. With the help of tentative norms, it was possible to express the pupils' test results in terms of school

standard. Thus, for example, a boy in standard four might have been rated as standard three, or standard five, so far as the achievement tests were concerned. When the results were collated, it was of interest to note the number of very advanced and very retarded pupils in each class. The figures are as follows :

(68) Class level in terms of achievement test scores.

At least two years below the level of the class - 10 %.

At least two years above the level of the class - 16 %.

This result lends force to certain statements made earlier, relating to the relative lack of uniformity in the Indian school (p.59). The figures might not cause concern if the age distribution in the two extreme groups were normal for these particular classes. In other words, there would be no cause for concern if the very advanced pupils were far too young to be promoted rapidly to their true level, or if the very retarded pupils were young enough to have the time to make up for lost ground (75 , p.129). However, the situation becomes more disturbing if the very advanced pupils are old enough to merit double promotion, or if the very retarded pupils are so old that they would not have the time, both to make up for lost ground and to complete the school course. Such

were the conditions existing in the four schools studied. There were numbers of very advance^d children, old enough to merit double promotion, and numbers of very backward children, too old ever to complete the course.

The situation may be illustrated by taking at random one of the four schools and tabulating these extreme cases according to chronological age.

(69) Ages of very advanced pupils.

<u>Age</u>	-	10	11	12	13	14	15	16	17
<u>Standard II</u>	-	2	2	6	9	4	.	.	.
<u>Standard III</u>	-	.	.	2	2	1	1	2	1
<u>Standard IV</u>	-	.	.	.	2	3	1	1	.

Since most of these pupils are, chronologically, too old for their present classes, it would appear that their double promotion would be justifiable.

(70) Ages of very retarded pupils.

<u>Age</u>	-	13	14	15	16	17	18	19
<u>Standard II</u>	-	.	.	.	1	.	.	1
<u>Standard III</u>	-	.	1	.	.	1	.	.
<u>Standard IV</u>	-	1	.	.	3	.	.	.

Since all these pupils are already two years below the level of their classes, it would appear that only by some miracle will they reach standard six before

the demands of adult life compel them to seek some form of remunerative employment.

h) Promotion to the secondary school.

Owing to the acute shortage of high school accommodation, only those Indian pupils that do well in the public examination held at the end of standard six have any chance of being admitted to Sastri College or the only two Indian high schools in Durban: the Indian Girls' High School. The achievement tests mentioned above have, over the past few years, been applied to all the new standard seven pupils at the secondary school for boys, Sastri College. This was done for the purpose of standard seven grading, but it is not without interest to investigate the quality of these pupils in terms of their success on the achievement tests. This has been set down below. The mean score of the standard six group has been set down in brackets next to the score for the standard sevens in the case of each test.

(71) Achievement test scores of standard seven pupils.

<u>Name of Test</u>	<u>Mean Score</u>	<u>Standard Deviation</u>
<u>English Comprehension</u>	15.26 (13.36)	2.22
<u>Problem Arithmetic</u>	35.66 (26.62)	4.75
<u>Mechanical Arithmetic</u>	41.35 (40.00)	4.00

The high quality of those accepted for standard

seven in relation to the general standard six level is evident. At the present time it is only the cream of the Indian primary schools that is receiving secondary education. Until the majority of pupils continue with their education beyond standard six, it will not be possible to assess the value of the primary school course in relation to high school success.

i) Summary.

Certain achievement tests have been applied in order to assess their suitability for Indian children. All these tests appear to be adequate for the purpose and standardisations have been made. This matter will be discussed further in Chapter XI.

When the tests were administered to all the pupils of four local Indian schools, it was clearly shown that they would prove useful in the matter of standardising class achievement for the various standards of the Indian system.

The value of the tests as a screening instrument for backward and advanced children was also indicated.

CHAPTER X : THE VALIDATION OF THE VARIOUS TESTS USED.

a) Criteria for validation.

J.L.Mursell suggests that there are three main forms of external criteria against which an intelligence test may be validated (58 , p.40).

In the first place, other tests of similar order may be used. Quite often, one of the revisions of the Binet Scale is utilised as the chief external criterion for validation. In this instance it will be the South African Individual Scale. In addition to this, the correlations among all the various intelligence tests used in this investigation will be studied.

In the second place, it is quite often other tests that purport to measure different functions that may be employed as a basis for comparison. This validation procedure may be regarded as a practical winnowing device. It enables us to group and to sub-divide tests dealing with similar or dissimilar functions. Thus, it is intended to note the inter-correlations among all the tests mentioned above and, by the processes of partial and multiple correlation, to study their interrelationships and to gain some knowledge of the discriminative value of each in certain combinations.

In the third place, intelligence tests can be validated against achievement in school (47 , p.348). A.M.Jordan reported the following correlations between test scores and high school marks.

(72) Intelligence score and high school success.

Army Alpha.....+.38

Otis Self Administering.....+.49

Terman Group Test.....+.47 (47 , p.348).

J.D.Nisbet noted even higher correlations than these when he used certain British intelligence tests.

(73) Moray House tests and high school success.

Moray House Test 41.....+.73

Moray House Test 42.....+.74 (65 , p.53).

Often teachers' ratings have been used as a criterion. However, J.L.Mursell criticises the use of these in the following terms: "An intelligence test is supposed to provide a better indication of mentality than can be provided by estimates made by teachers and, to use the latter for proving up the former, seems to amount to arguing in a vicious circle". (58 , p.42).

In this present investigation it has been possible to avoid the use of both school marks and teachers' ratings, and to work instead with the results of the standardised

achievement tests.

b) The choice of a group for correlation purposes.

It was deemed desirable that the same group of pupils should be given all the tests. In this way, the effect on the correlation coefficients of sundry sample groups, each with their conceivably different standard deviations, would be avoided. The only difficulty was that the age-range covered by each test was not the same. For example, the Draw-a-man Test has an upper limit of age 13 whereas the lower limit of the Non Verbal Group Test is only age 12. Furthermore, since we laid down that for a number of the tests the child should be at least in standard two, it was decided to draw only from standards two and three when making up the group for correlation purposes. This brings in the factor of restriction of range in the sample taken and the subsequent need to use some corrective technique in order to achieve results representative of the entire primary school population.

c) The table of uncorrected correlations.

The table of uncorrected correlations is set down below. Any coefficient of $+ .20$ or more may be regarded as significant in that it will be more than three times the probable error. Since there is a uniform number of 100 cases for all the correlations, it is clearly unnecessary to provide a separate probable error for each.

(74) Table of uncorrected correlations.

	1	2	3	4	5	6	7	8	9	10
1. <u>Maze Test</u>	.	.26	.11	.01	.21	.14	.24	.19	0	.22
2. <u>Knox Cube</u>	26	.	.17	.08	.26	.09	.21	.16	.04	.11
3. <u>S.A.G.T.</u>	11	.17	.	.32	.56	.53	.60	.63	.65	.43
4. <u>Draw-a-man</u>	01	.08	.32	.	.26	.23	.22	.31	.25	.14
5. <u>N.V.G.T.</u>	21	.26	.56	.26	.	.53	.47	.51	.31	.29
6. <u>Mech. Arithmetic</u> ...	14	.09	.53	.23	.53	.	.54	.58	.63	.28
7. <u>Prob. Arithmetic</u> ...	24	.21	.60	.22	.47	.54	.	.48	.53	.26
8. <u>Eng. Comprehension</u> ,	19	.16	.63	.31	.51	.58	.48	.	.56	.27
9. <u>Reading Vocabulary</u> .	0	.04	.65	.25	.31	.63	.53	.56	.	.22
10. <u>S.A. Individ. Scale</u> ...	22	.11	.43	.14	.29	.28	.26	.27	.22	.

All the correlations were positive.

d) The table of corrected correlations.

It was found necessary to correct the correlation coefficients for two restricting factors.

The first was restriction arising from the relatively small number of class intervals used in the plotting of certain of the scattergrams. Because of this, some of the resultant correlation coefficients were not a true reflection of the relationship that actually existed. J. Guilford says:

"In the limiting case of two classes each way, the computed r is less than two-thirds of the r had

there been no grouping. When the number of intervals is ten both ways, the r is about three per cent underestimated." (40, p.359).

In this present group of tests there was one distribution of only six class intervals, another of seven, and two of eight. Consequently it was decided to employ Guilford's corrective technique in order to make the necessary adjustments. The appropriate formula has been included in the Appendix.

In the second place it was found necessary to correct the coefficients for restriction in range of the sample used. In this instance the restriction resulted from the fact that the choice of cases for the correlation was limited to standards two and three (p.136). Both the restricted and the unrestricted standard deviations for the distributions are known. They have been set down below. In this table the tests are numbered in the same way as in the preceding table, number 74 (p.137).

(75) Restricted and unrestricted distributions - S.D.'s.

	1	2	3	4	5	6	7	8	9	10
<u>Restricted</u>	1.3	1.6	11.0	5.7	6.3	1.7	5.1	3.7	13.6	5.6
<u>Unrestricted</u>	1.3	1.7	17.4	6.5	6.8	1.7	6.6	3.7	14.7	5.8

The coefficients were adjusted in terms of Guilford's formula. (Appendix).

(76) Table of corrected correlations.

	1	2	3	4	5	6	7	8	9	10
1. <u>Maze Test</u>	.	.26	.10	.01	.19	.12	.22	.18	.02	.21
2. <u>Knox Cube</u>	.26	.	.22	.10	.29	.16	.25	.21	.12	.15
3. <u>S. A. G. T.</u>	.10	.22	.	.36	.71	.72	.72	.74	.79	.54
4. <u>Draw-a-man</u>	.01	.10	.36	.	.32	.29	.28	.35	.30	.19
5. <u>N. V. G. T.</u>	.19	.29	.71	.32	.	.70	.62	.64	.55	.43
6. <u>Mech. Arithmetic</u> ...	.12	.16	.72	.29	.70	.	.69	.71	.79	.44
7. <u>Prob. Arithmetic</u> ...	.22	.25	.72	.28	.62	.69	.	.61	.68	.40
8. <u>Eng. Comprehension</u> ...	.18	.21	.74	.35	.64	.71	.61	.	.69	.40
9. <u>Reading Vocabulary</u> ...	.02	.12	.79	.30	.55	.79	.68	.69	.	.39
10. <u>S. A. Indiv. Scale</u> ...	.21	.15	.54	.19	.43	.44	.40	.40	.39	.

All the correlations were positive.

A study of this table reveals several interesting points. In the first place there would appear to be an insignificant relationship between either of the non-verbal tests, Knox Cube and Maze Test, and the remaining tests in the battery. Although their correlation with each other is statistically significant, they do not appear to hold very much in common with most of the other tests. Perhaps the only exceptions to this are the small but statistically significant correlations between the Knox Cube Test and

the Non-Verbal Group Test and the Problem Arithmetic Test respectively. However, why there should be this relationship between the Knox Cube Test and an achievement test in arithmetic is not readily apparent.

On the other hand it is rather surprising to see how the Draw-a-man Test correlates with all the other tests, particularly with the English Comprehension and South African Group Tests. Once again, no explanation can be offered at this stage.

The high correlation between the South African Group Test and the various achievement tests, particularly the Reading Vocabulary Test, must also be mentioned. High correlations between this intelligence test and examination marks have been noted elsewhere. For example, D.J. Gouws provides the following figures in this connection.

(77) South African Group Test and school examinations.

<u>Standard</u>	<u>Correlation</u>
VI.....	+.78
VII.....	+.55
VIII.....	+.38

(38 , p.45).

The present investigator found a somewhat similar correlation between the South African Group Test and success in the standard eight examination.

(78) South African Group Test and Junior Certificate.

<u>Correlation</u>	<u>Probable Error</u>
<u>Europeans</u>+.49	±.02.
<u>Indians</u>+.37	±.05. (52 , p.50).

Of particular interest is the relatively high correlation between the Non-Verbal Group Test and the various achievement tests. For such a non-verbal test to correlate so well with a test of English comprehension is indeed remarkable, particularly when even the pattern of the non-verbal test calls for only a very low level of proficiency in the English language. This point will be discussed more fully later.

The fairly high correlation between the Non-Verbal Group Test and the South African Group Test may be due to one of two factors; the use in both of a number completion test, or the common technique employed in two of the sub-tests - Classifications and Analogies. It would appear that the Non-Verbal Group Test may prove a suitable substitute for the South African Group Test - a test which has already been shown to be not perfectly suited to Indian children (52 , p.77). Even the creator of the test, R.W.Wilcocks, is prepared to admit ~~that~~ the ability of a child to do the South African Group Test depends on a

certain level of educational achievement (95 , p.8). This matter will be discussed more fully later in the chapter.

The unusually low correlation between the South African Group Test and the South African Individual Scale also calls for comment. On previous occasions a higher coefficient has been obtained.

(79) South African Group and Individual Tests.

Correlation for Europeans $- +.74$. P.E. $\pm$.036.

Correlation for Indians $- +.70$. P.E. $\pm$.024. (52 , p.44).

No explanation for the surprisingly low correlation in this instance can be offered (p.139).

e) The elimination of certain conditioning factors.

The relationships between tests may sometimes be affected by one or more factors which must be excluded before any decisions on such relationships can be made. Such conditioning factors can be eliminated in one of two ways.

In the first place, certain adjustments to experimental procedure can allow for the exclusion of a certain factor e.g. chronological age. This is achieved by making use only of pupils of certain ages for sampling purposes.

In the second place, the technique of partial correlation can be used (44 , p.283). The necessary formula

is included in the Appendix. This method may be used for two purposes. It can help to express quantitatively the effect of some third variable on the correlation between two other variables. Furthermore it can help to reveal the influence of a third variable on the relationship between two other variables when no such influence is believed to exist. In the present investigation, the technique was used for both these purposes.

The conditioning factor - English Comprehension.

The main conditioning factor investigated was that of English comprehension, as measured by the achievement test of that name. Some of the test relationships were examined when the influence of English comprehension on that relationship had been eliminated by the use of partial correlation. It is interesting to note how much of what two tests hold in common may be ascribed simply to a knowledge of the English language as measured by the English Comprehension Test. The correlations of the South African Group Test with both the South African Individual Scale and Problem Arithmetic are pruned considerably. The same may be said of the relationship between Problem Arithmetic and Mechanical Arithmetic. Particularly surprising, however, is the degree by which the correlation between two allegedly non-verbal tests is lowered. The result is an

insignificant correlation between the Non-Verbal Group Test and the Draw-a-man Test.

In the table below have been set down the partial correlations side by side with the original correlations.

(80) Partial correlations with English Comprehension constant.

<u>Names of Tests.</u>		<u>Original r.</u>	<u>Partial r.</u>
South African Group Test	)		
South African Individual Scale	)-----	.54	.40
South African Group Test	)		
Non-Verbal Group Test	)-----	.71	.46
South African Group Test	)		
Draw-a-man Test	)-----	.36	.16
South African Group Test	)		
Mechanical Arithmetic	)-----	.72	.41
South African Group Test	)		
Problem Arithmetic	)-----	.72	.50
Problem Arithmetic	)		
Mechanical Arithmetic	)-----	.69	.38
Non-Verbal Group Test	)		
Draw-a-man Test	)-----	.32	.13
Non-Verbal Group Test	)		
South African Individual Scale	)-----	.43	.25
South African Individual Scale	)		
Mechanical Arithmetic	)-----	.44	.24

The importance of these partial correlations depends really on what it is that the test called English Comprehension is measuring. Is it ability in the English language or is it ability to comprehend, an ability that is closely tied up with intelligence test performance? If English Comprehension is measuring mainly the latter quality, then there is no need for concern because then the test is nothing more than another intelligence test. However, the test is regarded primarily as an achievement test and it is submitted that the first of the two alternatives is more cogent. If this is so, then it is manifestly clear that the language factor must be considered extremely seriously when assessing an Indian child's performance on any of the above tests. Perhaps with a group of European pupils, whose language ability is likely to be more uniform, the effect of English comprehension on test result would be less extreme.

Such a conclusion serves to stress once again the futility of interracial comparisons of intelligence, even on the basis of non-language tests, e.g. the battery of tests used by M.L. Fick (54, p.450), until the two groups under consideration have achieved an equivalent excellence in the language through which the tests are being given.

The conditioning factor - Reading Vocabulary.

The influence of vocabulary, as reflected by the

results of the Reading Vocabulary Test, on certain of the correlations was also studied. The partial correlations, together with the original ones, have been set down in the table below. It should be stressed, however, that this is not a true vocabulary test because the testee is not required to give the meanings of words. He simply has to read the list of words set before him.

(81) Partial correlations with Reading Vocabulary constant.

<u>Names of Tests</u>		<u>Original r.</u>	<u>Partial r.</u>
South African Individual Scale)			
South African Group Test)	-----	.54	.41
South African Group Test)			
English Comprehension)	-----	.74	.44
English Comprehension)			
Problem Arithmetic)	-----	.61	.27
	)		

Although the correlation between the South African Group Test and the South African Individual Scale does drop when the factor of reading vocabulary is held constant, the decrease is certainly not as great as that noticed in many of the other combinations. More interesting is the influence of this factor on the relationships of the English Comprehension Test with the South African Group Test and the Problem Arithmetic Test respectively. In these instances the effect is more marked.

The relationship between the S.A.G.T. and the S.A.I.T.

In an effort to identify further factors influencing the relationship between the South African Group Test and the South African Individual Scale the factors measured by the four achievement tests were isolated separately. The resultant partial correlations are set down below.

(82) S.A.G.T.-S.A.I.T.relationship - achievement tests constant

<u>Constant Factor.</u>	<u>Original r.</u>	<u>Partial r.</u>
Problem Arithmetic.....	.54	.40
Mechanical Arithmetic.....	.54	.36
English Comprehension.....	.54	.40
Reading Vocabulary.....	.54	.41

The part played by acquired knowledge in this relationship is quite evident. Of the four achievement tests it is Mechanical Arithmetic which would appear to have the greatest influence on the correlation between the two intelligence tests. Nevertheless, the other three all apparently play their part, suggesting once again the possibility that these two intelligence tests measure more than innate ability so far as Indian children are concerned.

In order to see how this correlation is affected when more than one of the above conditioning factors is isolated at the same time, use was made of the Second Order Partial Correlation technique (40, p.346). The necessary

formula has been included in the Appendix^{ces}. The limitations and dangers of this formula are fully appreciated (40 , p.347) and it is not intended that any final conclusion should be drawn from the result of its application. The two factors held constant were English Comprehension and Mechanical Arithmetic. The resultant second-order partial correlation is set down below.

(83) S.A.G.T.-S.A.I.T. - second order partial correlation.

	<u>Original r.</u>	<u>Partial r.</u>
South African Individual Scale)		
South African Group Test)	--- .54	.34

Once again the dependence for success in intelligence and achievement tests on certain abilities common in both is reflected by the co-efficient above.

f) The weighting of the tests in certain combinations.

A knowledge of the relationships existing among certain of the tests was advanced by the use of the Multiple Correlation technique. The method employed was that of A.C.Aitken (2 , p.172). It is based on the calculation of tetrad equations and is styled the Method of Pivotal Condensation (91 , p.201). The method was applied in the three following instances.

The weighting of the four achievement tests in relation to the South African Group Test.

It was desired to ascertain what particular combination of the achievement tests Mechanical Arithmetic, Problem Arithmetic, English Comprehension, and Reading Vocabulary, would provide the highest correlation with the South African Group Test. The resultant regression co-efficient is expressed below.

(84) S.A.G.T. and achievement tests - regression co-efficient.

Multiple Correlation $-+.86$.

This remarkably high correlation suggests one of three things. Either these four achievement tests are capable of a relatively accurate prediction of innate ability, or the South African Group Test is primarily a knowledge test, or that all the tests measure both knowledge and innate ability. The fact that the correlation of the South African Group Test with the South African Individual Scale is considerably reduced when English Comprehension and Reading Vocabulary are held constant, is indicative of the language factor involved in these two intelligence tests. Yet, on the other hand, there is no reason why high intelligence should not reveal itself through superior achievement test scores. C. Burt, for example, recognised the potential value of school achievement in the assessing of

intelligence when, in his famous equation, he gave school attainment almost twice as much importance as intellectual ability in the determination of success on the Binet-Simon Scale. Burt's equation is set down below.

(85) Burt's equation for success on the Binet-Simon Scale.

$$B = .54S + .33I + .11A$$

Where B - Mental Age according to the Binet-Simon Scale.

S - School attainment expressed in terms of educational age.

I - Intellectual ability, also expressed in terms of years.

A - Chronological Age. (8 , p.195).

Although this equation has been subsequently much criticised, it still stresses that intimate relationship between general intelligence and school success (11 , p.584).

W. Stephenson says very much the same thing in the following quotation : ".....a soundly constructed test of English.....is as fair a test of intelligence as almost any intelligence test itself." (88 , p.41). This observation is supported to some extent by J.D. Nisbet who found that achievement tests predicted future school success as well as, if not better than, intelligence tests (65 , p.51).

The precise relationship between intelligence and

school achievement is far from certain. Thus, even though there is no doubt that the South African Group Test does draw heavily on so-called knowledge questions, there is no justification for saying that its remarkably high correlation with the achievement test battery is due simply to this fact. As has already been pointed out, it may be due to the fact that the achievement tests are measuring, to a greater or lesser degree, innate ability.

There is also the third possibility that the intelligence and the achievement tests are all testing both attainment and innate ability (p.149).

The weighting of the three performance tests in relation to the Non Verbal Group Test.

It was decided to ascertain the highest possible relationship between the Maze Test, Draw-a-man Test, and the Knox Cube Test, and the Non-Verbal Group Test. The resultant regression co-efficient is expressed below.

(86) N.V.G.T. and performance tests - regression co-efficient.

Multiple Correlation - $+.44$.

Although this co-efficient cannot be regarded as very high, it is certainly indicative of some relationship between the Non-Verbal Group Test and the other non-verbal tests.

The weighting of the Mechanical Arithmetic and English Comprehension Tests in relation to the Problem Arithmetic Test.

It was desired to ascertain the relative influence of mechanical arithmetic and English comprehension in relation to success in problem arithmetic. For the purpose, it was assumed that these three qualities are measured by the tests of the achievement battery. This matter is of particular importance in a school system where there is clearly an inferiority in the medium of instruction - English. The resultant regression equation is expressed below.

(87) The constituents of success in problem arithmetic.

$$P.A. - .518 M.A. + .242 E.C.$$

Where P.A. - Problem Arithmetic as measured by the test of that name.

M.A. - Mechanical Arithmetic as measured by the test of that name.

E.C. - English Comprehension as measured by the test of that name.

Multiple Correlation - .71.

The relatively minor part played by English comprehension in the combination is not without significance. The result would appear to emphasize the need for thorough drill in the tables and bonds before success in arithmetic can be expected.

g) Summary.

Certain relationships among the tests used in this investigation have been discussed. Of special significance is the high correlation between the South African Group Test and the achievement tests. Various possible explanations for this phenomenon have been suggested, without any final conclusion being reached. One thing seems certain, however, and that is the vital importance of both background and innate ability in intelligence and achievement tests. Their precise relationship has still to be ascertained.

The influence of the language factor even in the relationships of the non-verbal tests with each other was also noted. This fact stresses once again our lack of knowledge of how to measure separately two such interconnected variables as intelligence and achievement. It underlines also, the futility of seeking a purely non-cultural test of intelligence for inter-racial comparisons. Only when the two groups being compared are products of identical environments would such comparisons be possible.

Finally, careful thought was given to the manner in which the Non-Verbal Group Test, the pièce de résistance of this investigation, was related to the other tests used. Results would suggest that the test should be of considerable value in its present context.

CHAPTER XI : THE STANDARDISATION OF THE TESTS INVESTIGATED.

a) Methods of scaling test scores.

One of the chief difficulties in making use of different intelligence tests is the matter of comparing their scores. Thus, for example, when the I.Q. of a child is stated, it is always necessary to state the name of the test from which it was derived. For example, an unselected group tested on both the South African Group Test and the Terman and Merrill Scale shows considerable difference in the distribution of I.Q.'s. For the former test, two-thirds of the cases fall between I.Q. 88 and I.Q. 112 ; whereas for the latter test, two-thirds of the cases fall between I.Q. 84 and I.Q. 116 (3 , p.3). Quite clearly, then, an I.Q. of 85 on the South African Group Test, the minimum I.Q. for a standard six pass, is equivalent to, roughly, I.Q. 80 on the Terman and Merrill Scale (46 , p.152). In this connection S. Biesheuvel says : " What is even more important is that diagnostic standards for educability should always be adjusted to the scale characteristics of the particular test used, if injustice to individuals is to be avoided " (3 , p.3).

J.L.Mursell echoes this sentiment in the following terms :

" There seems little doubt that the main reason for variations among tests is that their norms are based on different standardisation groups."

(58 , p.219).It would appear that the solution to the problem is some universal method of standardisation of test scores (49 , p.92).It is fairly clear,too,that any method of scaling must take cognisance of both the central tendency of each distribution and the dispersion of the scores therein (40 , p.288).

Two of the commonest scaling techniques were considered,the standard score and the t-score. Both were rejected because,even though they provide suitable scaling systems,neither is readily comprehensible to the layman. One half of a scale of standard scores is negative and the range of t-scores is only about 50 to 60 points (40 , p.296).

b) Wechsler's standardisation technique.

Because of the objections raised above,it was decided to employ the method of D.Wechsler because,besides lacking none of the merits inherent in the methods already mentioned,it has also an important advantage. This is that the test scores are expressed in terms of a scale little different both in appearance and meaning from the existing well-known scale of I.Q.'s (92 , p.39).

Wechsler's scale obviates the necessity for expressing scores in terms of years, a practice that has resulted in considerable confusion from time to time (92 , p.19). Furthermore, the method allows for the consideration of the child's performance exclusively in relation to those of his own age group.

It is not the intention to deal here with the supporting arguments used by Wechsler (92 , p.219). Furthermore, Wechsler's formula has been included in the Appendix.

All the tests have been standardised on the basis of this technique and the relevant conversion tables have been included in the Appendix. Some inconsistencies of scores at the tail-ends of certain distributions may be noted. This is inevitable and is due to the fact already noted, that the standard deviations of score distributions for any particular test do not always fall into a harmonious pattern for the various age levels.

It should be noted that in choosing cases for any particular age group it was always the mid-point that was used. For example, in the fourteen year old group would be included all pupils between thirteen years six months and fourteen years five months. Furthermore, so far as the standards classifications are concerned, the pupils in each class were tested in the last term of the school year.

The Maze Test was not standardised in quite the same way as the other tests. Since the mean scores of adjacent age groups did not differ significantly, all the cases were separated simply into a younger and an older group for standardisation purposes. It is readily conceded that this procedure does not give full consideration to differences in chronological age in the computation of I.Q. However, as already indicated, the value of the test lies not so much in assessing how well the testees solve the various mazes but, on the contrary, how badly (p.103).

The three achievement tests; Mechanical Arithmetic, Problem Arithmetic, and English Comprehension, were standardised both according to age and to school standard. This was done because, as has already been pointed out, the relationship between chronological age and school achievement is not so close in Indian schools as in a more normal system (p.130). It is of value, therefore, to know not only how a pupil is faring in relation to his own age group, but also in relation to his school standard.

It was not possible to handle the Reading Vocabulary test in this way. Since it is an individual test, it was possible to standardise it only on standards two and three. It is hoped that this project will be completed at a later date.

CHAPTER XII : CONCLUDING CHAPTER.

This dissertation was introduced by a survey of the facts relating to the spread of education among the Indians of Natal. It was noted that the growth of the school system has been so rapid that it has given rise to certain serious problems. Due to the inadequacy of classroom space, many children have begun their school careers five or six years later than what, in this province, is regarded as normal school age. This has resulted in abnormally large age ranges in the different standards. Thus, it is very difficult to discriminate between the boy who is backward due to late school starting and the boy who is backward because of mental or physical sub-normality. The need for a psychological investigation of such a problem is obvious.

Before any step in this direction can be made, it is necessary to prepare intelligence and achievement tests suitable for Indian school children. The provision of these measuring instruments is the aim of this investigation. A number of existing tests have been considered and one or two new ones have also been developed. Before any testing can be done, however, more must be known about the group under consideration. To find such information has been no easy

task, because very little has been published on the actual adaptation of the Indian to the novel conditions of his domicile in Natal.

The origin in India of the main language groups among Natal Indians has been studied and it has been noted that there are differences in racial stock. Although these ethnic groups have lost much of their original identity as the result of intermarriage, it is not justifiable to speak of "The Indian", as though any one individual is representative of the group as a whole. From the fair, long-nosed peoples in the north to the dark-skinned, flat-nosed strains further south, the peoples of India are characterised by a diversity of human types.

A brief study has been made of the religious and social system of India in order to assess its bearing on the outlook of the people. The Indian mind would appear, until the twentieth century at any rate, to have been characterised by a preoccupation with the inner life of the soul and an acceptance of a rigid order of society in which one's own position was fixed for one's lifetime by forces outside one's control. It has been suggested, too, that the various great invasions of India by foreign powers have, if anything, intensified these attitudes.

With the arrival of the Indian in Natal and his entry into the commercial world, both as a work-seeker and as a businessman, there has developed a great deal of hostility towards him from the natives and the whites. Besides this mounting tension from without, the Indian also has to face domestic difficulties arising from continual clashes between Western influences and his own way of life. It has been submitted that Indian outlook in Natal is conditioned by frustration, anxiety, and feelings of insecurity.

Because of a lack of homogeneity in the local Indian population, the choice of a suitable sample for the purposes of test standardisation has provided no little difficulty. The factors of sex, educational level, and language group have all had to be taken into consideration. The final sample covers more than 13,000 of the 17,500 Indian school-children in the Durban area.

Considerable time has been devoted to the construction and standardisation for Indian pupils of a non-verbal group test of intelligence. The resultant test would appear to be both reliable and adequately discriminative. Of the other three non-verbal tests considered, the Draw-a-man Test of Goodenough and the Maze Test of Porteus could be used for Indian children until better tests are available.

The Knox Cube Test did not appear to be at all discriminative and no effort to standardise the test was made.

The South African Group Test has already been discussed elsewhere (52), when it was deemed suitable for Indian pupils from standard two upwards. A pilot study of the applicability of the South African Individual Scale to Indian children has also been undertaken. It has been noted that, in the age-range three to fifteen years inclusive, there are only nine items that do not appear suitable for Indian children. Much more work is needed on this test, however, before any final conclusions can be drawn.

Certain achievement tests in the basic subjects have been administered to the pupils under consideration. The tests would appear to be suitable for Indian children. When these tests were applied to all the senior pupils of four representative Indian primary schools in Durban, it was noted that at least a quarter of the group were two or more years above or below the level of their present classes. It has been suggested that some reorganisation of certain pupils in local Indian schools may be desirable.

Sundry statistical processes have been employed in order to study more fully the quantitative relationships existing between the tests studied. The very high multiple correlation between the South African Group Test and the

achievement tests was noted and discussed. Such evidence of the influence of some common factor, or factors, in intelligence test and achievement test success cannot be overestimated. It was seen, too, that even the correlation between two non-verbal intelligence tests was appreciably lowered when the language factor was held constant.

The need for a common way of standardising all the tests has been emphasized and the method of D. Wechsler has been chosen for the purpose. All the tables of norms have been included in the Appendix at the end of this chapter.

The main function of this investigation has been to break new ground. The value of a number of intelligence and achievement tests have been considered in relation to Indian children. Some of them have been standardised and it is believed that, in the near future, they will have a wide application in Indian education. There are a number of unanswered questions in this field and, since the means of making quantitative assessments of Indian ability are now available, it is hoped that a number of other investigations will be undertaken.

Still to be tackled is the standardisation of an individual scale of general intelligence for Indian children. The test to be used for the purpose can be

chosen at a later date. That such a standardisation is a pressing need, however, can hardly be doubted. No psychological assessment can be regarded as thorough until the results of screening tests have been confirmed by the child's score on the individual scale.

Satisfactory intelligence tests for smaller Indian children must also be developed. It has already been shown that those presently available are not absolutely satisfactory. In fact they are only to be used in the absence of something more suitable.

With the tests that are now available it should be possible to make a full and broad study of mental and educational backwardness in Indian schools. When maladjusted pupils have been removed from the normal stream of classroom activity, there will arise the need to cater for them according to their capabilities. Methods of remedial education suitable for such a contingency will have to be devised.

At the secondary level tests are required for the selection of high school pupils. Not only should new entrants to standard seven be graded according to their ability, but there should also be an attempt to direct these pupils into the stream of study consonant with their interests and aptitudes.

The general characteristics of growth among Indian children must also be studied and described. The maturation of intelligence, the emergence of interests, and the appearance of behavioural problems, should be considered in relation to the complete picture of childhood development. The needs of the pre-school child and of the adolescent should also provide fertile fields of investigation. There is much to be done, too, in relation to truancy and juvenile delinquency. Furthermore, very little has been reported on the development of attitudes in the Indian child.

Some statement has yet to be made on the relationship between the schools controlled by the Natal Education Department and the vernacular schools which generally exist in conjunction with some temple or mosque. It has not yet been established whether these two systems of schools, the secular and the religious, are complementary to each other, or whether there are sharp and, perhaps, irreconcilable differences in teaching method and school discipline. Also unknown is whether a scholar has adequate mental resources and stamina to cope with the normal primary school day, his homework, and his two hours attendance at the vernacular school.

Even the influence of the vernacular on the Indian child's learning of English must not be overlooked.

In a school system where he learns right from class one, not through his mother tongue but through English, it is quite possible that difficulties may arise. The speech mistakes in English of each of the local Indian vernacular groups should be carefully studied and listed. It is logical to anticipate that they will be grouped according to the presence or absence of certain sounds in each vernacular. Surely the teaching of the English language to Indian pupils should be on the basis of a systematic knowledge of these weaknesses.

At the present time there exists in the Indian community of Natal a very fertile soil for the energy and enthusiasm of the research worker who wishes to see some immediate practical value deriving from his efforts. In the department of psychological research alone, there is quite obviously a great deal to be done. Each year there are increasing numbers of Indian graduates qualifying themselves to do such work. However, before they undertake any investigation, they should pause in order to reflect seriously on the potential value of their efforts to their community. With so much to be done, it is of vital importance that urgent and pressing problems should not be overlooked in the interesting quest for answers to less weighty and even, possibly, trivial questions.

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APPENDIX A : STATISTICAL FORMULAE.

a) The Spearman - Brown Prophecy Formula.

This formula is used to estimate the reliability of a possible, new version of a test, having a greater or lesser number of items than the original form for which the reliability is already known. The formula is as follows :

$$r_L = \frac{L r_{xx'}}{1 + (L - 1) r_{xx'}}$$

Where L - the ratio between the desired length of the test and the actual length of the test employed.

$r_{xx'}$ - the reliability co-efficient derived from the administration of alternate forms of the test.

(87 , p.281).

b) Estimation of G-saturation - Speerman's Formula.

$$r_{19}^2 = \frac{A_1^2 - A_1'}{T - 2A_1}$$

Where A_1, A_2 - are the sums of the columns of the correlation matrix without any entries in the diagonal cell.

T - is the sum of all the columnar totals and, therefore of all the correlations in the table where, quite naturally, each occurs twice.

A_1' - is the sum of all the columnar totals of all the squares of the correlations in the table. (86).

c) Guilford's Method of Item Analysis.

$$\text{Weighting} = \frac{P_u - P_L}{Pq} + 4$$

Where P_u - proportion in upper group responding correctly.

P_L - proportion in lower group responding correctly.

P - proportion in combined group answering correctly.

$q = 1 - p$

This formula yields weights ranging from 0 to 8, with a weight of 4 when the item-criterion correlation is zero. The standard error of the weight is derived as follows :

$$6w4 = \frac{2}{\sqrt{Npq}}$$

Where N - number of cases in the two sub-groups combined.

Two deviations of the standard error are regarded as

significant.

(39 , p.367).

d) Method of Item Analysis - F.B.Davis.

$$\text{Score} = R_p - \frac{W_p}{K-1}$$

Where R_p - % of correct responses.

W_p - % of incorrect responses.

K - number of choices in the item.

(20 , p.266).

e) Correction of a correlation for fewness of classes.

With the help of the table below, find the correction factor for the x and y axes. Find their product and divide it into the correlation co-efficient.

Correction Table.

<u>Number of</u> -	2	3	4	5	6	7	8	9	10.
<u>Classes.</u>									
<u>Correction</u>	.82	.86	.92	.94	.96	.97	.98	.98	.99.
<u>Factor.</u>									

(40 , p.360).

f) Correction of a correlation for restriction of range.

$$R_{12} = \frac{r_{12} + r_{13} \cdot r_{23} \left(\frac{\sum_3^2}{\sigma_3^2} - 1 \right)}{\left[1 + r_{13}^2 \left(\frac{\sum_3^2}{\sigma_3^2} - 1 \right) \right] \left[1 + r_{23}^2 \left(\frac{\sum_3^2}{\sigma_3^2} - 1 \right) \right]}$$

Where r_{12} - is the correlation co-efficient of the two variables in the restricted group.

σ_3 - is the standard deviation of measurements of X_3 in the restricted group.

$\sum_3$ - is the standard deviation of measurements of X_3 in the unrestricted group.

R_{12} - is the correlation co-efficient in the unrestricted group.

(40 , p.350).

g) The estimation of the Index of Reliability.

$$r_{\infty} = \sqrt{r_{11}}$$

Where r_{11} - is the co-efficient of reliability between the two forms of a test. (41 , p.413).

h) The estimation of the Standard Error of Measurement.

$$\sigma_{\infty} = \sigma \sqrt{1 - r_{11}}$$

Where σ - is the standard deviation of the test.

r_{11} - is the coefficient of reliability between two forms of the test. (41 , p.413).

i) The "Footrule" Coefficient of Reliability.

$$r_{tt} = \frac{n}{n-1} \times \frac{\sigma t^2 - n\bar{p}\bar{q}}{\sigma t^2}$$

Where M - is the arithmetic mean of the test scores.

N - is the number of items in the test.

$\bar{p}$ - is $\frac{M}{N}$

$\bar{q}$ - is $1.00 - \bar{p}$

σt - is the standard deviation of the test scores.

(50 , p.387).

j) The First Order Partial Correlation.

$$r_{12.3} = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$$

(44 , p.283).

k) The Second Order Partial Correlation.

$$r_{12.34} = \frac{r_{12.3} - r_{14.3} \cdot r_{24.3}}{\sqrt{(1 - r_{14.3}^2)(1 - r_{24.3}^2)}}$$

(44 , p.286).

1) Wechsler's Method for the Scaling of Test Results.

$$I.Q. = \frac{6.745 + Z}{6.745}$$

Where Z - is the equivalent standard score of any raw score on the test.

(92 , p.219).

APPENDIX B : N.V.G.T. - ORDER OF ITEM DIFFICULTY.

Form A - Classifications.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	18	17	17	17	12	3	6	2	1	4
Wrong	1	3	3	3	7	16	9	14	14	11
Left out	1	0	0	0	1	1	5	4	5	5

Age 15

Right	13	17	15	13	8	0	3	1	1	0
Wrong	6	3	4	3	9	16	8	10	10	10
Left out	1	0	1	4	3	4	9	9	9	10

Age 14

Right	16	14	17	19	8	2	3	3	1	2
Wrong	3	2	2	1	11	12	10	12	12	8
Left out	1	4	1	0	1	6	7	5	7	10

Age 13

Right	13	16	14	15	8	1	4	2	0	2
Wrong	4	2	5	2	7	17	11	11	12	7
Left out	3	2	1	3	5	2	5	7	8	11

Age 12

Right	12	10	13	15	8	0	3	0	1	1
Wrong	6	8	4	4	10	14	11	11	10	9
Left out	2	2	3	1	2	6	6	9	9	10

Total

Right	72	74	76	79	34	6	19	8	4	9
Wrong	20	18	18	13	44	75	49	58	58	45
Left out	8	8	6	8	12	19	32	34	38	46

Form B - Classifications.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	16	13	18	14	10	2	2	5	2	9
Wrong	1	4	1	5	7	13	12	7	12	7
Left out	3	3	1	1	3	5	6	8	6	4
<u>Age 15</u>										
Right	15	16	17	12	9	0	4	1	6	2
Wrong	4	3	3	6	9	17	14	12	9	11
Left out	1	1	0	2	2.	3	2	7	5	7
<u>Age 14</u>										
Right	12	15	17	10	3	0	1	0	3	6
Wrong	8	4	2	6	13	13	11	9	7	6
Left out	0	1	1	4	4	7	8	11	10	8
<u>Age 13</u>										
Right	16	16	19	14	9	0	3	0	5	6
Wrong	3	4	1	6	8	11	9	11	6	4
Left out	1	0	0	0	3	9	8	9	9	10
<u>Age 12</u>										
Right	17	14	14	13	11	1	0	1	3	7
Wrong	2	4	5	6	7	12	14	12	10	5
Left out	1	2	1	1	2	7	6	7	7	8
<u>Total</u>										
Right	76	74	85	63	42	3	10	7	19	30
Wrong	18	19	12	29	44	66	60	51	44	33
Left out	6	7	3	8	14	31	30	42	37	37

Form A - Analogies.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	9	12	14	16	10	7	12	11	4	3
Wrong	11	8	5	3	9	9	6	5	12	12
Left out	0	0	1	1	1	4	2	4	4	5

Age 15

Right	13	13	13	14	4	13	10	4	8	8
Wrong	7	7	6	6	16	6	7	13	7	7
Left out	0	0	1	0	0	1	3	3	5	5

Age 14

Right	7	7	12	12	5	3	10	7	2	1
Wrong	11	13	7	8	15	13	5	8	12	11
Left out	2	0	1	0	0	4	5	5	6	8

Age 13

Right	3	7	6	9	4	6	3	5	2	3
Wrong	15	12	11	9	15	10	13	8	10	9
Left out	2	1	3	2	1	4	4	7	8	8

Age 12

Right	4	4	8	8	2	2	5	5	2	4
Wrong	12	15	10	10	16	12	10	8	10	6
Left out	4	1	2	2	2	6	5	7	8	10

Total

Right	36	43	53	59	25	31	40	32	18	19
Wrong	56	55	39	36	71	50	41	42	51	45
Left out	8	2	8	5	4	19	19	26	31	36

Form B - Analogies.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	12	17	16	17	6	11	5	5	2	4
Wrong	7	2	2	3	13	7	14	11	13	10
Left out	1	1	2	0	1	2	1	4	5	6

Age 15

Right	13	16	14	15	7	9	7	6	8	2
Wrong	7	4	6	5	13	11	13	13	10	17
Left out	0	0	0	0	0	0	0	1	2	1

Age 14

Right	7	16	13	7	2	12	6	5	4	5
Wrong	11	3	7	12	15	6	8	9	7	6
Left out	2	1	0	1	3	2	6	6	9	9

Age 13

Right	8	11	9	8	5	10	5	2	2	2
Wrong	11	9	8	11	14	6	10	11	12	12
Left out	1	0	3	1	1	4	5	7	6	6

Age 12

Right	7	13	10	4	3	10	5	2	2	3
Wrong	13	6	8	14	15	7	11	11	8	7
Left out	0	1	2	2	2	3	4	7	9	10

Total

Right	47	73	62	51	23	52	28	20	19	16
Wrong	49	24	31	45	70	37	56	55	50	52
Left out	4	3	7	4	7	11	16	25	31	32

Form A - Inductions.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	19	14	14	14	13	13	3	4	8	8
Wrong	1	6	6	6	7	6	17	15	10	12
Left out	0	0	0	0	0	1	0	1	2	0

<u>Age 15</u>										
Right	19	13	17	8	10	7	4	4	7	8
Wrong	1	6	3	12	8	13	16	13	10	12
Left out	0	1	0	0	2	0	0	3	3	0

<u>Age 14</u>										
Right	20	13	11	4	8	7	0	4	9	5
Wrong	0	7	9	16	12	12	19	15	9	13
Left out	0	0	0	0	0	1	1	1	2	2

<u>Age 13</u>										
Right	20	8	12	4	10	7	1	4	5	1
Wrong	0	12	7	16	10	13	19	16	14	18
Left out	0	0	1	0	0	0	0	0	1	1

<u>Age 12</u>										
Right	20	15	8	2	4	6	1	2	2	3
Wrong	0	4	9	16	14	11	16	12	12	15
Left out	0	1	3	2	2	3	3	6	6	2

<u>Total</u>										
Right	98	63	62	32	45	40	9	18	31	25
Wrong	2	35	34	66	51	55	87	71	55	70
Left out	0	2	4	2	4	5	4	11	14	5

Form B - Inductions.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	18	18	17	8	13	11	5	10	11	6
Wrong	2	2	3	12	7	9	14	9	8	13
Left out	0	0	0	0	0	0	1	1	1	1

<u>Age 15</u>										
Right	18	16	14	8	12	12	3	8	7	3
Wrong	2	4	6	12	8	7	17	12	12	16
Left out	0	0	0	0	0	1	0	0	1	1

<u>Age 14</u>										
Right	16	16	7	7	9	11	2	3	6	3
Wrong	3	4	13	13	11	9	16	16	12	14
Left out	1	0	0	0	0	0	2	1	2	3

<u>Age 13</u>										
Right	19	18	13	5	7	14	5	5	7	4
Wrong	1	2	7	15	13	6	14	13	12	15
Left out	0	0	0	0	0	0	1	2	1	1

<u>Age 12</u>										
Right	15	16	11	3	5	13	3	3	5	3
Wrong	5	4	8	16	14	7	1	17	15	15
Left out	0	0	1	1	1	0	1	0	0	2

<u>Total</u>										
Right	86	84	62	31	46	61	18	29	36	19
Wrong	13	16	37	68	53	38	77	67	59	73
Left out	1	0	1	1	1	1	5	4	5	8

Form A - Numbers.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	17	20	20	20	18	14	14	18	17	16
Wrong	3	0	0	0	1	5	5	1	3	3
Left out	0	0	0	0	1	1	1	1	0	1

<u>Age 15</u>										
Right	19	20	19	19	16	12	15	18	13	12
Wrong	1	0	1	1	4	7	3	2	7	8
Left out	0	0	0	0	0	1	2	0	0	0

<u>Age 14</u>										
Right	17	18	18	18	16	11	11	14	15	10
Wrong	2	2	2	2	4	7	8	6	4	8
Left out	1	0	0	0	0	2	1	0	1	2

<u>Age 13</u>										
Right	12	16	13	16	9	5	6	10	8	4
Wrong	8	4	7	4	11	11	12	8	11	14
Left out	0	0	0	0	0	4	2	2	1	2

<u>Age 12</u>										
Right	13	15	13	16	7	2	2	8	6	1
Wrong	7	5	7	4	13	16	15	11	12	15
Left out	0	0	0	0	0	2	3	1	2	4

<u>Total</u>										
Right	78	89	83	89	66	44	48	68	59	43
Wrong	21	11	17	11	33	46	43	28	37	48
Left out	1	0	0	0	1	10	9	4	4	9

Form A - Numbers (cont.).

	11	12	13	14	15	16	17	18	19	20
<u>Age 16</u>										
Right	5	5	6	8	3	8	3	1	4	1
Wrong	15	10	5	7	15	10	11	12	9	12
Left out	0	5	9	5	2	2	6	7	7	7

<u>Age 15</u>										
Right	8	3	5	10	3	5	1	4	3	3
Wrong	10	5	9	4	9	9	11	6	7	5
Left out	2	12	6	6	8	6	8	10	10	12

<u>Age 14</u>										
Right	2	0	0	6	1	4	2	0	1	0
Wrong	18	9	12	8	16	13	13	9	12	12
Left out	0	11	8	6	3	3	5	11	7	8

<u>Age 13</u>										
Right	1	0	0	2	0	0	0	0	1	1
Wrong	17	16	12	10	14	13	12	10	8	7
Left out	2	4	8	8	6	7	8	10	11	12

<u>Age 12</u>										
Right	0	0	0	0	0	0	0	0	0	0
Wrong	17	13	14	16	17	17	14	14	13	14
Left out	3	7	6	4	3	3	6	6	7	6

<u>Total</u>										
Right	16	8	11	26	7	17	6	5	9	5
Wrong	77	53	52	45	71	52	61	51	49	50
Left out	7	39	37	29	22	21	33	44	42	45

Form B - Numbers.

	1	2	3	4	5	6	7	8	9	10
<u>Age 16</u>										
Right	19	20	20	18	20	17	17	19	17	16
Wrong	1	0	0	2	0	2	1	1	3	3
Left out	0	0	0	0	0	1	2	0	0	1

Age 15

Right	19	19	18	19	16	13	13	14	14	10
Wrong	1	0	2	1	4	6	6	4	5	10
Left out	0	1	0	0	0	1	1	2	1	0

Age 14

Right	16	18	19	16	14	9	11	14	12	6
Wrong	4	2	1	4	5	10	8	5	8	8
Left out	0	0	0	0	1	1	1	1	0	6

Age 13

Right	18	19	18	18	16	6	9	16	12	7
Wrong	1	1	2	2	3	12	7	2	5	11
Left out	1	0	0	0	1	2	4	2	3	2

Age 12

Right	16	16	19	17	13	3	7	14	11	14
Wrong	4	4	1	3	7	15	11	6	7	5
Left out	0	0	0	0	0	2	2	0	2	1

Total

Right	88	92	94	88	79	48	57	77	66	53
Wrong	11	7	6	12	19	45	33	18	28	37
Left out	1	1	0	0	2	7	10	5	6	10

Form B - Numbers (cont.).

	11	12	13	14	15	16	17	18	19	20
<u>Age 16</u>										
Right	8	13	6	16	10	8	5	4	8	5
Wrong	11	5	5	2	6	9	9	4	7	9
Left out	1	2	9	2	4	3	6	12	5	6
<u>Age 15</u>										
Right	8	12	9	14	6	6	5	4	5	3
Wrong	11	5	7	3	9	11	10	8	3	5
Left out	1	3	4	3	5	3	5	8	12	12
<u>Age 14</u>										
Right	1	4	0	3	3	2	0	0	1	0
Wrong	14	11	13	8	9	10	11	5	4	4
Left out	5	5	7	9	8	8	9	15	15	16
<u>Age 13</u>										
Right	3	5	1	4	2	1	0	0	1	0
Wrong	11	8	9	8	6	7	7	4	5	6
Left out	6	7	10	8	12	12	13	16	14	14
<u>Age 12</u>										
Right	0	0	0	0	1	0	2	0	1	1
Wrong	17	14	9	6	8	10	8	6	5	6
Left out	3	6	11	14	11	10	11	14	14	13
<u>Total</u>										
Right	20	34	16	37	22	17	11	8	16	9
Wrong	64	43	43	27	38	47	45	27	24	30
Left out	16	23	41	36	40	36	44	65	60	61

APPENDIX C : N.V.G.T. - DISCRIMINATIVE POWER OF ITEMS.

Forms A and B - Classifications.

<u>Form A</u>			<u>Form B</u>	
	<u>Index</u>	<u>S.E.</u>	<u>Index</u>	<u>S.E.</u>
1.	5.292	.608	6.634	.637
2.	5.421	.596	4.771	.621
3.	5.714	.655	5.761	.766
4.	4.973	.700	5.091	.553
5.	5.936	.546	5.538	.564
6.	5.080	1.040	4.715	1.196
7.	5.141	.676	5.322	.939
8.	5.080	1.040	5.322	.939
9.	6.077	1.441	5.014	.637
10.	4.750	.832	4.775	.570

Forms A and B - Analogies.

<u>Form A</u>			<u>Form B</u>	
	<u>Index</u>	<u>S.E.</u>	<u>Index</u>	<u>S.E.</u>
1.	6.337	.558	6.081	.545
2.	6.762	.554	4.711	.596
3.	6.762	.554	6.235	.546
4.	6.954	.558	7.426	.546
5.	6.111	.570	4.554	.608
6.	6.000	.564	5.042	.546
7.	7.000	.548	4.881	.608
8.	5.776	.596	4.973	.700
9.	5.090	.676	4.386	.621
10.	5.472	.700	3.509	.700

Forms A and B - Inductions.

<u>Form A</u>			<u>Form B</u>	
	<u>Index</u>	<u>S.E.</u>	<u>Index</u>	<u>S.E.</u>
1.	6.037	2.019	6.143	.655
2.	6.111	.570	5.286	.655
3.	6.460	.554	5.785	.570
4.	6.435	.570	5.905	.564
5.	6.676	.545	5.163	.550
6.	5.500	.548	4.468	.558
7.	4.328	.810	4.750	.832
8.	4.267	.730	4.487	.570
9.	5.286	.655	4.515	.586
10.	5.776	.596	4.685	.676

Forms A and B - Numbers.

<u>Form A</u>			<u>Form B</u>	
	<u>Index</u>	<u>S.E.</u>	<u>Index</u>	<u>S.E.</u>
1.	6.700	.621	5.761	.766
2.	6.511	.676	6.298	.810
3.	6.769	.608	6.160	1.040
4.	5.963	.700	5.274	.730
5.	7.559	.545	6.232	.586
6.	7.300	.548	7.111	.544
7.	7.068	.554	6.859	.564
8.	7.483	.550	6.333	.700
9.	7.110	.544	6.460	.554
10.	7.300	.548	6.831	.546
11.	6.511	.676	6.842	.596
12.	5.800	.866	6.762	.554
13.	6.454	.700	6.634	.637
14.	7.000	.577	7.124	.546
15.	6.160	1.040	6.700	.621
16.	6.634	.637	6.571	.655
17.	6.204	.939	6.400	.730
18.	6.160	1.040	6.347	.766
19.	6.347	.766	6.511	.676
20.	6.117	1.196	6.347	.766

APPENDIX D : PATTERN FOR THE NON VERBAL GROUP TEST.

The Examiner walks into the room and, when the seating of the pupils has been inspected and the books have been given out, face downwards, he puts up the chart -
Classifications.

Sub - test 1 - Classifications.

" Are you all listening ? Today you are going to do a test and you must do it as well as you can. We want to see whether the pupils in this school can do as well as the boys and girls in other schools. This is the first test you will have to do. It is called a Classifications Test. Look at the blackboard. This is the kind of question you are going to have in the test. This is question 1, question 2, question 3, question 4. "

(The Examiner carefully points out that each question occupies one line of five figures.)

" In each line you must cross out the drawing that is different in some way from the other four. "

(The Examiner points to question 1 and it must be shown to the pupils that drawings 1, 2, 3, and 5 have + 's but 4 has not. Therefore 4 must be crossed out.)

" Look at question 2. "

(The Examiner carefully counts 1234, 123, 1234, 1234, and it

thus becomes obvious that drawing 2 must be crossed out.)

" In each line you must cross out the drawing that is different from the rest."

(Questions 3 and 4 are treated in the same careful way. The Examiner must be satisfied in his own mind that the pupils really understand what has to be done before he proceeds. It may, for example, be necessary to repeat the whole explanation.)

" Now this test is on the first page of your books only."

(The Examiner prints in large letters on the board the word - Classifications).

" Do not turn any other pages. As soon as you have finished this page, turn your books over and fold your arms. If you can't do one question, leave it and go on to the next one. Try to get as many questions right as you can, but do not guess. For this test you have five minutes. Are you ready ? Turn over your books, Begin."

(The Examiner must then move speedily through the desks to make certain that all pupils have their books the right way round, and have started with question 1.)

Sub - test 2 - Analogies.

(After 5 minutes.)

" Stop - turn your books over - fold your arms,"

(The Analogies charts are put up in place of the

Classifications chart.)

" This is a test of analogies. In this test there are two lines for each question."

(This must be carefully pointed out to the pupils.)

" Now look at question 1. An empty ring is to a full ring as an empty square is to what ? Which one of these four (point to the lower line) must I cross out to go in the place of the question mark ? "

(Show the correct answer and be sure that the explanation is understood before passing on to the next question.)

"Now look at question 2".

(This question is best explained by the Examiner pushing all the fingers of his hand in the same direction as the lines in each drawing.)

" This - is to this - as this is to - Which one of the four drawings must I cross out to go in the place of the question mark ? "

(Be sure that the example is understood before proceeding.

" Now look at question 3. 1,2,3,4,5,6,7,8,9 dots are to 1,2,3 dots - as how many dots are to 1,2 dots ? In other words,nine is three times three.What is three times two ? Now this test is on page 2 and page 3 of your books."

(Write in big letters on the board - Analogies.)

" In this test you will have to do some more questions of the same kind. Now be sure to begin with page 2 because the questions there are easier than those on page 3. When you have done pages 2 and 3, close your books and fold your arms. If you can't do one question, leave it and go on to the next one. Try to get as many questions right as you can but do not guess. For this test you will have 4 minutes. Are you ready ? Turn to page 2. Begin."

(The Examiner must speedily make a check to see that all have started with question 1 on page 2.)

Sub - test 3 - Inductions.

(After 4 minutes.)

" Stop. Turn your books over. Fold your arms."

(The Inductions charts are now put up in place of the Analogies charts.)

" Now we come to the next test which also has two lines for each question."

(Point this out carefully.)

" Now look at question 1. We have a long drawing and a piece has been cut out of it.(Point to it) Now which one of these four drawings below (Point them out one by one) must we cross out because it is the right one to fit into the space above ? "

(Explain why number 4 is the correct one.)

" Now look at the second question. Empty ring - something - empty ring - cross in a ring - empty ring. Which one of the four below must be crossed out to go in the place of the question mark ? (Explain why 2 is the correct one.)

Now look at question 3. Eight dots, seven dots, something, five dots, four dots. Which one of the four below must we cross out to go in place of the question mark ? This test is on pages 4 and 5 and it is called, Inductions."

(Print Inductions on the board in large letters.)

" Begin with page 4 because it is easier than page 5. When you have finished pages 4 and 5, close your books and fold your arms. If you can't do one question, leave it and go on to the next one. Try to get as many questions right as you can, but do not guess. For this test you will have 5 minutes. Are you ready ? Turn to page 4. Begin."

(The Examiner must then speedily make a check to see that all have started with question 1 on page 4.)

Sub - test 4 - Numbers.

(After 5 minutes.)

" Stop. Turn your books over. Fold your arms."

(Put up the Numbers chart in place of the Inductions charts.)

" On each line there is a question. (Demonstrate) In each

question there are two empty spaces that have to be filled in with numbers to make the line complete. Look at question 1 : 4,5,6,7,8, - 9 and 10. Look at the second question : 9.11.13.15,17 - 19 and 21. The numbers are two more each time. Now look at question 3 : 36,34,32,30,28 - 26 and 24. The numbers are two less each time. Now look at question 4.(Deal with it in the same way.) This test, Numbers, is on the last page of your books."

(Print the word,Numbers,on the board.)

" When you have finished,close your books and fold your arms. If you can't do one question,leave it and go on to the next one. Try to get as many questions right as you can,but do not guess. You may do rough-work on the side of the page if you like. You will have 7 minutes for the test. Are you ready ? Begin."

(The Examiner must be sure that all the pupils have started at number 1 on page 6.)

APPENDIX E : CONVERSION TABLES FOR THE INTELLIGENCE TESTS.

The Porteus Maze Test.

<u>Raw Score.</u>	<u>Intelligence Quotient.</u>	
	<u>9 - 12 yrs</u>	<u>13 - 16 yrs</u>
3	6	
4	17	
5	27	
6	37	9
7	47	22
8	57	35
9	68	48
10	78	61
11	88	74
12	98	87
13	108	100
14	119	112

Raw Score.Intelligence Quotient.

	<u>Age 8</u>	<u>Age 9</u>	<u>Age 10</u>	<u>Age 11</u>	<u>Age 12</u>	<u>Age 13</u>
1	51	46	45	30	31	34
2	54	48	47	33	34	36
3	56	51	50	36	36	39
4	59	53	52	38	39	41
5	61	56	54	41	41	44
6	64	58	57	44	44	46
7	66	60	59	47	47	48
8	69	63	61	50	49	51
9	71	65	63	52	52	53
10	74	68	66	55	54	56
11	76	70	68	58	57	58
12	79	72	71	61	60	60
13	81	75	73	64	62	63
14	84	77	75	66	65	65
15	86	80	78	69	67	68
16	89	82	80	72	70	70
17	91	84	82	75	73	72
18	94	87	84	78	75	75
19	96	89	87	80	78	77
20	99	92	89	83	80	80
21	101	94	91	86	83	82
22	104	96	94	89	86	84
23	106	99	96	92	88	87
24	109	101	98	94	91	89
25	111	104	101	97	93	92
26	114	106	103	100	96	94
27	116	108	105	103	99	96
28	119	111	107	106	101	99
29	121	113	110	108	104	101
30	124	116	112	111	106	104
31	126	118	114	114	109	106
32	129	120	117	117	112	108
33	131	123	119	120	114	111
34	134	125	121	122	117	113
35	136	128	124	125	119	116
36	139	130	126	128	122	118
37	141	132	128	131	125	120
38	144	135	130	134	127	123
39	146	137	133	136	130	125
40	149	140	135	139	132	128
41	151	142	137	142	135	130
42	154	144	140	145	138	132
43	156	147	142	148	140	135
44	159	149	144	150	143	137
45	161	152	147	153	145	140

The Non - Verbal Group Test.

Raw Score

Intelligence Quotient.

	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
1	69	64	53	53	45
2	71	66	55	55	47
3	74	69	58	57	49
4	76	71	60	59	51
5	79	73	63	61	53
6	81	76	65	64	56
7	83	78	67	66	58
8	86	80	70	68	60
9	88	82	72	70	62
10	91	85	75	72	64
11	93	87	77	74	66
12	95	89	79	76	68
13	98	92	82	78	70
14	100	94	84	80	72
15	103	96	87	82	74
16	105	99	89	85	77
17	107	101	91	87	79
18	110	103	94	89	81
19	112	105	96	91	83
20	115	106	99	93	85
21	117	108	101	95	87
22	119	110	103	97	89
23	122	113	106	99	91
24	124	115	108	101	93
25	127	117	111	103	95

The Non - Verbal Group Test (cont.).

Raw Score. Intelligence Quotient.

	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
26	129	120	113	106	98
27	131	122	115	108	100
28	134	124	118	110	102
29	136	126	120	112	104
30	139	129	123	114	106
31	141	131	125	116	108
32	143	133	127	118	110
33	146	136	130	120	112
34	148	138	132	122	114
35	151	140	135	124	116
36	153	143	137	127	119
37	155	145	139	129	121
38	158	147	142	131	123
39	160	149	144	133	125
40	163	152	147	135	127
41	165	154	149	137	129
42	167	156	151	139	131
43	170	159	154	141	133
44	172	161	156	143	135
45	175	163	159	145	137
46	177	166	161	148	140
47	179	168	163	150	142
48	182	170	166	152	144
49	184	172	168	154	146
50	187	175	171	156	148

The South African Group Test.

Weighted Score

Intelligence Quotient.

	<u>Age 11</u>	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
1	71	71	73	70	63	62
2	72	72	74	71	64	63
3	73	73	75	72	65	64
4	74	74	76	72	65	65
5	75	75	77	73	66	66
6	76	76	77	74	67	66
7	77	77	78	75	68	67
8	78	78	79	76	70	68
9	80	79	80	76	71	69
10	81	80	81	77	72	70
11	82	81	81	78	73	70
12	83	82	82	79	74	71
13	84	83	83	80	75	72
14	85	84	84	80	76	73
15	86	85	85	81	76	74
16	87	86	85	82	77	74
17	88	87	86	83	78	75
18	89	88	87	84	79	76
19	90	89	88	84	80	77
20	91	89	89	85	81	77
21	92	90	89	86	82	78
22	94	91	90	87	82	79
23	95	92	91	88	83	80
24	96	93	92	88	83	81
25	97	94	93	89	84	82
26	98	95	93	90	84	82
27	99	96	94	91	85	83
28	100	97	95	92	86	84
29	101	98	96	92	87	85
30	102	99	97	93	88	86
31	103	100	97	94	89	87
32	105	101	98	95	90	87
33	106	102	99	96	90	88

The South African Group Test (cont.).

Weighted Score

Intelligence Quotient.

	<u>Age 11</u>	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
34	107	103	100	96	91	89
35	108	104	101	97	92	90
36	109	105	101	98	93	90
37	110	106	102	99	94	91
38	111	107	103	100	95	92
39	112	107	104	100	96	93
40	113	108	105	101	96	94
41	114	109	105	102	97	94
42	115	110	106	103	98	95
43	116	111	107	104	99	96
44	117	112	108	104	100	97
45	119	113	109	105	101	97
46	120	114	109	106	102	98
47	121	115	110	107	102	99
48	122	116	111	108	103	100
49	123	117	112	108	103	101
50	124	118	113	109	104	102
51	125	119	113	110	106	102
52	126	120	114	111	107	103
53	127	121	115	112	108	104
54	128	122	116	112	108	105
55	129	123	117	113	109	106
56	130	124	117	114	110	106
57	131	125	118	115	111	107
58	132	126	119	116	112	108
59	134	126	120	116	113	109
60	135	127	121	117	114	110
61	136	128	121	118	114	110
62	137	129	122	119	115	111
63	138	130	123	120	116	112
64	139	131	124	120	117	113
65	140	132	125	121	118	114
66	141	133	125	122	119	114

The South African Group Test (cont.).

Weighted Score

Intelligence Quotient.

	<u>Age 11</u>	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
67	142	134	126	123	120	115
68	143	135	127	124	120	116
69	144	136	128	124	121	117
70	145	137	129	125	122	117
71	146	138	129	126	123	118
72	148	139	130	127	124	119
73	149	140	131	128	125	120
74	150	141	132	128	126	121
75	151	142	133	129	127	122
76	152	143	133	130	127	122
77	153	144	134	131	128	123
78	154	145	135	132	129	124
79	155	146	136	132	130	125
80	156	147	137	133	131	126
81	157	148	137	134	132	126
82	159	149	138	135	133	127
83	160	150	139	136	133	128
84	161	151	140	136	134	129
85	162	152	141	137	135	130
86	163	153	141	138	136	130
87	164	154	142	139	137	131
88	165	155	143	140	138	132
89	166	156	144	140	138	133
90	167	157	145	141	139	134
91	168	158	145	142	140	134
92	169	159	146	143	141	135
93	170	160	147	144	142	136
94	171	161	148	144	143	137
95	173	161	149	145	144	137
96	174	162	149	146	145	138
97	175	163	150	147	145	139
98	176	164	151	148	146	140
99	177	165	152	148	147	141
100	178	166	153	149	148	142

APPENDIX F : CONVERSION TABLES FOR ACHIEVEMENT TESTS.

Schonell's Silent Reading Test A

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
1	72	71	61	54	52
2	76	75	65	58	56
3	81	79	70	63	60
4	85	83	74	67	65
5	90	87	79	72	69
6	94	91	83	76	73
7	98	94	87	80	77
8	103	98	92	85	81
9	107	102	96	89	86
10	112	106	101	94	90
11	116	110	105	98	94
12	120	114	109	102	98
13	125	118	114	107	102
14	129	122	118	111	107
15	134	125	123	115	111
16	138	129	127	119	115
17	142	133	131	123	119
18	147	137	136	128	123

Schonell's Silent Reading Test A.

Classification of pupils according to school standard.

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Std. II</u>	<u>Std. III</u>	<u>Std. IV</u>	<u>Std. V</u>	<u>Std. VI</u>
1	70	69	55	53	38
2	75	73	60	58	43
3	81	77	65	62	48
4	86	81	70	67	53
5	91	85	75	71	58
6	97	90	80	76	63
7	102	94	85	80	68
8	107	98	90	85	73
9	112	102	95	89	78
10	118	106	100	94	83
11	123	110	105	98	88
12	128	114	110	103	93
13	134	118	115	107	98
14	139	122	120	112	103
15	144	126	125	116	108
16	150	131	130	121	113
17	155	135	135	125	118
18	160	139	140	129	123

Schonell's Essential Problem Arithmetic Test Forms A and B.

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
1	69	70	53	55	53
2	72	72	56	57	55
3	75	75	58	59	57
4	78	77	61	61	59
5	81	79	63	63	61
6	84	82	66	66	63
7	87	84	69	68	64
8	90	86	71	70	66
9	93	88	74	72	68
10	96	91	76	74	70
11	99	93	79	76	72
12	102	95	82	78	74
13	105	98	84	80	76
14	108	100	87	82	78
15	111	102	89	84	79
16	114	105	92	87	81
17	117	107	95	89	83
18	120	109	97	91	85
19	123	111	100	93	87
20	126	114	102	95	89
21	129	116	105	97	91
22	132	118	108	99	93
23	135	121	110	101	94
24	138	123	113	103	96
25	141	125	115	105	98

Schonell's Essential Problem Arithmetic Test (cont.).

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
26	144	128	118	108	100
27	147	130	121	110	102
28	150	132	123	112	104
29	153	134	126	114	106
30	155	137	128	116	108
31	158	139	131	118	109
32	161	141	134	120	111
33	164	144	136	122	113
34	167	146	139	124	115
35	170	148	141	126	117
36	173	151	144	129	119
37	176	153	147	131	121
38	179	155	149	133	123
39	182	157	152	135	124
40	185	160	154	137	126
41	188	162	157	139	128
42	191	164	160	141	130
43	194	167	162	143	132
44	197	169	165	145	134
45	200	171	167	147	136
46	203	174	170	150	138
47	206	176	173	152	139
48	209	178	175	154	141
49	212	180	178	156	143
50	215	183	180	158	145

Schonell's Essential Problem Arithmetic Test - Forms A and B.

Classification of pupils according to school standard.

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Std.II</u>	<u>Std.III</u>	<u>Std.IV</u>	<u>Std.V</u>	<u>Std.VI</u>
1	72	67	46	48	35
2	75	70	49	51	38
3	78	72	52	53	40
4	81	75	55	56	43
5	84	78	58	58	45
6	87	81	61	61	48
7	89	83	63	63	50
8	92	86	66	66	53
9	95	89	69	68	55
10	98	91	72	71	58
11	101	94	75	73	60
12	104	97	78	76	63
13	107	99	81	78	65
14	110	102	84	81	68
15	112	105	86	83	70
16	115	108	89	86	73
17	118	110	92	88	75
18	121	113	95	91	78
19	124	116	98	93	80
20	127	118	101	96	83
21	130	121	104	98	85
22	133	124	107	101	88
23	135	126	109	103	90
24	138	129	112	105	93
25	141	132	115	108	95

Schonell's Essential Problem Arithmetic Test (cont.).

Classification of pupils according to school standard.

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Std. II</u>	<u>Std. III</u>	<u>Std. IV</u>	<u>Std. V</u>	<u>Std. VI</u>
26	144	135	118	110	98
27	147	137	121	113	100
28	150	140	124	116	103
29	153	143	127	118	105
30	156	145	130	121	108
31	158	148	132	123	110
32	161	151	135	126	113
33	164	153	138	128	115
34	167	156	141	131	118
35	170	159	144	133	120
36	173	162	147	136	123
37	176	164	150	138	125
38	179	167	153	141	128
39	181	170	155	143	130
40	184	172	158	146	133
41	187	175	161	148	135
42	190	178	164	151	138
43	193	180	167	153	140
44	196	183	170	156	143
45	199	186	173	158	145
46	202	189	176	161	148
47	204	191	178	163	150
48	207	194	181	166	153
49	210	197	184	168	155
50	213	199	187	171	158

The Mechanical Arithmetic Test - Forms A and B.

	<u>Raw Score</u>	<u>Quotient</u>				
		<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
1		50	48	33	0	0
2		52	50	35	0	0
3		54	52	37	1	1
4		56	53	39	4	4
5		58	55	41	7	7
6		61	57	43	10	10
7		63	59	45	13	12
8		65	61	47	16	15
9		67	62	49	19	18
10		69	64	51	21	21
11		71	66	53	24	23
12		73	68	55	27	26
13		75	70	57	30	29
14		77	71	59	33	31
15		79	73	61	36	34
16		82	75	63	39	37
17		84	77	65	42	39
18		86	79	67	44	42
19		88	80	69	47	45
20		90	82	71	50	48
21		92	84	73	53	50
22		94	86	75	56	53
23		96	88	77	59	56
24		98	89	79	62	58

The Mechanical Arithmetic Test - Forms A and B (cont.).

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Age 12</u>	<u>Age 13</u>	<u>Age 14</u>	<u>Age 15</u>	<u>Age 16</u>
25	100	91	81	65	61
26	103	93	83	67	64
27	105	95	85	70	66
28	107	97	87	73	69
29	109	98	89	76	72
30	111	100	91	79	75
31	113	102	93	82	77
32	115	104	95	85	80
33	117	106	97	88	83
34	119	107	99	90	85
35	121	109	101	93	88
36	124	111	103	96	91
37	126	113	105	99	93
38	128	115	107	102	96
39	130	116	109	105	99
40	132	118	111	108	102
41	134	120	113	111	104
42	136	122	115	113	107
43	138	124	117	116	110
44	140	125	119	119	112
45	142	127	121	122	115
46	145	129	123	125	118
47	147	131	125	128	120
48	149	133	127	131	123

The Mechanical Arithmetic Test - Forms A and B.

Classification of pupils according to school standard.

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Std.II</u>	<u>Std.III</u>	<u>Std.IV</u>	<u>Std.V</u>	<u>Std.VI</u>
1	55	48	11	0	0
2	57	50	13	2	0
3	59	52	16	4	0
4	61	54	18	7	0
5	63	56	21	10	0
6	65	58	24	13	0
7	66	59	26	16	0
8	68	61	29	18	0
9	70	63	31	21	0
10	72	65	34	24	0
11	74	67	37	27	0
12	76	69	39	30	4
13	78	71	42	32	7
14	80	73	44	35	11
15	81	74	47	38	14
16	83	76	50	41	17
17	85	78	52	44	21
18	87	80	55	46	24
19	89	82	57	49	28
20	91	84	60	52	31
21	93	86	63	55	34
22	95	88	65	58	38
23	96	89	68	60	41
24	98	91	70	63	45

The Mechanical Arithmetic Test - Forms A and B (cont.).

Classification of pupils according to school standard.

<u>Raw Score</u>	<u>Quotient</u>				
	<u>Std.II</u>	<u>Std.III</u>	<u>Std.IV</u>	<u>Std.V</u>	<u>Std.VI</u>
25	100	93	73	66	48
26	102	95	76	69	51
27	104	97	78	72	55
28	106	99	81	74	58
29	108	101	83	77	62
30	110	103	86	80	65
31	111	104	89	83	68
32	113	106	91	86	72
33	115	108	94	88	75
34	117	110	96	91	79
35	119	112	99	94	82
36	121	114	102	97	85
37	123	116	104	100	89
38	125	118	107	102	92
39	126	119	109	105	96
40	128	121	112	108	99
41	130	123	115	111	102
42	132	125	117	114	106
43	134	127	120	116	109
44	136	129	122	119	113
45	138	131	125	122	116
46	140	133	128	125	119
47	141	134	130	128	123
48	143	136	133	130	126

Schonell's Graded Reading Vocabulary Test.

Norms for standards two and three.

<u>Raw Score</u>	<u>Quotient</u>			<u>Raw Score</u>	<u>Quotient</u>	
	<u>Std.II</u>	<u>Std.III</u>			<u>Std.II</u>	<u>Std.III</u>
1	48	53	:	31	96	83
2	50	54	:	32	98	84
3	51	55	:	33	99	85
4	53	56	:	34	101	86
5	54	57	:	35	102	87
6	56	58	:	36	104	88
7	58	59	:	37	106	89
8	59	60	:	38	107	90
9	61	61	:	39	109	91
10	62	62	:	40	110	92
11	64	63	:	41	112	93
12	66	64	:	42	114	94
13	67	65	:	43	115	95
14	69	66	:	44	117	96
15	70	67	:	45	118	97
16	72	68	:	46	120	98
17	74	69	:	47	122	99
18	75	70	:	48	123	100
19	77	71	:	49	125	101
20	78	72	:	50	126	102
21	80	73	:	51	128	103
22	82	74	:	52	130	104
23	83	75	:	53	131	105
24	85	76	:	54	133	106
25	86	77	:	55	134	107
26	88	78	:	56	136	108
27	90	79	:	57	138	109
28	91	80	:	58	139	110
29	93	81	:	59	141	111
30	94	82	:	60	142	112

LIST OF REFERENCES.

1. Adult Education Commission - Report, U.G. 35/1945,
Government Printer, Pretoria, 1945.
2. Aitken A.C. - The evaluation of a certain triple product
matrix. Proc. Roy. Soc., Edinburgh, 57/1937.
3. Biesheuvel S. - The nation's intelligence and its
measurement. Presidential address to Section F of the
S.A. Association for the Advancement of Science, Cape
Town, July 1952.
4. Breasted J.H. - The conquest of civilisation. New York, 1926.
5. Burks B.S. - The relative influence of nature and nurture
upon mental development - a comparative study of foster-
parent - foster-child resemblance and true-parent -
true-child resemblance. Yearb. Nat. Soc. Stud. Educ., 1928.
6. Burrows R. - Indian life and labour in Natal. S.A. Instit.
of Race Relations, revised edition, 1952.
7. Burt C. - Br. Journal of Ed. Psy., Methuen and Co., Vol. XXV
Part 1, Feb. 1955.
8. Burt C. - Mental and scholastic tests. Staples Press,
London, 3rd edition, 1949.
9. Burt C. - The backward child. Univ. of London Press,
London, 3rd edition, repr., 1951.

10. Calpin G.H. - Indians in South Africa. Shuter and Shooter, P.M. Burg, 1949.
11. Carmichael L. - Manual of child psychology. John Wiley and Sons Inc., London, 1947.
12. Cattell R.B. - A guide to mental testing. University of London Press, London, 3rd edition, 1953.
13. Cattell R.B. - The fate of national intelligence - test of a thirteen year prediction. Eugen. Rev. 42, 3(1950).
14. Clark E.L. - A method of evaluating the units of a test. Journal of Educ. Psycho., 1928 - 19.
15. Clayton Commission Report, 1909.
16. Colonial Secretary's Office 1735-1872. - Superintendent to colonial secretary, Sept. 18.
17. Cooke E. - Art teaching and child nature. London Journal of Education, 1885.
18. Cooppan S. - The education of the Indian in Natal 1860-1947. Thesis for Ph.D. Degree, University of Cape Town, 1948.
19. Davies H.A. - An outline history of the world. O.U.P. London, 1937.
20. Davis F.B. - Item selection techniques. Educational measurement. Edited by E.F. Lindquist. American Council on Education, Washington D.C., 1950.

21. Dept. of Labour Report. U.G. 71/1951.
22. Director of Education - Circular Minute, 126/1954.
23. Director (Superintendent) of Education, Natal - Report on Indian schools. D.P. 62/1903.
24. Director of Education, Natal - 1949 report. Natal Witness, Pietermaritzburg, 1952.
25. Director of Education, Natal - Statistical supplement to monthly notice to schools. September 1953.
26. Durant Will - Our oriental heritage. Simon and Schuster, New York, 1942.
27. Encyclopaedia Britannica, Vol. 7, London, 1950.
28. Ferguson Davie C.J. - The early history of Indians in Natal. S.S. Instit. of Race Relations, Johannesburg, undated.
29. Fick M.L. - An individual scale of general intelligence for South Africa. Cape Times Ltd, Cape Town, 1939.
30. Flanagan J.C. - General considerations in the selection of test items and a short method for estimating the product moment coefficient from the data at the tails of distributions. Journal of Ed. Psy. 30, Dec. 1939.
31. Freeman W. and Watts J. - Psycho-surgery. 2nd Edition, 1950.
32. Friedman D. - Hinduism. Sect. 2, Ch. 8 of Yearbook of Education, Evans Bros Ltd, London, 1951.

33. Garratt G.T. - Caste and the structure of society.
Chapter from The legacy of India. O.U.P., London, 1937.
34. Garth T.R. - Race psychology. Mc Graw Hill, New York, 1931.
35. Goodenough F.L. - Studies in the psychology of children's drawings. Psychol. Bulletin, 47/1950.
36. Goodenough F.L. - The measurement of intelligence by drawings. Yonkers Book Co., New York, 1926.
37. Gordon H. - Mental and scholastic tests among retarded children. London Board of Education, 1923.
38. Gouws D.J. - 'n Aantekening oor die SuidAfrikaanse Groepsverstandstoets. N.I.P.R. Bulletin 3/1951.
39. Guilford J.P. - A simple scoring weight for test items and its reliability. Psychom. 1941 - 6.
40. Guilford J.P. - Fundamental statistics in psychology and education. 2nd edition. Mc Graw Hill, New York, 1950.
41. Guilford J.P. - Psychometric methods. First edition, seventh impression. Mc Graw Hill, New York, 1936.
42. Havinghurst R.J., Gunther M.K., and Pratt I.E. - Environment and the draw-a-man test : the performance of Indian children. Journal of Abnormal and Social Psycho., 41 of 1946.
43. Hirsch N.D.M. - An experimental study of the east Kentucky mountaineers. Genet. Psychol. Monogr., 1928 - 3.

44. Holzinger K.J. - Statistical methods for students of education. Ginn and Coy, Boston, 1928.
45. Hunkin V. - Validation of the Goodenough draw-a-man test for African children. Journal for Social Research, Vol 1, No 1.
46. Interdepartmental Committee for Deviate Children - Report. Government Printer, Pretoria, U.G. 30/1945.
47. Jordan A.M. - Journal of Ed. Psycho., 14 of 1923. (348 - 365)
48. Jorgenson A.N., Greene H.A., Gerbereich J.R. - Measurement and evaluation in the elementary school. Longmans, Green and Co., New York, 1953.
49. Kefauver G.N. - need for equating I.Q.'s obtained from group tests. Jour. of Ed. Research, 19 of 1929.
50. Kuder G.F. and Richardson M.W. - The theory of the estimation of test reliability. Psychometrika : 2, 151 - 160, September 1937.
51. Lindquist E.F. - Statistical analysis in educational research. Houghton Mifflin Coy, Massachusetts, 1940.
52. Logue G.D. - An investigation into the suitability of the South African group test for Indian children in Durban. M.Ed Thesis, University of Natal, 1954.
53. MacMunn G.F. - Encyclopaedia Britannica, Volume 12. London, 1950.

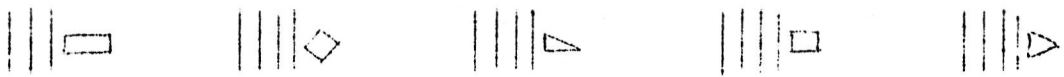
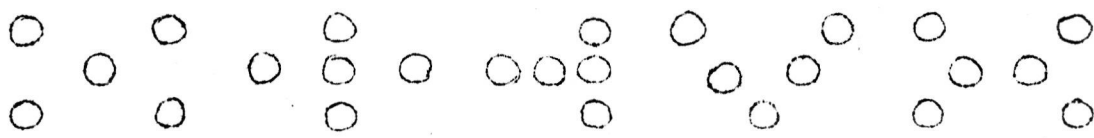
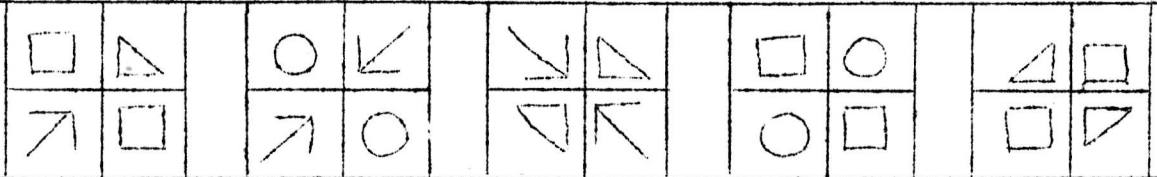
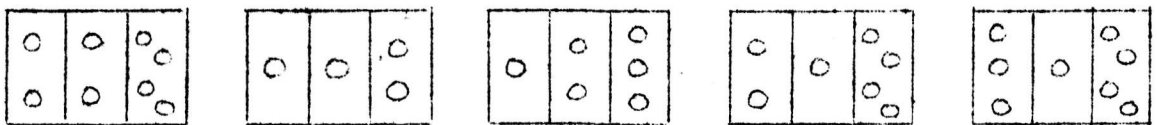
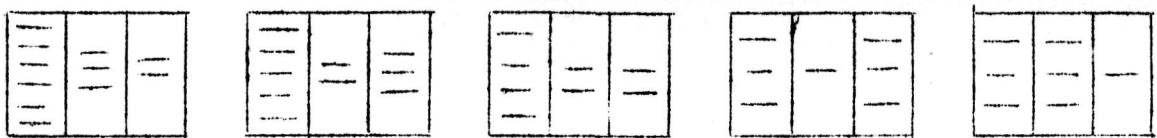
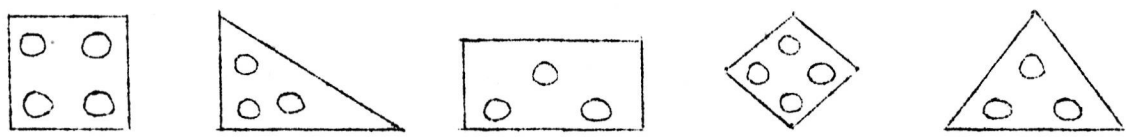
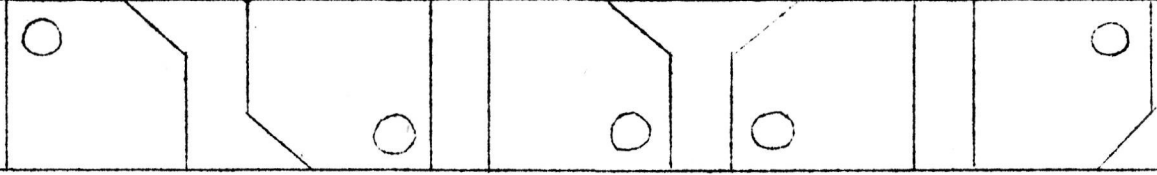
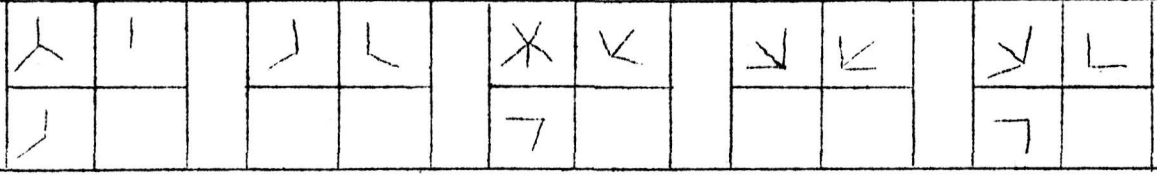
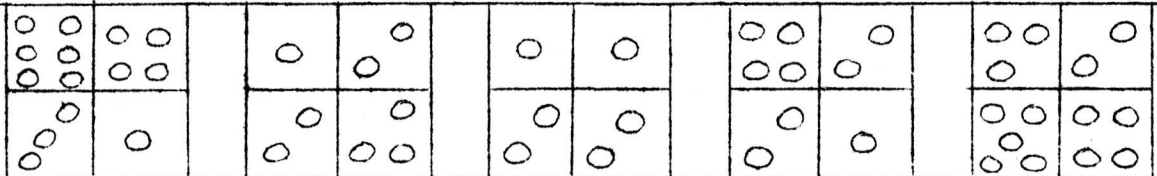
54. Malherbe E.G. - Educational adaptations in a changing society. Juta and Co. Ltd, Cape Town, 1937.
55. Meston J.S. - Ethnology and religion. Encyclopaedia Britannica, Volume 12. London, 1950.
56. Monier Williams M. - Indian wisdom. London, 1893.
57. Muller F.M. - Thoughts on life and religion. Constable, London, 1907.
58. Mursell J.L. - Psychological testing. Longmans, New York, reprinted 1950.
59. Naidoo V.S. - Religion among Indians in South Africa. Chapter 24, Handbook on Race Relations in South Africa, O.U.P., Cape Town, 1947.
60. Natal Education Department - Schools handbook. Natal Witness, Pietermaritzburg, 1949.
61. Natal Education Department - Syllabus in arithmetic, elementary mathematics and mathematics. Natal Witness, 1951.
62. Natal Indian Congress - Petition to the colonial secretary Natal. Paragraph 7, May 1909. (requote - Cooppan - 18)
63. National Council for the Blind - Report on ophthalmic unit tour, number 8, Pretoria, 1954.
64. Neff W.S. - Socio-economic status and intelligence. Psychol. Bulletin 35, 10 (1938).

65. Nisbet J.D. - English composition in secondary school selection. Br. Jour. of Ed. Psycho., Vol. 25, 1955.
66. Oates L.E. - The Goodenough drawing test and its application to Zulu children. M.A. Thesis, University of South Africa.
67. Paterson D.G. - Preparation and use of new-type examinations. World Book Coy, Yonkers, 1926.
68. Peatman J.G. - Descriptive and sampling statistics. Harper Brothers, New York, 1947.
69. Pintner and Paterson - A scale of performance tests. Requote from Cattell R.B. - A guide to mental testing.
70. Plato - The republic. Everyman's, J.M. Dent and Sons, London, reprinted 1954.
71. Porteus S.D. and Kepner R de M. - Mental changes after bilateral prefrontal lobotomy. Genetic Psychology Monographs, No. 29, 1944.
72. Porteus S.D. - Studies in mental deviations. Smith Printing House, Vineland, 1922.
73. Porteus S.D. - The Porteus maze test manual. George Harrap and Co., London, 1952.
74. Poull L. and Montgomery R. - The Porteus maze test as a discriminative measure in delinquency. Journal of Applied Psychology, April 1929.

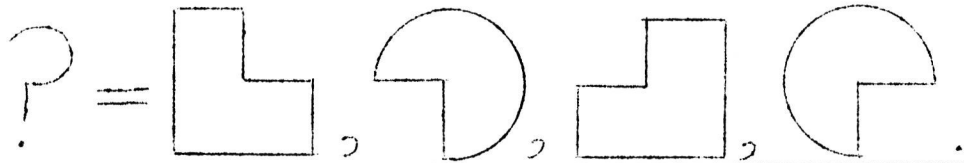
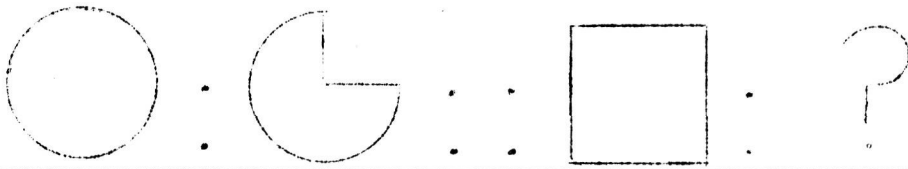
75. Provincial Education Committee Report. Natal Witness, Pietermaritzburg, 1946.
76. Quadir Abdul - The cultural influences of India. Chapter from Garratt G.T. - The legacy of India. O.U.P., London, 1937.
77. Raven J.C. - Guide to using the progressive matrices 1938. H.K. Lewis and Co., London. Repr. 1952.
78. Rose H.A. - Caste. Encyclopaedia Britannica, Volume 4, London, 1950.
79. Rose H.A. - Religion of India. Encyclopaedia Britannica, Volume 12, London, 1950.
80. Rose H.A. - The peoples of India. Encyclopaedia Britannica, Volume 12, London, 1950.
81. Rouma G. - Le langage graphique de l'enfant. 1913.
Requote from Goodenough F.L. - The measurement of intelligence by drawings.
82. Schonell F.J. - Backwardness in the basic subjects. Oliver and Boyd, Edinburgh, 4th edition, reprinted 1952.
83. Schonell F.J. - Diagnostic and attainment testing. Oliver and Boyd, Edinburgh, 1950.
84. Schonell F.J. - The psychology and teaching of reading. Oliver and Boyd, Edinburgh, 1951.

85. Smith V.A. - Oxford history of India. Oxford,1923.
86. Spearman C. - The abilities of man. London,1932.
87. Spearman C. - Correlation calculated from faulty data.
British Journal of Psychology,3/1910.
88. Stephenson W. - Testing schoolchildren, Longmans Green
and Co.,London,1949.
89. Symonds P.M. - Factors influencing test reliability.
Journal of Educ. Psycho.,19 of 1928.
90. Terman L. and Merrill M. - Measuring Intelligence.
G.G.Harrap and Co.,London,reprinted 1949.
91. Thomson G. - The factorial analysis of human ability.
University of London Press,5th edition,1951.
92. Wechsler D. - The measurement of adult intelligence.
Waverly Press,1947.
93. Wellman B.L. - Our changing concept of intelligence.
J. Consult. Psychol.,2 of 1938.
94. Wheeler L.R. - The intelligence of east Tennessee
mountain children. Journal of Ed. Psy.,23 of 1932.
95. Wilcocks R.W. - The South African group test of
intelligence. Pro Ecclesia Drukkery,Stellenbosch,1931.
96. Woods C.A. - The Indian community of Natal. O.U.P.,
Cape Town,1954.
97. Wrigley J. - The relative efficiency of intelligence
and attainment tests as predictors of success in grammar
schools. British Journal of Ed. Psycho.,part2,25 of 1955.

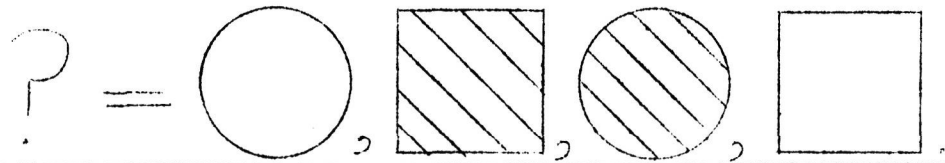
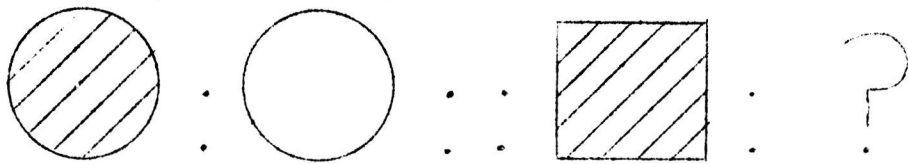
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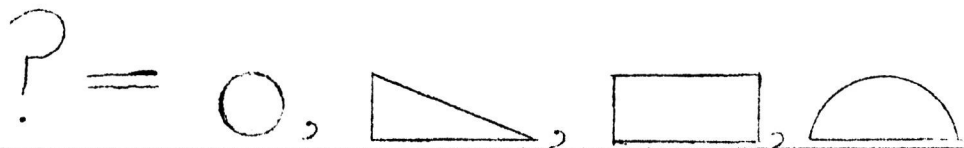
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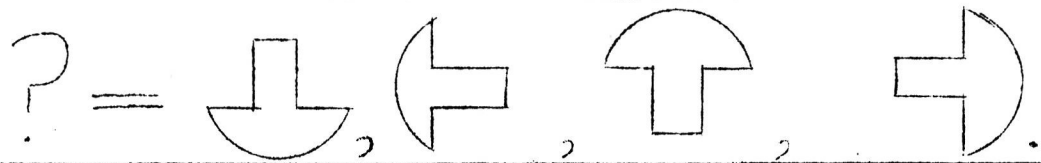
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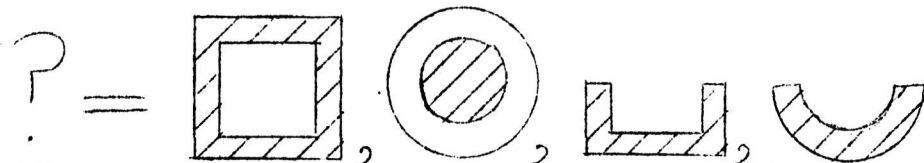
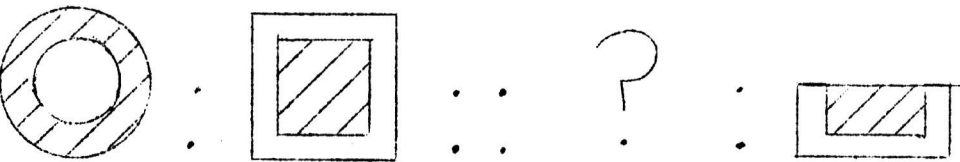
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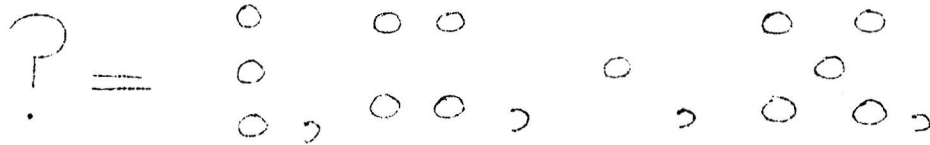
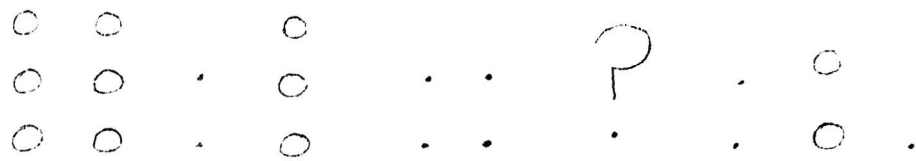
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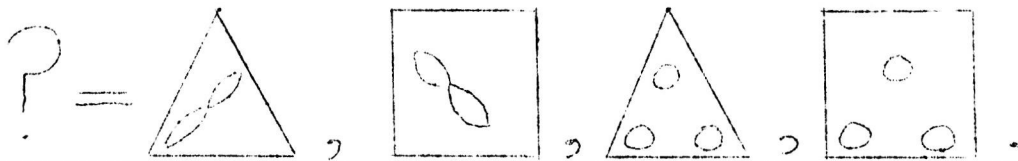
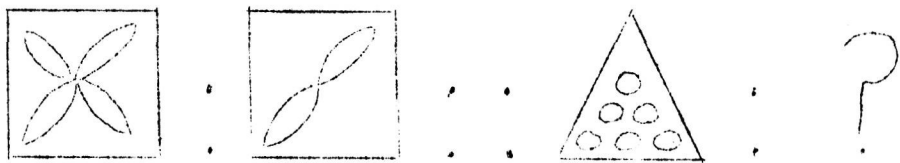
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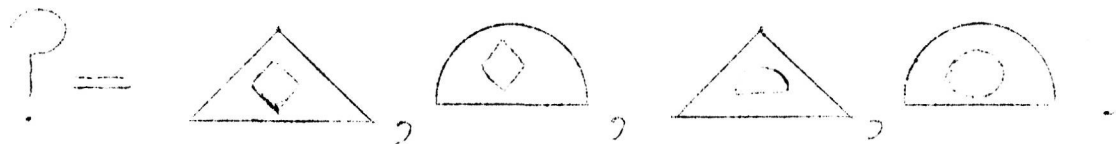
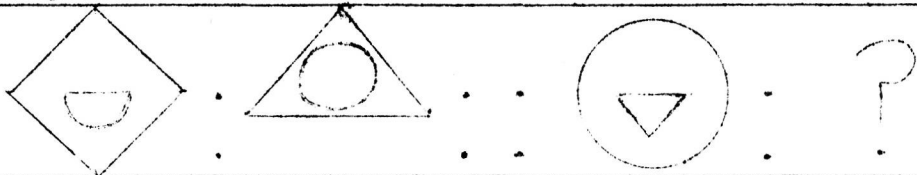
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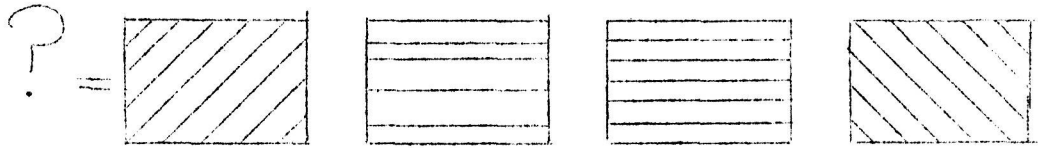
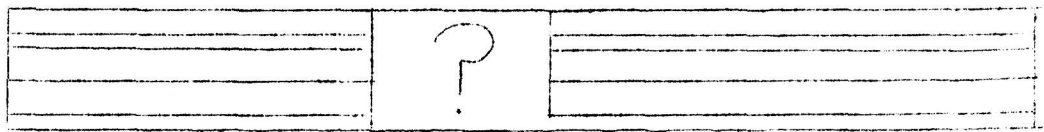
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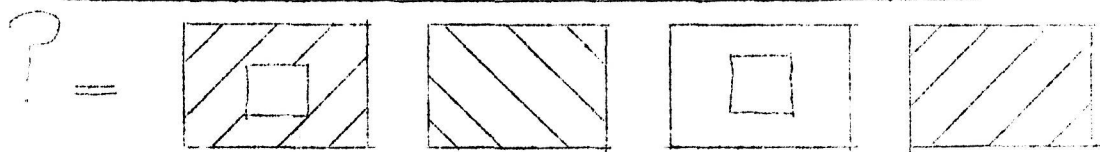
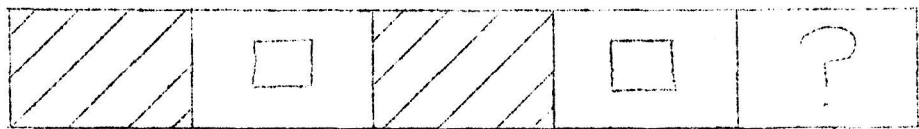
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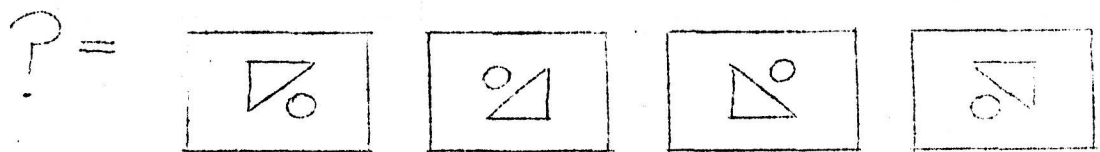
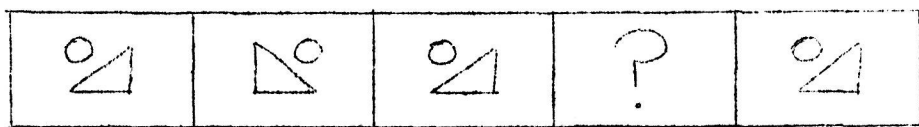
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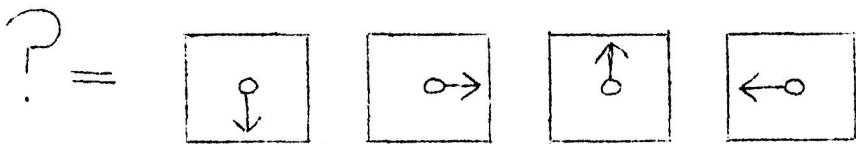
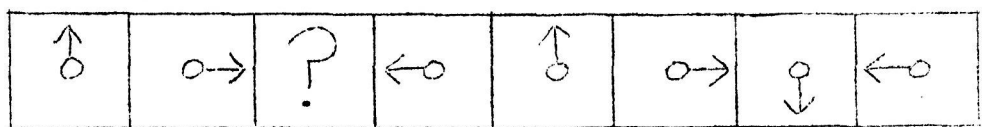
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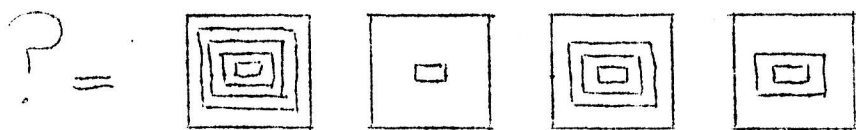
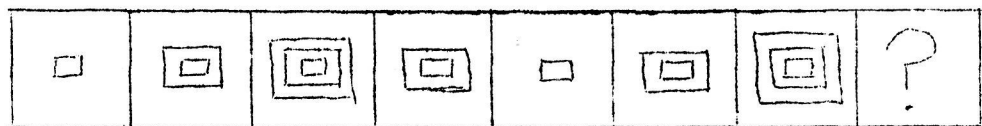
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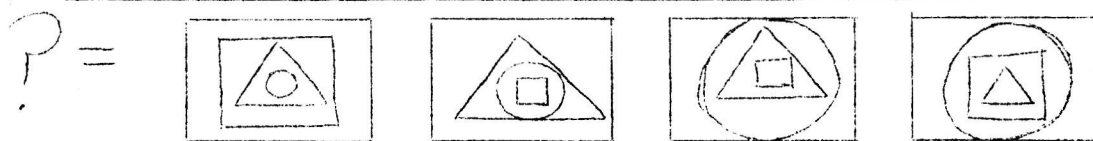
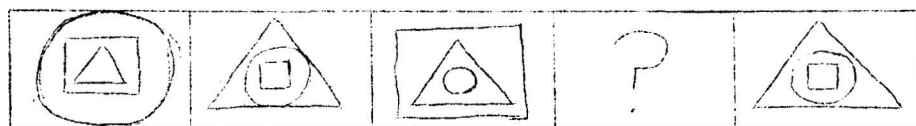
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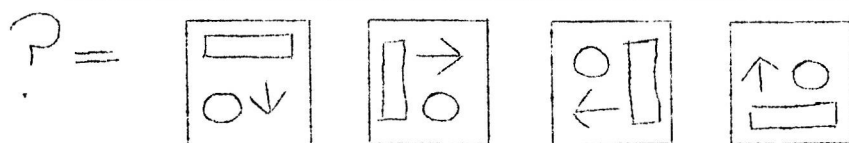
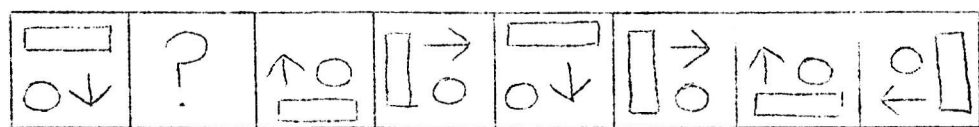
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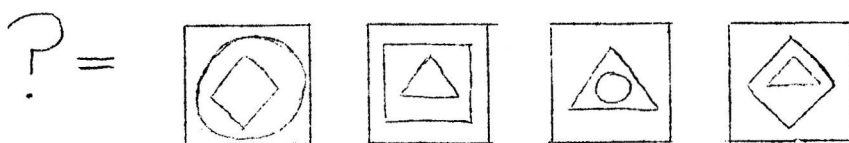
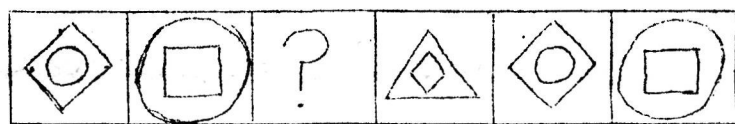
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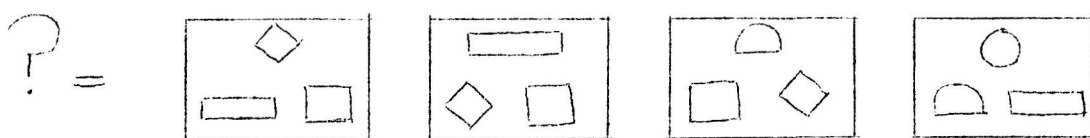
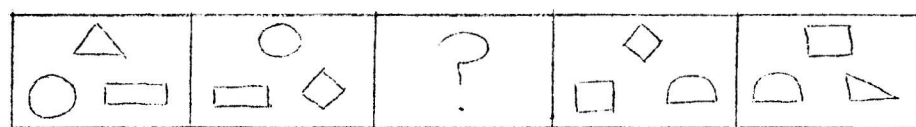
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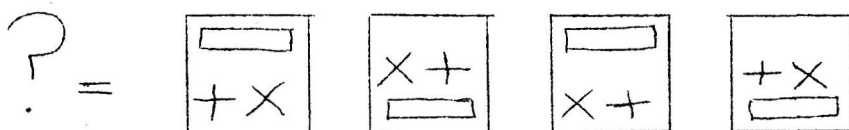
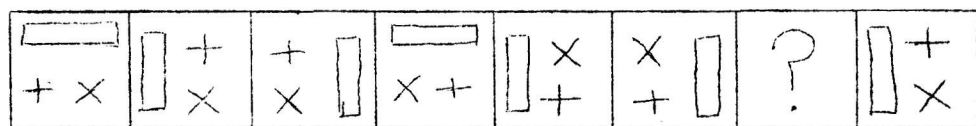
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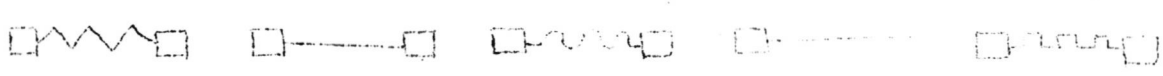
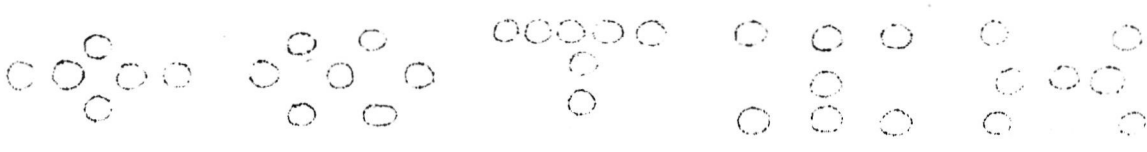
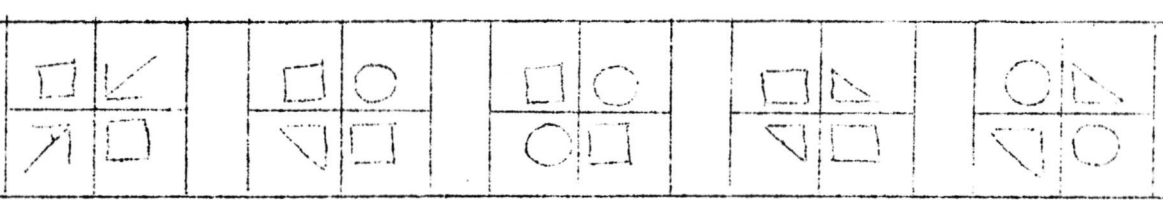
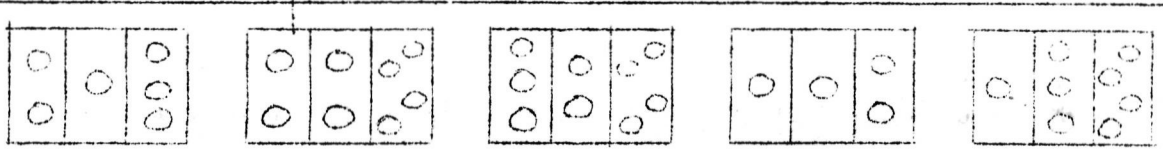
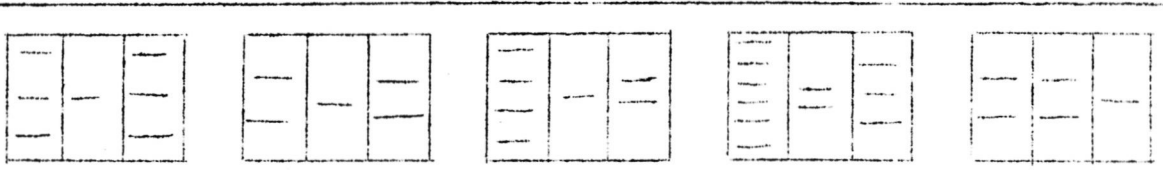
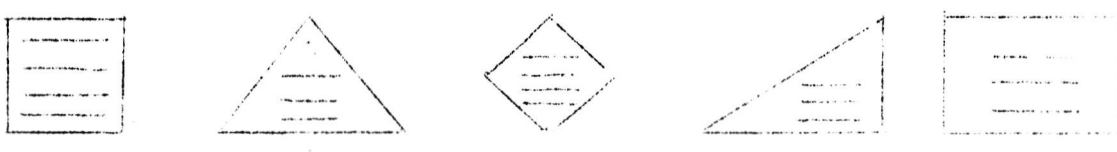
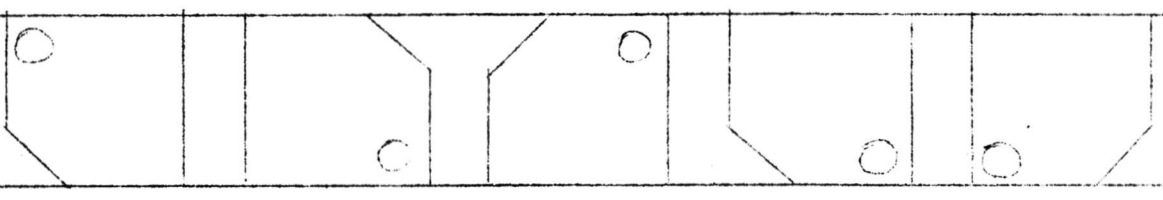
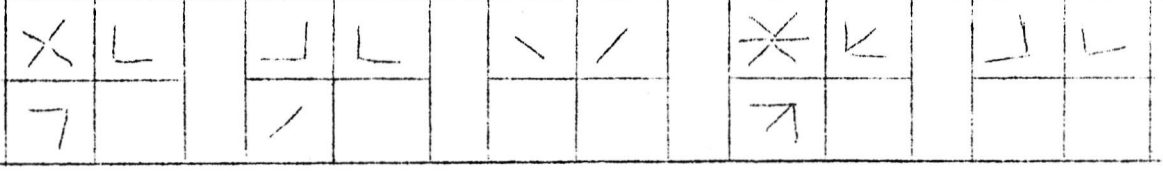
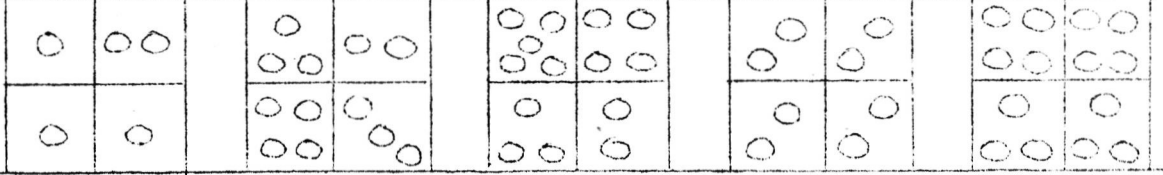
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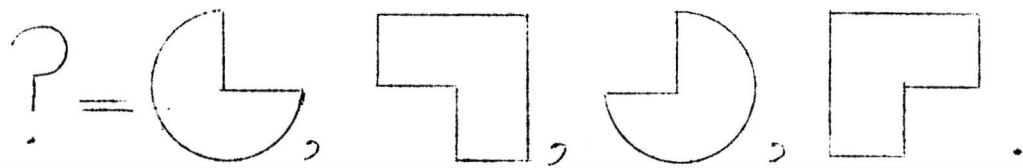
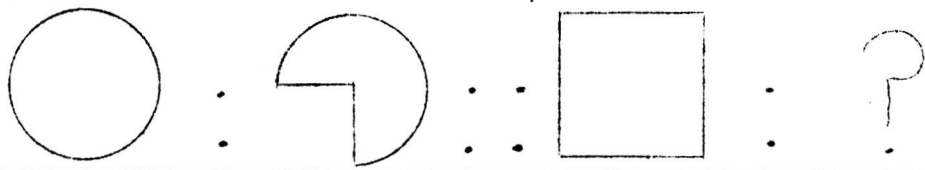
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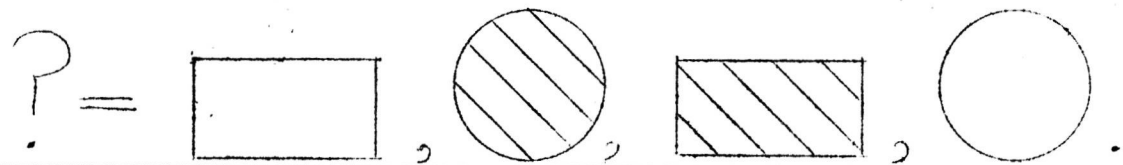
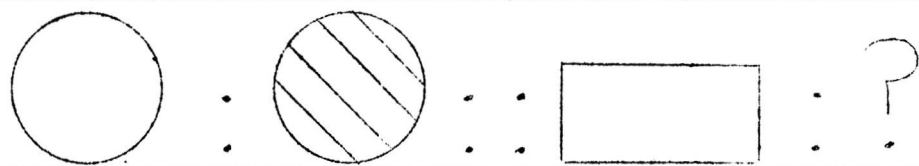
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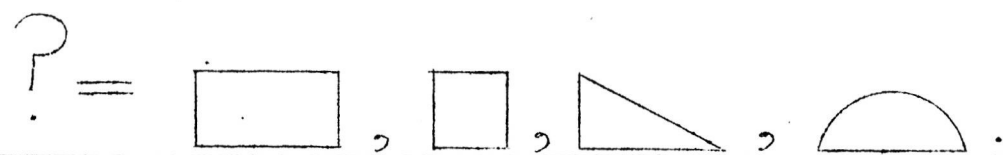
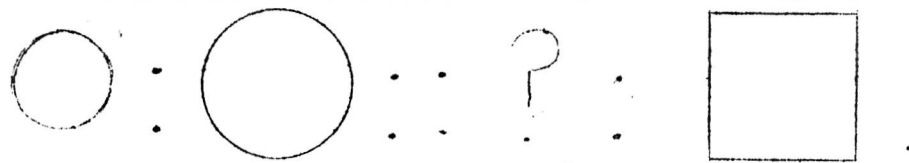
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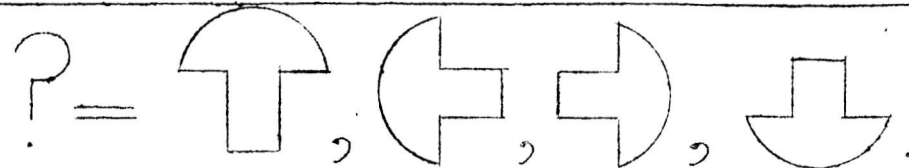
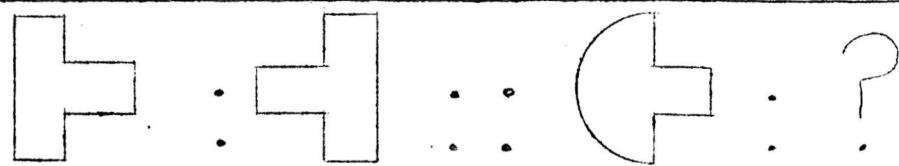
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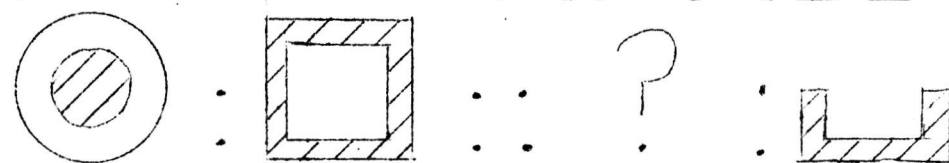
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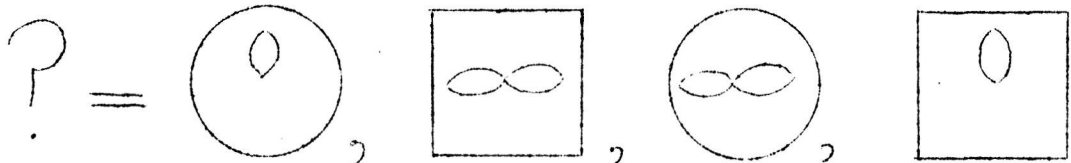
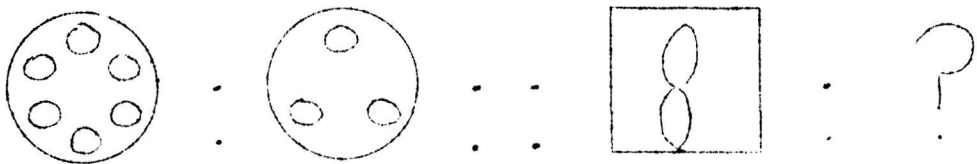
ANALOGIES - B

Page-3.

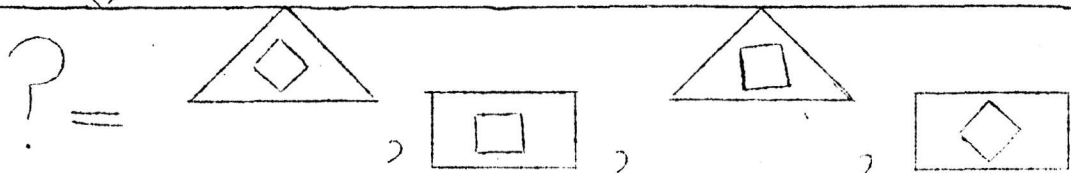
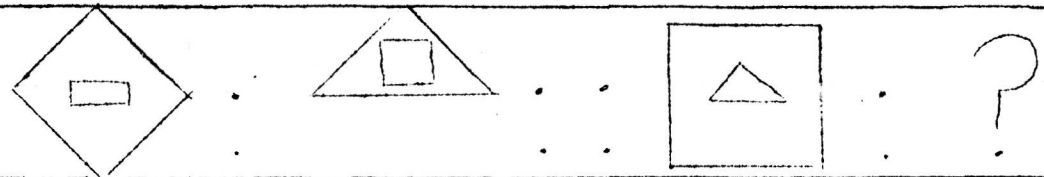
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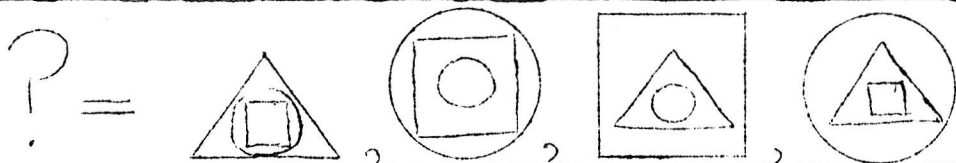
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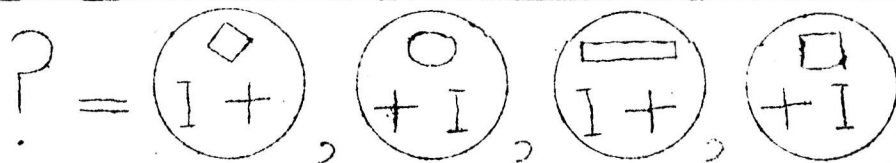
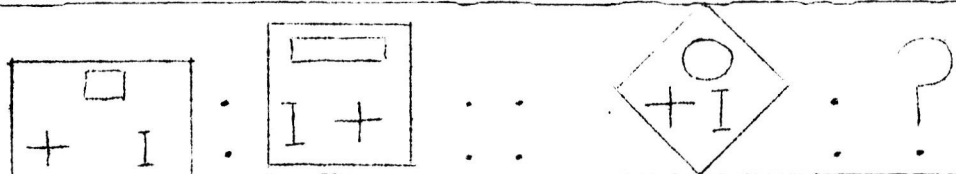
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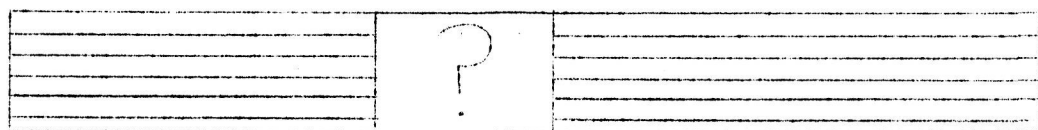
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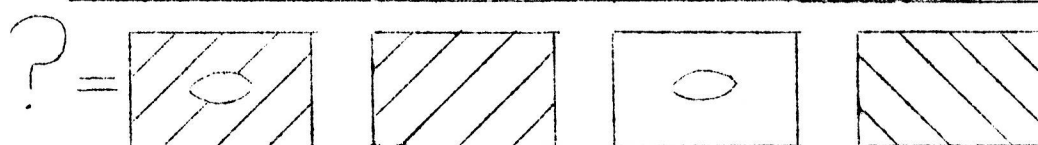
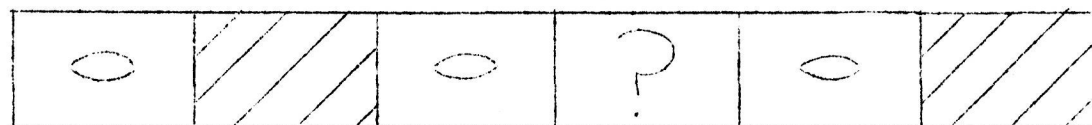
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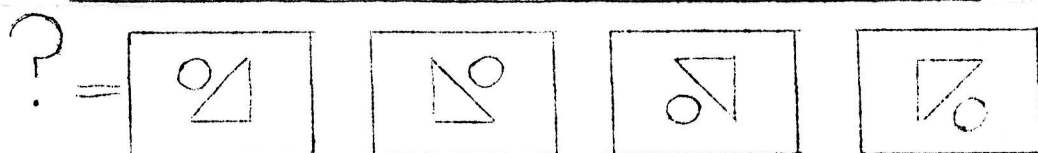
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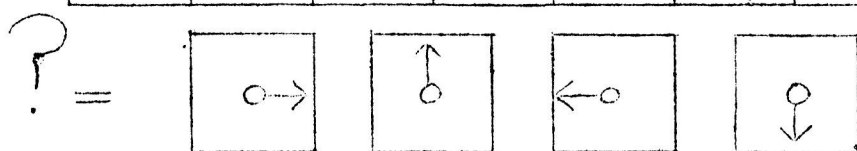
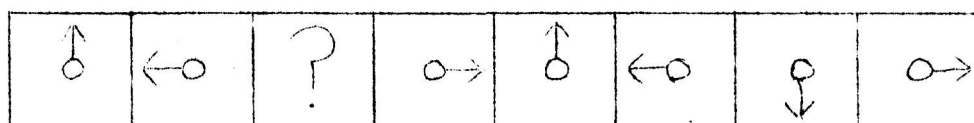
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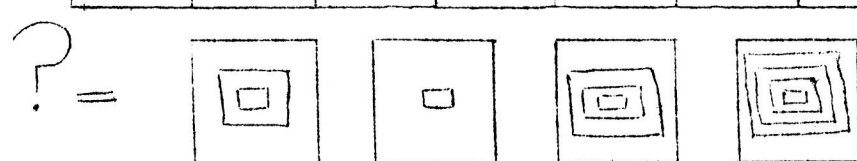
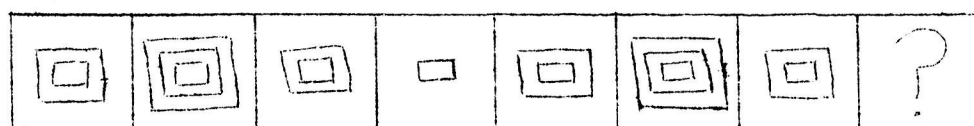
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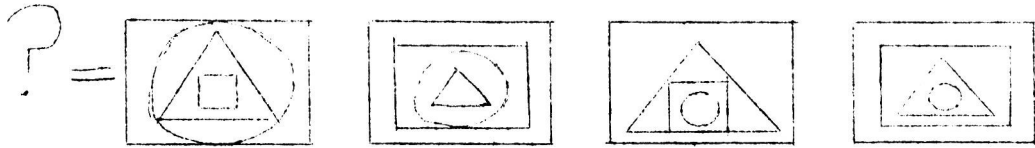
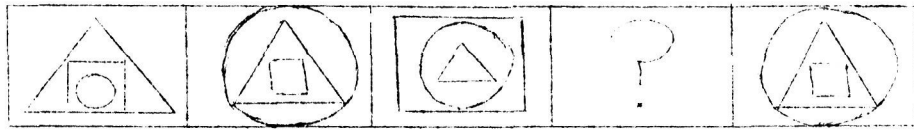
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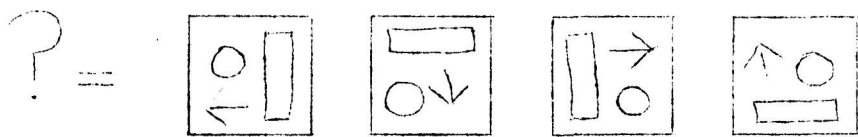
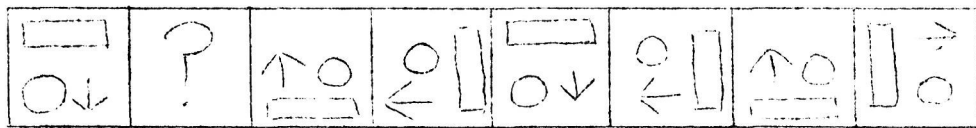
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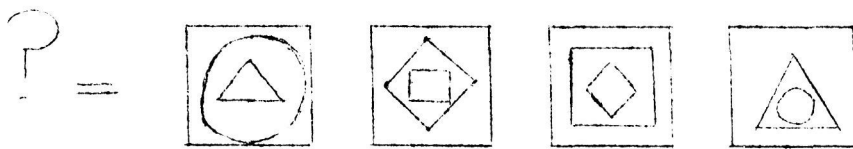
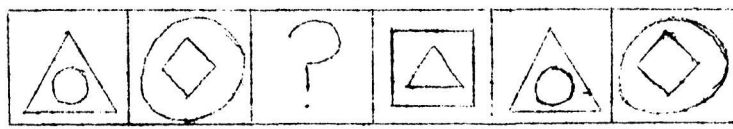
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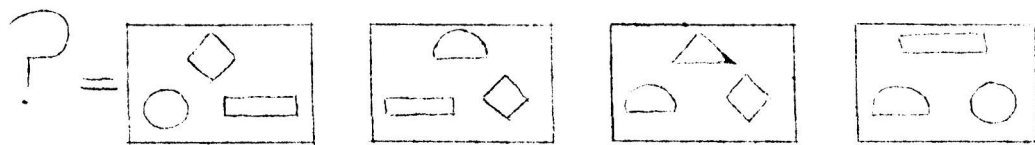
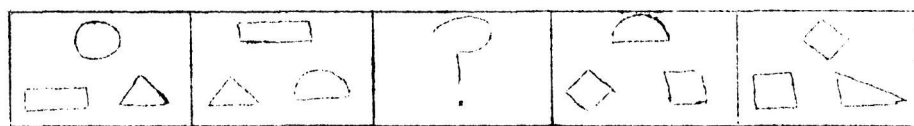
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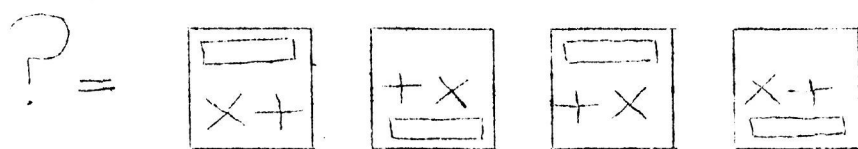
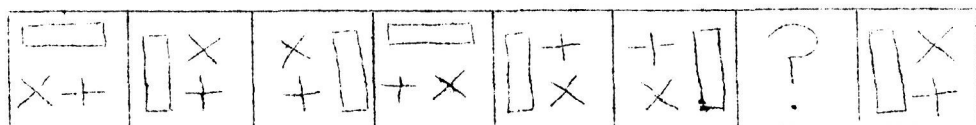
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9.



10.



NumbersForm B

1.	8	3	8	3	8	—	—
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3	13	14	15	16	17	—	—
4	3	5	7	9	11	—	—
5	22	20	18	16	14	—	—
6	2	9	2	18	2	—	—
7	5	13	21	29	37	—	—
8	1	4	7	10	13	—	—
9	3	11	19	27	35	—	—
10	52	45	38	31	24	—	—
11	3	6	12	24	48	—	—
12	128	64	32	16	8	—	—
13	1	3	9	27	81	—	—
14	1448	224	112	56	28	—	—
15	5	6	8	11	15	—	—
16	1	2	4	5	7	—	—
17	13	12	10	9	7	—	—
18	3	3	6	18	72	—	—
19	3	6	7	10	11	—	—
20	4	6	5	7	6	—	—