PROJECT III

AN INVESTIGATION INTO THE PERFORMANCE OF INDIAN CHILDREN IN INTELLIGENCE AND SCHOLASTIC TESTS IN RELATION TO DELAYED ENTRANCE INTO SCHOOL

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A STUDY OF THREE CURRENT PROBLEMS OF INDIAN EDUCATION

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(A) INTRODUCTION:

As stated in the general introduction, Project III was concerned with a study of the relationship between the performance level of Indian pupils in intelligence and scholastic tests in relation to their age of school entrance.

It has already been pointed out that there have been for many years more Indian children of school-going age in Natal than school buildings to accommodate them all. Parents have often had to wait years beyond the normal school-going age of 5 plus before they could secure places for their children and Durban has been throughout the main crisis centre. In the particular locality of Durban where the present research was carried out the problem seems to have existed from as far back as 1912 (Clairwood Schools' Golden Jubilee Celebrations Committee, 1953).

It has also been mentioned previously that primary education is neither wholly free nor compulsory for Indians as it is for Europeans and Coloureds, nor is there a minimum legal school-leaving age or grade prescribed for them[1].

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1) Natal has had compulsory education for European children since 1908, and for Coloured children since 1942. The present minimum school-

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Because many Indian children have to wait for school places, the age-ranges in Indian primary classes are greater than those in corresponding European classes. Age-ranges are particularly large in Indian classes in Durban where pressure on school accommodation is greater than anywhere else in Natal. However, since the relevant figures for Durban are not published separately, this point is illustrated below with figures for the whole of Natal. Only sub-standard one, which is the entrance class, and standard six, which is the last grade in the Indian primary school, are exemplified. They are sufficient to illustrate both the facts of later entry of Indian children into schools as compared with Europeans and the greater Indian age-ranges which persist from the lowest to the highest class in the primary school.

TABLE I

AGE-RANGES OF EUROPEAN AND INDIAN PUPILS IN SUB-STANDARD ONE OF NATAL SCHOOLS, JUNE, 1957[1)]

Ages	Number: Europeans	Number: Indians
Under 6 Years	2,328	1,267
6 Years	3,387	5,220
7 Years	432	4,316
8 Years	54	2,186
9 Years	2	1,023
10 Years	1	488
11 Years	-	283
12 Years	-	120
13 Years	-	48
14 Years	-	21
15 Years	-	6
Totals	6,204	14,978
Medians (Years)	6.23	7.23

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leaving age for these children is 15 years or standard eight. In contrast, one educational body has calculated that, in the absence of compulsory education and a prescribed minimum, the average school life of an Indian pupil in a primary school is about four years (Indian Education Committee, 1953). Normally, if no grade is failed, a child requires eight years to complete the primary school course, i.e., sub-standard one to standard six.

1) Director of Education (Natal) (1959).

The difference between the standard deviations of the two distributions is very highly significant, the figures being as follows:-

Indians	Europeans
σ_1 = 1.454	σ_2 = 0.635
σ_{σ_1} [1] = 0.008	σ_{σ_1} = 0.006
t [2] : 81.9	P : < .01

The corresponding figures for standard six were as follows:-

TABLE II

AGE-RANGES OF EUROPEAN AND INDIAN PUPILS IN STANDARD SIX OF NATAL SCHOOLS, JUNE, 1957

Ages	Number: Europeans	Number: Indians
11 Years	30	3
12 Years	1,270	74
13 Years	2,426	424
14 Years	987	1,029
15 Years	359	1,153
16 Years	90	894
17 Years	8	513
18 Years	2	195
19 Years & Over	-	79
Totals	5,172	4,364
Medians (Years)	13.53	15.57

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1) σ_σ stands for standard error of a standard deviation. It was obtained by use of the following formula (for large samples), given by Garrett (1947, p. 194):-

$$\sigma_\sigma = \frac{\sigma}{\sqrt{2\,N}}$$

2) Obtained by the formula:-

$$t = \frac{\sigma_1 - \sigma_2}{\sqrt{\sigma^2_{\sigma_1} + \sigma^2_{\sigma_2}}}$$

Garrett (1947, p. 216)

The difference between the standard deviations of the two distributions is again very highly significant, the figures being as follows:-

Indians	Europeans
$\sigma_1 = 1.459$	$\sigma_2 = 0.954$
$\sigma_{\sigma_1} = 0.009$	$\sigma_{\sigma_1} = 0.016$
t : 27.446	P : < .01

The median ages of European and Indian pupils in each grade from sub-standard one to standard six (and beyond) show the Europeans to be consistently younger, thus:-

TABLE III

MEDIAN AGE (IN YEARS) OF EUROPEAN AND INDIAN PUPILS IN NATAL SCHOOLS, JUNE, 1957[1)]

Grades	Indians	Europeans	Differences
Sub-Standard I	7.23	6.23	1.00
Sub-Standard II	8.72	7.32	1.40
Standard I	9.95	8.39	1.56
Standard II	11.20	9.39	1.81
Standard III	12.54	10.41	2.13
Standard IV	13.62	11.42	2.20
Standard V	14.57	12.56	2.01
Standard VI	15.57	13.53	2.04

The fact, that the differences between the median ages of European and Indian pupils decrease as one proceeds downwards from standard six to sub-standard one is probably due to the institution of the platoon school system on an increasingly wider scale from 1952 onwards.

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1) Director of Education (Natal) (1959).

It was against such a background of overageness-for-grade among Indian children that Project III was set.

(B) ACKNOWLEDGMENTS:

The schools that participated in this project were as follows: Clairwood Boys', Durban South, H.S. Done, Hillside, Jacobs Road, King's Rest, Luxmi Narayan, Merebank, Mobeni, St. Michael's, South Coast Madressa and Wentworth. The principals and staffs of these schools are warmly thanked for their ever-willing co-operation.

The researcher is also indebted to the Natal Indian Teachers' Society, particularly to its secretary, Mr. P. Raidoo, for providing both published and unpublished statistical data in respect of Indian education.

(C) THE PROBLEM : HYPOTHESES:

It has been pointed out in the introduction that Project III was inspired by the fact that Indian children entered school at varying ages, not from choice but from compulsion. The result of this was that classes in Indian schools consisted (and still consist) of children differing widely in age. The age-range in sub-standard one in 1957 was under 6 years to 15 years (Table I) and in standard six from 11 years to 19 years and over (Table II). In other words, while some Indian eleven-year-olds were in sub-standard one, others of the same age, but more fortunate, were in standard six. Such extreme ranges were not present in the case of European classes. Standard deviations in age in the bottom and top classes of the primary school were shown to be very significantly higher for Indians than for Europeans.

Such a situation brought to the fore two problems which were described as "relative retardation" and "relative educability".

By "relative retardation" the following is meant: Given a number of children varying in standard but equal in age, are those in the lower grades retarded in respect of their mental and scholastic development when compared with their age peers in the upper grades?

By "relative educability" the following is implied: Given a number of children varying in age but in the same school standard, do the older, by virtue of their greater age maturity and experience, derive more benefits than the younger children from instruction within that grade, in other words, are the older children more educable than the younger?

On the basis of commonsense, affirmative answers were given to these two questions and these answers, re-stated in operational terms, constituted the working hypotheses of Project III, as follows:-

(1) Of a group of pupils of the same chronological age but varying in school standard, those in the upper grades will achieve higher I.Q.'s as well as higher raw scores in mental and scholastic tests than those in the lower grades, other things equal.

(2) Of a group of pupils in the same school standard but varying in chronological age, the older, presumably more advanced in mental age and experience, will achieve higher raw scores in mental and scholastic tests than the younger, other things equal.

Hypothesis (2) suggested a corollary, termed "relative progress", by which the following is meant: Given two groups of pupils in standard two, the one consisting of late-starters and the other of early-starters, are their rates of progress from grade to grade up to standard six, as measured by intelligence and scholastic tests, different in any way?

The working hypothesis adopted in respect of this corollary was as follows: Given a group of late- (older children) and a group of early-

starters (younger children) in standard two, the older, by virtue of their advantage in chronological and, presumably, mental age, will show greater progress from grade to grade and finish at standard six at a significantly higher level of mental and scholastic attainment than the younger, other things equal.

All the possible results of the two main hypotheses, together with their practical implications, were then considered in order to ascertain whether the project was worth the while and justified the risk of carrying through, for certain formidable problems (which will be discussed later) began to show up at the planning stage. In the consideration of possible outcomes (which are outlined in the immediately succeeding paragraphs), scores in mental tests were the ones held mainly in mind for these were regarded as being of primary importance; scores in scholastic tests were deemed to be of secondary importance as they were, in some measure, deducible from the former. The assumption was also made that the groups of children being compared were initially equal in mental ability.

The testing of Hypothesis (1) (age constant - standard varying) was expected to yield one of three possible sets of results, as follows:-

(1) (a) Significant differences between I.Q.'s and, therefore, raw scores, of pupils in the upper classes and those of pupils in the lower classes, favouring the former: Such a result would imply that schooling had a stimulating effect on intellectual development and that the child who left school early or reached the age when mental development is believed to cease (in the late teens)[1)]

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1) Recent findings suggest that the older view that intellectual growth ceased at the age of sixteen or thereabouts (held, for example, by Terman and Merrill, 1937) need modification. When total scores in intelligence tests are considered, cross-sectional studies show a peak in the twenties, a gradual decline to about fifty, and a much steeper

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while still in a standard not commensurate with his chronological age (because of late entrance into school) would be intellectually stunted.

(1) (b) Significant differences in I.Q.'s and raw scores favouring students in the lower grades: The implication would be that the later the age of school entry, the better for mental development. High unlikely.

(1) (c) No significant differences in I.Q.'s and raw scores: This would imply that delayed schooling did not have an adverse effect on intellectual growth and that, from the purely paedagogical point of view, it did not matter whether children started school at 5 years or at 15 years since their ability to learn was not impaired in any way.

The investigation of Hypothesis (2) (standard constant - age varying) was also expected to yield one of three possible sets of results, as follows:-

(2) (a) Significant differences in raw scores[1] between the scores of the younger and older children, favouring the younger. This

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decline thereafter (for example, Miles and Miles, 1932; Jones and Conrad, 1933). Longitudinal studies (reported, for example, by Owens, 1953 and Bayley, 1949 and 1955), have, however, cast doubt on the inevitability of the decline from twenty to fifty, at least for educated people. It has also been found that there are different rates of decline for the various abilities (for example, by Fox and Birren, 1950). Vocabulary, general information and power tests show the least decline and performance tests (for example, Wechsler's digit-symbol) the most. It also appears that the decrease starts earlier in men in the lower-grade occupations than among those in more "intellectual" occupations (Vernon, 1951). In the Indian situation, however, the question still remains whether intellectual growth will continue to its maximum potential in the case of pupils grossly over-age for their grades, who have missed the stimulation of school life during their most formative years while waiting for school places.

1) Throughout this account, raw scores in the intelligence tests used will be regarded as indicative of mental age or mental maturity, irrespective of chronological age.

would indicate that delayed schooling had very seriously affected mental growth. Further, if one took into consideration the possibility that intellectual development ceased in the late 'teens, it might appear that the older child would be damned to serious and permanent mental crippling relative to his younger school peer.

(2) (b) Significant differences in raw scores favouring the older: This would mean that delay in schooling did not adversely affect intellectual growth (although, of course, it would delay scholastic progress, but then this could be made good by accelerating the education of late starters).

(2) (c) No significant differences in raw scores: The implication would be that delayed entrance into school had adversely interfered with mental development since, other things equal, children higher in chronological age should also be higher in mental age.

In the discussion of the results of Project II some light was shed on Hypothesis (2). Table LXXV (p. 278) showed that in the case of standard six non-failures who had entered school at varying ages, non-verbal, verbal and combined scores in the New South African Group Test (I.Q.'s as well as raw scores) were significantly and consistently correlated negatively with age. The same applied to scores in the four scholastic tests. Tables LXXVI (p. 280), LXXVII (p. 282), and LXXVIII (p. 283) showed up these results strikingly in terms of actual scores for each level and for each of the low and high socio-economic status groups. In view of these results it might be felt that Hypothesis (2) whould have been formulated to favour the younger over the older children. Instead of doing this, however, it was decided to keep to the commonsense view that the older would be superior to the younger by virtue of their age maturity. The implica-

tions of the data in the tables quoted could not be accepted at this stage with a high degree of conviction for Project II was limited to a cross-sectional study of a single school standard and the criterion of socio-economic status used, namely, the occupational level of the father, was not sufficiently refined for the interpretations that one was tempted to make immediately. The situation at the moment, in respect of Hypothesis (2), is, therefore, analogous to the one in which a benevolent court enters a plea of "not guilty" and proceeds with the trial of a self-confessed murderer.

(D) REVIEW OF PREVIOUS STUDIES:

Since this project is concerned with the influence of the school environment on performance in intelligence and scholastic tests by Durban Indian children, the literature to be reviewed below will have both a general and a specific relevance, namely,

(a) studies pertaining to the influence of the school environment in determining intelligence level, and
(b) literature pertaining to mental and scholastic testing among non-Europeans in South Africa.

(a) Literature Pertaining to the Influence of the School Environment on Intelligence:

The parts played by heredity and environment in the determination of an individual's mental level has for long been a subject of contention among psychologists. Heredity is determined by the sum total of genes that are transmitted to individuals by both parents at conception. Environment is a very broad concept, including both the intracellular and intercellular environment within the organism itself as well as the manifold external influences that impinge upon it from birth to death.

Pastore (1949) points out that extreme hereditarian and environmentalist opinions among psychologists and sociologists are usually closely associated with conservative and liberal attitudes respectively on other issues. Environmentalists tend to be optimistic about the nature of human nature and like to think that under favourable conditions any individual is almost infinitely improvable in any trait. Thus Stoddard (1939), one of the group of workers at the Iowa Child Welfare Research Station, has claimed: "..... the children of definitely moronic mothers and laboring class fathers, if placed early in good foster homes, will turn out to be above average in mental ability". Hereditiсians, on the other hand, ever since Galton's first research into genius beginning in 1869 (Galton, 1952), have tended to be pessimistic about the prospect of changing human nature to any significant extent by manipulating the environment and have stressed the importance of producing better human beings by eugenical measures. As Cattell (1941) says, an individual's heredity was made to seem like Fate itself, giving bounteously to some, without any great effort on their part, and bringing inevitable misery to others.

Anastasi (1958) distinguishes three views in the nature - nurture controversy. The early classification of behaviour into "instincts" and "habits", corresponding to "native behaviour" and "acquired behaviour", respectively, assumed the <u>exclusive operation</u> of either heredity or environment within a given activity. Secondly, the heredity - environment relationship has been conceived in terms of <u>additive contribution</u>. According to this view, both heredity and environment are involved in all behaviour development and the resulting behaviour characteristics can be analysed into the <u>sum</u> of hereditary and environmental influences. This additive assumption lies back of such statements as: "Heredity contributes 75 per cent and environment 25 per cent to the development of intelligence". The third view of the relationship is that of <u>interaction</u>. This is the most

widely accepted standpoint to-day. It implies that the contribution of heredity in the development of a given trait depends upon the contribution of environment and vice versa. In other words, any one environmental factor will exert a different influence depending upon the specific hereditary material upon which it operates. Similarly, any hereditary factor will operate differently under different environmental conditions. From this point of view, any attempt to estimate the proportional contribution of a hereditary or environmental factor would be futile since the proportion would vary as either hereditary or environmental factors varied. The mathematical soundness of additive procedures in this context has been similarly called into question by Loevinger (1943). Anastasi says that heredity-environment interdependence can be more accurately likened to the arithmetical operation of multiplication than to addition. An individual's characteristics may be thought of as the product rather than the sum, of the hereditary and environmental factors, so that a slight difference in environment in interaction with a slight difference in heredity may result in a very large difference in the characteristic concerned. The effects of heredity and environment are so intertwined that they are inextricable[1].

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1) In the same vein, Hebb (1958) writes: ".... it is said for example that 80 per cent of intelligence is determined by heredity, 20 per cent by environment. This statement is, on the face of it, nonsense. It means that a man would have 80 per cent of the problem-solving ability he would otherwise have had, if he were never given the opportunity to learn a language, never learned how people behave, and so forth. Conversely, it means that 20 per cent of a man's problem-solving capacity will result from a good environment, no matter what heredity is involved, which we know of course is not true. What we must say is that both these variables are of 100 per cent importance: their relation is not additive but multiplicative. To ask how much heredity contributes to intelligence is like asking how much the width of a field contributes to its area.

"It is reasonable to ask how much the variations in intelligence are determined by variations of heredity, or of environment, but this is a very different question .....".

Tyler (1956) regards the heredity-environment controversy an artifact. She believes that as soon as we say heredity or environment, nature versus nurture, we have already misstated the question and rendered it unanswerable in view of the relationship of interaction holding between the two factors. The writer goes on to say, however, that there are certain questions relating to heredity and environment for which answers are attainable, questions such as: (1) How much difference can we expect a change of environment to make in the kinds of traits that have interested psychologists, particularly intelligence and personality characteristics? (2) Which environmental conditions are the ones that really count most heavily in psychological development?

Wellman (1940a) lists the following types of environment that have been studied in relation to intelligence: (1) socio-economic status; (2) education of parents; (3) preschool attendance; (4) school and home; (5) geographical location; (6) institutional residence; and (7) training programmes. Of these, the influence exerted by the school is the central problem of the present project.

The view that the school environment does stimulate intellectual growth is a relatively recent development in psychology. Early psychological thinking was convinced of the total or near total innateness of intelligence. As great an authority as Terman (1919) could say that lack of schooling does not prevent a subject from earning an average or superior score in the Binet-Simon (Stanford) and could quote cases in support. As Goodenough (1940) says, before the publication by the National Society (1929) of the Twenty-Eighth Yearbook, "intellectual ability, or intellect, had been tacitly assumed to be in the nature of a gift from the gods. It was the task of educators to help the child to learn, not to increase his intrinsic ability to learn new things. The doctrine of formal discipline, although it occurred and reoccurred in the educational literature from time

to time, was pretty thoroughly dispelled by controlled experiments early in the present century. With the rediscovery, in 1900, of Mendel's now famous work on the mechanisms of heredity, and the enthusiastic adaptation of these principles to the question of mental deficiency by Goddard that occurred a little more than a decade afterward, the public mind, which has ever been ready to shed inconvenient responsibilities, became more firmly set than ever in the attitude that, as far as his mental development is concerned, the future of the child is on the knees of the gods".

Burt (1921), as a result of extensive research among London children, wrote: "..... to achieve distinction, at all events in a trial so academic as the Binet-Simon tests, experience must be heavily supplemented; it must be reinforced either by the artificial aids supplied by a civilised society, or by the natural stimulus of an unusual native wit. Imagine two children, aged seven and seventeen respectively, both possessing an intelligence equally normal (at birth), neither having passed a single hour in school. The younger, as a consideration of the several tests will show, might reach a mental age of six; the older, despite ten years' seniority, barely that of nine. So barren is growth deprived of opportunity".

With the knowledge that we have to-day, there is probably no one who will deny the stimulating effect of the school on mental growth. Biesheuvel (1956b) regards the school as being "particularly important during the later years of childhood, and in establishing verbal, numerical, and reasoning skills, without which the power of the mind can never realise its maximum potential or attain optimum effectiveness in adjusting to the requirements of civilisation".

Wheeler and Perkins (1932), staunch environmentalists, make the point vehemently (and, perhaps, not quite accurately), thus: "..... the teacher must stimulate the development of intelligence. ..... To regard

intelligence as a 'capacity' is to place a stumbling block in the way at the outset. Intelligence is made, not born; heredity plays only one part in the making. Science repudiates the postulation of a 'capacity' defined as something of which the child possesses so much and no more". And again: "The function of environment is to raise the growth potential, not merely to permit its expression". They give an analogy to illustrate this point: "A very sluggish stream of water flows through a canyon. There is no power in the stream; it can achieve nothing. But an engineer builds a dam across it, raising its level two hundred feet. Now the stream rushes over the top of the dam and at the bottom turns mighty engines that supply power for a radius of many miles. A potential has been raised by elevating the stream. Now there is achievement. ..... Now we know the function of education. Its aim is to raise the energy of the growing organism to higher potentials through stimulation and motivation. It does more than permit intelligence to express itself; it creates intelligence, just as building a dam creates water power".

It seems to be generally accepted now that the school environment fosters mental development but how and to what extent have not been adequately investigated under controlled conditions. While a fair amount of research into the effects of preschool attendance on intelligence have been done in the past, the literature on the influence of delayed schooling on mental growth is scanty, largely because the compulsory education laws in western societies demanding that children shall begin school attendance at a certain age do not permit sufficiently large populations of educationally deprived children to accumulate (Goodenough, 1940a; Lynn, 1959). However, two lines of research, though of indirect relevance as far as the present study is concerned, provide some light on the problem. They are (1) investigations into the relationship between amount of schooling and intelligence among adults or near-adults, and (2) investigations into the intellectual development of isolated groups of children. There are also a

few studies which may be classified as "miscellaneous" that have some bearing on the present problem and these also will be briefly reviewed below.

(1) Amount of Schooling and Intelligence:

An analysis of the relationship between educational level and intelligence test scores of adults in the American army during both World Wars showed correlations of .73 and .74 between performance in the Army Alpha or AGCT and highest grade reached at school (Anastasi, 1958). However, these bare correlations are hardly informative for they could be interpreted in two ways: (1) Education raises the intellectual level. (2) The brighter individuals are more likely to "survive" as higher and higher levels of education are attained.

Mursell (1947) quotes four investigations into the effects of later schooling on intelligence - by Rogers (1931), McConnell (1934), Livesay (1939) and Thomson (1940). Senior students were used in all the studies. Test and re-test after intervals ranging from 9 months to 4 years showed substantial gains which were attributed to continued schooling.

Newman, Freeman and Holzinger (1937) have also produced evidence that amount of schooling has a favourable effect on mental growth. They studied 19 pairs of identical twins who were separated at ages ranging from 2 weeks to 6 years. At the time of the study, their ages ranged from 12 to 60 years. Twelve of the pairs showed negligible differences in both mental ability and educational environment. In the case of one pair, no marked difference in intelligence was found even though a large difference in formal schooling had occurred. One pair, with similar formal schooling, showed a marked difference in ability but in this case other differences in cultural opportunity had operated. The remaining 5 pairs of twins had experienced large differences in education and showed corresponding differences in mental ability. Although this study has been criticised on sta-

tistical[1)] and other grounds, for example, by Burks (1938) and McNemar (1938), the method of studying separately reared identical twins seems to possess great promise.

Lorge (1945) has carried out the most famous study of the influence of schooling on mental ability. In 1921, 863 boys around 14 years of age and in the eighth grade had been given a series of intelligence and aptitude tests. In 1941, 20 years later, 131 of the original 863 were located and induced to take mental tests. According to Lorge, this sample of 131 was not significantly different in mean achievement and variability from the original 863 and hence was representative of the larger group. The educational achievement (highest grade completed) of these 131 adults varied from 8 grades to 17 or more and the opportunity was afforded, therefore, to discover how differences in extent of schooling affected the 1941 scores of boys equated for test score in 1921. He found that final scores tended to increase as amount of subsequent education increased. Thus among the 30 men whose scores fell between 69 and 78 on the original test, those who completed the eighth grade had a final mean score of 20.7 (on the Otis S-A) while those who had had graduate training beyond college averaged 38.0. Lorge's main conclusion was that schooling raises the I.Q. He said: "For boys of 'equal' intelligence at age 14, 7-8 years of (additional) schooling produce an increase by age 34 of two full years in MA or a change in IQ from 103 to 115".

Garrett (1946 and 1953) has criticised Lorge's findings, and particularly his loose usage of the concepts of M.A. and I.Q. derived from scores on his group test as if they were equivalent to the Stanford-Binet measures. Anastasi (1958) has also expressed dissatisfaction with the

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1) Discussing this work of Newman, Freeman and Holzinger, Carter (1940) says that some statistical errors are inevitable in any major study!

smallness of Lorge's sample and his failure to take account of regression effect in his method of analysis of data.

Another longitudinal study has been carried out by Husén (1951). He compared the test performance of 722 young men examined upon induction into military service with their scores ten years earlier while in the third grade of primary schools in Malmö (Sweden). The sample was divided into 5 groups on the basis of total education received. These ranged from the compulsory 7 years of primary education to 12-13 years. Within each group, initial and final I.Q.'s were compared. In relation to the total sample, the group with the least education showed a mean loss of 1.2 I.Q. points. The other groups showed relative mean increases of 2.1, 3.0, 3.2 and 11.0 points, respectively. The last three differences were significant at the .01 level. Continued education was thus associated with increasing I.Q.'s. Another analysis of data of the same study showed that total amount of education correlated .61 with initial test score and .80 with final score (Husén, 1950). The fact that the second coefficient was higher than the first was further evidence of the direct effect of further education upon intelligence test scores.

A study by Owens (1953) gave similar results. He re-tested, in 1949-1950, 127 males who had taken the Army Alpha 30 years before, at the time they entered college. This group not only showed a significant mean gain on the re-test (which, incidentally, contradicted views that general intelligence level declined with age) but also significant mean gains as amount of college or graduate education increased.

(2) Intellectual Development of Isolated Groups:

Of perhaps greater relevance to the present study than the works cited above are researches into the mental development of the children of isolated groups of people.

Gordon (1923) carried out a study of English canal-boat and gypsy children. The canal-boat population lived an isolated life, the environment provided little intellectual stimulation, most of the adults were illiterate and the children had few contacts outside their immediate families. Special schools were maintained for the children who could attend them when the boats were tied up for loading or discharging. In health and morals the population compared favourably with town dwellers of the same class, but the children were grievously under-educated, their attendance at school averaging about 4-5%, compared with the 88% of children in ordinary elementary schools.

The abbreviated scale of the Stanford revision tests was used, together with standardised tests in speed of reading, adding, subtracting and spelling.

The mean age of the 76 children tested was 9:5. Their mean I.Q. was found to be 69.6, suggesting a borderline group with a few feeble-minded individuals. The educational quotient of the 36 children who could do the simple scholastic tests was only slightly lower than their I.Q. (70.4 and 71.5, respectively), the coefficient of correlation being .715. Further analysis showed that the I.Q. declined sharply with age within the group, the 4- to 6-year-olds averaging 90 while the 12- to 22-year-olds averaged only 60. The correlation between I.Q. and age was -.755. Even when children in the same family were compared, a consistent drop in I.Q. from the youngest to the eldest sibling was noted, thus:-

TABLE IV

I.Q.'S OF CANAL-BOAT CHILDREN WITHIN THE SAME FAMILY (GORDON, 1923)

	N	Mean Age	I.Q.
4th child in family	5	5:9	88.6
3rd " " "	11	7:5	76.0
2nd " " "	22	8:10	72.9
1st " " "	22	11:11	60.0

In I.Q., the boys tested considerably higher than the girls, the latter being about a year or more retarded than the boys. This retardation was, however, probably due to the greater average age of the girls (9:10 against 8:9 for the boys), intelligence and age being negatively correlated.

Gordon concluded: "The fact that there is a marked decrease in 'intelligence' with an increase of age, and that this is especially noticeable among children in the same family, suggests very convincingly that the low average 'intelligence' of these children is not due to heredity. It may be due to environment, or to the lack of schooling, or to both combined. But as it has been shown that the correlation between the results of the mental and scholastic tests is very high, and further that the average ratios for these two sets of tests are approximately the same, it may be assumed with some reasonableness that the lack of schooling has affected both 'mental' and scholastic achievements to the same extent. In other words, without education (schooling) children are very much handicapped when tested by the 'intelligence' tests used in this investigation - in fact, to nearly the same extent as when tested by purely scholastic tests. ..... Without the mental effort or mental exercises associated with schooling it would appear that there has been very little mental development on the intellectual side" .....

Gordon made a similar study of 82 gypsy children. The gypsies led a nomadic existence, the children attending school only during the few winter months when they were temporarily settled. In spite of the fact that their living conditions were crude and primitive, the gypsy children had more social contacts outside of their immediate families and were, therefore, less isolated than the canal-boat children.

The mean age of the children was 9:9 and their mean I.Q., 74.5. The correlation between age and I.Q. was -.430. Thus both the overall inferiority and age decrement in intelligence were less marked among the gypsies than among the canal-boat children. Correspondingly, it was found that the mean school attendance of the gypsy children was very much higher than that of the canal-boat children, being 34.9% as against 4-5% of the possible number of school days. Also, within the gypsy group, I.Q. showed a significant positive correlation of .368 with school attendance. The educational and mental quotients of 60 children who could do the scholastic tests were 77.4 and 75.4, respectively, the correlation being .784.

The close correspondence between low intelligence and low educational quotients in the case of both the canal-boat and gypsy children led Gordon to suggest that the mental tests did not measure native ability apart from schooling except in the case of very young children.

Examining the fact of age decrement in intelligence among both groups studied by Gordon, Anastasi (1958) says: "One possible explanation for such a decrement is that the intellectual needs of the younger child can be satisfied almost as well in the restricted environment of the canal boat or gypsy camp as in a prosperous urban home. As the child grows older, however, the differential effects of poorer home environment and of deficient schooling become increasingly apparent. Another factor which undoubtedly enters into the obtained results is the well-known difference in the functions measured by intelligence tests at the lower and upper age levels. The increasing emphasis upon verbal and other abstract functions at the older ages may present a progressively greater handicap to children whose environments do not encourage the development of these abilities.

Gordon's findings have been corroborated by several studies of mountain children in America. Surveys have been carried out in Kentucky,

Tennessee, Georgia and the Blue Ridge Mountains. In general, the inhabitants of the regions studied lived in virtual isolation for a large part of the year because of poor roads and other forms of communication. A low standard of living and high degree of inbreeding were characteristic of these groups. Nearly all the inhabitants were of British descent, their families having lived in the United States for many generations.

The surveys carried out among the mountaineers will be classified by regions.

Kentucky:

Hirsch (1928) tested the children of East Kentucky mountaineers with intelligence and scholastic tests. He says that his most important single discovery was that the mean I.Q. obtained was 79.0. He found only small negative correlations between I.Q. and age. In one school of 257 children the figure was -.23; with 796 additional children, the coefficient was -.005. The E.Q.'s, like the I.Q.'s, were also well below 100. From the fact that the I.Q.'s of the various age-groups were about the same (small negative correlations between I.Q.'s and age), Hirsch concluded that the general intelligence level of the sample was "casually (?) speaking, largely independent of its educational and social environment, the latter being, for the most part, an effect and expression of the intelligence level and energy status of the mountaineers". And from the fact that the mean I.Q.'s and E.Q.'s of the groups were approximately the same he ventured that "the general level of each was relatively independent of environmental circumstances and was an expression of the innate mental capacity of the subjects tested". Hirsch thus attributed the mental and scholastic retardation of the mountain children mainly to inborn, hereditary inferiority.

Asher (1935) also studied mountain children in south-eastern Kentucky. The Myers Mental Measure was given to 363 children, the median

I.Q. being 67.7. The National Intelligence Test, Scale B, was administered to 234 children of the same group, the median being 71.5. With 56 children who were not at school when either of the two tests was given, Asher used the Binet-Simon. This gave a median I.Q. of 72.85.

It was found that the median I.Q. for each age-group decreased gradually and continuously with age, thus:-

TABLE V

MEDIAN I.Q.'S OF MOUNTAIN CHILDREN
BY CHRONOLOGICAL AGE (ASHER, 1935)

Age	Median I.Q.
7	83.50
8	75.50
9	74.25
10	69.05
11	66.50
12	64.25
13	63.25
14	63.30
15	60.60

Unlike Hirsch, Asher attributed both the low mean I.Q. of the mountain children and their decrease in I.Q. with increasing age to environmental factors. The aim of the investigator had been to show that intelligence tests constructed and standardised in one locality for and on particular groups of individuals should not be used in some other locality or on some other group with a view to making comparisons between individuals living in the two localities, unless it could be proved that the one did not differ essentially in its opportunities from the other. The writer says: "If the children in a mountain environment are given a test which measures the knowledge and skills in kind and amount of urban children, it seems obvious that the mountain children would be at a decided disadvantage unless they had had approximately the same opportunity to acquire this know-

ledge and skill as the urban children. The same could be said for racial comparisons. Of course, such comparisons can be made and one can conclude that mountaineers do not know what other children know or cannot do what other children can do, but it is just about as likely that the city children do not know some of the things that the mountain children know, things that may require as much ability to learn as the things which they do not know. One could expect one or another result depending upon what kind of test item one included in his tests".

Tennessee:

In 1930, Wheeler (1932) studied 1,147 children in the public schools of the East Tennessee mountain region, using the Dearborn (non-language) and Illinois General Intelligence (language) scales. Both tests showed the same trends, the mean I.Q.'s being 82 and 78 on the Dearborn and Illinois tests, respectively. At age 6 years, the mean I.Q. of the mountain children measured nearly normal after which there was a consistent decrease with increase in chronological age. Scholastic retardation was marked, being 1½ years in the first grade to 2 years in the eighth. Wheeler concluded that performance on both tests was affected by environmental factors and that the mountain children were not as far below the normal as the tests seemed to indicate. The investigator suggested that with proper environmental changes the children might test near a normal group.

In 1940, ten years after the first study, Wheeler (1942) revisited the area and carried out another similar survey. During the intervening decade there had been definite improvement in the economic, social and educational conditions of the mountain area. The average mountain child was now eight months younger for his grade than he was ten years ago, so that there was a decrease in age-grade retardation. 3,252 children in 40 schools were tested. They were found to be superior to the 1930 group at

all ages and at all grades, as measured by the same tests, to the extent of about 10 points of I.Q. (Smith (1942) found similar increases in intelligence test scores of public school children in Honolulu as a result of improvement in educational facilities during an interval of 14 years).

The 1930 study had shown a consistent decrease in I.Q. with increase in chronological age from 94.7 at age six to 73.5 at age sixteen, a decline of 1.9 points a year. The 1940 survey showed a similar decline, but at a higher level, from 102.6 at age six to 80 at age sixteen, an average of 2 points each year.

In order to study the influence of over-ageness or age-grade retardation, Wheeler eliminated all children who were over-age by one or more years, from each grade. He found that for the normal age-groups the mean I.Q.'s remained normal at each grade level. The retarded cases had lowered the I.Q. from 4 points at ages seven and eight to 14.83 points at age twelve. As over-ageness increased and retardations accumulated from grade to grade, there occurred a corresponding decline in I.Q. This point is of direct relevance to the present research.

Georgia:

Edwards and Jones (1938) in a study of the children of North Georgia mountaineers also obtained a mean I.Q. lower than the national average as well as a decline in I.Q. from around 100 at ages seven to nine years to 76 at age fourteen and 70 for those older. The educational quotients of the children were, however, rather better than might have been expected from their I.Q.'s.

Blue Ridge Mountains:

Sherman and Key (1932) made a study of 102 children from four hollows in the Blue Ridge Mountains as well as 81 children from a small

village at the foot of the Blue Ridge. All the inhabitants of these areas were descendants from a common ancestral stock so that they were racially homogeneous. Four tests of intelligence were administered. The table below illustrates all the usual characteristics of the intelligence distribution of isolated groups. Both the village and mountain children achieved means below 100 in nearly all the tests. The village children, however, scored higher on nearly all the tests and this was attributed to their better schooling opportunities. Both groups showed the usual decline in test scores as chronological age increased, this being (as expected) less marked with the village group, as shown below. This work is of particular significance because of the wide range of tests used, which included performance tests.

TABLE VI

I.Q. DISTRIBUTIONS BY AGE OF MOUNTAIN AND VILLAGE CHILDREN (SHERMAN AND KEY, 1932)

Age	Pintner-Cunningham		National Intelligence		Goodneough Draw-A-Man		Pintner-Patterson	
	Mt.	Vill.	Mt.	Vill.	Mt.	Vill.	Mt.	Vill.
6-8	84	94			80	93	89	
8-10	70	91		117	66	82	76	93
10-12	53	76	66	101	71	69	70	87
12-14			67	91	69	73	83	
14-16			52	87	49	70	73	

Assessment of Studies of Isolated Children:

The low average intelligence of isolated children and their decline in I.Q. with increasing age have been explained in three different ways by writers. Some attribute them to a poor heredity, caused by inbreed-

ing and the superior families leaving the isolated areas for better economic and educational opportunities in other places. Others base their explanations on the theory that the mind develops with stimulation, maintaining that, since the isolated environment is less stimulating, there occurs a general decline in the rate of mental growth as the children become older chronologically, the effects being cumulative.

Goodenough (1940a) stands for the first view[1]. She says: "Given two centuries of social anomia, during which time all the ablest members of the group have been continuously drained away, leaving only the intellectual and volitional weaklings to interbreed and reproduce their kind, need we seek further for an explanation of the state of educational backwardness and intellectual degeneracy found? Lack of schooling? But our pioneering ancestors did not find schools ready built in the wilderness. They made schools, and it did not require two centuries of residence for them to do so. Accordingly, I find it hard to accept the idea that the low I.Q.'s of the mountain children are to be explained solely on the basis of educational deprivation. One is forced to ask: Why were they so deprived?"

An example of the second type of explanation is provided by Klineberg (1940). After surveying the results of studies of isolated children he writes: "The evidence along these lines is so overwhelming that

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1) Goodenough does, however, recognise that post-natal factors such as inferior environment, poor physical condition and linguistic difficulties do handicap, for example, South European (Portuguese, Spanish, Italian) and Negro children but she insists that, beyond these adventitious variables, innate racial differences do exist. Regarding the effects of an unfavourable environment, she wrote: "It seems probable, upon the whole, that inferior environment is an effect at least as much as it is a cause of inferior ability, as the latter is indicated by intelligence tests. The person of low intelligence tends to gravitate to those neighborhoods where the economic requirement is minimal; and, once there, he reacts toward his surroundings along the line of least resistance. His children inherit his mental characteristics" (Goodenough, 1926b).

the cumulative effect of inferior environment on reducing intellectual achievement as measured by mental-test scores can hardly be questioned. In this case no alternative explanation of the results carries conviction. Taken together, the studies constitute a powerful argument in favour of the important part played by educational factors in determining group variations in the level of the IQ".

Similarly, Biesheuvel (1956b) describes the relationship between schooling and intelligence with reference to Africans, thus: Scholastic education is the mechanism which establishes the mental skills through which intelligence can best make itself effective, and whereby the mind is raised to higher adaptive levels. Though educational facilities are increasing, they as yet touch only a minority of Africans. Schooling is often confined to establishing the rudiments of literacy and arithmetic, and its effects in stimulating the mind to enquire, to criticise, and to seek objective causal relations is negligible in all but the smallest minority of cases. It follows, therefore, that environment has not only failed to enhance intellectual development in Africans, it has, both through its physical and its cultural influences, actively restrained such development and congealed the mind into habits which debar the individuals concerned from adequately responding to such education or stimulation as may eventually come their way".

A third explanation is that the type of items contained in the usual intelligence tests and their placement favour certain groups. For instance, Eells, Davis et al. (1951), discussing socio-economic status differences in intelligence-test performance, write: "If (a) the children from different social-status levels have different kinds of experiences and have experiences with different kinds of material, and if (b) the intelligence tests contain a disproportionate amount of material drawn from the cultural experiences with which pupils from the higher social-status levels

are more familiar, one would expect (c) that children from the higher social-status levels would show higher I.Q.'s than those from the lower levels". This argument tends to conclude that the observed differences in pupil I.Q.'s are artifacts dependent upon the specific content of the test items and do not reflect accurately any important underlying ability in the pupils.

These three lines of argument are, of course, over-simplifications. Probably no psychologist or educator would to-day subscribe to the idea that all the observed differences in test-intelligence between children of low and high socio-economic status, between rural and urban groups, between non-isolated and isolated groups, and so on, are to be accounted for by any one of the three factors mentioned above. It is a matter of which of them has to be emphasised.

(3) Miscellaneous Studies:

Depressed intelligence test scores and decline in scores with increase in chronological age are not confined to unusual groups of children but appear among under-privileged and rural groups as well. This has been brought out, for example, in studies by Wilcocks (1932) of poor-white children in South Africa; by Jordan (1933) of mill-town children of low socio-economic status; by Skeels and Fillmore (1937) of children admitted to an orphanage after varying periods of residence in their own, very inferior homes; and by Lichtenstein and Brown (1938) of children reared in a high delinquency area in a large city.

Wilcocks (1932) tested 3,281 children of poor whites in 1929 using the (old) South African Group Test. The subjects scored below the national (European) norm in I.Q. and showed a decline in test-intelligence with age. This was attributed by the investigator mainly to the unfavour-

able environment in which they lived. The children were also retarded educationally as shown by tests of problem arithmetic, mechanical arithmetic and vocabulary (Malherbe, 1932).

Jordan (1933), using language and non-language tests, found that the I.Q. of children of mill-workers decreased from about normal at age six to 85 at age thirteen. A difference of 9-10 I.Q. points appeared in favour of the non-language tests, the language tests showing an "impossible" number of feeble-minded cases. He concluded: "..... in those occupations represented largely by semi-skilled workers the poverty of the environment is so severe that children's scores on intelligence tests are definitely lowered so that children who begin their work in school with normal capacities have dropped to the level of dullards by the time they have attained the age of 13".

It will be remembered that the associated phenomena of depressed mental and scholastic test scores and negative correlation between test quotients and chronological age were also observed with the Indian standard six sample studied in Project II (Tables LXXV (p. 278), LXXVI (p. 280), LXXVII (p. 282) and LXXVIII (p. 283). In a discussion of the results it was hypothesized that it was educational deprivation in the form of delayed entrance into school rather than language, cultural or socio-economic handicaps that was responsible for the observed facts. It will be shown in the next section that the scores of other non-white children in South Africa show the same tendency.

(b) Literature Pertaining to Mental and Scholastic Testing among Non-Europeans in South Africa:

Mental and scholastic testing among South African non-Europeans has often taken the form of inter-racial[1] studies.

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1) The term "race" will be used throughout this account in its popular sense, to mean an ethnic group.

The prioneer effort in this direction was made in 1915 and 1916 by Loram (1917). His subjects comprised 328 European, 176 Indian and 281 Zulu school children in standards three to six. To measure mental ability he used Pyle's test of intellectual functions comprising tests of memory, quickness of learning, association, word-building and one ink-blot test. It was found that the Zulus were only 50% as efficient as the Europeans and 75% as efficient as the Indians. He stated that the inferiority of the African to the Indian pupils, whose mother tongue also is not English, points to an inferiority deeper than that of mere language ability.

In the scholastic tests it was found that the Zulu children surpassed the European in handwriting but that in composition and in the four fundamental arithmetical processes the European children were superior. The Indian group was intermediate in handwriting, composition and addition of numbers but was superior to the European in the other three arithmetical processes.

Loram's conclusions were as follows:-

1. "In the mental tests so far devised, and still more in school achievements, the Native is considerably inferior to the European, but there is no evidence that this inferiority will be permanent. The spread of civilisation, selective breeding, improved environment, and better teaching will undoubtedly tend to lessen the mental differences between Europeans and Natives.

2. "The so-called arrest of mental development[1] at the age of puberty is clearly not a racial characteristic, though it is undeniably true that

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1) According to Loram, a number of educationalists (at least during his time) believed in this theory which he describes as follows: "In the case of the Bantu people the weakness of the higher mental processes

(footnote continued next page)

about that period a larger number of Native pupils than European pupils do become listless and indifferent in their school studies, and fail to make the progress hitherto sustained.

3. "This failure to progress is due principally to a course of study and methods of teaching which fail to give the pupils the satisfaction necessary to evoke their continued efforts.

4. "The unsatisfyingness of ordinary school work is over-poweringly strong at about the age of puberty, when the pupil is no longer subservient to the ordinary school discipline, when he begins to think about the meaning of his school studies and to form plans for his future, and when other satisfiable interests begin to appear.

Fick (1929) administered the Army Beta Test (non-linguistic in directions and responses) and the Official Mental Hygiene Individual Scale to 5,800 Coloured, 10,000 European, 762 Indian and 296 Zulu children. For every year of age from 10 to 14 (inclusive) the European group was superior to the Zulu. The urban Coloured and urban Indian groups occupied the intermediate positions in that order.

Discussing these findings, Fick wrote: "In testing Native children one cannot help noticing a number of factors that operate to the disadvantage of this group, and to a lesser degree of the children of the Indian and Coloured country schools. There appears a distinct inability to

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(footnote continued from page 340)

compared with the strength of the earlier processes of sensation and memory, coupled with a lessening of these earlier powers more noticeable than in the case of the whites, has led to the generally accepted hypothesis that there is a marked arrest in the mental development in the case of the negro. This arrest, occurring for the most part in the early stages of adolescence, has induced the further hypothesis that the arrest takes place at, or shortly after, the pubertal period".

carry out even the simplest directions when given to the group. It amounts almost to a complete lack of the power of working as a group. Whether this inability is due to the innate or racial make-up of the groups concerned, whether it is merely an indication of a lower level of intelligence or whether it is due to that type of training or teaching the child receives, it is impossible to state definitely. The methods of teaching are far inferior in the Native, Coloured (country) and Indian schools. The methods are predominantly of the rote memory type. The result is that, when the child is faced with a novel situation that requires some initiative or independent activity, as in the intelligence test, it is confused and at a loss".

Fick (1937), in a paper read before the New Education Fellowship Conference in Johannesburg, reported the results of a further study (carried out in 1934) in which an attempt was made to remedy some of the handicaps that African children experienced in being tested. The subjects comprised 532 African, 180 Coloured, 645 European and 94 Indian pupils. The children were tested individually and concrete material was used for the most part. Six tests were used. In four of them the responses were motor, while in the case of the other two the response consisted of a word or a number. The median scores of the European children were adopted as the criteria, and the percentages of the other groups reaching or exceeding these scores on each of the tests were computed. The findings were as follows:-

TABLE VII

PERCENTAGES OF NON-EUROPEAN GROUPS REACHING OR EXCEEDING EUROPEAN SCORES ON TESTS OF INTELLIGENCE (FICK, 1937)

Test	African %	Coloured %	Indian %
Worcester Formboards	4.1	15.1	15.7
Knox Cube Test	13.2	20.1	36.4
Malherbe's Match Test	8.8	11.1	19.7
Porteus Maze Tests	10.7	14.9	20.8
Reasoning	13.9	25.5	17.0
Arithmetic	6.9	16.1	21.3

The inferiority of all the non-white groups, particularly of the African, to the white group is obvious. Fick used these figures to suggest that the educability of the Bantu was low as compared with that of the European.

At the same Conference Dent (1937) reported the achievement of 122 African children on a number of performance tests. He found them to be retarded by as much as 4 or 5 years in mental development as compared with European children of the same age. Dent attributed the difference largely to environmental factors.

In 1935, about 12,000 African pupils comprising practically all those in standard six to standard ten in all four provinces of the Union were tested by the Interdepartmental Committee on Native Education appointed by the Union Government (1936) (Cook, 1939), in arithmetic (both mechanical and problem) and English vocabulary. It was found that, in arithmetic, the African pupils were about two standards behind European performance in every grade. In English vocabulary it appeared that the African

child in standard six started about level with the English-speaking pupil in standard two and the Afrikaans-speaking pupil in standard four, after which he gained on the European score so that he approached fairly nearly the European norm by the time he got to the matriculation stage. Against this it must be remembered that by the time this level is reached the African group has become relatively very much smaller and more selected than the European groups.

However, the Committee specifically rejected the suggestion made by Fick as a result of his 1934 testing that Africans are inherently less educable than Europeans. It stated: "A great deal of careful research needs ..... to be undertaken ..... before the conclusion can be arrived at with any degree of scientific certainty, that the potential or inborn intelligence of the Native is lower than that of the white man. Most of the tests used so far have been taken from the cultural and scholastic environment of the white man, and if Natives are deficient in those school-acquired skills (as most of them are) they do not show to advantage. Even in using non-linguistic tests of a manipulative type, there are many simple habits, as, for example, working from left to right, or working in a straight line, which the white man imbides unconsciously from infancy, but which cannot be taken for granted to the same extent in the Native. The degree to which these habits constitute part of his mental make-up frequently determines the score which he makes in a test. On the whole it may be said that an intelligence test affords a valid comparison between individuals only in proportion, as they have a more or less homogeneous or common social inheritance. It is very difficult, when constructing such tests, to find elements on which the white man and black man stand absolutely level as regards the contribution of purely environmental factors operating from as far back as the prenatal stage ..... It is only when all ..... external handicaps (environmental deficiencies) are removed that one can fairly compare the

intellectual capacity of Natives with that of Europeans. It is, therefore, unscientific to conclude at this stage that this intellectual backwardness is attributable to lack of innate mental ability. The facts are all not in".

A comparison of age-standard distributions for 1935 showed that in the lower standards the African pupils were from 2½ to 3 years older than the European pupils, due to the fact that Bantu children came to school at a later age than European children.

Van Rensburg (1938), using the double-handle test of Moede, a mirror-drawing test, a sorting test and a maze test concluded that the African had not the learning ability to be able to compete on equal terms with the average European, except in tasks of an extremely simple nature. He states that the results indicate, though they do not prove, that the difference in ability between Africans and Europeans in tasks like those contained in the double-handle and mirror-drawing tests, representing thinking and difficulties to be overcome, is partly innate.

Two authorities, Hoernlé (1937) and Westermann (1939), have expressed views diametrically opposed to those of Fick in respect of Bantu educability. Both quote the findings of R.A.C. Oliver who tested secondary school European and African students in Kenya Colony. Two important findings which emerged from this study were that the average African score in the intelligence test used was about 85% of the average European score and that about 14% of the Africans reached or exceeded the median European score. The difference of 15 I.Q. points between the mean scores was interpreted as being not one of kind, but merely one of degree. Hoernlé says: "The best Bantu surpassed the average of the Whites; the worst Whites were below the average of the Bantu. And in each group, the difference between the highest and the lowest in that group was much larger than the difference

between the average of the two groups. In other words, the two groups largely overlapped .....".

Hoernlé goes on to draw far-reaching conclusions of practical and educational importance for South Africa from Oliver's investigation. He says that the findings imply:-

(a) "that no inborn deficiency of intelligence debars the Bantu as a 'race' from making Western civilisation their own .....

(b) "that those who favour for Native education a content, or curriculum, essentially different from the content of the education given to White children, cannot base their arguments on congenital differences of endowment .....

(c) "that the two favourite arguments by which South African Whites often seek to give a moral justification to measures of discrimination against the Bantu, viz. (i) that Whites, as such, are innately superior, and Bantu, as such, innately inferior; and (ii) that White civilisation, as the product of superior congenital mentality, must be protected against being destroyed by the inferior congenital mentality of the Bantu, are, in fact, without foundation".

In a further contribution, Hoernlé (1940) takes up a much more vehement stand against all forms of racial discrimination in matters educational in South Africa.

Fick (1939b) administered five tests of intelligence to African and European groups. The tests were an individual scale (comprising four performance tests, namely, the Worcester Formboards, the Knox Cube Test, Malherbe's Match Test and the Porteus Maze Test); the Porteus Form and Assembling Test; the Army Beta Test; the Mirror Drawing Test; and the South African Group Test (the old version). He found a marked inferiority on the part of the Africans.

Fick's conclusion was as follows: "This achievement (of Africans) on (intelligence) tests and in the classroom has been shown by all previous investigations and the present (one) to be between 4 and 5 years behind that of the European, of the same age. This means that the mental age for at least 50 per cent. of the Natives will be under 10 years. With this mental age the rudiments of education only should be the goal for the masses - a finding worthy of consideration by bodies responsible for Native education. Previously the present writer (Fick, 1937) found that about 25 per cent. can pass the standard VI examination of European difficulty whilst about 3 per cent. were shown to have the ability to pass the matriculation". The final statement in the book, and the most controversial, reads: "This inferiority occurring in certain tests in which learning or environmental conditions are equalised for Native and European groups does not appear to be of a temporary nature".

Biesheuvel (1943) has severely criticised Fick's techniques and conclusions. He says that Fick's judgment that the inferiority of the African is permanent and innate and not due to remediable environmental influences is based on the following claims made by him:-

(a) His subjects were a fully representative, if not superior, sample of the Union Bantu population.

(b) The tests used were individual, concrete and non-linguistic, and, therefore, fair to both groups.

(c) Steps were taken to create a favourable attitude towards the test situation when the Africans were being examined.

(d) No difference in scores appeared between two African groups brought up under different environment conditions, namely, urban and rural.

(e) No difference in scores appeared between two African groups which had had their schooling under different conditions, the one group having been taught by better qualified teachers than the other.

(f) The scores of the Africans were inferior also to those of the Poor White group in spite of the fact that environmental conditions were equally unfavourable for intellectual growth in both cases.

(g) The results of inter-racial studies of scholastic achievement furnished by other South African investigators follow the same pattern as his own.

(h) The results of inter-racial studies of intelligence by other South African investigators are similar to his.

Every one of these claims is contested by Biesheuvel. He points out that the growth of intelligence is determined by other factors than heredity alone, such as cultural milieu, home environment, school environment, nutrition and temperament. He argues that in none of these vital matters did Fick adequately equalise conditions for the African and European groups.

Referring to Fick's corollary that the inferiority of the African does not appear to be of a temporary nature, Biesheuvel states: "Here, in fact, lies the real danger of interracial comparisons. The motive behind these investigations is, as a rule, to discover racial, and therefore genetic, differences. And where it is impossible to disentangle, with any degree of scientific certainty, what is innate and what is acquired, the temptation to interpret the data in accordance with political bias or emotional needs often becomes too strong".

Biesheuvel believes that it is a mistake to indulge in inter-racial comparisons of intelligence under the present circumstances and by means of the usual techniques. "First and foremost", he says, "we require more information about what it is we are comparing. A thorough qualitative study of African intelligence should precede all further attempts at quantitative assessment of difference. Thereafter, the precise effect of each

environmental factor, by itself, on the growth of intelligence should be determined. And thirdly, an experimental setting and test instruments which are free from the extrinsic environmental effects on intelligence should be devised. Only then shall we be in a position to make statements about African intelligence and its potentialities which deserve to be treated as scientific. Until that time, the African should be given the benefit of the doubt, and a verdict of 'not proven' should be returned to the charge of inherent intellectual inferiority".

Goldstein (1947) administered the (old) South African Group Test (Wilcocks, 1931) and the Raven Matrices (1938) to African, Coloured and European school children in Cape Town. On both tests she found that European subjects scored the highest and the African subjects least with the Coloureds intermediate, but the differences between the groups were almost halved on the Progressive Matrices.

The researcher concludes: "From the results obtained, it is clear that the Matrices Test does minimise inter-racial differences in intelligence, as measured by intelligence tests. In comparing Matrices differences with South African Group Test differences, we may take it that the Matrices Test discriminates convincingly against verbal fluency as independent of such operations as are measured by the Matrices. The South African Group Test leans heavily on verbal ability and tuition. The relationships involved cannot, in most cases, be evoked without familiarity with the vocabulary and subtleties of meaning usually taught at school. In the Matrices Test, the relationships and problems are presented in perceptual form".

With regard to the differences that still appeared between the groups on the Progressive Matrices, Goldstein says: "The reservation must be made ..... that even the material of the Progressive Matrices may be un-

familiar to children reared in cultural environments where manipulation of such patterns is not common. Possibly this, combined with hostility to and fear of the European tester, as well as unfamiliarity of the test-situation and inability to see the end in view - may be responsible for the inter-racial differences in mean score. Under the prevailing circumstances, these factors would militate more strongly against the Africans than against the Coloureds".

Hunkin (1947, 1950) gives the results of 1,729 African children ranging from class two to standard three (inclusive) from nine Durban schools in the Goodenough Drawing-A-Man Test. Logue (1956) did similar work with 600 Durban Indian primary school children. The African and Indian scores are given in the composite table below, together with the norms for American whites presented by Goodenough (1926a).

TABLE VIII

DURBAN AFRICAN, DURBAN INDIAN AND WHITE AMERICAN SCORES ON THE GOODENOUGH DRAWING-A-MAN TEST

Ages	6	7	8	9	10	11	12	13
Africans	11.9	14.3	15.9	17.5	20.1	22.2	22.7	23.8
Indians	--	--	20.4	23.3	24.9	26.4	28.0	29.3
Americans	14.0	18.0	22.0	26.0	30.0	34.0	38.0	42.0

The inferiority of the African and Indian children at all ages relative to American white children is obvious. Since their aim was not primarily inter-racial comparison, Hunkin and Logue did not attempt to equate the groups on any variable besides age. Of her results, Hunkin says: "The relatively low score (of the Africans) on the test may ..... be due to culturally determined factors of personality and interests and may .....

not be taken to indicate a generally lower level of ability". The fact that the differences between African and white American scores increase with age has also been noted by Oates (?). Logue's figures for Indians also show the same tendency.

Dent (1949) administered a translated version of the (old) South African Group Test to over 4,000 Zulu-speaking students ranging from standard three to standard nine. He found that in each standard there were significant differences in favour of Europeans. In each standard there were numbers of over-age pupils, and as age increased overall performance on the test markedly decreased. The difference between Zulu and European scores were least in standard three and increased sharply from standard to standard thereafter. The students in the African primary schools were about two years retarded as compared with the standards in the European schools. The increases in median scores were considerably greater for the Europeans from age to age, than they were for the Africans. At 10 years of age, 35% of the Zulu pupils scored above the European median for that age. Dent points out that the standards in the Native school code do not correspond exactly to the same standards in the European school code. Generally speaking, the standard is considerably lower in the Native schools, as compared with the European schools, standard for standard. There are many factors tending towards this state of affairs, important among which are the following:-

(a) The home education of the Bantu child is very much inferior to that of the average European child, as is also his whole home environment, from the point of view of school education.

(b) The educational facilities and the quality of teaching are far superior in the European schools, as compared with the Bantu schools.

Biesheuvel (1949b) administered five tests individually to 125 African and 125 European school-going children in Johannesburg. The tests were Koh's Blocks, Cube Construction, Alexander Passalong, Porteus Maze and the Match Test of Malherbe. There were no significant differences between the means of the two groups on the Passalong, Maze and Match tests but the European children were superior on the Koh's Blocks and Cube Construction tests. However, Biesheuvel uses this investigation to demonstrate the practical impossibility of establishing satisfactory control even for an urbanised group of Africans. He equated the two groups for age, narrowed the gap in socio-economic status, tried to control the attitudinal factor and used only performance tests claimed to be equally fair to both races. Yet in doing these things something else was thrown out of gear, namely, educational levels. The difference between the educational means was more than one school standard, but as the level of instruction in African schools is much lower, the effective difference was probably about three years of schooling. Had education been equated, the control of the age factor would have been upset .....

In 1949, the Commission on Native Education appointed by the Union Government (1951), applied the same two tests (arithmetic and English vocabulary) that were used by the Interdepartmental Committee on Native Education (1936), to over 10,000 African pupils ranging from standards four to ten, in order to ascertain whether there had been any change during the intervening 14 years. It was found that there had been a lowering of the standards of Bantu achievement in all grades, thus increasing the inferiority of the Africans relative to the European norms of 1935.

In addition, a number of tests of reading comprehension in English, Afrikaans and seven vernacular languages were also given for the first time as well as an Afrikaans vocabulary test. The results were as follows:-

TABLE IX

MEAN SCORES OF AFRICAN AND EUROPEAN PUPILS ON SCHOLASTIC TESTS[1)]

Std.	Norms of Afrikaans-Speaking Pupils	Norms of English-Speaking Pupils	Scores of African Pupils
1. English Comprehension Test			
IV	8.5	10.1	4.59
V	10.5	10.9	6.43
VI	11.0	12.0	7.85
VII	13.0	14.5	10.53
VIII	15.1	15.8	12.43
IX	16.9	15.7	13.80
X	17.4	18.6	14.80
2. Afrikaans Comprehension Test			
IV	7.7	7.5	5.58
V	9.0	8.6	6.09
VI	10.2	9.8	7.24
VII	11.9	11.7	9.12
VIII	12.8	12.8	10.79
IX	14.7	14.2	—
X	16.4	15.8	13.47
3. Afrikaans Vocabulary			
IV	12.5	4.6	3.28
V	16.4	6.3	4.27
VI	19.5	8.4	5.09
VII	24.1	9.2	7.53
VIII	31.0	14.9	10.82
IX	35.8	19.5	13.62
X	37.8	24.9	18.23

1) Adapted from: Union of South Africa. 1951. Report of the Commission on Native education, 1949-1951.

Results in (silent) reading skill in the Bantu languages were poorer than those in the official languages, especially in the higher classes. The rate of progress in the Bantu languages seemed to decrease considerably after standard eight.

The age-standard distribution for 1949 showed little change from that of 1935 - the median Bantu child went to school some 2.3 years later than the median European child. By standard one, the median Bantu child was more than 3 years (3.38) older than the median European child. This difference persisted throughout the remaining standards studied.

Logue's 1954 study has already been described in the description of Project II. He administered the (old) South African Group Test of Intelligence to Indian primary school children in Durban, ranging in standard from two to six and in age from 10 to 15 years. This test was largely of a verbal nature and was administered in English. The overall mean for 1,242 subjects was 87.4 as against 100 for South African European children. He also found a steady decline in scores as age increased, thus:-

Age (Years)	I.Q.
10	102
11	98
12	94
13	90
14	89
15	88

Logue attributed the inferior performance of the Indian children by 12.6 points of I.Q. to their weakness in English.

Logue (1956) gives the results of several mental and scholastic tests given by him to Indian primary school children in Durban.

His results of the Goodenough Drawing-A-Man Test have already been given (see p. 350).

The Porteus Maze Test was administered to about 400 Indian pupils in the age range 9-16 years. In relation to the English norms given by Porteus (1952), the performance of the Indian group was as follows:-

TABLE X

MENTAL AGES OF INDIAN CHILDREN ON THE PORTEUS MAZE TEST BY ENGLISH NORMS (LOGUE, 1956)

Chronological Age of Indian Children	9	10	11	12	13	14	15	16
Mental Age of Indian Children by English Norms	11.1	11.8	12.2	12.4	12.8	13.0	13.1	13.1

It is to be noted that up to the age of 12 the Indian child shows superiority over the English, after which inferiority sets in. These results may be compared with those of Fick (1937) (cf. Table VII, p. 343) who found that only 20.8% of his Indian subjects reached or exceeded the median score of his European subjects.

Logue also administered the South African Individual Scale (Fick, 1939a) to about 100 Indian children made up of equal numbers of 11, 12 and 13-year-olds. The mean raw score of the group was 57 points as compared with the European norm of 61 points. Logue attributes the difference to handicap in English on the part of the Indian subjects.

He also administered two scholastic tests of Schonell (1950) to 500 Durban Indian primary school children, 100 of each age level from 12 to 16, and ranging from standard two to six. Their scores set against English norms were as follows:-

TABLE XI

MEAN SCORES OF INDIAN PUPILS ON SCHONELL'S ATTAINMENT TESTS (LOGUE, 1956)

(1) Test R3: Silent Reading Test A		
Chronological Age in Years	Score	Reading Age by English Norms for Boys in Years
12	7.38	8.2
13	8.34	8.6
14	9.76	9.3
15	11.50	10.3
16	12.50	10.8
(2) The Essential Problem Arithmetic Test		
Chronological Age in Years	Score	Arithmetic Age by English Norms
12	11.14	9.0
13	14.18	9.7
14	18.94	10.5
15	22.10	11.1
16	27.18	12.3

In both scholastic tests Indian children are behind. They are, however, very much over-age for their standards as compared with English children.

The most recent results available of inter-racial testing are those of Lloyd (1958). He administered the Non-Verbal Test of the National Foundation of Educational Research to African, European and Indian children in Durban, of the age range 10-12 years. The results were as follows:-

TABLE XII

MEAN SCORES OF AFRICAN, EUROPEAN AND INDIAN PUPILS IN THE NON-VERBAL TEST OF THE NATIONAL FOUNDATION OF EDUCATIONAL RESEARCH (LLOYD, 1958)

	African	European	Indian
Boys	86.131 (N = 120)	103.202 (N = 181)	88.278 (N = 129)
Girls	86.964 (N = 155)	103.397 (N = 95)	85.473 (N = 473)

The European scores for both boys and girls are substantially higher than those for Africans and Indians. An interesting feature is the relatively small difference between African and Indian scores.

Differences in mental and scholastic test performance have appeared not only between white and non-white groups in South Africa but also between the English- and Afrikaans-speaking groups.

Morkel (1950) found statistically significant differences between the performances of two Afrikaans-speaking groups, each of 250 cases and two English-speaking groups of the same size, drawn at random from about 4,000 men, tested as recruits for the South African Air Force ground staff during World War II. The difference between the means was in favour of the English-speaking volunteers to the extent of about 9 percentile points.

Biesheuvel (1952) made a similar study on groups of subjects tested by the N.I.P.R. in the course of various selection and training projects. The sample comprised 4,206 English- and 3,935 Afrikaans-speaking persons. For the lower occupational groups the Mental Alertness Test (Intermediate) was used and for the higher occupational groups, the Raven Matrices. In all 20 pairs of means that were compared the differences were in favour of the English-speaking groups. Though not large, the dif-

ferences were nearly all significant beyond statistical doubt. They occurred regardless of age, and educational and occupational level.

In accounting for the inferiority of the Afrikaans-speaking groups, Biesheuvel rejects the hypothesis of inborn differences. "The most reasonable explanation", he says, "is that the Afrikaans population, being predominantly rural or new to town life and more numerous in the working class than in the upper class suburbs, has not enjoyed as rich and varied a cultural milieu or as stimulating a material environment, as the English-speaking group. Scholastic education in particular is not as adequate in the country as in the towns, and in so far as disparities were even greater 30 or more years ago, the Afrikaans-speaking generations involved in these tests had also less intellectual stimulation from their parents, parental education being highly correlated with the child's I.Q. The observed difference is therefore far more likely to be environmental than genetic. This conclusion is supported by the fact that the differences are smallest in the highest educational and occupational groups where presumably environmental conditions were more nearly equal".

Olckers (1950) reports the results of scholastic tests given to all the European standard five pupils in the Witwatersrand-Central inspectorial district. Tests of reading comprehension, vocabulary, language usage and arithmetic (mechanical and problem) were written by 3,494 pupils in their mother tongue (English and Afrikaans). The age medians of the Afrikaans- and English-speaking groups were 13 yrs. 4.8 mths. and 12 yrs. 10.2 mths., respectively. The whole group was considered to be a fairly representative sample of standard five pupils in the Transvaal.

The mean I.Q.'s of the children on the (old) South African Group Test were found to be 104.79 and 112.20 respectively for the Afrikaans and English groups. Olckers explains the inferior showing of the

former as follows: "From these results one should not be misled that English-speaking pupils are in general more intelligent than Afrikaans-speaking pupils. It is a well-known fact that there is a high correlation between intelligence and socio-economic status and in a town like Johannesburg the difference between the two groups in this respect is striking"[1].

In the scholastic tests also the English-speaking group scored higher means as shown below.

	Afrikaans-Speaking Pupils	English-Speaking Pupils
Reading Comprehension	10.55	13.83
Vocabulary	19.51	24.12
Language Usage	32.09	40.34
Mechanical Arithmetic	7.4	9.9
Problem Arithmetic	10.0	12.1

There seems to be a moral here for those who would lightly undertake comparisons between whites and non-whites in mental and scholastic tests. If relatively minor differences in environmental background can produce statistically significant differences between English- and Afrikaans-speaking groups on such tests, then it is reasonable to expect that the impoverished environment of the non-Europeans will have far more serious, adverse effects on their test scores. Hence, until such time as the various ethnic groups are genuinely equated for both the subtler and the more obvious factors of environment, inter-racial comparisons of abilities will be scientifically futile if the aim is to look for differences based on "blood".

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1) Free translation from the Afrikaans.

Prof. C.W. de Kiewiet (1960), in the opening address to the Educational Conference, University of Natal, took a similar standpoint. Discussing the question, "Can the Afrikan become a modern man?", he said: "Apocalyptic utterances about the unfitness of the African to live successfully in the modern world are easy to make and always unreliable. We know far too little about the potential of the African as a human being. We know him, or think we know him, in an environment of malaria, bilharzia, malnutrition, tribalism, social and economic frustration, low productivity and short life span. We do not know what will happen to the genetic elements of the African people in an environment free of disease, with better hygiene and more plentiful food".

As conditions are in South Africa, it will perhaps be more meaningful, useful and rewarding and, at the same time, less difficult to investigate the effects of environmental factors on the abilities of non-whites. This is the purpose of the present study.

Biesheuvel (1949a) admirably summarises the present-day status of inter-racial studies of intelligence in a passage that will bear quotation at length. He says: "Many scientific studies of interracial differences in intelligence have been made, the majority attempting to compare the innate ability of the American negro with that of Indian, Coloured or European groups. The results nearly always reveal both quantitative and qualitative differences in favour of the European or near-whites groups. The usual interpretation of these results as indicating constitutional inferiority on the part of African races must, however, be questioned. The usual instrument of investigation is the general intelligence test, modified in such a way as to make it culturally equivalent for the groups being tested. So far no test has been designed which can pass muster on this score. Avoidance of linguistic material and the use of pictures with familiar cultural content do not meet the case. It has been shown that

familiarity with pencil and paper, and with the conventions underlying pictorial presentation, as well as the perceptual and manipulative habits involved in performance tests of intelligence, are culturally determined and place the African at a disadvantage. Motivation towards and confidence in the test situation are also different for the two groups. Speed and bustle are fundamental attributes of the Western way of life which are foreign to African culture. The European child gets used from an early age to examinations, which involve the same attitudinal context as intelligence tests; whereas even the school-going African child is apt to be less confident in the intelligence test situation because of the presence of European testers and the special importance which attaches to the occasion.

"Attempts have been made to overcome some of these difficulties by the selection of control groups in which these cultural influences were held constant. Apart from the inherent difficulty of equating test conditions in groups with a different background and living under different environmental conditions (the control group technique has proved inadequate even in the case of the American negro, whose culture is close to that of the European, though at a lower economic and sociological level) other factors have to be considered which make comparisons invalid. The first of these is the intrinsic effect of environmental influences on the growth of intelligence. Whereas those which we have discussed so far merely affect the measurement of intelligence, there are others, such as the nutrition of the mother during pregnancy and the lactation period, the feeding of the child after weaning, the stimulus to mental growth which emanates from the child's environment particularly during the first two years of life, which may have a permanent effect on the growth of the nervous system and thus on the level of intellectual development which the individual may eventually reach. So far no experiments have been conducted in which this determinant of intelligence has been controlled.

"A second disturber of the validity of interracial comparisons, in which extensive control of extraneous environmental influences has been attempted, is the narrow and unrepresentative range of mental abilities which is eventually left over for comparison. Psychological theory now holds that the level of an individual's intelligence cannot be adequately stated in terms of one general factor, determining performance in any sample of problem solving activities. It has been shown that there are a considerable number of primary mental abilities, the joint operation of which determines power as well as quality of intellect. Tests used for interracial intelligence studies usually involve only a few of these factors, the all important verbal fluency, verbal relations and number factors being virtually always excluded. At best, therefore, such studies can only reveal some differences in mental attributes; they can provide no basis for generalisations about the intellectual ability of a non-European race.

"The third difficulty is the impossibility of finding truly representative population samples for controlled comparisons. The nearer experimental and control groups are brought to each other in respect of environmental circumstances, the further they tend to deviate from their respective population means".

Biesheuvel concludes: "(a) that in the present state of our knowledge it is impossible to say whether the innate intellectual capacities of African races differ either quantitatively or qualitatively from those of Europeans; (b) that their actual intelligence, as it shows itself in educational, occupational and social situations, is lower than it could have been, on account of the depressing effects of a variety of early environmental influences on its growth".

Biesheuvel made the first of such criticisms against interracial studies of intelligence in 1943 (as already noted above). He repeated them

in later works (1949a, 1949b, 1952a, 1952b and 1952c). In more recent publications (1956a, 1956b) he deprecates also the contrary claim that there are no genetically determined differences in respect of intelligence between eithnic groups, a point of view which, Biesheuvel claims, is being propogated in Unesco publications (1950a and 1950b). He maintains that such a claim is more a statement of scientific faith than of fact, for the possibility cannot be ignored that natural selection and isolation have produced strains in Africa that are different, both in respect of the power of the mind and of the skills that are most readily developed. He says that in the meanwhile, categorical statements that are made concerning the abilities of Africans are based more on the prevailing ideologies of the twentieth century than on its record of scientific fact. The only scientifically valid standpoint, which does not outrun the known facts, and which neither prejudices nor prejudges future findings, he concludes, is as follows (1952a): "That observed African abilities are different from, in some respects superior, in others inferior to those of Western man; that environmental, more particularly cultural circumstances have greatly contributed to bring about these differences, which are sometimes artifacts of the method of measurement, sometimes the result of social conditioning; that it is not known at present from what genetic origins the manifest mental attributes of Africans have developed, nor whether this development would have equalled that of the average European if environmental circumstances had been comparable; that a new orientation in research, and the utilization of different experimental and control techniques will be necessary, in order to provide conclusive answers".

(E) THE PRESENT RESEARCH

(a) The Place of the Present Research in the Context of Previous Studies:

The review of the existing literature shows that there has not been any direct study specifically designed to investigate the effects of delayed entrance into school on mental and scholastic development. True enough, some light on this problem has been forthcoming indirectly from related studies, particularly those of canal-boat and mountain children and of African intelligence, but in all these the investigators were pursuing other objectives. Some were, for instance, interested in demonstrating the inapplicability of certain tests to particular groups (e.g., Asher, 1935), others were concerned with the depressing influence of unstimulating environments in general on child growth (e.g., Wheeler, 1932) and still others were engrossed in inter-racial differences in intelligence (e.g., Fick, 1937). So far as is known, no investigator has taken as his subjects groups of children who began formal schooling at different ages and followed their intellectual and scholastic development over a number of years as attempted cross-sectionally in the present study. A possible reason for the lack of research along these lines has already been considered.

One aspect of the present investigation, namely, that concerned with the study of relative retardation in which the performances of pupils of the same age but at different educational levels will be compared, bears some resemblance to previous studies into the influence of amount of schooling but, whereas in the former case, the differences in educational attainment are due solely to the fact of late entry into school, in the latter case, where the subjects had completed their scholastic careers and had left school (e.g., in the study of Lorge, 1945), differences in the ultimate educational standing achieved could have been due to a host of other, irrelevant, factors such as opportunity, motivation, etc. Also, in the latter

type of studies, adults or senior students comprised the subjects, whereas, in the present research junior, primary school children who were still at school formed the sample.

The present study also differed from those of isolated or rural groups of children in two outstanding respects. Firstly, it was carried out on urban children living in Durban which is one of the largest cities in South Africa and which has by far a larger Indian population than any other centre in the Union. This fact also eliminated the possibly disturbing influence of selective migration for, if at all operative, this factor would favour the city children.

Secondly, whereas the factor of educational motivation was always an unknown quantity in the case of canal-boat or mountain parents, determining (1) the age at which children were first sent to school, (2) the regularity of their attendance at school, (3) the seriousness with which children regarded school work, and (4) the length of their scholastic careers, this problem is either non-existent or greatly attenuated in the case of Durban Indians, at least where primary education is concerned.

Surveying studies of isolated mountain children, Goodenough (1940a) was inclined to attribute the relatively low standing of these children on mental and scholastic tests to hereditary weakness resulting from selective migration of the more intelligent and enterprising individuals to the urban areas and the low intellectual and motivational standing of those who remained behind. She wrote: "It is practically impossible to find in the civilised world of today any large number of children for whom equality of genetic potentialities and inequality of educational opportunity can fairly be assumed. Choose a community with an educational system that is definitely below average in its measurable features and you will almost inevitably find that the intellectual level of the adults who are

responsible for that character of the schools is low; choose a community of superior adults and you will find in it superior schools. One of the first things that every intelligent group of pioneers in this country did was to establish schools for its children. It was not by chance that Harvard College was founded only sixteen years after the landing of the Pilgrims and that the maintenance of both elementary and secondary schools was required by Massachusetts law as early as 1647. Schools are man-made institutions and their existence and quality reflect the characteristics of those who gave them being".

This observation would probably have a large measure of truth in a "free" society such as the United States where the development of all its people is unhampered (in theory, at least) by state legislation and where, consequently, the economic and educational status achieved by individuals or groups are fairly accurate reflections of inner potential. This is not the case in South Africa. Confining the discussion to Natal Indians relative to Europeans, one can safely say that "equality of genetic potentialities and inequality of educational opportunity" do co-exist. This is shown by the greater per capita expenditure on European education by the authorities, the provision of more and better constructed and better equipped schools for Europeans, the legal provisions for free and compulsory education for European children, the higher rates of salary for European teachers relative to similarly qualified Indian teachers, etc.

The tremendous degree of self-help on the part of Indians in the way of providing and maintaining schools for their children in the face of these disabilities has already been pointed out in the general introduction of this report. The delay in the schooling of their children is not due to lack of motivation on the part of Indian parents but to the failure of the educational authorities to provide sufficient schools. Attendance

in Indian schools is wholly voluntary and yet the average annual attendance in Indian primary schools is about the same as in European and Coloured schools where attendance is compelled by officers. The annual attendance figures for 1957 were as follows: Indians, 94.22%; Europeans, 92.83%; and Coloureds, 92.37% (Director of Education, Natal (1959)). This point will be elaborated further. It will be sufficient to note at this stage that, in terms of both intellectual potential (if the canal-boat and mountain populations were inferior specimens at all) and educational motivation, the Indian sample of the present study presents a contrast to the isolated groups studied by previous investigators.

The review of existing literature on the subject has brought forth two outstanding generalisations, firstly, that the mental and scholastic test scores of less-privileged groups - be they canal-boat, poor white or African children - are below par, and secondly, that there is among them a negative correlation between mental and educational quotients on the one hand and chronological age on the other. These two established facts can be attributed to heredity, to environment or to both. The present writer is averse to ascribing them to inborn inferiority until such time as all the environmental possibilities have been exhausted; and the environmental factor of age at school entrance on the intellectual and scholastic development of children is the special subject of study of this project.

(b) Design of the Research:

Perhaps the ideal arrangement for the study of the influence of "later" schooling on the intellectual and scholastic development of children who enter school at varying ages would have been a longitudinal study extended over many years similar to the Harvard Growth Studies (Dearborn

and Rothney, 1941) or the researches of the Iowa Child Welfare Research Station (as described, for example, by Wellman, 1940b). A detailed study of children of varying ages could have been made at the point of school entry (with special reference to intellectual factors, home background, educational motivation and physical status) and their progress compared at regular intervals over an extended period.

The longitudinal study should not, however, be regarded as the perfect answer to all methodological problems involved in nature-nurture investigations. Thus Goodenough (1940b) says: "During recent years there has been a tendency to extol the so-called 'longitudinal' approach to the study of human development, in which the same group of children are followed for a number of years, in contrast to the 'cross-sectional' approach, in which comparisons are made between different groups of children of different ages, often of successive ages. There can be no doubt that the former method lends itself to the study of many problems for which the latter is poorly suited, that by using the same group of children from year to year, certain types of sampling errors are automatically excluded, and, what is of chief importance for our present consideration, it becomes possible to employ techniques that are truly experimental in nature, since the effect of an artificially interpolated condition can be studied in terms of responses both before and after its occurrence. Thus, if the group studied is of fair size, it becomes theoretically possible to make use of the techniques of investigation that have been devised for cross-sectional studies, and to supplement these by other methods that cannot readily be employed in such studies. But unmixed blessing are rare. Cross-sectional studies, it is true, are peculiarly subject to certain hazards and limitations; yet the longitudinal approach is likewise subject to hazards and to fallacies more or less peculiar to itself".

Some of the errors to which longitudinal studies are liable are listed by Goodenough (1940b, 1951) as follows:-

"1. Errors brought about by selective elimination of many of the original subjects during the course of the study, as a result of which those individuals who remain are unlikely to constitute a representative sample of the initial group .....

"2. Errors resulting from unequal matching of experimental and control groups when the selection of the former is not within the control of the experimenter, or from unequal experience of the two groups in respect to matters affecting the results of the measurement used for comparison, but not affecting the trait that it is presumed to measure (uncontrolled variables).

"3. Systematic errors of measurement due to prejudgment of results when examiners are acquainted with results of preceding measurements or anticipate that findings will tend to take a given direction. Such errors may affect either the administration of tests or their scoring, or both.

"4. Errors resulting from the non-comparability of tests used at different ages, particularly when the time span between initial test and retest covers the interval from early to later childhood or adolescence, since the items used for measurement at such widely disparate stages of development of necessity differ so greatly in kind that their psychological equivalence becomes uncertain. .....

"5. Errors of interpretation resulting from failure to take account of the principle of regression, particularly in its effects on measurements of gain or loss".

It was decided to make the present research a cross-sectional one not because of the formidable methodological problems that characterise longitudinal studies but because the researcher was working single-handed and any investigation extended over more than six months was out of the question. However, a knowledge of the defects that have marked many longitudinal approaches in the past was useful, since it indicated the precautions that one should have to observe in cross-sectional studies as these share certain possible weaknesses in design with longitudinal methods.

Anastasi (1958) gives a useful summary of the defects that studies into the influence of (nursery) schooling on I.Q. are generally prone to. These may apply to longitudinal and/or cross-sectional approaches. They are as follows:-

(1) With regard to the continued improvement of children attending nursery school for two or three years, the gains in test scores may result largely from practice and test sophistication (e.g., Goodenough's (1940b) criticism of Wellman (1932)).

(2) Improvement in test performance following pre-school attendance may also result in part from better emotional and motivational adjustment to the testing situation on part of the children (e.g., McNemar's (1940) criticism of the Iowa studies generally).

(3) Studies may utilise previously differentiated populations, in which a process of "self-sorting" has occurred. Anastasi says: "Ideally, matched groups should be chosen in advance by the experimenter, from a single population. In testing the effects of nursery school attendance, for instance, children should first be paired off on the basis of matching characteristics. One member of each pair should then be selected at random for assignment to the nursery school group, the other being assigned to the control group. In actual practice, how-

ever, investigations of schooling have had to resort to a posteriori matching. Certain children within a community are entered in nursery school on the basis of their parents' decision. Such a decision may itself reflect characteristics which distinguish these parents, their homes, or their children from others in the community. The investigator now steps in and tries to find other children in the community who 'match' these nursery children in what he considers to be important characteristics for his study.

"With a posteriori matching, it is likely that the groups will differ in one or more characteristics whose relevance to the problem under investigation may have been overlooked. If, for example, children from more 'intellectually oriented' homes are sent to nursery schools, then the systematic difference in home atmosphere in favour of the nursery group might in time lead to superior development of this group, in contrast to the control group ..... When the experimenter assigns children at random to the nursery and non-nursery groups, any uncontrolled characteristics will tend by chance to be distributed equally in the two groups. But when special factors, such as parents' decision to register their child in nursery school, determine placement in experimental or control group, then the uncontrolled characteristics may vary systematically, piling up an excess of one type of child in only one of the groups".

(4) Regression effects may lead to fallacious conclusions. When individuals are tested and re-tested, extreme scores on the initial test tend to regress toward the mean upon re-testing. Such regression results from the presence of uncorrelated, chance factors which affect scores on the two occasions. Some of the subjects who receive high initial scores do so partly because certain chance factors raise their scores on that occasion. Since, however, such chance factors are un-

correlated on the two tests, these individuals will not be equally favoured on the re-test and their scores will tend to drop more often than they will rise or remain the same. (One of the main criticisms of the claims of the Iowa researchers is their ignoring of regression effects in interpreting gains and losses in I.Q.'s, for example, by McNemar (1940)).

It was mentioned in the general introduction to this report that the nature of Project III made it susceptible to certain methodological difficulties. The objections listed above were the ones that the researcher had in mind. It will be useful at this stage to consider to what extent the studies of relative retardation and relative educability of the present project were vulnerable to the criticisms outlined and what measures were taken to counter them.

The Study of Relative Retardation (Age Constant - School Standard Varying) (Horizontal Comparison in Table XIII):-

Objection (1): Practice and Test Sophistication:-

This objection was regarded as not applicable. The sample was completely unsophisticated as far as intelligence tests were concerned. It was also the first time that the children had worked at standardised scholastic tests.

TABLE XIII

DIMENSIONS OF COMPARISON IN PROJECT III[1)]

Ages in Years	STANDARDS					Totals
	2	3	4	5	6	
8.0 - 8.9	7	1	---	---	---	8
9.0 - 9.9	28	4	---	---	---	32
10.0 - 10.9	103	34	1	---	---	138
11.0 - 11.9	85	76	34	3	---	198
12.0 - 12.9	69	91	53	23	2	238
13.0 - 13.9	43	66	69	82	28	288
14.0 - 14.9	25	50	78	89	68	310
15.0 - 15.9	13	29	56	69	74	241
16.0 - 16.9	4	8	21	57	83	173
17.0 - 17.9	---	2	1	9	35	47
18.0 - 18.9	---	---	---	3	14	17
19.0 - 19.9	---	---	---	1	1	2
20.0 - 20.9	---	---	---	---	1	1
Totals	377	361	313	336	306	1,693

1) To preserve clarity in the table, just one group of pupils is exemplified in the case of each dimension. In the actual analyses, at least three groups of students were compared within each of the dimensions.

As for school tests, there were, of course, differences between the lower and upper standards in frequency of experience. Although the students in this analysis were all of the same age, the pupils in standard two, for instance, had obviously faced fewer school tests and examinations than their age-peers in standard six. However, pupils in standard two have already spent three years at school and by that time have probably little or nothing more to gain from the mere experience of school tests and examinations. As with the effects of practice in intelligence tests, there are probably upper limits to the amount of benefit that can be derived from mere familiarity with school tests and examinations.

Objection (2): Emotional and Motivational Adjustment to the Testing Situation:-

This was also regarded as not applicable. What has been said above applies again here. In the study of relative retardation, the children with the least experience of school life were those in standard two while the pupils with the most experience were in standard six. It is true that though both groups were of the same age, the former had been at school for about $3\frac{1}{2}$ years and the latter for about $7\frac{1}{2}$ years at the time of testing. However, since they had already been at school for over three years, the standard two pupils would not be expected to be as emotionally and motivationally immature to the testing situation relative to the standard six students as, for instance, a pre-school group would be relative to a nursery school group. Three years would surely be sufficient for a child to adjust himself emotionally to the routine of school life with its daily exercises, tests and examinations.

In considering the validity of Objections (1) and (2) in the present context, it must be remembered that Anastasi's criticisms were directed to the intelligence test situation involving pre-school and nursery school children and not so much to elementary school pupils who have had

time to accommodate themselves to the demands of adults in regular school situations.

Objection (3): Previously Differentiated Populations:-

It was on this score that the whole project was nearly abandoned at the planning stage. The problem of controlling the operation of selective factors and bias in the sampling entered into the study of relative retardation in two ways.

Firstly, since there were in the sample pupils of the same age scattered through the entire range of standards from two to six (horizontal comparison), it followed, for instance, that those who were in standard two had entered school four years later than those in standard six. The crucial question was whether the parents of those pupils who entered school earlier were more intelligent, more highly motivated and educationally more sophisticated than those parents whose children entered school at a later age. In such a case, if, say, thirteen-year-olds in standard six were found to score higher in intelligence tests than thirteen-year-olds in standard two, might the difference not be due merely tc the superior genetic endowment of the former in intelligence rather than to the effects of schooling?

Secondly, since only non-failures were to be studied, would not standards two, three, four and five, in decreasing frequencies, contain potential failures who, presumably lower in intelligence than potential non-failures, would depress the scores of these classes (in decreasing amounts from standards two to five) relative to the intelligence score of standard six? In such a case, if, say, thirteen-year-olds in standard six were found to score higher in intelligence tests than thirteen-year-olds in standard two, might the difference not be due to the progressive "weeding out" of the duller pupils through failure, from standard to standard, rather than to the effects of schooling?

It will be noted that if any or both of these two possibilities applied they would have had the effect of exaggerating the favourable effects of schooling on performance in intelligence and scholastic tests.

Objection (4): Regression Effects:-

This objection was regarded as not applicable since there would be no testing and re-testing of the same groups and no follow-up, longitudinal studies of individual subjects.

The Study of Relative Educability (Standard Constant - Age Varying) (Vertical Comparison in Table XIII):-

Objection (1): Practice and Test Sophistication:-

If this objection had any force at all in the study of relative retardation, it had none whatsoever here. All the students would be working at intelligence and scholastic tests for the first time in their school careers and since standard was to be held constant in this analysis, the groups to be compared would also be matched for practice and test sophistication in respect of school tests and examinations.

Objection (2): Emotional and Motivational Adjustment to the Testing Situation:-

This objection, too, would not apply at all. Since comparisons were to be made between children of different ages but within the same grades, the students in each grade would be equalised for length of school experience and emotional and motivational adjustment to tests and examinations.

Objection (3): Previously Differentiated Populations:-

In the study of relative educability, selective bias in the sample within each grade could have affected results in only one way, as fol-

lows: Since there were, within each grade from standard two to six, pupils of varying ages (vertical comparison in Table XIII), it followed that the older students within a given grade had entered school later than the younger. The crucial question was whether the parents of those pupils who had entered school earlier were more intelligent, more ambitious and educationally more sophisticated than those parents whose children entered school at a later age. If this were the case, then bias in the sample would favour the younger children since they would be genetically better endowed than the older and any possible favourable effects of advanced age on educability would be obliterated.

Objection (4): Regression Effects:-

This objection would not apply. (Vide the relevant section under the study of relative retardation).

It will be noted that in the study of relative educability the problem of systematic errors in sampling was not as serious as that involved in the case of relative retardation. It will also be seen that if no correction for possible bias in this analysis were made and the younger children were, in fact, genetically better equipped than the older, any advantage that age maturity might have on educability would have been minimised.

The Study of Relative Progress (Both Standard and Age Varying: Diagonal Comparison in Table XIII):-

Objection (1): Practice and Test Sophistication:-

This was not regarded as being applicable for the same reasons as given previously in connection with the study of relative retardation.

Objection (2): Emotional and Motivational Adjustment to the Testing Situation:-

This was also not regarded as being applicable, the reasons being the same as those given in connection with the study of relative retardation.

Objection (3): Previously Differentiated Populations:-

This objection was applicable in only the first of the two possible ways mentioned in the case of the study of relative retardation, namely, that the early-school-starters might be more favourably endowed genetically than the late-starters.

The problem of potential future failures overloading the lower standards was not important. As shown in Table XIII, diagonal progress comparisons between three groups, each ranging in grade from standard two to six, but differing in age range, were intended. The possibility of there being proportionately more potential failures in the lower standards than in the upper would apply to all three progress groups and so cancel itself out as a disturbing factor.

Objection (4): Regression Effects:-

This was not applicable. Different groups of pupils were tested from grade to grade.

It will be noted that the problem of selective sampling was the only one to be regarded as possibly relevant in the present series of investigations and that it could operate in two ways in one of the studies and in one way in each of the other two. The task now was to design procedures to control its possible influence.

It has been mentioned earlier that a longitudinal approach might have been preferable to a cross-sectional one in the study of the effects of schooling on intelligence test scores. In the present context, such an approach could have taken the following ideal form: A large number of pre-school children would be tested for intelligence. Pairs would then be precisely matched for test score, age, sex, home background and physical status. One member of each pair, selected at random, would be sent to school at the normal age of five plus years. A number of such children would constitute the control group. The other members of each pair would be sent to school for the first time at six, seven, eight, nine and ten years of age, and prevented from leaving until the conclusion of the research. The intellectual and scholastic development of all the pupils would be measured at regular intervals of say, a year, for a number of years and the records of the late-starters compared with the records of the normal-starters. Of course, throughout the years of the experiment, there would be no change of staff in the experimental school, teachers would not change grades and the same methods of teaching and school organisation would be maintained. Further, neither the parents of the children nor the teachers nor the testers at yearly intervals should be acquainted with the purpose of the experiment. Outside the school, for example in the home, the children would not be subjected to differential influences throughout the period of the experiment, such as private tuition or special cultural stimulation for these might interfere with the measurement of purely school influences. And finally, in the scrutiny of results, all statistical procedures of dubious validity would be avoided.

Now, outside the laboratory, such model programmes for research, must remain the psychologist's dream. In educational and sociological investigations particularly, controls are difficult to apply. The researcher often has to accept the situation as it is and make attempts to approach

the ideal by ex post facto methods (Jahoda, Deutsch and Cook, 1951). This was the position of the present project.

It has been pointed out that the main experimental obstacle in the present study was the possibility that one was dealing with previously differentiated populations and that this factor might enter into the situation in two ways which may be briefly summarised as follows:-

(a) The more intelligent children of more intelligent parents might have found their way into schools at an earlier age than duller children of duller parents.

(b) The lower the grade, the greater the percentage of potential future failures would it contain as compared with the higher grades.

The implications of these eventualities for the present research have already been discussed. How these problems were faced will now be described.

(a) The task here was to match the various groups of early- and late-starters for initial or "native" intelligence which, in the present context, would mean intelligence unaffected by school influences. Since it was already too late to do this by testing the children, the next most desirable alternative would have been to test the parents. As this, too, was out of the question, the only acceptable alternative that remained was to obtain an indirect measure of parental intelligence through the measurement of socio-economic status.

Now, it has been found in the past that the socio-economic position achieved in life by an individual is significantly associated with intelligence level. Tyler (1956), summarising past researches in the field, says that this is "one of the best documented facts in mental test history". Anastasi (1958), in her review of the literature on the topic, reaches a

similar conclusion. Furthermore, both writers point out that this adult phenomenon applies to children also - those from homes of high socio-economic standing consistently scoring higher in mental tests than those from lower status homes. This point has already been elaborated in the account of Project II.

The question as to why intelligence should be positively correlated with socio-economic status in the case of both children and adults is a problem in cause and effect. The mere fact of correlation between two variables cannot tell us whether one of the two variables, or still others, are causally responsible. Loevinger (1940) says that there are three possible hypotheses to explain the relationship between intelligence and socio-economic status, as follows:-

(1) The superior advantages of a home with high cultural standards tend to aid or promote mental development (the environmentalist's view).

(2) Persons of superior intelligence gravitate towards the occupations that stand higher on the scale; on the average they earn more money to give their children more cultural advantages, and they transmit superior abilities to their children by way of biological heredity (the geneticist's view).

(3) The relationship between socio-economic status and intelligence is due to the fact that both are related in the populations studied to other variables such as race, personality factors, family size, and probably other unidentified factors.

In connection with Hypotheses (1) and (2), Loevinger says: "There are no longer any investigators who voice serious doubts as to the efficacy of either of these factors, at least in extreme cases". And with respect to Hypothesis (3), which is not a prominent one in the existing

literature, she says: "Where a third variable or set of variables can be shown to be related to the two major variables, it does not follow immediately that it is responsible for a spurious correlation between intelligence and social status. The direction of causal influence is no easier to establish here than when only intelligence and socio-economic status are considered. In some instances of the association with third factors it will seem easier to conceive of social status as responsible for a spurious relation with the other factor and intelligence; in other cases it may be easier to conceive of intelligence or of the third factor as responsible for a spurious relation between the other two".

Loevinger points out that Hypotheses (1) and (2) have received the most attention from investigators. In the present study it is not necessary to take sides with the environmentalists or the hereditricians. Almost certainly, there is some truth in the points of view of both, so that in matching the various groups of early and late school starters for socio-economic status one would be really matching them for both hereditary and environmental factors. Looked at from this angle, matching of children on the basis of socio-economic status would seem to be actually superior to matching them on the basis of parental intelligence alone (even if it were possible to obtain this measure) for the latter procedure might not have fully taken into cognisance the environments in which the children were reared both while out of school and in it. However, in order to match the groups for both endowment and environment, it was necessary that the scale for the measurement of socio-economic status should take account of both factors.

Loevinger (1940) says that scales for the measurement of socio-economic status are of three types, as follows:-

(1) Occupational, such as the Barr Scale and the Minnesota Scale for Occupational Classification.

(2) Non-Occupational, such as Chapin's Living-Room Equipment Rating Scale.

(3) Composite, such as the Chapman-Sims Scale, Sim's Score Card for Socio-Economic Status and Leahy's Minnesota Home Status Index.

Since it was the purpose to match groups for both inherited and environmental factors, it was decided to construct a comprehensive scale of the composite type that would take into account the occupational factor, the material standards of the home, its cultural tone and the literacy level of both parents. The scale, as finally perfected, is shown on pages 400-401.

Closely related to the problem of parental intelligence was the more intangible question of educational motivation. Given two groups of parents of similar intelligence and socio-economic level, would there still not be a tendency for the more highly motivated parents to secure school places for their children at an earlier age than parents less strongly motivated? There was no method of assessing directly the degree of educational motivation on the part of parents. One can only assume that, taken in the mass, there would be little likelihood of, say, two groups living in the same locality and equal in socio-economic standing to differ materially in their desire to educate their children.

That this assumption is probably more applicable to the Indian community being studied than to any other ethnic group in South Africa will now be considered.

It has already been pointed out in the general introduction of this report (and the point will be stressed again when the nature of the sample of the present study is discussed) that it is not apathy on the part of Indian parents that keeps their children out of school until a late age

but the non-availability of school places. The existence of numerous "private" schools in the area studied, charging fees for an inferior kind of tuition as against the superior free-of-fee education provided by the regular Government and Government-Aided schools, is evidence that Indian parents go to extreme lengths to secure schooling for their children. Further evidence of their enthusiasm for education is the near-riot conditions that prevail in the regular schools in the area on the first day or two of every school year when hundreds of people almost besiege the schools clamouring for places and harrassed principals and teachers are driven frantic by tearful appeals, cajoling, offers of bribes, abuses and threats of assault by disappointed parents who are turned away and asked to wait for another year with their children already long past the age of school entry[1]. In this matter of educational motivation, the Indian position is in complete contrast to that of, say, Gordon's canal-boat children (1923) or Asher's Kentucky mountain-children (1935) or Malherbe's Poor White children (1932), where parents were indifferent and even reluctant about sending their children to school.

At the same time, there is no evidence that the poorer Indian parents are less enthusiastic about sending their children to school at the appropriate age than the more well-to-do. Principals of schools in the area of the present research state that there is no discernible difference between the rich and the poor[2] in the demand for school places. They believe,

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1) The observations made here are based on the writer's personal experience of teaching in the area and on interviews with the principals of the schools in which the research was conducted.

2) The terms "rich" and "poor" are used here in a relative sense. It will be shown later, when the nature of the sample is discussed, that the locale of the present investigation is one of the poorest in Durban. The range in socio-economic status among the Indians in the area is probably small, smaller certainly than among the Indians of Durban Central (i.e., the Old Borough).

on the contrary, that the poor, impelled by a strong desire that their children should not grow into their own wretched conditions, may be more strongly motivated than the well-to-do to provide their children with education which may be looked upon by them as the key to the more remunerative occupations. Nevertheless, although there may be little or no difference between parents of low and high socio-economic status in their desire to educate their children, it will be shown below that the more well-to-do parents do, in fact, succeed in placing their children in schools at an earlier age than the less well-to-do. Some evidence for this has already been offered in the account of Project II.

This leads to a discussion of the policies followed by the schools in the locality studied for the admission of pupils. Since the present study was carried out in 1957, the period to be discussed extends from 1950 (the year in which the standard six pupils of the sample must have first entered school) to 1954 (the year in which the standard two children of the sample must have come to school for the first time). Prior to 1954, there existed no directive from the Natal Education Department as to the age basis on which admissions should be made, the matter being left entirely to the discretion of the principals or school committees who followed a variety of procedures. The commonest of these was to take in children in order of age priority, preference being given to the older. Thus a principal would admit all eleven-year-old applicants first, followed by all the ten-year-olds, and so on, until all vacancies had been filled. In some schools a variation of this method was followed. A fixed number, chosen at random, would be taken from each age group. As many families sought admission for more than one child at the same time, it was the practice of some principals to admit one child from each of such families as a measure of appeasement. Some of the Government-Aided (but not Government) schools charged up to five guineas as admission fee, the money being used

to carry out extensions and renovations to existing buildings[1]. It may be thought that such a practice would have had the effect of excluding the poorer parents from the competition for school places but it was often found that even the poorest often went to fantastic lengths of deprivation to secure the necessary fee. In the absence of an official policy for admitting pupils, it was obvious that the more influential, the more well-to-do and the more persistent parents would tend to secure school places earlier than others, but this was not the general rule[2]. Furthermore, children coming on transfer to these schools into the upper grades from the outlying areas where the problem of accommodation was non-existent or not so pressing would tend to be younger. One school in the area gave priority of admission to children of a particular religious group, irrespective of age. All in all, the age range of Indian students in each standard from two to six, as reflected in Table XIII, was due to a host of factors that had the effect of cutting across the operation of any clear principle of selection such as parental intelligence or socio-economic status or degree of educational motivation.

Nevertheless, there was a significant trend in the direction of a positive correlation between age of school entry and socio-economic status in the sample studied, as shown below:-

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1) The practice of charging admission fees on the part of grantees and school committees of Government-Aided Indian schools was prohibited by the Natal Education Department in 1954.

2) The points made in this paragraph are based on the writer's personal experience of living and teaching in the area under study and on interviews with principals of the schools concerned in the study.

TABLE XIV

DISTRIBUTION OF PUPILS IN SCHOOL STANDARDS BY AGE AND SOCIO-ECONOMIC STATUS[1)]

Stds.	Age[2)]	Low	High	Totals	Chi-Squares	df's	P's
II	Older	143 (73%)	53 (27%)	196	17.804	1	< .01
	Younger	93 (51%)	88 (49%)	181			
III	Older	108 (70%)	47 (30%)	155	10.246	1	< .01
	Younger	108 (52%)	98 (48%)	206			
IV	Older	118 (76%)	38 (24%)	156	20.439	1	< .01
	Younger	79 (50%)	78 (50%)	157			
V	Older	114 (60%)	77 (40%)	191	11.160	1	< .01
	Younger	59 (41%)	86 (59%)	145			
VI	Older	77 (57%)	57 (43%)	134	3.560	1	> .01
	Younger	79 (46%)	93 (54%)	172			

It will be noted that in all the grades from standard two to five (inclusive) there is a significant tendency for earlier school-starters to come from homes of higher social standing than later starters. The figures for standard six are not statistically significant (probably because many of the older pupils of low status have, by this time, left school to seek for employment) but the trend is in the same direction. An important point to be noted, however, is that there are numerous exceptions to this rule.

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1) The scale used for the measurement of socio-economic status is described on pp. 392-401. Under "low" were grouped pupils of scale scores 0, 1 and 2 and under "high" were included children with scale scores 3, 4 and 5.

2) The division of pupils into "older" and "younger" within each standard was done in such a way that the totals would approximate each other as closely as possible.

It was felt that, in this somewhat amorphous situation, matching of early and late school starters for socio-economic status would equalise them for both genetic endowment of intelligence and home environment, not that there appeared to be clear-cut and systematic background differences between the two groups. The factor of previously differentiated populations, in other words, selective placement in schools, would have probably constituted an insuperable barrier to the present study had it not been for the overwhelming enthusiasm for education shown by Indian parents irrespective of economic level, educational standing, social status and religious-mother tongue affiliation. By way of contrast, nursery school placement, on which many previous studies into the effects of schooling on intelligence were carried out, is a far more selective matter. In short, it is difficult to conceive of a comparable situation in any other part of the civilized world where the opportunity to study the effects of "later" (as against nursery) schooling on intelligence growth is present with such a minimum of selective factors operating to cloud results as the Indian situation in Durban. In fact, even here, the opportunity for future studies of this sort is fast disappearing with the opening of new schools and the whittling down of the problem of waiting for school places, at least as far as Indians are concerned.

(b) The second problem of selection, as pointed out previously, was that since only non-failures were to be studied, the lower standards would contain more potential future failures than the upper grades, in which case, comparisons between pupils of the same age but in different standards would favour those in the upper classes which would, in fact, be more select groups in terms of intelligence. This problem was met by asking teachers to rate the chances of their pupils passing all grades up to and including standard five without failure on a five-point scale, the points being labelled, "very good", "good", "reasonably fair", "poor", and "very poor".

Thereafter, inter-standard comparisons of pupils (in the study of relative retardation) were made with only those students whose chances were rated as very good, good and reasonably fair. This was the only method available of meeting the problem of "progressive failure".

It will be noted that both problems of selection were involved in the study of relative retardation but only one, that of possible initial disparity in intellectual potential, in the studies of relative educability and relative progress.

The question had to be frankly faced at the planning stage whether it was worth the while to carry the study through in the face of these two problems of selection. In the end, the importance of the problem decided the matter and it was resolved to pursue the investigation. The following five considerations were responsible for the affirmative decision:-

(1) No comparable research into the effects of "later" schooling on intelligence had been carried out in any western country previously because of the lack of opportunity for such a study, compulsory school-going ages being laid down by law.

(2) The opportunity of making this nature-nurture study was fast slipping away among Durban Indians and would probably never occur again. (It is possible, however, that a comparable situation will arise in the near future among Africans - when they become sufficiently conscious of the necessity for schooling and begin to show impatience at the absence of facilities for it. The present would, therefore, seem to be the right time for some organisation equipped with adequate funds and personnel to plan out a long-term, longitudinal project in anticipation of the problem).

(3) Matching for socio-economic status and teachers' ratings of future chances of passing grades seemed to be reasonably adequate measures, in the circumstances, to meet the problems of selection.

(4) The problem was of immediate importance for Indian education for if it appeared that schooling was an important determinant of intellectual growth, as reflected by performance in mental tests, added weight would be given to the community demand for more schools and more speed in providing them.

(5) As mentioned in the general introduction, the writer subscribes to the philosophy of Notcutt (1947) and Maslow (1954) that, within reasonable limits, methodological feasibility should not be the only criterion of whether a particular research should be initiated or not. The importance and urgency of the problem to be investigated should also be taken into consideration. At the same time, possible weaknesses in method and design should be frankly acknowledged.

It will not be entirely premature at this stage to mention that the ultimate outcome of the present study fully justified the calculated risks that were taken at the start, for the findings were so clear-cut and decisive that the possibilities of distortion of results through dealing with selected groups faded almost into insignificance.

(c) <u>The Instruments Used:</u>

The instruments used in this project comprised a questionnaire, a verbal and two non-verbal tests of intelligence, three scholastic tests and a specially constructed scale for the measurement of socio-economic status.

(1) The Questionnaire:-

The questionnaire (see Annexure) was made up of four sections which required personal information, details of school history, information from teachers and parents' opinions on the purpose of education. The responses to the last-named have already been discussed in the general introduction. A large part of the questionnaire was filled in by the pupils at school under the supervision of their teachers but the parental section was completed at home.

(2) The Intelligence Tests:-

Two tests of intelligence were used, namely, the New South African Group Test, Forms A and B, Junior, Intermediate and Senior Series, which contains a non-verbal and a verbal section, with norms for each section as well as combined norms (National Council for Social Research, 1956), and the Raven Progressive Matrices (1938) which is non-verbal throughout (Raven, 1952).

The justification for the use of intelligence tests which have not been prepared for and standardised on the ethnic group employed in these studies has already been discussed in the account of Project II (pp. 166-167).

(3) The Scholastic Tests:-

The scholastic tests comprised a test of vocabulary, a test of problem arithmetic and a test of mechanical arithmetic, all issued by the National Bureau of Educational and Social Research (1951). Forms A and B of each of the tests were used.

The vocabulary test comprised two separate tests, namely, the National Bureau Elementary and Junior Tests of Silent Reading. Although

the elementary version is meant really for European pupils in standard one, two and three, and the junior version for standards four, five and six, all the students were given both tests and the scores were combined. The elementary test has been described in the account of Project I (p. 41) and the junior test in the description of Project II (p. 167).

The arithmetic tests were those of Milne. They have been described in the account of Project II (p. 167).

(4) The Socio-Economic Status Scale:-

In the drawing-up of this scale, the same general considerations that applied during the construction of the Bilingualism Scale of Project II (see pp. 168-178) were also pertinent here. The aim was to obtain, through the responses of pupils, an accurate assessment of the socio-economic status of their homes. This imposed certain limitations. For instance, one had to avoid questions to which young children would not be expected to know the answers, such as questions relating to family income or parental participation in community activities through clubs and societies. Furthermore, it was important that parents should not be made suspicious of or antagonistic to the research, for this would have jeopardised the co-operation of the principals of the schools used.

As with the Bilingualism Scale, the Guttman cumulative system was also adopted in this case but, whereas, the scaling procedure advocated by Ford (1954) was alone used in the preparation of the Bilingualism Scale, a combination of Ford's method and that offered by Stouffer et al. (1954) was employed in the construction of the Socio-Economic Status Scale.

Stouffer et al. call their method the H-technique. Its advantage is that it does not involve the restriction of a scale to content of too narrowly limited specificity or to questions with too uniform a format.

This is achieved in the following way: instead of using only one item to determine a given "cutting" point on the scale, as in the conventional system, the H scale uses two, three, or even more items. In effect, the responses to two or more items are converted into a response to a "new" item which is called a "contrived" item. The method, therefore, makes possible the utilisation of a larger amount of data than is possible by the conventional Guttman procedure, thus improving the quality of the scale. Once the contrived items have been secured through statistical manipulation, the Ford method of scaling may be applied to them.

Since the Ford technique of scaling has already been described in the account of Project II (see pp. 168-175), attention here will be devoted mainly to the procedure by which items were contrived.

Originally, 22 questions bearing on socio-economic status were asked. For the purpose of this study, the definition of socio-economic status given by Chapin (1933) was accepted, namely, "the position an individual or a family occupies with reference to the prevailing average standards of cultural possessions, effective income, material possessions, and participation in the group activities of the community". It will be noted that the definition does not directly encompass the esteem dimension of social position as in the "community-reputational" technique of Warner and his associates (1941 and 1949). For reasons already given, it was not possible to secure directly from young children information on all four aspects of socio-economic status mentioned by Chapin, namely, cultural possessions, effective income, material possessions and participation in communal activities. Nevertheless, the questions chosen for the construction of the scale resembled those used successfully with school children by Sims (1928) and Arsenian (1937) and with rural families by Sewell (1940).

As scaling with the total sample of 1,693, even with the use of punch-cards and a Powers-Samas Sorter, would have been a laborious matter for 22 questions, a sub-sample of 537 was chosen for the purpose with the aid of a table of random numbers. The original questions and the frequency of positive responses to each by the sub-sample were as follows, in descending order of frequency:-

TABLE XV

ORIGINAL QUESTIONS TO MEASURE SOCIO-ECONOMIC STATUS AND FREQUENCY OF POSITIVE RESPONSES TO THEM BY 537 PUPILS[1)]

	Question	%
1.	Do your parents (or guardian) get any money from the Child Welfare Society?	89.01
2.	Is there an electric or a coal (or coke or anthracite) stove in your kitchen?	74.67
3.	Have you tap ("Corporation") water in your home or in the yard in which you live?	73.74
4.	Can your father write in English? For example, if you were absent from school, will he be able to write a letter to the Headmaster to say why?	71.51
5.	Does your home get "The Sunday Tribune" or "The Sunday Times" or "The Sunday Express" every week?	64.81
6.	Does your home get "The Leader" or "The Graphic" or "New Age" every week?	53.07

(Table XV continued next page)

1) A positive response is a "yes" response except in the case of Questions (1), (7), (10) and (15). In Questions (1) and (10), a response of "no" would be in the direction of high status and such an answer was, therefore, regarded as positive while a "yes" was regarded as negative. In Question (7), a room-person ratio was worked out. On an empirical basis, ratios of 1 : 3 and above were regarded as positive, those below as negative. A similar procedure was followed by Arsenian (1937) and Sewell (1940). In Question (15), occupations were graded into two broad categories, "high" and "low", as in Project II (see pp. 212-216). A high occupational category was marked positive, a low category, negative.

TABLE XV (Continued)

	Question	%
7.	Leaving out the kitchen, bathroom, pantry, lavatory, storeroom, outbuildings, and rooms given out on rent to other people, how many rooms are used by your family in your house? Answer: ..... How many members of your family use these rooms? Answer:	50.28
8.	Does your home get the newspaper every day from Monday to Saturday?	43.58
9.	Do your parents (or guardian) own the house and land on which you live?	41.90
10.	Does anyone in your home sleep on the floor?	41.53
11.	Is there a radio in the home, which your family uses?	35.38
12.	Have you electric lights in your home?	32.96
13.	Is there a separate room in your home that is used as a "sitting room" (and in which no one sleeps or eats)?	31.66
14.	Is there a tap and sink inside your kitchen?	24.95
15.	What work does your father do? (If your father is not alive, say what work he did before he died). (Give details: For example, if he is in business, say whether he owns the business or works for someone else, and write what kind of business it is, for example, grocery, drapery, wholesale, retail, etc. If he works in a factory, say where he works and what kind of work he does, for example, labourer, machinist, foreman, etc. From what you write we should be able to know exactly what your father does).	22.72
16.	Can your mother write in English? For example, if you were absent from school will she be able to write a letter to the Headmaster to say why?	16.57
17.	Is there a telephone in your home, which your family uses?	10.43
18.	Is there a servant who works every day in your home?	9.50
19.	Is there a refrigerator in the home, which your family uses?	9.31
20.	Is there a private car in the home, which your family uses?	8.94
21.	Has your father or mother, or both, ever gone overseas to other countries?	6.70
22.	Is there a washing machine (a machine that washes clothes) in your home?	0.01

This questionnaire was answered by the pupils in groups at school under the close supervision of their class teachers who explained the questions one by one and clarified matters when a child was uncertain as to what response to give. The teachers themselves were provided with detailed instructions. Where the parent had died, information on his/her literacy and/or occupational level was secured by the pupil from relatives, but such cases were very few in number.

Seventeen of the original 22 questions were grouped to yield 5 contrived items as shown in the table below. Two positive responses out of a possible three in the case of each of Contrived Items I, II, III and IV, and two positive responses out of a possible five in the case of Contrived Item V were found, by statistical devices, to be the most suitable "cutting" points between positive and negative responses to the contrived items regarded as wholes, The percentage of positive responses to each contrived item resulting from such a choice of cutting points is also shown in the table.

TABLE XVI

COMPOSITION AND FREQUENCY OF POSITIVE RESPONSES TO CONTRIVED ITEMS

Contrived Items	Constituent Questions	%
I	(2), (3), (4)	78.77
II	(5), (6), (7)	57.54
III	(8), (9), (10)	38.18
IV	(11), (12), (13)	29.42
V	(14), (15), (16), (17), (18)	22.35

It will be noted that the range of 20% - 80% for positive responses is obtained in the case of each item as required by Ford, as well as a decrease in percentage of positive responses from about 80% for the

"easiest" item to about 20% for the "hardest". Five of the original questions, namely, (1), (19), (20), (21) and (22) had to be dropped as their inclusion would have made it difficult, if not impossible, to maintain the 20% - 80% range, Question (1) because it was too "easy" and the others because they were too "difficult".

After the contrived items had been derived, the scaling procedure was the same as for the Bilingualism Scale described in Project II. Table XVII shows the scaling sheet, a model of which is provided by Ford (1954, pp. 289-290). Referring to Ford's four criteria of scalability, the following points may be noted from the scaling sheet:-

(1) The scale just violates the first criterion in that the frequency of 31 against Unique Score(2), by yielding a percentage of 5.77 when set against the total sub-sample of 537, exceeds the 5% mark set up by Ford. However, this excess of 0.77% was not regarded large enough to justify a further trial run as Ford himself states that the criterion of 5% is merely an empirically derived limit, there being as yet no exact measure for judging the randomness of distribution of errors (1954, p. 294).

(2) The second criterion is met fully since errors in all the positive and negative categories are well below half the category frequencies. Item I came nearest to violating this injunction with 26.2 errors out of a total of 114 responses, representing 22.98%.

(3) The reproducibility coefficient is 94.29%, obtained by subtracting the percentage of total errors (156) in relation to the total number of responses (2,685), i.e., 5.71% from 100.00%. The lowest limit of reproducibility for a valid scale, laid down by Ford, is 90%. The number of individuals who achieved perfect scale scores was 387 (70.07%).

TABLE XVII - SCALING SHEET : SOCIO-ECONOMIC STATUS SCALE*

Unique (Non-Scale) Score	Frequency	Extent of Error	Total Errors	Errors of Pos. Categories Contrived Items & Weights					Errors in Neg. Categories Contrived Items & Weights				
				I 1	II 2	III 4	IV 8	V 16	I 0	II 0	III 0	IV 0	V 0
(0)	63	(0)	0										
(1)	99	(0)	0										
(2)	31	(1)	31		15.5				15.5				
(3)	80	(0)	0										
(4)	7	(1)	7			7.0							
(5)	21	(1)	21			10.5				10.5			
(6)	10	(1)	10						10.0				
(7)	44	(0)	0										
(8)	2	(1)	2				2.0						
(9)	9	(1)	9				9.0				0.3		
(10)	1	(2)	2		0.3		0.7		0.7				
(11)	15	(1)	15				7.5				7.5		
(12)	-	(2)	0										
(13)	6	(1)	6							6.0			
(14)	-	(1)	0										
(15)	29	(0)	0										
(16)	-	(1)	0										
(17)	9	(1)	9					9.0					
(18)	-	(2)	0										
(19)	6	(1)	6					6.0					
(20)	-	(2)	0										
(21)	2	(2)	4			0.7		1.3		1.3		0.7	
(22)	-	(2)	0										
(23)	7	(1)	7					3.5				3.5	
(24)	-	(2)	0										
(25)	3	(2)	6				1.5	1.5		1.5	1.5		
(26)	-	(2)	0										
(27)	14	(1)	14								14.0		
(28)	-	(2)	0										
(29)	7	(1)	7							7.0			
(30)	-	(1)	0										
(31)	72	(0)	0										

Tot. Freq	537

Computation of Error

	Total	In Positive Categories					In Negative Categories				
Total Error	156	0	15.8	18.2	20.7	21.3	26.2	26.3	23.3	4.2	0
No. of Responses Involved	2685	423	309	205	158	120	114	228	332	379	417
Total Errors by Question		26.2	42.1	41.5	24.9	21.3					
Percent of Error	5.810	4.88	7.84	7.73	4.64	3.97					

* All figures within brackets are fixed constants.

(4) For none of the contrived items did the margin of error exceed 15%. Item II came nearest to violating this requirement with a figure of 7.84%.

The scale, therefore, turned out to be a satisfactory one from the point of view of internal logical structure. In its final form it appeared as shown on p. 400.

Reliability:-

Of the three conventional methods of testing reliability, namely, test - retest, equivalent form and split-half, the first was resorted to.

Fifty pupils, ranging in standard from two to six, completed the scale twice with an interval of a week between the first and second administrations. The reliability quotient was .974. On the retest, 46 of the pupils returned exactly the same scale scores as on the first occasion, 3 were displaced by one rank and 1 by two ranks. When the scale scores were classified into just two categories, namely, "low" (comprising the rank orders, 0, 1 and 2) and "high" (comprising the rank orders, 3, 4 and 5), then all the 50 pupils retained their original classification. This must be regarded as an extremely satisfactory state of affairs.

Validity:-

One school was used to study the validity of the scale. Teachers of this school were asked to submit the names of 50 children whose home background they knew intimately. It was requested that 25 of these children should be from homes of relatively high and 25 from homes of relatively low status. The students were then given the scale by the researcher who was ignorant of the teachers' estimates. There was 100% correspondence between teachers' opinions and scores on the scale classified into "low" (scale scores of 0, 1 and 2) and "high" (scale scores of 3, 4 and 5) categories.

Further evidence of the validity of the scale is the finding that the estimated product-moment coefficient of correlation between paternal occupation and scores in the full scale was +.550 (Project II, Table XLIII, p. 215), and among the Durban Indian children studied, as among other groups, occupation of father is by itself a fair indicator of socio-economic status.

U N I V E R S I T Y O F N A T A L

INSTITUTE FOR SOCIAL RESEARCH

S-E S SCALE

SCHOOL: ..... DATE: .....

SURNAME (in full): .....

CHRISTIAN NAME (in full): .....

STANDARD: ..... DIVISION: ..... REGISTER (SERIAL) NO: .....

I	(a)	Is there an electric or a coal (or coke or anthracite) stove in your kitchen?	YES	NO	
	(b)	Have you tap ("Corporation") water in your home or in the yard in which you live?	YES	NO	
	(c)	Can your father write in English? For example, if you were absent from school will he be able to write a letter to the Headmaster to say why?	YES	NO	
II	(a)	Does your home get "The Sunday Tribune" or "The Sunday Times" or "The Sunday Express" every week?	YES	NO	
	(b)	Does your home get "The Leader" or "The Graphic" or "New Age" every week?	YES	NO	
	(c)	Leaving out the kitchen, bathroom, pantry, lavatory, storeroom, outbuildings, and rooms given out on rent to other people, how many rooms are used by your family in your house? Answer: ..... How many members of your family use these rooms? (Count everyone, even the smallest baby). Answer:			

Continued next page

Continued from previous page.

III	(a)	Does your home get the newspaper <u>every day</u>?	YES	NO	
	(b)	Do your parents (or guardian) own the house <u>and</u> land on which you live?	YES	NO	
	(c)	Does anyone in your home sleep on the floor?	YES	NO	
IV	(a)	Is there a radio in the <u>home</u>, which your family uses?	YES	NO	
	(b)	Have you electric lights in your home?	YES	NO	
	(c)	Is there a separate room in your house that is used as a sitting room (and in which no one sleeps or eats)?	YES	NO	
V	(a)	Is there a tap <u>and</u> sink inside your kitchen?	YES	NO	
	(b)	What work does your father do? (If your father is not alive, say what work he did before he died). (Give details: For example, if he is in business, say whether he owns the business or works for someone else, and write what kind of business it is, for example, grocery, drapery, wholesale, retail, etc. If he works in a factory, say where he works and what kind of work he does, for example, labourer, machinist, foreman, etc. From what you write we should be able to know exactly what your father does):			
	(c)	Can your <u>mother</u> write in English? For example, if you were absent from school will she be able to write a letter to the Headmaster to say why?	YES	NO	
	(d)	Is there a telephone in the <u>home</u>, which your family uses?	YES	NO	
	(e)	Is there a servant who works <u>every day</u> in your home?	YES	NO	

(d) The Sample:-

For the 1951 Census, Durban was divided into 262 enumerators' districts. These were consolidated into 36 "census tracts" by Kuper, Watts and Davies (1958) in an investigation into the racial ecology of Durban, started in 1954. The 36 census tracts were then further combined into 6 sociographic zones which they labelled Sea Front (I), Alluvial Flats (II), Seaward Transitional (III), Central Berea Ridge (IV), Inland Transitional (V) and Peripheral (VI), as shown in Figure I, p. 403. The Alluvial Flats Zone comprised 7 tracts numbered 7, 16, 18, 28, 29, 30 and 33 (Figure 2, p. 404).

It was decided to locate the present research in the adjoining Census Tracts 28, 29, 30 and 33, an area covering the major portion of the Alluvial Flats. The choice of this locale was determined by two factors. Firstly, the area, particularly Census Tract 29, contained a heavy population density of Indians and the problem of school accommodation for Indian children was probably more acute here than anywhere else in Durban, or in the rest of Natal. Secondly, the investigator had worked in this area for several years as a schoolmaster and knew the locality intimately.

It was decided to use all the schools in the selected census tracts, that were suitable for the purpose in hand. Because of the difficulty of testing very young children in large groups, sub-standards one and two and standard one were excluded from the research. Girls were also omitted from the study as Project II had shown that there were significant sex differences in intelligence and scholastic attainment among Indian children. The inclusion of girls would have further complicated an investigation that was already showing signs of bristling with difficulties, both at the levels of theory and practice. It was also decided to exclude all afternoon schools in the area as one could not be certain that the

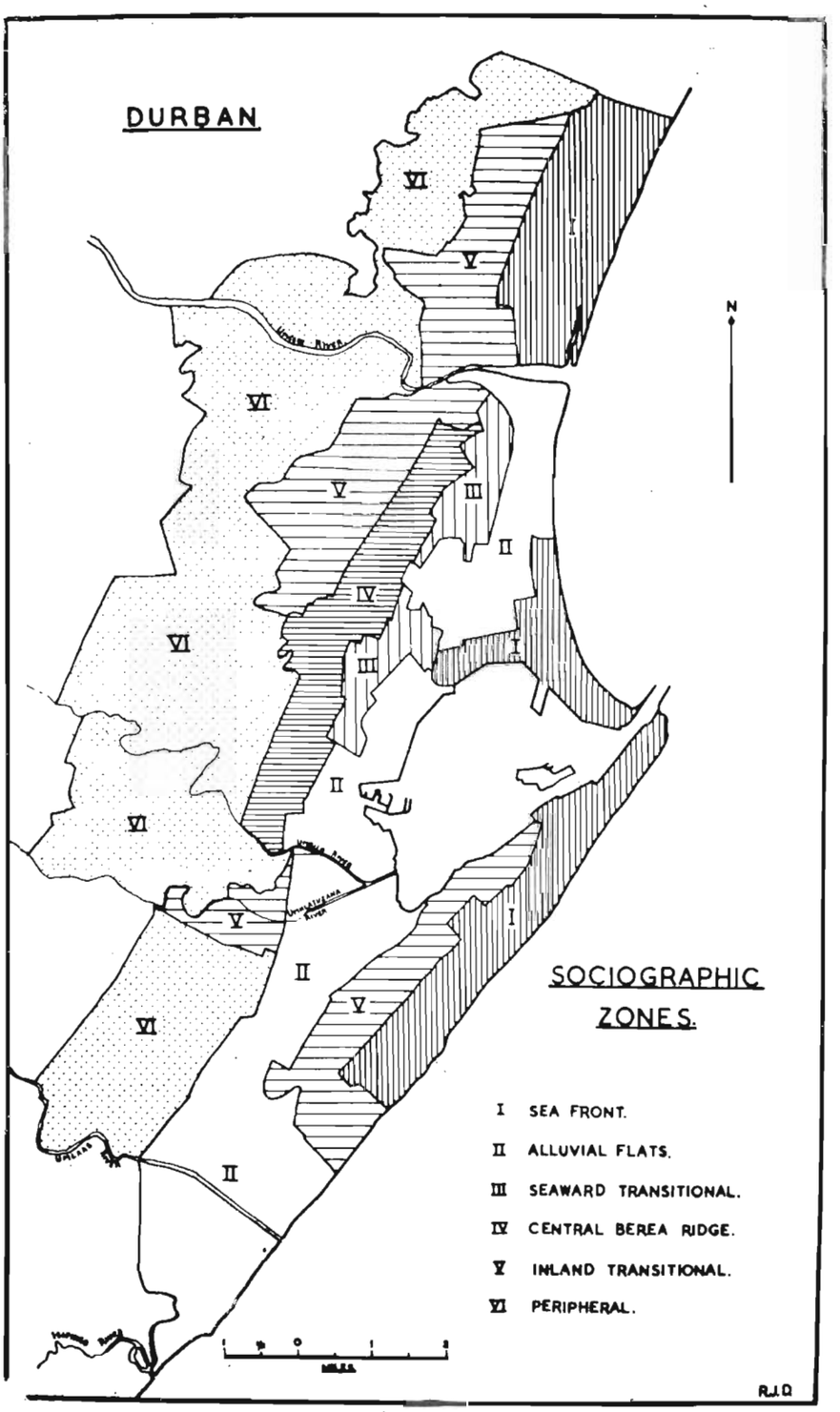

FIGURE 1: SOCIOGRAPHIC ZONES OF DURBAN
(KUPER, WATTS AND DAVIES (1958))

(Reproduced by kind permission of the authors)

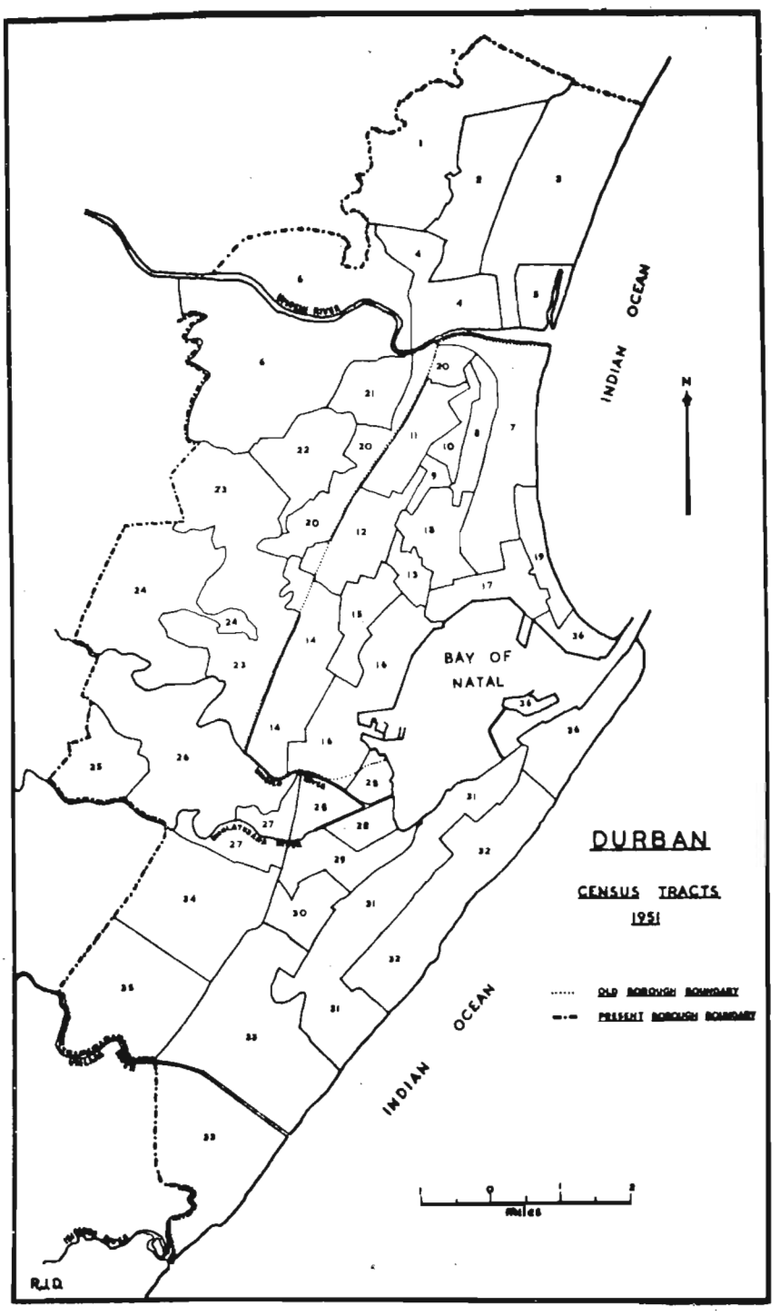

FIGURE 2: CENSUS TRACTS COMPRISING ALLUVIAL FLATS OF DURBAN

(KUPER, WATTS AND DAVIES (1958))

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standard of work in these newly instituted schools was on a par with work in the normal (morning) schools with their better qualified and more experienced teachers.

This left a total of 12 regular, "morning", Government or Government-Aided schools for study. Seven of these were clustered together within a radius of a quarter of a mile. The qualifications of the staffs of the 12 schools were, on an average, more or less the same. The schools followed exactly the same official syllabuses in all the grades and taught the same subjects. There was a constant movement of pupils between the schools. In fact, it was the practice in some of them to send all their standard six students to one school in particular which prepared them for the secondary school situated immediately next to it. All twelve schools were filled to capacity and those which catered for beginners had long waiting lists.

It will be seen, therefore, that the schools utilised in the research were not chosen at random. First of all, four adjoining census tracts were selected mainly on the ground that they contained the problem of the investigation in its most acute form. All the "normal" schools in these tracts were used. Finally, all the appropriate subjects in these schools who were present for all the tests were included.

The table below indicates the schools that participated in the research and the census tracts in which they were situated.

TABLE XVIII

LOCATION OF SCHOOLS BY CENSUS TRACTS

Schools	Tract Nos:
St. Michael's Government-Aided (Mixed)	28
Clairwood Government (Boys')	29
Durban South Government (Mixed)	29
H.S. Done Government (Mixed)	29
Jacobs Road Government-Aided (Boys')	29
King's Rest Government-Aided (Mixed)	29
Luxmi Narayan Government-Aided (Mixed)	29
Mobeni Government-Aided (Mixed)	29
South Coast Madressa Government-Aided (Mixed)	29
Wentworth Government-Aided (Mixed)	29
Hillside Government-Aided (Mixed)	33
Merebank Government-Aided (Mixed)	33

It will be noted that Census Tract 30 contained no schools. Indian children of this area attended the schools in Census Tracts 28, 29 and 33.

The Alluvial Flats Zone of Durban, in which the research schools were situated, is the zone most densely populated by Indians (Kuper, Watts and Davies, 1958). The writers state: "Sections of these Alluvial Flats were malarial swamps as late as 1934, when the city had its last serious outbreak of malaria. Land in this residentially undesirable belt was either allotted for Non-European Barracks, compounds and locations, or occupied by Non-Europeans on their own initiative". The table below shows that, in the four census tracts used, the Indian population predominated over all others.

TABLE XIX

RACIAL COMPOSITION OF CENSUS TRACTS, DURBAN - 1951 CENSUS[1)]

Tract No.	Europeans	Coloureds	Indians	Africans	Totals
28	6 0.22%	- -	1,591 58.75%	1,111 41.03%	2,708 100%
29	43 0.24%	1,285 7.13%	16,266 90.26%	428 2.37%	18,022 100%
30	210 2.43%	407 4.72%	5,950 68.99%	2,058 23.86%	8,625 100%
33	577 9.23%	315 5.04%	4,686 74.95%	674 10.78%	6,252 100%

The four census tracts served by the schools that were studied are somewhat below average in socio-economic status even by Indian standards. The table below shows that both in terms of mean and per capita income the Indians in these centres are poorer than Durban Indians generally.

TABLE XX

ANNUAL MEAN AND PER CAPITA INCOME, BY RACE AND CENSUS TRACT DURBAN - 1951 CENSUS

Tract No:	Europeans		Coloureds		Indians	
	Mean Income £	Per Capita Income £	Mean Income £	Per Capita Income £	Mean Income £	Per Capita Income £
DURBAN	552.06	282.74	201.20	64.34	182.85	40.02
28	462.50	154.17	—	—	110.44	21.10
29	268.75	127.98	201.07	51.33	155.62	33.49
30	363.06	156.34	199.59	60.47	151.31	33.64
33	348.79	124.74	259.77	72.90	151.62	33.13

1) The data of Table XIX and Table XX have been adapted from those presented by Kuper, Watts and Davies (1958).

The design of this investigation required that only those boys, ranging from standards two to six, who had never failed any grade in their school careers, should be chosen. In all, 1,693 such pupils were found. Great care was taken to trace their school progress in admission registers to confirm claims of non-failure. The age-standard status of the sample was as follows:-

TABLE XXI

AGE-STANDARD STATUS OF SAMPLE OF NON-FAILURES ON DAY OF TESTS (MARCH - APRIL, 1957)

Age in Years	Standards					Totals
	2	3	4	5	6	
8 but not 8½	2	-	-	-	-	2
8½ " " 9	5	1	-	-	-	6
9 " " 9½	6	-	-	-	-	6
9½ " " 10	22	4	-	-	-	26
10 " " 10½	42	9	-	-	-	51
10½ " " 11	61	25	1	-	-	87
11 " " 11½	43	27	12	2	-	84
11½ " " 12	42	49	22	1	-	114
12 " " 12½	40	39	29	10	1	119
12½ " " 13	29	52	24	13	1	119
13 " " 13½	27	33	40	43	10	153
13½ " " 14	16	33	29	39	18	135
14 " " 14½	15	29	43	37	34	158
14½ " " 15	10	21	35	52	34	152
15 " " 15½	8	18	40	36	30	132
15½ " " 16	5	11	16	33	44	109
16 " " 16½	3	5	15	34	47	104
16½ " " 17	1	3	6	23	36	69
17 " " 17½	-	1	1	6	20	28
17½ " " 18	-	1	-	3	15	19
18 " " 18½	-	-	-	2	11	13
18½ " " 19	-	-	-	1	3	4
19 " " 19½	-	-	-	1	1	2
19½ " " 20	-	-	-	-	-	-
20 " " 20½	-	-	-	-	1	1
Totals	377	361	313	336	306	1,693
Mean Ages	11.78	12.85	13.84	14.71	15.69	13.68
Median Ages[1]	11.54	12.71	13.94	14.67	15.73	13.74

1) It will be noted that the median ages, by standards, for the present

(footnote 1) continued next page)

The table below compares the Indian students of the present sample with European pupils in the same grade and on the same date by age[1].

TABLE XXII

MEDIAN AGES IN YEARS OF INDIAN PUPILS OF THE SAMPLE AND NATAL EUROPEAN PUPILS IN MARCH - APRIL, 1957

Standard	Indians	Europeans	Difference
II	11.54	9.19	2.35
III	12.71	10.21	2.50
IV	13.94	11.22	2.72
V	14.67	12.36	2.31
VI	15.73	13.33	2.40

It will be seen that in every grade the Indian pupils are over-age by more than two years relative to their European counterparts.

As none of the students had failed any grade up to the time of testing, the age "spread" within each standard shown in Table XXI was due solely to the fact that the children had commenced their school careers at different ages. Of the total, only 165 pupils were not over-age for their classes. The parents of the vast majority of the remainder attributed the delay in their children's schooling to having to wait for accommodation as shown below.

(footnote 1) continued from previous page)

sample, are higher than the Indian medians for the whole of Natal as shown in Table III, p. 313. Actually, they would have been higher still were it not for the fact that the ages in Table XXI were recorded in March-April of the year of research, whereas, the Natal figures reflect ages in June. Also, whereas, the Natal figures include non-failures and failures (the latter of whom have "accumulated" age through failing one or more times), the present sample was a "pure" one, consisting of non-failures only. All this goes to show that even by Indian standards the pupils used in this project were very markedly "over-age" for their classes.

1) The figures for European pupils have been derived by reducing the June figures given in Table III, p. 313, to correspond to the dates in March -April on which the Indian ages were taken.

TABLE XXIII

REASONS FOR DELAYED ENTRANCE INTO SCHOOL GIVEN BY PARENTS OF 1,528 OVER-AGE PUPILS

Reasons	%
No accommodation	97.382
Lived too far from school	0.262
Illness	0.523
Out of country	0.393
Miscellaneous	1.440

Failing to secure admission into a regular Government or Government-Aided school, parents, in desperation, often sent their children to so-called "private" schools if they were within convenient distance of home. The existence of such schools has already been mentioned in the general introduction. The chairman of the local branch of the Natal Indian Teachers' Society described these schools in the following words in his annual report for 1958: "Most members are aware that there is another type of school (in the district) - that is, the purely private school. If you were to visit these schools, you would be shocked at the conditions under which they are run. I have visited most of them, of which there are 15 in number. The roll varies from 50 in the smaller schools to about 350 in the larger ones. Classes range from class one (sub-standard one) to standard two. The total number of pupils is well over 2,000. One school is accommodated in a large hall which is fairly well furnished, another in a temple yard, the third in a garage, the fourth in a graveyard, while the rest are conducted in backyards, verandahs, disused stables and the open air. Those schools that have benches are fortunate. In most schools the children sit on the floor. Fees charged range from 1s. 6d. to 3s. 0d. (per month), and the salary drawn by the teachers ranges from £3 to £5 a month. One private group which runs a morning and an afternoon school charges an admission fee of one guinea" (Bechoo, 1958).

Of the 1,528 over-age pupils in the present sample of 1,693, no less than 1,006 or 59% had attended a private school before securing admittance to a regular school while 687 or 41% had not. The qualifications of the teachers in these private schools were so pathetically low and the standard of work so deplorably meagre that, on admission to a regular school, children from private schools were, and still are, usually made to start afresh from the first grade. The very existence of these schools, however, and the support they receive from the general public, illustrate one very important point, and that is, that the delay in the schooling of Indian children is not due to apathy and indifference on the part of their parents towards education, for, being denied the facilities of normal schooling for their children, free of fees, they turn in their anxiety to instruction which they know is inferior and are prepared to pay for a primitive type of tuition even though this would certainly mean further denial of the bare necessities of life on which the majority of them miraculously manage to survive.

Socio-economic status, as measured by the Scale, was distributed as follows in the sample:-

TABLE XXIV

SOCIO-ECONOMIC STATUS OF SAMPLE BY SCHOOL STANDARDS

Scale Scores	Standards					Totals	
	2	3	4	5	6		
0	56	47	45	41	26	215)	
1	96	96	80	53	45	370)	Low
2	84	73	72	79	85	393)	
3	59	51	53	61	55	279)	
4	34	40	24	26	28	152)	High
5	48	54	39	76	67	284)	
Totals	377	361	313	336	306	1,693	
Means	2.167	2.285	2.153	2.613	2.703		

When the chi-square test was applied to this distribution after grouping the scale scores into "low" and "high" status categories (for ease of computation), a significant difference between the standards appeared, chi-square being 18.901 with a probability of $< .05$ for 4 degrees of freedom.

More detailed analyses were then carried out to determine just where the differences were sharpest. When standards two, three and four were compared with one another, no significant difference appeared, and this also applied when standards five and six were compared with each other[1]. But when the three lower classes were combined and compared with the two upper, a significant difference was discovered, as follows:-

TABLE XXV

COMPARISON OF STANDARDS FIVE AND SIX WITH STANDARDS TWO, THREE AND FOUR BY SOCIO-ECONOMIC STATUS[2]

Standards	Scale Scores		Totals	Means
	Low (0, 1, 2)	High (3, 4, 5)		
V & VI	329	313	642	2.656
II, III & IV	649	402	1,051	2.204
Totals	978	715	1,693	

Chi-square: 17.598 df: 1 P: $< .05$

How may one account for this finding? The 1957 age-standard table for the whole of Natal (Director of Education (Natal), 1959) suggests that standards four and six are the main school-leaving points for Indian

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1) These groupings were suggested by the mean scale scores of the standards, as shown in Table XXIV.

2) For the formula employed in computing chi-square from 2 x 2 tables with correction for continuity, see footnote on p. 189. This formula is employed throughout the report of Project III whenever 2 x 2 tables are used.

pupils, the total classified Indian school population in 1957 being distributed as follows:-

TABLE XXVI

DISTRIBUTION OF CLASSIFIED INDIAN SCHOOL POPULATION IN NATAL IN 1957 BY STANDARDS

Classes	Numbers	%
Sub-Standard I	14,978	17.23
" " II	13,785	15.86
Standard I	12,903	14.84
" II	11,705	13.47
" III	10,478	12.06
" IV	8,817	10.14
" V	5,945	6.84
" VI	4,364	5.02
" VII	1,695	1.95
" VIII	1,227	1.42
" IX	560	0.64
" X	464	0.53
Totals	86,921	100.00

It will be noticed that there are sudden drops in percentages at the standard four-five and standard six-seven levels, indicating larger-than-normal frequencies in school-leaving at these points. This suggests that in the present sample, the disparity in socio-economic status between standards two, three and four, on the one hand, and standards five and six, on the other, may be due to the fact that at the end of the standard four course more pupils from homes of low socio-economic status left school than from homes of high status. It is quite possible that this trend in school-leaving, whenever there is no compulsion to remain, operates at all levels, from sub-standard one to the university stage, the poorer parents being compelled to withdraw their children from school sooner than the more well-to-do, both because their financial resources could not stand the burden of continued education and because children at work could supplement meagre family incomes. In any case, it is clear that, in the present sample, the

two higher classes were a more select lot than the three lower standards in term of socio-economic status.

(F) RESULTS:-

(a) The Study of Relative Retardation:-

It will be remembered that the first working hypothesis of the present project was that of a group of pupils of the same chronological age but varying in school standard (because of differences in age at school entry), those in the upper grades will achieve higher I.Q.'s as well as higher raw scores in mental and scholastic tests than those in the lower classes, other things equal.

The hypothesis was investigated by the method of partial correlation which has already been described in the account of Project II (p. 242). The question now became: What is the degree of association between scores on mental and scholastic tests and school standard, other factor(s) held constant?

In the study of the relationship between test-intelligence and school standard, it was decided to hold age and socio-economic status constant as the only relevant variables so that first order partials had to be computed. Sex did not enter as all the subjects were boys. Age was controlled by confining each analysis to a particular age group and socio-economic status was held constant statistically.

Two age-groups were studied separately, namely, thirteen- and fourteen-year-olds, each group ranging from standard two to six. In a supplementary analysis, a fifteen-year-old group, ranging from standard three

to six, was also used[1]. Considering that in Natal school children may be admitted at the age of 5 plus years, the only pupils of normal age for their grade were the thirteen-year-olds in standard six. All the other children were retarded in age-grade status in varying degrees by one to six years because of delay in securing admission to school, as shown below:-

TABLE XXVII

DEGREE OF AGE-GRADE RETARDATION OF THREE AGE-GROUPS OF INDIAN PUPILS

	Number of Years by which Retarded		
	13-Year-Olds	14-Year-Olds	15-Year-Olds
Standard Two	4	5	6
Standard Three	3	4	5
Standard Four	2	3	4
Standard Five	1	2	3
Standard Six	Normal	1	2

Since it appeared from Project II that mental and scholastic test scores were negatively correlated with age among Durban Indian school children, great care was taken to match the pupils in the various standards for age before comparing them. Fairly large numbers of subjects were available so that it was possible to carry out exact matching. In each standard, as many pupils below the half-year mark as above it were taken at random from the numbers available. The result was that the mean age of the thirteen-year-olds in each of the standards from two to six was 13.450 years and of the fourteen-year-olds, 14.450 years. A number of the subjects

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1) Vide, horizontal rectangle in Table XIII, p. 373.

available, therefore, had to be eliminated in the process of matching for age.

An additional number had to be excluded as only those students whose chances of passing every grade up to and including standard five without failure were rated either as "very good", "good", or "reasonably fair" were included in the analysis[1].

The result was that, of the 288 thirteen-year-olds and 310 fourteen-year-olds available, the numbers finally selected for study were as follows:-

TABLE XXVIII

DISTRIBUTION BY SCHOOL STANDARD AND AGE OF PUPILS SELECTED FOR THE STUDY OF RELATIVE RETARDATION BY PARTIAL CORRELATION

	Standard						Mean Age (Years) of Each Standard and of All Pupils
	II	III	IV	V	VI	Total	
13-Year-Olds	30	48	52	58	20	208	13.450
14-Year-Olds	16	40	58	60	68	242	14.450

1) The reason for this step is given on pp. 388-389.

(1) Results of Intelligence Tests:-

TABLE XXIX

(i) RELATIONSHIP BETWEEN RAW SCORES IN THE PROGRESSIVE MATRICES AND SCHOOL STANDARD[1]

Thirteen-Year-Olds (N = 208)

	Variables	Zero-Order r's	P	Partial r^{2}	P[3]
1.	Test Scores	r_{12} = +.531	<.01	$r_{12.3}$ = +.512	<.01
2.	School Standard	r_{13} = +.173	>.01		
3.	Socio-Economic Status	r_{23} = +.398	<.01		

Fourteen-Year-Olds (N = 242)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.465	<.01	$r_{12.3}$ = +.449	<.01
2.	School Standard	r_{13} = +.147	>.01		
3.	Socio-Economic Status	r_{23} = +.420	<.01		

It is clear that schooling exercises a decisive influence on performance in the Progressive Matrices Test. The results are consistent for the two age levels studied. Pupils who have received a greater amount of schooling than other children of the same age score progressively higher with increasing increments of education. In the present context, this would mean that children who begin school life early have a decided advantage over those who commence late. That this should appear with such clarity in a test like the Matrices, the contents of which are not directly of a scholastic nature, is remarkable.

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1) Whenever age is uniform, raw scores, rather than percentile ranks or quotients, will be used as none of the intelligence or scholastic tests used have been standardised for Indian children.
2) Vide, Footnote (1), p. 244, Project II, for the formula used to compute first-order partial r's.
3) Vide, Footnote (2), p. 244, Project II, for the method used to determine probability levels.

TABLE XXX

(ii) RELATIONSHIP BETWEEN COMBINED RAW SCORES IN THE NEW SOUTH AFRICAN GROUP TEST AND SCHOOL STANDARD

Thirteen-Year-Olds (N = 208)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.688	< .01	$r_{12.3}$ = +.638	<.01
2.	School Standard	r_{13} = +.351	< .01		
3.	Socio-Economic Status	r_{23} = +.398	< .01		

Fourteen-Year-Olds (N = 242)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.610	< .01	$r_{12.3}$ = +.570	<.01
2.	School Standard	r_{13} = +.261	< .01		
3.	Socio-Economic Status	r_{23} = +.420	< .01		

The table shows that goodness of performance on the full New South African Group Test of intelligence is very closely connected with the amount of schooling the pupil has received, in the present context, with the age at which the child first began to receive formal schooling. The finding is uniform for both age groups studied.

TABLE XXXI

(iii) RELATIONSHIP BETWEEN NON-VERBAL RAW SCORES IN THE NEW SOUTH AFRICAN GROUP TEST AND SCHOOL STANDARD

Thirteen-Year-Olds (N = 208)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.540	< .01	$r_{12.3}$ = +.489	< .01
2.	School Standard	r_{13} = +.271	< .01		
3.	Socio-Economic Status	r_{23} = +.398	< .01		

Fourteen-Year-Olds (N = 242)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.445	< .01	$r_{12.3}$ = +.403	< .01
2.	School Standard	r_{13} = +.206	< .01		
3.	Socio-Economic Status	r_{23} = +.420	< .01		

The conclusion from the table above is that ability to work the non-verbal section of the New South African Group Test is significantly dependent upon the educational level of the subject. Among pupils of the same age, those who have begun schooling earlier come off significantly better than those whose schooling has been delayed. Surprisingly, the coefficients of correlation between the South African Group Test non-verbal scores and school standard in the table above are smaller than those between Matrices scores and school standard in Table XXIX at both age levels and for the same samples. One would have expected the reverse to be the case as the non-verbal section of the New South African Group Test contains a Numbers sub-test which would seem to depend heavily upon school knowledge for successful performance.

TABLE XXXII

(iv) RELATIONSHIP BETWEEN VERBAL RAW SCORES IN THE NEW SOUTH AFRICAN GROUP TEST AND SCHOOL STANDARD

Thirteen-Year-Olds (N = 208)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.719	<.01	$r_{12.3}$ = +.679	<.01
2.	School Standard	r_{13} = +.329	<.01		
3.	Socio-Economic Status	r_{23} = +.398	<.01		

Fourteen-Year-Olds (N = 242)

	Variables	Zero-Order r's	P	Partial r	P
1.	Test Scores	r_{12} = +.619	<.01	$r_{12.3}$ = +.579	<.01
2.	School Standard	r_{13} = +.268	<.01		
3.	Socio-Economic Status	r_{23} = +.420	<.01		

This table brings out the influence of schooling or of age of entry into school (in the present study) on intelligence test performance most strikingly. The coefficients of correlation (for the same samples) between performance and school standard are the largest of all those obtained so far. It is clear that verbal tests of intelligence are much more susceptible to school influences than non-verbal tests. Thirteen- and fourteen-year-olds in standard two are severely retarded in such tests as compared with their age peers who are in higher grades by virtue of having begun formal schooling at earlier age.

Socio-Economic Status and Test-Intelligence:-

It will be noticed from the preceding tables that the relationship between intelligence test scores and socio-economic status is statis-

tically significant at the .01 level in the case of all three sets of scores in the New South African Group Test for both age groups. In the case of the Matrices scores, the relationship, though not significant at the .01 level, is so at the .05 level of confidence with both age groups.

The relationship between test scores and socio-economic status in the present context was, however, found to be adventitious. Socio-economic status attains its apparent importance only through its positive association with school standard which has come out as the primary determinant of test scores. The coefficients of correlation between school standard and economic status were +.398 and +.420, respectively, for the two age-groups (Table XXIX, p. 437), both coefficients being significant at the .01 level.

How is it that school standard comes to be positively associated with economic status? In the account of Project II, it was shown by means of Tables XLVIII (p. 219) and XLIX (p. 219) that parents of higher status succeeded in securing school places for their children at an earlier age than those lower in status. This was confirmed for the whole sample used in Project III (Table XIV, p. 387) although exceptions were numerous. Exactly the same situation holds for the thirteen- and fourteen-year-old sub-samples in the present study of relative retardation.

TABLE XXXIII

DISTRIBUTION BY SOCIO-ECONOMIC STATUS AND SCHOOL STANDARD OF THIRTEEN-YEAR-OLDS

School Grade	Socio-Economic Status		Totals	%
	Low (0, 1, 2)	High (3, 4, 5)		
VI	7 (35%)	13 (65%)	20	100
V	21 (36%)	37 (64%)	58	100
IV	36 (69%)	16 (31%)	52	100
III	34 (71%)	14 (29%)	48	100
II	23 (77%)	7 (23%)	30	100
Totals	121	87	208	

Chi-square: 28.030 df: 4 P: <.05

It is clear from the table above that the thirteen-year-old group in standard six who entered school four years earlier than the thirteen-year-old group in standard two contained a significantly higher proportion of children from homes of high socio-economic status than the latter, and correspondingly for the intermediate grades. The distribution of the fourteen-year-old group was found to be similar.

The "spurious" correlation observed here between test-intelligence and socio-economic status is brought out clearly when school standard is partialled out. Using the figures of the four immediately preceding correlational tables again, one finds that the net potency of socio-economic status as a determinant of intelligence test score falls below the .01 level of significance in every case, as follows:-

TABLE XXXIV

NET CORRELATION BETWEEN SOCIO-ECONOMIC STATUS AND INTELLIGENCE TEST SCORE

Test	13-Year-Olds	P	14-Year-Olds	P
Progressive Matrices	+.041	>.01	-.060	>.01
S.A.G.T.: Combined	+.116	>.01	+.007	>.01
S.A.G.T.: Non-Verbal	+.073	>.01	+.023	>.01
S.A.G.T.: Verbal	+.066	>.01	+.011	>.01

The present analyses throw some light on the relative importance of schooling and socio-economic status in the determination of mental test scores. In the sub-samples studied in this section, socio-economic standing was found to be unrelated significantly to test-intelligence. This result is contrary to established findings. It is perhaps also not consistent with the results obtained in Project II (Table LXXVI, p. 280 and Table LXXVII, p. 282) where a positive association appeared between the scores of standard six pupils in the New South African Group Test and parental occupation although the statistical significance of the association was not investigated.

The discrepancy may be explained by the fact that, whereas the sample of Project II was drawn from a wide area covering the poorest and wealthiest Indian areas in Durban, the sample of Project III came from a specific locality which happened to be one of the poorer Indian areas of Durban[1]. The heterogeneity of the former sample with respect to socio-economic status was sufficiently marked to bring out differences, even though small, in performance in intelligence tests. On the other hand, the relative homogeneity of the present sample (in spite of the fact that

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1) Vide, Table XX, p. 407.

the socio-economic status scale was sensitive enough to spread the subjects out on a scale of 0 to 5) was not conducive to the appearance of significant social status differences in test performance. It would seem that in the present situation the extremely powerful factor of schooling levelled out whatever differential effects socio-economic status might have had on test scores.

It is possible that it is only in a society where opportunities for schooling are unrestricted and in which age-grade status depends primarily on the intellectual, temperamental and motivational factors in the pupils themselves, that test scores would show marked socio-economic status differences. However, where gross inequality of educational opportunities exists in the context of a generally impoverished environment, as with the present Indian sample, the factor of schooling would assume major importance in the intellectual development of children and overwhelm the relatively milder and subtler effects of socio-economic differences.

To summarise: There is clear evidence that, in the scramble for school places, parents on the higher rungs of the economic ladder do succeed in securing admission for their children into schools at an earlier age than parents lower in the scale. On the basis of past researches, the former may be supposed to be superior in mental endowment to the latter, and, presumably, they transmit their intellectual characteristics to their offspring. However, in the sub-sample worked upon, there is no evidence that children from homes of high socio-economic status surpass those from homes of low status in mental tests, to any significant extent. It appears, on the other hand, that, given a random group of children of the same age, it is not so much their social status standing as the amount of schooling they have had or, in the present context, the fact of their earlier or later entrance into school, that (perhaps within limits) determines the goodness of their performance in both non-verbal and verbal tests of in-

telligence. Even a test like the Progressive Matrices which does not involve the skills learned at school directly is very much dependent upon schooling for its successful working.

Effects of Schooling in Terms of Actual Scores in Intelligence Tests:-

In Tables XXIX, XXX, XXXI, and XXXII (pp. 417-420) all the first-order coefficients of partial correlation between intelligence test performance and scholastic status were found to be highly significant consistently. What do these coefficients mean in terms of actual scores? For instance, by how many percentile ranks on the Progressive Matrices and by how many I.Q. points on the New South African Group Test are late school starters retarded in performance for every year of delay in formal schooling? Similarly, how is retardation "spread" over the different standards at different age levels? The figures given below are necessarily in terms of existing European norms as the tests have not been standardised for Indian subjects but this fact does not vitiate the internal comparison that is intended within the Indian group.

In this analysis, the students were distributed as follows:-

TABLE XXXV

DISTRIBUTION OF PUPILS OF THE SAME AGES BUT IN DIFFERENT SCHOOL STANDARDS

School Std.	Thirteen-Year-Olds		Fourteen-Year-Olds		Fifteen-Year-Olds	
	N	Age	N	Age	N	Age
II	41	13.4	22	14.4	-	-
III	53	13.4	47	14.4	24	15.4
IV	63	13.4	70	14.4	54	15.3
V	67	13.4	77	14.5	61	15.5
VI	28	13.5	68	14.5	74	15.5
Totals	252		284		213	

It will be seen that the total number of pupils in the thirteen- and fourteen-year-old groups are higher than those given in Table XXVIII, p. 416. This is due to the fact that all those pupils who had been discarded during the process of matching for age in the correlational analysis were now included. The increase in numbers increases the reliability of the obtained means. The resulting dislocation in age means is not serious as may be seen from the table above.

Socio-economic status was ignored in this analysis as it had been found to be a negligible factor in determining intelligence test scores.

A third group, consisting of 213 fifteen-year-olds, ranging from standard three to six was also included. As there were only 10 such pupils in standard two, they were excluded from the comparison in the interests of reliability of mean scores.

The differences between the mean scores on intelligence tests of the various grades within each of the age groups were not tested for significance as the correlational studies had already indicated highly significant results.

In the comparisons to be made in the tables that follow, the thirteen-year-olds in standard six should be regarded as the criterion group as these are the only pupils shown in the tables, who are of normal age for their grade.

TABLE XXXVI

MEAN SCORES OF PUPILS OF THE SAME AGE BUT IN DIFFERENT SCHOOL STANDARDS IN THE PROGRESSIVE MATRICES TEST[1)]

School Std.	Thirteen-Year-Olds		Fourteen-Year-Olds		Fifteen-Year-Olds	
	Raw Scores	Per. Ranks	Raw Scores	Per. Ranks	Raw Scores	Per. Ranks
II	27	10	27	9	--	--
III	30	16	32	16	28	10
IV	33	22	34	19	34	20
V	37	32	37	25	36	23
VI	40	36	39	33	39	33

It will be seen that within each age group there is a consistent increase in raw scores and percentile ranks with length of schooling. The thirteen-year-old boy in standard six, who entered school four years earlier than his age peer in standard two, has an advantage of 13 points in raw score and 26 ranks in the percentile order. The trend is the same with the other two groups.

1) Conversions from raw scores to percentile ranks was carried out by means of graphs drawn with the help of the norms of thirteen-year-olds, fourteen-year-olds and adults (to cover the fifteen-year-olds) provided by Raven (1938). These graphs were necessary to secure the intermediate percentile points as Raven gives only seven score levels for each age.

TABLE XXXVII

MEAN SCORES OF PUPILS OF THE SAME AGE BUT IN DIFFERENT SCHOOL STANDARDS IN THE NEW SOUTH AFRICAN GROUP TEST

Combined Scores:-

School Std.	Thirteen-Year-Olds		Fourteen-Year-Olds		Fifteen-Year-Olds	
	Raw Scores	I.Q.	Raw Scores	I.Q.	Raw Scores	I.Q.
II	23	70	21	65	--	--
III	25	73	26	70	25	66
IV	29	77	28	72	29	70
V	36	84	34	77	35	74
VI	45	91	40	82	41	79

Non-Verbal Scores:-

School Std.	Thirteen-Year-Olds		Fourteen-Year-Olds		Fifteen-Year-Olds	
	Raw Scores	I.Q.	Raw Scores	I.Q.	Raw Scores	I.Q.
II	13	76	11	70	--	--
III	15	80	15	76	14	71
IV	16	82	16	77	17	75
V	20	88	19	81	21	80
VI	25	94	22	85	23	83

Verbal Scores:-

School Std.	Thirteen-Year-Olds		Fourteen-Year-Olds		Fifteen-Year-Olds	
	Raw Scores	I.Q.	Raw Scores	I.Q.	Raw Scores	I.Q.
II	8	68	9	64	--	--
III	9	69	11	68	10	64
IV	13	76	12	71	13	68
V	16	82	16	76	15	72
VI	21	90	19	82	19	79

The results of the New South African Group Test consistently parallel those obtained with the Progressive Matrices. There are striking differences in the raw scores and I.Q.'s of students of the same age but in different standards. The differences between the extreme groups (standards two and six) among the thirteen-year-olds are 22 points of raw score corresponding to 21 points of I.Q. in the combined test, 12 points of raw score corresponding to 18 points of I.Q. in the non-verbal test, and 13 points of raw score corresponding to 22 points of I.Q. in the verbal test.

As might have been expected, differences between the lowest and highest standards were greater in the verbal than in the non-verbal section in the case of all three age groups. The verbal test is more susceptible to school influences than the non-verbal. The figures are 22 points of I.Q. as against 18, respectively, in the case of the thirteen-year-olds, 18 as against 15 in the case of the fourteen-year-olds, and 15 as against 12 in the case of the (incomplete) group of fifteen-year-olds.

(2) Results of Scholastic Tests:-

The fact that amount of schooling has a definite influence on performance in scholastic tests is so obvious that little need be said about it. The relationship between these two factors was studied with the same group of subjects as was used in the study of the relationship between test-intelligence and school standard[1]. In this analysis, intelligence and socio-economic status were held constant statistically so that second-order coefficients of partial correlation had to be computed[2].

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1) Vide, Table XXVIII, p. 416, for details of sample.
2) Vide, footnote on p. 247 (Project II) for the formula employed to compute second-order partial r's.

It was decided to use scores in the Progressive Matrices rather than performance in the New South African Group Test for control purposes as it is less scholastic in content than even the non-verbal section of the latter which has a numbers sub-test. The results were as follows:-

TABLE XXXVIII

RELATIONSHIP BETWEEN RAW SCORES IN VOCABULARY AND SCHOOL STANDARD

Thirteen-Year-Olds (N = 208)					
Variables 1. Vocabulary Scores 2. School Standard 3. Progressive Matrices Scores 4. Socio-Economic Status					
Zero-Order r's	P	First-Order r's	P	Second-Order r	P
$r_{12} = +.787$	$<.01$	$r_{12.3} = +.704$	$<.01$	$r_{12.34} = +.710$	$<.01$
$r_{13} = +.522$	$<.01$				
$r_{14} = +.206$	$<.01$	$r_{14.3} = +.138$	$>.01$		
$r_{23} = +.531$	$<.01$				
$r_{24} = +.398$	$<.01$	$r_{24.3} = +.366$	$<.01$		
$r_{34} = +.173$	$>.01$				

Fourteen-Year-Olds (N = 242)					
Variables 1. Vocabulary Scores 2. School Standard 3. Progressive Matrices Scores 4. Socio-Economic Status					
Zero-Order r's	P	First-Order r's	P	Second-Order r	P
$r_{12} = +.753$	$<.01$	$r_{12.3} = +.682$	$<.01$	$r_{12.34} = +.640$	$<.01$
$r_{13} = +.490$	$<.01$				
$r_{14} = +.333$	$<.01$	$r_{14.3} = +.303$	$<.01$		
$r_{23} = +.465$	$<.01$				
$r_{24} = +.420$	$<.01$	$r_{24.3} = +.403$	$<.01$		
$r_{34} = +.147$	$>.01$				

TABLE XXXIX

RELATIONSHIP BETWEEN RAW SCORES IN PROBLEM ARITHMETIC AND SCHOOL STANDARD

Thirteen-Year-Olds (N = 208)					
Variables 1. Problem Arithmetic Scores 2. School Standard 3. Progressive Matrices Scores 4. Socio-Economic Status					
Zero-Order r's	P	First-Order r's	P	Second-Order r	P
r_{12} = +.710	<.01	$r_{12.3}$ = +.565	<.01	$r_{12.34}$ = +.555	<.01
r_{13} = +.651	<.01				
r_{14} = +.226	<.01	$r_{14.3}$ = +.151	>.01		
r_{23} = +.531	<.01				
r_{24} = +.398	<.01	$r_{24.3}$ = +.366	<.01		
r_{34} = +.173	>.01				

Fourteen-Year-Olds (N = 242)					
Variables 1. Problem Arithmetic Scores 2. School Standard 3. Progressive Matrices Scores 4. Socio-Economic Status					
Zero-Order r's	P	First-Order r's	P	Second-Order r	P
r_{12} = +.691	<.01	$r_{12.3}$ = +.591	<.01	$r_{12.34}$ = +.532	<.01
r_{13} = +.541	<.01				
r_{14} = +.347	<.01	$r_{14.3}$ = +.321	<.01		
r_{23} = +.465	<.01				
r_{24} = +.420	<.01	$r_{24.3}$ = +.403	<.01		
r_{34} = +.147	>.01				

TABLE XL

RELATIONSHIP BETWEEN RAW SCORES IN MECHANICAL ARITHMETIC AND SCHOOL STANDARD

Thirteen-Year-Olds (N = 208)					
Variables: 1. Mechanical Arithmetic Scores; 2. School Standard; 3. Progressive Matrices Scores; 4. Socio-Economic Status					
Zero-Order r's	P	First-Order r's	P	Second Order r	P
$r_{12} = +.769$	$<.01$	$r_{12.3} = +.667$	$<.01$	$r_{12.34} = +.641$	$<.01$
$r_{13} = +.587$	$<.01$				
$r_{14} = +.298$	$<.01$	$r_{14.3} = +.246$	$<.01$		
$r_{23} = +.531$	$<.01$				
$r_{24} = +.398$	$<.01$	$r_{24.3} = +.366$	$<.01$		
$r_{34} = +.173$	$>.01$				

Fourteen-Year-Olds (N = 242)					
Variables: 1. Mechanical Arithmetic Scores; 2. School Standard; 3. Progressive Matrices Scores; 4. Socio-Economic Status					
Zero-Order r's	P	First-Order r's	P	Second-Order r	P
$r_{12} = +.801$	$<.01$	$r_{12.3} = +.749$	$<.01$	$r_{12.34} = +.726$	$<.01$
$r_{13} = +.461$	$<.01$				
$r_{14} = +.299$	$<.01$	$r_{14.3} = +.263$	$<.01$		
$r_{23} = +.465$	$<.01$				
$r_{24} = +.420$	$<.01$	$r_{24.3} = +.403$	$<.01$		
$r_{34} = +.147$	$>.01$				

The high second-order coefficientsof partial correlation clearly bring out the influence of schooling on performance in vocabulary, problem arithmetic and mechanical arithmetic consistently in the case of both age groups. These results were to be expected but not, perhaps, the finding that performance in problem arithmetic is relatively less affected by schooling than vocabulary or mechanical arithmetic.

Socio-Economic Status and Scholastic Attainment:-

As in the case of intelligence test scores, it was decided to ascertain the influence of socio-economic status on scholastic test scores. For this purpose, intelligence (as measured by the Progressive Matrices Test) and school standard were held constant. The same figures as given in Tables XXXVIII, XXXIX and XL were used in the computations. The results were as follows:-

TABLE XLI

NET RELATIONSHIP BETWEEN SCHOLASTIC TEST SCORES AND SOCIO-ECONOMIC STATUS

Tests	13-Year-Olds	P	14-Year-Olds	P
Vocabulary	-.179	>.01	+.042	>.01
Problem Arithmetic	-.073	>.01	+.112	>.01
Mechanical Arithmetic	+.003	>.01	-.064	>.01

It turned out again, as in the case of mental test scores, that socio-economic status in itself had no significant association with scholastic ability in the sample studied. The probabilities here, too, were that the social status differences among the group studied were not sharp enough to produce effects above and beyond that which schooling brought about. In other words, it seemed that the powerful factor of schooling ironed out the positive effects of socio-economic status, the school, in the present context, being a great equaliser.

Effects of Schooling in Terms of Actual Scores in Scholastic Tests:-

As in the case of intelligence test scores, it was decided to ascertain the actual increments of progress from standard to standard in attainment test performance. The sample represented in Table XXXV (p. 425) was again used. Socio-economic status was ignored once more as it had been found to be a negligible factor in determining scores in the scholastic tests. The differences between the means were also not tested for significance as the correlational studies had already indicated a highly significant association between test performance and school standard. Again, the thirteen-year-olds in standard six should be regarded as the criterion group. The results were as follows:-

TABLE XLII

MEAN SCORES OF PUPILS OF THE SAME AGE BUT IN DIFFERENT SCHOOL STANDARDS

Vocabulary:-

Standard	Thirteen-Year-Olds	Fourteen-Year-Olds	Fifteen-Year-Olds
II	19	20	--
III	26	27	25
IV	34	32	33
V	42	42	42
VI	52	46	47

Table XLII continued next page

TABLE XLII (Continued)

Problem Arithmetic:-

Standard	Thirteen-Year-Olds	Fourteen-Year-Olds	Fifteen-Year-Olds
II	4.073	4.682	-----
III	4.774	5.064	6.083
IV	7.127	6.743	6.333
V	8.985	9.156	9.066
VI	11.607	10.456	10.527

Mechanical Arithmetic:-

Standard	Thirteen-Year-Olds	Fourteen-Year-Olds	Fifteen-Year-Olds
II	2.220	1.909	-----
III	3.698	4.106	3.833
IV	5.841	5.886	5.981
V	6.731	6.675	7.066
VI	9.536	9.559	9.257

The table above brings out clearly the striking differences in scholastic performance between pupils of the same age but in different school standards. The differences between the extreme groups (standards two to six) among the thirteen-year-olds are 32 points of raw score in vocabulary, 8 points in problem arithmetic and 8 points in mechanical arithmetic.

Conclusion:-

The conclusion in respect of the first hypothesis of this study is affirmative, clear-cut and consistent. Among Indian pupils of the same age but varying in school standard, those in the lower grades are seriously

retarded in performance in both non-verbal and verbal mental tests and in scholastic tests as compared with students in the higher grades, other things equal. Within the intelligence limits of the children who comprised the sub-sample of this study, it seems that socio-economic status (with its double implication relating to home environment and inheritance of mental traits) is a minor factor in determining performance level in tests when gross inequalities in opportunity for schooling are operative.

(b) The Study of Relative Educability:-

It will be remembered that the second working hypothesis of the present project was that, of a group of pupils in the same school standard but varying in chronological age (because of differences in age at school entry), the older, presumably more advanced in mental age and experience, will achieve higher raw scores in mental and scholastic tests than the younger pupils, other things equal.

To test this hypothesis, three standards were studied separately, namely, standards two, four and six. As shown in Table XXI (p. 408), the age ranges in the three grades were 8.0 - 16.9, 10.0 - 17.9 and 12.0 - 20.9 years, respectively.

The methodological problems involved in the study of relative educability were not as formidable as those encountered in the study of relative retardation. The only likely disturbing factor was the possibility that the more intelligent children of more intelligent parents might have secured school places at an earlier age than the duller children of duller parents. Such a bias in the sample would favour the younger children since they would be genetically better endowed than the older so that any possible favourable effects of age maturity on educability would be obliterated. As already pointed out, it was hoped that the problem would be overcome by taking the socio-economic status of parents into account.

Table XIV (p. 387) showed that the younger children in all the classes studied were higher in socio-economic standing than the older - evidence that parents higher up in the social status scale found accommodation for their children in schools at an earlier age than those lower in the scale. The analysis of relative retardation showed, however, that the socio-economic factor was not significantly associated with mental and scholastic test scores of pupils of the sub-sample, so that in future statistical computations this variable could have been ignored.

The statistical task in the present study (of relative educability) was to take one school standard at a time and compare the test scores of the students of different ages within that grade. This was done by means of one-way analyses of variance. As mentioned above, differences in socio-economic status could have been ignored but before variance analyses of the scores in the tests were attempted, the precaution was taken of carrying out brief chi-square tests employing 2 x 2 tables in order to confirm that socio-economic status really was an irrelevant factor in determining test scores within each single standard just as it was within each age group in the study of relative retardation.

In drawing up the 2 x 2 tables it was, of course, most important that the students in the low and high socio-economic categories should be equal in age since it was the influence of this factor that was being investigated. In the process of matching the two groups for age, some subjects necessarily had to be eliminated. Selection of subjects was carried out by use of the Powers-Samas Sorter, randomising being resorted to wherever necessary. Matching by this method resulted in the formation of two groups which contrasted in socio-economic standing but whose mean ages (and standard deviations) were identical or almost identical. The dividing line between "low" and "high" test scores in the 2 x 2 tables were chosen in such a way as to give as near equal numbers as possible in the marginal totals.

In the (main) analyses of variance, however, all the students in each age category in the three standards studied were used, no data being "wasted".

The tables immediately below give the results of the chi-square tests and are largely self-explanatory.

TABLE XLIII

DISTRIBUTION BY SOCIO-ECONOMIC STATUS OF TEST SCORES : STANDARD SIX

	Low Social Status	High Social Status
Mean Age (Years):	15.6	15.6
Mean Status Score:	1.440	3.840

(1) Progressive Matrices: Raw Scores

Score	Low Status	High Status	Totals
39 & Above	47	57	104
Up to 38	53	43	96
Totals	100	100	200

Chi-square: 1.623 df: 1 P: >.05

(2) New South African Group Test: Combined I.Q.

Score	Low Status	High Status	Totals
76 & Above	50	55	105
Up to 75	50	45	95
Totals	100	100	200

Chi-square: 0.312 df: 1 P: >.05

(3) Vocabulary: Raw Scores

Score	Low Status	High Status	Totals
48 & Above	55	51	106
Up to 47	45	49	94
Totals	100	100	200

Chi-square: 0.181 df: 1 P: >.05

(4) Problem Arithmetic: Raw Scores

Score	Low Status	High Status	Totals
11 & Above	49	50	99
Up to 10	51	50	101
Totals	100	100	200

Chi-square: 0.000 df: 1 P: >.05

(5) Mechanical Arithmetic: Raw Scores

Score	Low Status	High Status	Totals
10 & Above	38	48	86
Up to 9	62	52	114
Totals	100	100	200

Chi-square: 1.652 df: 1 P: >.05

TABLE XLIV

DISTRIBUTION BY SOCIO-ECONOMIC STATUS OF TEST SCORES : STANDARD FOUR

	Low Social Status	High Social Status
Mean Age (Years):	13.5	13.5
Mean Status Score:	1.233	3.651

(1) Progressive Matrices: Raw Scores

Score	Low Status	High Status	Totals
35 & Above	36	42	78
Up to 34	50	44	94
Totals	86	86	172

Chi-square: 0.586 df: 1 P: > .05

(2) New South African Group Test: Combined I.Q.

Score	Low Status	High Status	Totals
78 & Above	45	43	88
Up to 77	41	43	84
Totals	86	86	172

Chi-square: 0.002 df: 1 P: > .05

(3) Vocabulary: Raw Scores

Score	Low Status	High Status	Totals
34 & Above	42	42	84
Up to 33	44	44	88
Totals	86	86	172

Chi-square: 0.000 df: 1 P: > .05

(4) Problem Arithmetic: Raw Scores

Score	Low Status	High Status	Totals
7 & Above	48	42	90
Up to 6	38	44	82
Totals	86	86	172

Chi-square: 0.583 df: 1 P: > .05

(5) Mechanical Arithmetic: Raw Scores

Score	Low Status	High Status	Totals
6 & Above	46	40	86
Up to 5	40	46	86
Totals	86	86	172

Chi-square: 0.581 df: 1 P: > .05

TABLE XLV

DISTRIBUTION BY SOCIO-ECONOMIC STATUS OF TEST SCORES : STANDARD TWO

	Low Social Status	High Social Status
Mean Age (Years):	11.6	11.6
Mean Status Score:	0.943	3.811

(1) Progressive Matrices: Raw Scores

Score	Low Status	High Status	Totals
25 & Above	51	54	105
Up to 24	55	52	107
Totals	106	106	212

Chi-square: 0.075 df: 1 P: > .05

(2) New South African Group Test: Combined I.Q.

Score	Low Status	High Status	Totals
80 & Above	48	57	105
Up to 79	58	49	107
Totals	106	106	212

Chi-square: 1.208 df: 1 P: > .05

(3) Vocabulary: Raw Scores

Score	Low Status	High Status	Totals
17 & Above	47	57	104
Up to 16	59	49	108
Totals	106	106	212

Chi-square: 1.529 df: 1 P: > .05

(4) Problem Arithmetic: Raw Scores

Score	Low Status	High Status	Totals
40 & Above	49	48	97
Up to 39	57	58	115
Totals	106	106	212

Chi-square: 0.000 df: 1 P: > .05

(5) Mechanical Arithmetic: Raw Scores

Score	Low Status	High Status	Totals
3 & Above	33	37	70
Up to 2	73	69	142
Totals	106	106	212

Chi-square: 0.192 df: 1 P: > .05

It is clear from the tables above that socio-economic status played no significant role in determining test scores within each of the three grades studied. The independence of the two variables held consistently and firmly. With this assurance, it was now possible to compare the scores of the different age groups within each standard without taking social status variations into account. The details of the groups studied are given below.

TABLE XLVI

NATURE OF THE SUB-SAMPLES USED IN THE STUDY OF RELATIVE EDUCABILITY

(1) Standard Six: N = 306

Age Group	N	Age Range (Years)	Mean Age (Years)
(A)	30	12.0 - 13.9	13.4
(B)	68	14.0 - 14.9	14.5
(C)	74	15.0 - 15.9	15.5
(D)	83	16.0 - 16.9	16.4
(E)	51	17.0 - 20.9	17.7

(2) Standard Four: N = 313

Age Group	N	Age Range (Years)	Mean Age (Years)
(A)	35	10.0 - 11.9	11.5
(B)	53	12.0 - 12.9	12.4
(C)	69	13.0 - 13.9	13.4
(D)	78	14.0 - 14.9	14.4
(E)	78	15.0 - 17.9	15.6

(3) Standard Two: N = 377

Age Group	N	Age Range (Years)	Mean Age (Years)
(A)	35	8.0 - 9.9	9.4
(B)	103	10.0 - 10.9	10.5
(C)	85	11.0 - 11.9	11.4
(D)	69	12.0 - 12.9	12.4
(E)	85	13.0 - 16.9	14.1

(4) Standard Five (Supplementary): N = 336

Age Group	N	Age Range (Years)	Mean Age (Years)
(A)	26	11.0 - 12.9	12.4
(B)	82	13.0 - 13.9	13.4
(C)	89	14.0 - 14.9	14.5
(D)	69	15.0 - 15.9	15.4
(E)	70	16.0 - 19.9	16.7

The series of tables below give the results standard by standard and need little comment.

TABLE XLVII

DISTRIBUTION BY AGE OF TEST SCORES WITHIN STANDARD SIX

(1) Progressive Matrices: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
10 - 14	-	-	-	-	1
15 - 19	-	-	2	-	-
20 - 24	-	1	-	1	2
25 - 29	2	6	7	5	3
30 - 34	2	12	7	16	6
35 - 39	9	17	17	23	14
40 - 44	10	16	20	21	14
45 - 49	4	14	17	14	7
50 - 54	2	2	4	3	4
55 - 59	1	-	-	-	-
N:	30	68	74	83	51
Means:	40.667	38.691	39.500	38.747	38.667

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	116	4	29.000	0.558	> .05
Within Age Groups	15,645	301	51.977		
Total	15,761	305			

(2) New South African Group Test: Combined I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	1	1	2
60 - 69	1	2	6	20	25
70 - 79	3	23	32	40	21
80 - 89	9	30	28	14	3
90 - 99	9	11	7	8	-
100 - 109	6	1	-	-	-
110 - 119	2	1	-	-	-
N:	30	68	74	83	51
Means:	91.833	82.882	76.500	75.463	69.402

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	11,826	4	2,956.500	16.619	< .01
Within Age Groups	53,547	301	177.897		
Total	65,373	305			

TABLE XLVII (Continued)

(3) New South African Group Test: Non-Verbal I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	-	1	2
60 - 69	-	2	6	12	12
70 - 79	4	18	23	35	21
80 - 89	7	22	27	25	11
90 - 99	6	20	14	7	5
100 - 109	10	5	4	3	-
110 - 119	1	1	-	-	-
120 - 129	2	-	-	-	-
N:	30	68	74	83	51
Means:	95.500	86.118	82.743	78.596	75.480

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	9,751	4	2,437.750	40.541	<.01
Within Age Groups	18,099	301	60.130		
Total	27,850	305			

(4) New South African Group Test: Verbal I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	2	4	7
60 - 69	1	3	7	19	24
70 - 79	-	24	34	40	15
80 - 89	12	28	24	15	5
90 - 99	10	11	7	5	-
100 - 109	7	2	-	-	-
N:	30	68	74	83	51
Means:	91.833	82.294	78.149	74.259	68.029

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	13,179	4	3,294.750	40.845	<.01
Within Age Groups	24,280	301	80.664		
Total	37,459	305			

TABLE XLVII (Continued)

(5) New South African Group Test: Combined Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
20 - 29	2	6	6	17	13
30 - 39	6	30	25	30	18
40 - 49	12	23	29	21	17
50 - 59	4	4	10	7	2
60 - 69	5	5	4	7	1
70 - 79	1	-	-	1	-
N:	30	68	74	83	51
Means:	46.833	40.382	41.932	39.681	36.657

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	2,158	4	539.500	4.669	<.01
Within Age Groups	34,778	301	115.542		
Total	36,936	305			

(6) New South African Group Test: Non-Verbal Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
5 - 9	-	-	1	4	1
10 - 14	3	11	12	11	11
15 - 19	5	18	14	26	14
20 - 24	7	13	23	16	10
25 - 29	4	19	12	19	10
30 - 34	9	4	8	2	5
35 - 39	1	3	4	5	-
40 - 44	1	-	-	-	-
N:	30	68	74	83	51
Means:	25.000	21.706	21.932	20.675	20.137

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	535	4	133.750	2.648	<.05
Within Age Groups	15,201	301	50.501		
Total	15,736	305			

TABLE XLVII (Continued)

(7) New South African Group Test: Verbal Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
5 - 9	-	-	2	4	5
10 - 14	1	8	10	14	15
15 - 19	11	33	30	33	18
20 - 24	8	18	19	21	10
25 - 29	6	5	10	6	3
30 - 34	4	4	3	3	-
35 - 39	-	-	-	2	-
N:	30	68	74	83	51
Means:	22.167	19.353	19.297	18.687	16.118

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	745	4	186.250	6.024	<.01
Within Age Groups	9,306	301	30.917		
Total	10,051	305			

(8) Vocabulary: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
20 - 29	-	1	1	1	5
30 - 39	4	14	17	15	10
40 - 49	13	33	28	21	16
50 - 59	3	16	23	34	18
60 - 69	8	4	4	12	2
70 - 79	2	-	1	-	-
N:	30	68	74	83	51
Means:	51.500	45.676	46.527	49.440	44.892

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	1,433	4	358.250	3.678	<.01
Within Age Groups	29,317	301	97.399		
Total	30,750	305			

TABLE XLVII (Continued)

(9) Problem Arithmetic: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
4 - 6	2	5	6	6	6
7 - 9	5	20	18	31	19
10 - 12	10	26	30	29	16
13 - 15	9	13	18	16	7
16 - 18	3	4	2	1	3
19 - 21	1	-	-	-	-
N:	30	68	74	83	51
Means:	11.900	10.603	10.676	10.096	9.941

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	91	4	22.750	3.554	<.01
Within Age Groups	1,927	301	6.402		
Total	2,018	305			

(10) Mechanical Arithmetic: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
1 - 3	-	1	-	1	-
4 - 6	3	3	8	5	6
7 - 9	13	30	32	39	23
10 - 12	12	28	29	33	19
13 - 15	2	6	5	4	2
16 - 18	-	-	-	1	1
N:	30	68	74	83	51
Means:	9.300	9.544	9.257	9.337	9.176

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	5	4	1.250	0.224	>.05
Within Age Groups	1,683	301	5.591		
Total	1,688	305			

The table above makes it consistently clear that, at the standard six level, the hypothesis that the older children will, because of their age advantage, do better in intelligence and scholastic tests than the younger does not hold. On the contrary, it is the younger pupils who outstrip the older. Differences between means are significant in 8 of the 10 tests at the .05 or .01 levels of confidence; even in the two cases where the differences were not statistically significant, it was the younger students who fared better.

A remarkable finding is that even in the case of raw scores in the New South African Group Test the younger pupils score significantly higher than the older in both the non-verbal and verbal (and, therefore, in the combined) sections. This result is contrary to all known findings with "normal" populations. If the raw scores are interpreted as indicating mental age, not, of course, in the technical Binet sense, but in the general sense of mental maturity, then the implications of this result would seem to be serious. The point will be taken up later.

Two other matters that may be noted here but which will be reserved for discussion later are that raw Matrices scores show no significant variations with age at this grade level and that both non-verbal and verbal I.Q.'s on the New South African Group Test show a steep decline with age.

TABLE XLVIII

DISTRIBUTION BY AGE OF TEST SCORES WITHIN STANDARD FOUR

(1) Progressive Matrices: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
10 - 14	1	-	-	1	-
15 - 19	2	2	2	3	5
20 - 24	1	7	10	5	9
25 - 29	4	9	11	14	9
30 - 34	7	13	16	17	17
35 - 39	10	11	18	20	21
40 - 44	6	8	7	11	15
45 - 49	4	3	5	6	2
50 - 54	-	-	-	1	-
N:	35	53	69	78	78
Means:	34.571	32.660	32.725	33.731	32.962

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	122	4	30.500	0.502	>.05
Within Age Groups	19,239	308	62.464		
Total	19,451	312			

(2) New South African Group Test: Combined I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	1	1	5
60 - 69	-	2	8	34	33
70 - 79	2	15	41	34	35
80 - 89	12	26	12	8	4
90 - 99	15	8	7	1	1
100 - 109	5	2	-	-	-
110 - 119	1	-	-	-	-
N:	35	53	69	78	78
Means:	91.929	83.179	76.819	71.167	69.756

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	16,476	4	4,119.665	64.665	<.01
Within Age Groups	19,619	308	63.698		
Total	36,095	312			

TABLE XLVIII (Continued)

(3) New South African Group Test: Non-Verbal I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	-	2	7
60 - 69	1	-	7	14	14
70 - 79	1	7	20	35	38
80 - 89	6	26	30	20	15
90 - 99	16	16	8	6	3
100 - 109	8	4	4	1	1
110 - 119	3	-	-	-	-
N:	35	53	69	78	78
Means:	95.357	87.708	81.891	76.679	73.987

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	14,933	4	3,733.25	39.815	<.01
Within Age Groups	28,880	308	93.766		
Total	43,813	312			

(4) New South African Group Test: Verbal I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	-	5	13
60 - 69	-	5	21	37	34
70 - 79	-	15	23	28	28
80 - 89	16	21	21	6	3
90 - 99	14	10	2	2	-
100 - 109	5	2	-	-	-
N:	35	53	69	78	78
Means:	91.357	82.425	75.080	69.756	67.192

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	19,171	4	4,793.750	67.910	<.01
Within Age Groups	21,737	308	70.575		
Total	40,908	312			

TABLE XLVIII (Continued)

(5) Vocabulary: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
0 - 9	-	-	-	1	-
10 - 19	3	2	1	3	4
20 - 29	13	15	23	25	27
30 - 39	13	23	30	39	31
40 - 49	6	13	12	9	15
50 - 59	-	-	3	1	1
N:	35	53	69	78	78
Means:	30.786	33.368	33.486	31.551	32.192

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	282	4	70.500	0.987	> .05
Within Age Groups	22,008	308	71.455		
Total	22,290	312			

(6) Problem Arithmetic: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
1 - 3	3	5	4	10	8
4 - 6	14	20	26	32	33
7 - 9	14	21	30	31	34
10 - 12	4	5	8	3	3
13 - 15	-	2	1	2	-
N:	35	53	69	78	78
Means:	6.629	6.811	6.957	6.269	6.231

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	30	4	7.500	1.217	> .05
Within Age Groups	1,898	308	6.162		
Total	1,928	312			

TABLE XLVIII (Continued)

(7) Mechanical Arithmetic: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
0 - 1	2	1	1	1	2
2 - 3	3	13	7	8	6
4 - 5	16	15	27	23	27
6 - 7	11	20	21	37	31
8 - 9	2	3	12	9	11
10 - 11	1	1	1	-	1
N:	35	53	69	78	78
Means:	5.129	5.028	5.630	6.199	5.679

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	22	4	5.500	1.471	> .05
Within Age Groups	1,152	308	3.740		
Total	1,174	312			

On the whole, the results obtained with standard four follow the same pattern as that obtained with standard six in that the older pupils show no superiority over the younger in any of the tests administered.

In respect of I.Q.'s, the younger children retain their advantage in the combined, non-verbal and verbal sections of the New South African Group Test. A sharp decline in I.Q.'s with increasing age is still evident.

It was not possible to compare all five age groups in standard four with regard to raw scores in the New South African Group Test as the students worked three different levels of the Test, namely, Junior, Intermediate and Senior, depending upon age, but it was possible to compare the age groups which worked only the senior level, with the following results:-

TABLE XLIX

DISTRIBUTION BY AGE OF THE COMBINED RAW SCORES OF STANDARD FOUR PUPILS IN THE SENIOR LEVEL OF THE NEW SOUTH AFRICAN GROUP TEST

Scores	Age (Years)			
	13.0 - 13.9	14.0 - 14.9	15.0 - 15.9	16.0 & Above
10 - 14	2	1	2	-
15 - 19	4	7	4	3
20 - 24	9	23	12	5
25 - 29	23	17	13	4
30 - 34	16	15	12	4
35 - 39	5	10	7	3
40 - 44	6	3	4	1
45 - 49	2	1	1	2
50 - 54	-	-	-	-
55 - 59	1	1	1	-
N (223):	67	78	56	22
Means:	29.164	27.897	28.964	29.273

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	76	3	25.333	0.383	> .05
Within Age Groups	14,468	219	66.064		
Total	14,544	222			

It will be seen that in terms of combined raw scores in the New South African Group Test, the age groups which worked the senior level did not differ among themselves in mean scores. In view of this, comparisons based on non-verbal and verbal raw scores were not attempted. It will be noted that while the older pupils did not show any superiority over the younger, they did not, at the same time, exhibit any inferiority as they did at the standard six level.

In the three attainment tests also there was more or less parity among all the five age groups, though, as may be observed from the means, the older children appear to have a slight advantage (although not signi-

ficantly so) over the younger in vocabulary and mechanical arithmetic. It will be remembered that, at the standard six level, the younger students actually surpassed the older to a significant extent in vocabulary and problem arithmetic.

Mean scores in the Progressive Matrices again showed no significant age differences.

TABLE L

DISTRIBUTION BY AGE OF TEST SCORES WITHIN STANDARD TWO

(1) Progressive Matrices: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
5 - 9	-	-	1	1	1
10 - 14	2	9	5	2	2
15 - 19	5	10	6	4	12
20 - 24	4	36	24	28	17
25 - 29	10	24	16	12	19
30 - 34	10	15	22	7	18
35 - 39	3	6	9	10	12
40 - 44	1	3	-	4	4
45 - 49	-	-	2	1	-
N:	35	103	85	69	85
Means:	26.857	24.718	26.035	26.783	27.176

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	341	4	85.250	1.327	> .05
Within Age Groups	23,904	372	64.258		
Total	24,245	376			

TABLE L (Continued)

(2) New South African Group Test: Combined I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
50 - 59	-	-	-	2	16
60 - 69	-	2	5	16	43
70 - 79	2	22	38	38	21
80 - 89	8	43	34	12	5
90 - 99	10	28	7	1	-
100 - 109	13	8	1	-	-
110 - 119	2	-	-	-	-
N:	35	103	85	69	85
Means:	95.929	86.248	79.912	73.630	66.265

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	31,302	4	7,825.500	110.026	<.01
Within Age Groups	26,458	372	71.124		
Total	57,760	376			

(3) New South African Group Test: Non-Verbal I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
40 - 49	-	-	-	-	1
50 - 59	-	-	-	1	5
60 - 69	-	-	1	3	30
70 - 79	1	7	21	31	30
80 - 89	4	36	38	25	17
90 - 99	13	43	20	7	2
100 - 109	11	14	4	2	-
110 - 119	6	3	1	-	-
N:	35	103	85	69	85
Means:	99.357	91.587	85.441	80.297	71.912

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	27,629	4	6,907.250	80.226	<.01
Within Age Groups	32,028	372	86.097		
Total	59,657	376			

TABLE L (Continued)

(4) New South African Group Test: Verbal I.Q.'s

Scores	(A)	(B)	(C)	(D)	(E)
40 - 49	-	-	-	-	2
50 - 59	-	2	1	1	19
60 - 69	-	6	18	29	43
70 - 79	4	30	32	32	18
80 - 89	13	41	33	7	2
90 - 99	10	18	1	-	-
100 - 109	8	6	-	-	1
N:	35	103	85	69	85
Means:	90.786	82.752	76.265	71.022	64.853

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	24,610	4	6,152.500	77.118	<.01
Within Age Groups	29,678	372	79.780		
Total	54,288	376			

(5) Vocabulary: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
0 - 4	-	1	-	-	2
5 - 9	5	11	7	5	8
10 - 14	10	34	16	18	15
15 - 19	7	24	26	23	27
20 - 24	8	16	19	13	12
25 - 29	2	12	16	7	14
30 - 34	3	3	1	3	6
35 - 39	-	2	-	-	1
N:	35	103	85	69	85
Means:	17.143	16.544	18.412	17.580	18.471

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	241	4	60.250	1.176	>.05
Within Age Groups	19,060	372	51.237		
Total	19,301	376			

TABLE L (Continued)

(6) Problem Arithmetic: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
0	4	7	5	1	4
1	6	16	5	10	5
2	8	19	12	9	9
3	7	20	22	10	19
4	4	20	15	15	15
5	2	11	15	15	14
6	2	9	6	4	8
7	2	-	4	-	6
8	-	-	1	5	3
9	-	-	-	-	1
10	-	-	-	-	1
11	-	1	-	-	-
N:	35	103	85	69	85
Means:	2.714	3.049	3.553	3.725	4.035

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	70	4	17.500	4.711	<.01
Within Age Groups	1,382	372	3.715		
Total	1,452	376			

(7) Mechanical Arithmetic: Raw Scores

Scores	(A)	(B)	(C)	(D)	(E)
0	14	21	17	9	12
1	5	26	13	14	20
2	8	23	22	18	24
3	6	16	19	13	13
4	-	15	10	13	11
5	2	2	4	1	5
6	-	-	-	1	-
N:	35	103	85	69	85
Means:	1.400	1.845	2.047	2.203	2.071

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	18	4	4.500	2.211	>.05
Within Age Groups	757	372	2.035		
Total	775	376			

Standard two presents a somewhat more equivocal picture than did standards six and four. As far as the intelligence tests are concerned, mean scores in the Matrices Test followed the usual pattern, the older not showing off to advantage as hypothesized. In combined, non-verbal and verbal I.Q.'s on the New South African Group Test, the older pupils were again severely handicapped as compared with the younger. I.Q.'s once more showed a steep decline with increasing age.

As in the case of standard four, it was not possible to compare the performances of all five groups on the basis of raw scores in the New South African Group Test, for all three levels of the test were worked by the pupils. However, a sufficient number of children worked the intermediate version of the test to make possible a comparison of three age groups as shown below.

TABLE LI

DISTRIBUTION BY AGE OF THE COMBINED RAW SCORES OF STANDARD TWO PUPILS IN THE INTERMEDIATE LEVEL OF THE NEW SOUTH AFRICAN GROUP TEST

Scores	Age (Years)		
	10.0 - 10.9	11.0 - 11.9	12.0 - 12.9
10 - 19	6	3	4
20 - 29	33	26	16
30 - 39	35	27	27
40 - 49	20	23	13
50 - 59	6	4	7
60 - 69	1	1	1
N (253):	101	84	68
Means:	33.509	34.738	35.382

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	157	2	78.500	0.711	>.05
Within Age Groups	27,614	250	110.456		
Total	27,771	252			

It will be seen that the older students do not surpass the younger at a statistically significant level but the means indicate a tendency on their part to perform somewhat better. It was unfortunate that the other two, extreme groups ranging in age from 8.0 to 9.9 and 13.0 to 16.9 years could not be used in the table as their inclusion might have clarified the situation. Comparisons using non-verbal and verbal raw scores were not attempted as the combined scores did not show significant differences between the groups.

In the attainment tests, the older pupils, for the first time, surpassed the younger in problem arithmetic, the difference being statistically significant. The tendency in mechanical arithmetic was similar, the F-ratio approaching the .05 level of confidence. In vocabulary also, the older children fared better than the younger, though not significantly so.

Summary:-

TABLE LII

COMPARATIVE SUMMARY OF TEST PERFORMANCES OF YOUNGER AND OLDER PUPILS

	Test/Score	Group Favoured	Significance Level
Standard Six	Progressive Matrices	Neither	----
	Combined I.Q.	Younger	.01
	Non-Verbal I.Q.	Younger	.01
	Verbal I.Q.	Younger	.01
	Combined Raw Score	Younger	.01
	Non-Verbal Raw Score	Younger	.05
	Verbal Raw Score	Younger	.01
	Vocabulary	Younger	.01
	Problem Arithmetic	Younger	.01
	Mechanical Arithmetic	Neither	----
Standard Four	Progressive Matrices	Neither	----
	Combined I.Q.	Younger	.01
	Non-Verbal I.Q.	Younger	.01
	Verbal I.Q.	Younger	.01
	Combined Raw Score	Neither	----
	Vocabulary	Neither	----
	Problem Arithmetic	Neither	----
	Mechanical Arithmetic	Neither	----

(Table LII continued next page)

TABLE LII (Continued)

	Test/Score	Group Favoured	Significance Level
Standard Two	Progressive Matrices	Neither	----
	Combined I.Q.	Younger	.01
	Non-Verbal I.Q.	Younger	.01
	Verbal I.Q.	Younger	.01
	Combined Raw Score	Neither	----
	Vocabulary	Neither	----
	Problem Arithmetic	Older	.01
	Mechanical Arithmetic	Neither	----

Thus the second hypothesis of the study that the older pupils in a class, because of their greater age and experience, would surpass the younger in tests of intelligence and school subjects has been negatived completely at the standard six and four levels and almost completely at the standard two level.

(c) The Study of Relative Progress:-

It will be remembered that the study of relative progress was formulated as a corollary to the study of relative educability and was stated as follows: Given a group of late- (older children) and a group of early-starters (younger children) in standard two, the older, by virtue of their advantage in chronological and, presumably, mental age, will show greater progress from grade to grade and finish at standard six at a significantly higher level of mental and scholastic attainment than the younger, other things equal.

The study of relative educability has already proved that the older students enjoy no advantage over the younger in scholastic work at the three grade levels studied except in problem arithmetic in standard two. Nor do they show a higher order of mental maturity, as reflected by

raw scores in intelligence tests, when compared with the younger children, in spite of their age advantage.

These findings were perhaps sufficient to provide the answer to the third hypothesis - in the negative. It was thought, however, that a more detailed study of this aspect might reveal new facts and/or confirm the results of previous analyses. In any case, it would serve to give completion to the present project.

In this study, three groups of standard two pupils differing in age (because of varying ages at school entry) were selected. The progress of each age group from grade to grade up to and including standard six was then studied separately, different pupils being involved in the different grades. The test performance of a particular age group in standard two was compared with the performance of an age group in standard three which was a year older, the performance of the latter with that of an age group in standard four which was a year older than the standard three group, and so on[1].

The mean age of the youngest group of standard two pupils selected for study was 9.4 years, of a middle group, 11.4 years, and of the oldest group, 13.4 years. Of these, the first group alone was normal in age-grade status, this normality being retained from standard two to standard six, the age range through all five grades being 9.0 to 13.9 years. The middle group entered school two years later, their age range through the five grades being 11.0 to 15.9 years. The third group was delayed by no less than four years so that their age ranged from 13.0 to 17.9 years. The three groups were labelled A, B and C, respectively.

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1) The dimension of comparison is indicated by the diagonal rectangles in Table XIII, p. 373.

In this analysis, as in the study of relative retardation, only those students whose chances of passing every grade up to and including standard five were rated either as "very good", "good", or "reasonably fair", were included[1].

Although the two previous analyses had indicated that the socio-economic status of the pupils had no significant effect on their test scores, it was decided to keep this factor in check as far as possible. It was not found necessary to make any adjustments for this factor in the case of the youngest and oldest groups, for chi-square tests revealed no significant differences in social status within each of these two groups from standard to standard. In the case of the intermediate group, however, it was found that standards five and six were somewhat "overloaded" with pupils of high status as compared with the lower grades. Some students from these standards were, therefore, eliminated (at random) so that the five grades were more or less evenly matched in this respect.

The sub-sample of this analysis was constituted as follows:-

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1) Elimination of potential failures was at first not considered to be really necessary as mentioned on p. 378. It was felt that since all three progress groups would contain such pupils, they would be equally affected and results would not be distorted. There was, however, the possibility that the potential failure rate would be different for the three age-groups. Also, since the lower standards would contain larger numbers of potential failures than the upper, mean test scores of the lower grades might be unduly depressed relative to those of the higher standards so that progress scores would be exaggerated. For these reasons, it was decided to observe caution and exclude the potential failures at the start.

TABLE LIII

COMPOSITION OF "PROGRESS" GROUPS

School Std.	Group A (9.0 - 13.9 Years)		Group B (11.0 - 15.9 Years)		Group C (13.0 - 17.9 Years)	
	N	Mean Age (Yrs)	N	Mean Age (Yrs)	N	Mean Age (Yrs)
II	22	9.4	73	11.4	41	13.4
III	28	10.4	79	12.5	47	14.3
IV	33	11.4	63	13.4	54	15.3
V	21	12.4	62	14.5	45	16.3
VI	28	13.5	64	15.5	35	17.3

TABLE LIV

DISTRIBUTION BY SOCIO-ECONOMIC STATUS OF PUPILS IN "PROGRESS" GROUPS

GROUP A

Status Level	Standards					Totals
	II	III	IV	V	VI	
High (3, 4, 5)	15	16	21	12	18	82
Low (0, 1, 2)	7	12	12	9	10	50
Totals	22	28	33	21	28	132

Chi-square: 0.825 df: 4 P: $> .05$

GROUP B

Status Level	Standards					Totals
	II	III	IV	V	VI	
High (3, 4, 5)	25	34	19	25	25	128
Low (0, 1, 2)	48	45	44	37	39	213
Totals	73	79	63	62	64	341

Chi-square: 3.120 df: 4 P: $> .05$

TABLE LIV (Continued)

GROUP C

Status Level	Standards					Totals
	II	III	IV	V	VI	
High (3, 4, 5)	11	9	15	17	10	62
Low (0, 1, 2)	30	38	39	28	25	160
Totals	41	47	54	45	35	222

Chi-square: 3.433 df: 4 P: > .05

The tables below indicate the scores achieved by the three groups from standard to standard.

TABLE LV

MEAN SCORES BY STANDARD OF "PROGRESS" GROUPS

(1) Progressive Matrices: Raw Scores

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	26.545	27.027	26.805
III	32.321	28.886	31.936
IV	34.819	33.238	34.000
V	35.571	36.984	35.667
VI	40.036	39.734	39.029
Points Gained	13.491	12.707	12.224

(2) Vocabulary: Raw Scores

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	18.819	18.438	19.073
III	24.857	26.367	27.000
IV	31.697	34.302	32.833
V	45.571	40.871	40.222
VI	52.000	46.609	45.286
Points Gained	33.181	28.171	26.213

TABLE LV (Continued)

(3) Problem Arithmetic: Raw Scores

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	2.818	3.699	4.073
III	5.250	5.063	5.064
IV	6.848	7.127	6.333
V	8.857	8.952	8.622
VI	11.607	10.625	10.200
Points Gained	8.789	6.926	6.127

(4) Mechanical Arithmetic: Raw Scores

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	1.364	2.000	2.200
III	3.143	3.949	4.106
IV	5.091	5.841	5.981
V	6.524	6.726	6.622
VI	9.536	9.313	8.971
Points Gained	8.172	7.313	6.751

It will be noted from the table above that in the Progressive Matrices Test all three groups start at the same point in standard two and finish at about the same level in standard six. This corresponds with the findings in the study of relative educability where no significant differences between the scores of the younger and older pupils appeared in any of the standards studied, on the Matrices Test[1)].

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1) This footnote appears on the next page.

In vocabulary, the younger and older pupils start at more or less the same point, but the younger show more progress and finish at a level much higher than the older. It will be remembered that the study of relative educability showed that the younger and older pupils differed significantly in mean vocabulary scores at the standard six level but not at the standard two and four levels. The present analysis confirms those results.

In problem arithmetic, the older students in standard two have a lead over the younger but they are outstripped by the time standard six is reached. The younger again show greater progress. These results corroborate the findings during the study of relative educability where it was seen that, in problem arithmetic, the older were significantly superior to the younger at the standard two level but that positions were reversed in standard six, there being relative parity at standard four.

Progress of the three groups in mechanical arithmetic parallels that in problem arithmetic, the younger being somewhat behind the older at the standard two stage but ahead in standard six, with equality in standard four. The study of relative educability showed, however, that the differences were not significant at any grade level.

The results of this study of relative progress are remarkably consistent. Progress is greatest for the youngest group (the early school-starters) and least for the oldest (the late school-starters), the middle group maintaining its intermediate position throughout. Even in the Progressive Matrices, where the study of relative educability showed no signi-

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Footnote 1) from previous page:

1) It is to be noted that the sub-samples used in the studies of relative educability and relative progress were somewhat different, for, while in the former, all the pupils in standards two, four and six were used, in the latter, only those whose chances of passing all grades up to and including standard five were employed. Further, in the study of relative progress, standards three and five were included.

ficant differences between the younger and older, the younger were and are now seen to be a shade behind the older in standard two but ahead by the time the standard six level is attained.

It was not possible in the present analysis to compare the raw scores of the progress groups in the New South African Group Test as the pupils worked all three levels of the test - Junior, Intermediate and Senior - according to age, but it was possible to compare I.Q.'s. Of course, one would not look for progress here since I.Q.'s of groups remain constant although the occurrence of wide fluctuations in individual cases is recognised (e.g., Honzik, 1948; Hilden, 1949; and Bayley, 1949 and 1955). Nevertheless, it was thought that it would be informative to follow the fate of the three progress groups from standard two to standard six in terms of I.Q.'s, with the following results:-

TABLE LVI

MEAN I.Q.'S OF "PROGRESS" GROUPS

(1) New South African Group Test: Combined I.Q.'s

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	95.409	80.904	69.927
III	93.607	79.025	69.979
IV	92.758	76.921	70.148
V	90.333	77.000	69.111
VI	90.643	78.484	70.286

(Table LVI continued next page)

TABLE LVI (Continued)

(2) New South African Group Test: Non-Verbal I.Q.'s

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	99.500	86.589	76.146
III	98.786	83.582	76.043
IV	94.879	82.000	75.148
V	92.476	81.113	73.556
VI	94.143	82.156	76.000

(3) New South African Group Test: Verbal I.Q.'s

Standard	Group A (9.0-13.9 Yrs)	Group B (11.0-15.9 Yrs)	Group C (13.0-17.9 Yrs)
II	90.409	76.932	67.610
III	90.036	76.304	68.064
IV	91.394	76.048	67.741
V	89.619	75.871	68.777
VI	90.036	78.484	69.286

In the table above, the separate non-verbal and verbal I.Q.'s are more informative than the composite I.Q.'s.

It will be seen that in the case of non-verbal I.Q.'s, Group C shows the greatest stability. The differences between the extremes of each of the three groups are (in round figures) 0 in the case of the oldest group, 5 points for the intermediate, and 6 for the youngest, the last two groups actually showing a decline at the standard six level as compared with scores at standard two. It may be noted, in passing, that

the normal group (a) attains the European mean in non-verbal I.Q. at the standard two level.

In the case of verbal I.Q.'s, the differences between the extremes are 1 point of I.Q. for the oldest and 1 point for the intermediate, both being gains at the standard six stage. The youngest group showed no noticeable difference in performance at the standard two and six levels.

Reference to these findings will be made in the general discussion that follows.

(G) DISCUSSION:

Like the first two projects, the third - an investigation into the performance of Indian children in intelligence and scholastic tests in relation to delayed entrance into school - had both practical and theoretical relevance.

The practical implication stemmed from the fact that there were, at the time of the field work, many Indian children in Natal, 5 plus years or more in age, who were not at school because the provincial administration which is responsible for primary education had failed to provide sufficient school buildings to accommodate them all. While it is obvious to any thinking person that educational deprivation of this kind must adversely influence not only the vocational future of the children affected but their whole personality[1)] as well, it was necessary that a research at a technical level should be conducted to determine, as precisely as possible, just what the implications of delayed schooling are in terms of intellec-

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1) The relationship between personality traits and intelligence has been demonstrated, for example, by Cattell (1945) and Hartshorne and May (1953).

tual and scholastic development. Everyone suspects that retardation of some sort occurs in children to whom congested schools bar their doors but there has been no objective evidence to date of the directions and extent of such retardation. Nor has it been possible to say with any conviction whether delay in starting school can be compensated for later by a system of expedited tuition. It was believed, therefore, that the results of the present project would be of some practical value not only in regard to Indians but also in the case of Africans who are faced with a similar problem.

On the theoretical side, the Durban Indian school situation provided a unique opportunity for a study of the effects of schooling upon intelligence and scholastic test scores. This obviously is just one aspect, though, in modern society, perhaps the most important aspect, of the more general problem of the influence of nurture on intellectual development.

The nature versus nurture controversy has had widespread repercussions in the field of inter-racial testing of intelligence, some investigators stressing that the former is of relatively greater importance, others the latter, in the determination of intellectual capacity.

The United States has abounded in researches of this type. Shuey (1958) is among the most recent contributors to this problem. After surveying in detail the work done in the field of Negro intelligence over a period of 44 years and evaluating about 240 studies in which 60 different tests were used with children and adults from all sections of the United States, she concludes that there exist "some native differences between Negroes and whites as determined by intelligence tests". Garrett (1958) sets the seal of his authority on this conclusion. He writes: "Dr. Shuey concludes that the regularity and consistency of the results strongly im-

ply a racial bias for these differences. I believe that the weight of evidence supports her conclusion".

Biesheuvel's critique of inter-racial studies of intelligence has already been detailed in the review of the literature on the subject. Klineberg (1935, 1940 and 1951) holds a similar view. After surveying the evidence against racial differences in intelligence, he concludes: "The net result of all this research that has been conducted in this field is to the effect that innate racial differences in intelligence have not been demonstrated; that the obtained differences in test results are best explained in terms of the social and educational environment; that as the environmental opportunities of different racial or ethnic groups become more alike, the observed differences in test results also tend to disappear. The evidence is overwhelmingly against the view that race is a factor which determines level of intelligence" (Klineberg, 1951).

It is usually forgotten, as by Shuey, that it is not the quantity of evidence of white superiority that is under fire but its quality and that a mere accumulation of the results of researches that are methodologically defective can never succeed in establishing their validity, a point made by Yoder in his review of the literature on racial differences as far back as 1928. And in the same year, Rigg wrote: "The day is past when the psychologist can calmly sit down with a stack of Stanford-Binet blanks, determine the median IQ's for a few children of native American, German, Jewish, and Italian descent, and proceed without delay to announce to the world the relative intelligence levels of the nationalities represented". Obviously, not every investigator has taken the errors of the past to heart[1]).

Footnote 1) appears on the next page.

Racialistic explanations of differences in intelligence-test performance of whites and non-whites in South Africa have not been wanting. The present Indian study throws some light on the matter by showing the great influence that a single environmental factor, namely, schooling, can exert on intelligence-test performance within a single ethnic group, let alone others such as socio-economic conditions, cultural differences, linguistic handicaps, nutritional factors, etc.

The problem was approached from three directions, namely, relative retardation, relative educability and relative progress of early and late school-starters. All three studies have revealed in clear-cut terms that children who begin schooling later than the normal school-going age of 5 plus years enjoy no intellectual or scholastic advantage over the early-starters by virtue of their age maturity and greater experience. On the contrary, the evidence is that it is the early-starters who benefit more from schooling and that actual damage is being done to the mental development of the late-starters by the non-provision of school facilities.

In the study of relative retardation, where the performance of children of the same age but in different school standards (from two to six) was studied, it was found that the net coefficients of correlation between raw intelligence-test scores and school grade (or number of years of schooling) ranged from .403 to .679. The corresponding range in the case of scores in attainment tests was .532 to .726. Considering the fairly large numbers of subjects involved in these analyses and the fact that all the coefficients were statistically significant well beyond the

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Footnote 1) from previous page.

1) Krech and Crutchfield (1948) point out that every study purporting to prove a racial basis for difference in intelligence is vulnerable on some point or other. The general feeling in this matter to-day is indicated by Freedman, Hawley, et al (1952) who say: "No important biologists or social scientists subscribe to this theory (racialistic superiority of Caucasoids over Mongoloids and Negroids in innate intelligence) at present, but it has a place in American folklore and is accepted by many laymen".

.01 level of confidence, the findings must be regarded as clear evidence of the intellectual and scholastic benefits that early schooling provides.

The question was investigated as to how great, in terms of actual scores, was the retardation suffered by those pupils whose schooling was delayed as compared with those who had suffered no deprivation. Considering the (normal) thirteen-year-old group as the criterion, the losses sustained by children who began school life four years late were as follows:-

Progressive Matrices:-

13 points of raw score, corresponding to a percentile rank difference of 26.

New South African Group Test, Combined:-

22 points of raw score, corresponding to 21 points of I.Q.

New South African Group Test, Non-Verbal:-

12 points of raw score, corresponding to 18 points of I.Q.

New South African Group Test, Verbal:-

13 points of raw score, corresponding to 22 points of I.Q.

Vocabulary:-

33 points of raw score.

Problem Arithmetic:-

8 points of raw score.

Mechanical Arithmetic:-

8 points of raw score.

Correspondingly smaller losses were recorded by students whose schooling had been delayed by 3 years, 2 years and 1 year.

As pointed out previously, the large difference between the normal and the seriously delayed groups in the Progressive Matrices is somewhat surprising, for the content of the test is not directly of a scholas-

tic nature. The implication is that the test involves thought processes that are susceptible to development by the stimulation provided by the school.

The difference between the two groups is greater in the verbal than in the non-verbal section of the New South African Group Test. This is understandable. As has already been shown (Project II, Table LV p. 228), performance in the verbal test becomes worse relative to the non-verbal test as one goes downwards from standard six to two, that is to say, with decreasing mastery of English. But this does not apply to the non-verbal part of the test which shows an average loss of no less than 5 points of I.Q. for every year of delay in schooling.

While, in the study of retardation, the effect of school standard was the main variable studied, in the investigation of educability, the influence of age was the centre of interest. The question here was whether delayed schooling, like the proverbial cloud, might not have its silver lining - might not the child who entered school at a more mature chronological age and who might, therefore, be expected to be higher in mental age than a chronologically less mature child find school work a lighter burden and surpass the latter in test performance?

The results showed that in the standards investigated, namely, two, four and six, the answer was almost completely negative; in fact, it was the reverse of what was hypothesized, the younger pupils actually faring better than the older.

In all three grades, the younger surpassed the older in terms of I.Q. on the New South African Group Test, their superiority being consistent throughout the non-verbal, verbal and combined series. In short,

there was a steep decline in I.Q. with increase in chronological age[1] among children within the same school standard. In the table below, the data presented separately in previous tables are brought together to show this phenomenon.

TABLE LVII

MEAN NEW SOUTH AFRICAN GROUP TEST I.Q.'S WITHIN STANDARDS BY AGE

	Mean Age (Yrs)	Combined I.Q.	Non-Verbal I.Q.	Verbal I.Q.
Standard Six		P: <.01	P: <.01	P: <.01
	13.4	91.833	95.500	91.833
	14.5	82.882	86.118	82.294
	15.5	76.500	82.743	78.149
	16.4	75.463	78.596	74.259
	17.7	69.402	75.480	68.029
Standard Four		P: <.01	P: <.01	P: <.01
	11.5	91.929	95.357	91.357
	12.4	83.179	87.708	82.425
	13.4	76.819	81.891	75.080
	14.4	71.167	76.679	69.756
	15.6	69.756	73.987	67.192
Standard Two		P: <.01	P: <.01	P: <.01
	9.4	95.929	99.357	90.786
	10.5	86.248	91.587	82.752
	11.4	79.912	85.441	76.265
	12.4	73.630	80.297	71.022
	14.1	66.265	71.912	64.853

As pointed out in the review of studies, a decline in I.Q. with increasing age has been found in previous researches with isolated or backward groups both overseas and in South Africa. In trying to explain

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1) A similar decline in I.Q. was noted in Project II (Table LXXV, p. 278) but only standard six pupils had been involved. The present account covers standards two and four as well.

the decline, investigators supposed that whereas a restricted environment could adequately satisfy the intellectual needs of the younger child, a poor home environment and deficient schooling could not provide the stimulus required for intellectual development at the higher levels (e.g., Anastasi, 1958; Hebb, 1958).

In the present context, the decline in I.Q. noted in the table above must be attributed more to deficiency in schooling than to a restricted home background, the deficiency in this case taking the form of delayed entrance into school. Under normal educational conditions, the older pupils would have been ahead of the younger in the same standard by as many grades as the number of years separating them in age. The New South African Group Test, however, compared all the students, young and old, against the same norms, which were derived from a group whose schooling had been regular, namely, European subjects. Age, therefore, tied to a grade not commensurate with it, became a severe handicap to the older Indian pupils and this age-grade difference lowered quotients in proportion to its magnitude, the greater the difference, the lower the obtained I.Q.

The cramping effect of an impoverished home environment on intellectual growth is, nevertheless, also evident. Table LVI, p. 467, illustrates it. Three groups of students are shown in this table, each of a different age range, the differences resulting from varying degrees of delay in schooling. However, once in school, the pupils progressed normally by a grade for every year of chronological age. Group A is normal in age-grade status by European standards and Group C, the most seriously retarded.

Considering Group A for the present, it will be seen that, in non-verbal I.Q., there is a fall of 5.357 points from standard two to standard six (99.500 - 94.143). It is suggested that this drop is due

partly to the fact that as the child grows older the effects of an unfavourable home background and also, perhaps, inferior school facilities (by European standards), do begin to exercise their retarding influence. If this is correct, then the same considerations should apply to verbal I.Q.'s also, but in this case a compensating factor operates. Mastery of English improves grade by grade resulting in progressively better performance in the verbal section of the New South African Group Test relative to the non-verbal section. This improvement in language counters the tendency of the verbal I.Q. to drop with age as a result of an inferior home and school background. The gradual bridging of the gap between non-verbal and verbal I.Q.'s from standard two to standard six and from this point to the University level has already been described in the account of Project II (Tables LV (p. 228) and LVI (p. 228).

Group B, delayed in schooling by 2 years, shows more or less the same pattern of scores as Group A. Group C, however, delayed by 4 years, exhibits a surprising low-level constancy in both non-verbal and verbal I.Q.'s, that is difficult to explain. It seems as though an unstimulating pre-school period extending over 4 years beyond the normal school-going age has already worked its insiduous influence on the mental development of the pupils as manifested by the low I.Q. achieved by this group in standard two and that the subsequent school stimulation is sufficient to maintain their I.Q. at the early depressed level. On the other hand, the same school facilities, which are really below European standards, in conjunction with a poor home environment, cannot maintain the original I.Q.'s of Groups A and B at their relatively higher levels. And improvement in verbal I.Q.'s relative to non-verbal I.Q.'s with increasing command of English from standard two upwards is of a smaller order in Group C than in the case of the other two groups.

So far, discussion of the results of the study of relative educability has been in terms of the I.Q. The I.Q. is, of course, a statistical abstraction. In the standardisation of the New South African Group Test, the I.Q. was not calculated by the Binet formula ($I.Q. = \frac{M.A.}{C.A.} \times 100$) but by the method adopted by Wechsler (1939). The distribution for each age group was normalised by converting the raw scores into percentile ranks and these into standard deviation units by multiplying by 15 and adding 100. With a mean of 100 and a standard deviation of 15 the resulting scores corresponded numerically to the I.Q. in the conventional sense (National Council for Social Research, 1956). Now, the I.Q., even when derived by Wechsler's method, takes age into account. At the same time, the standardisation sample of the New South African Group Test consisted of 30,000 European testees in educational institutions only so that schooling also was a central factor in the distributions obtained. It has already been pointed out that, measured against such norms, the older Indian child whose schooling had been delayed by years would be at a serious disadvantage and would show lower scores than younger Indian children in the same grade, whose schooling had been more normal.

In the matter of raw scores on the New South African Group Test, however, there should be no loading of the dice in favour of the younger as against the older students in the same grade. Normally, raw scores are indicative of mental age or mental maturity which, in turn, depends upon chronological age, so that older children would be expected to achieve higher raw scores than the younger. This should apply even if the intelligence test depended heavily upon school knowledge, for one would expect older pupils, because of their higher mental age, to surpass the younger in school work.

The study of relative educability revealed, however, that at the standard six level, the older students not only failed to achieve higher raw scores in the New South African Group Test than the younger but that they were actually surpassed by them in both the non-verbal and verbal sections. At the standard four level, the differences were not significant. At standard two, the differences were again not statistically significant but the tendency seemed to be reversed, the older being ahead of the younger pupils. Whatever happens below the standard two level, it appears that, in raw scores in the New South African Group Test, parity exists between the younger and older students at standard four after which the younger begin to overtake the older.

To check this, a supplementary analysis of the combined raw scores of four of the age groups in standard five, which had worked the senior version of the test was carried out with the following results:-

TABLE LVIII

DISTRIBUTION BY AGE OF THE COMBINED RAW SCORES OF STANDARD FIVE PUPILS IN THE SENIOR SERIES OF THE NEW SOUTH AFRICAN GROUP TEST[1)]

Scores	(B)	(C)	(D)	(E)
0 - 9	-	1	-	-
10 - 19	3	4	3	7
20 - 29	17	25	20	36
30 - 39	31	32	25	15
40 - 49	22	19	15	10
50 - 59	6	7	5	1
60 - 69	2	-	1	1
N:	81[2)]	88[2)]	69	70
Means:	36.599	34.159	34.790	29.500

Analysis of Variance

Source of Variation	Sum of Squares	df	Mean Square	F	P
Between Age Groups	2,006	3	668.667	4.667	<.01
Within Age Groups	43,459	304	142.957		
Total	45,465	307			

Footnotes 1) and 2) appear on the next page.

The table above makes it clear that the older students are already outstripped by the younger at the standard five level.

All the raw scores that have already been presented separately are now brought together in the table below for easy comparison.

TABLE LIX

MEAN COMBINED RAW SCORES IN THE NEW SOUTH AFRICAN GROUP TEST WITHIN STANDARDS BY AGE[1)]

	Mean Age (Years)	Senior Scores
STANDARD SIX		
		P: <.01
(A)	13.4	46.833
(B)	14.5	40.382
(C)	15.5	41.932
(D)	16.4	39.681
(E)	17.7	36.657
STANDARD FIVE		
		P: <.01
(B)	13.4	36.599
(C)	14.5	34.159
(D)	15.4	34.790
(E)	16.7	29.500
STANDARD FOUR[2)]		
		P: >.05
(C)	13.4	29.164
(D)	14.4	27.897
((E)	15.3	28.964
((E)	16.4	29.273
STANDARD TWO		
		P: >.05
(B)	10.5	33.509
(C)	11.4	34.738
(D)	12.4	35.382

Footnote 1) page 479 - Details in regard to the mean ages of the groups are given in Table XLVI, p. 442.

Footnote 2) page 479 - One student from this age group worked the intermediate series of the test and, therefore, had to be excluded from the table.

1) Table XLVI, p. 442, gives the numbers involved in each standard.

2) The "E" group shown in Table XLVI, p. 442, has been split into two age groups ranging from 15.0-15.9 and 16.0 & Above years, consisting of 56 and 22 students, respectively.

Scores in the scholastic tests reveal a similar tendency. The older pupils are either on a par with or superior to the younger in the lower grades but are surpassed at the standard six level, in some cases at the standard five level. The scores of the younger and older children in the scholastic tests, already presented separately (except in the case of standard five), are brought together in the table below.

TABLE LX

MEAN SCORES IN SCHOLASTIC TESTS BY AGE[1)]

Tests	Standards			
	II	IV	V	VI
Vocabulary	> .05	> .05	< .01	< .01
(A)	17.143	30.786	45.269	51.500
(B)	16.544	33.368	42.061	45.676
(C)	18.412	33.486	40.118	46.527
(D)	17.580	31.551	41.022	49.440
(E)	18.471	32.192	37.643	44.892
Problem Arithmetic	< .01	> .05	> .05	< .01
(A)	2.714	6.629	9.346	11.900
(B)	3.049	6.811	8.865	10.603
(C)	3.553	6.957	8.859	10.676
(D)	3.725	6.269	8.761	10.096
(E)	4.035	6.231	8.071	9.941
Mechanical Arithmetic	> .05	> .05	> .05	> .05
(A)	1.400	5.129	6.577	9.300
(B)	1.845	5.028	6.524	9.544
(C)	2.047	5.630	6.613	9.257
(D)	2.203	6.199	6.877	9.337
(E)	2.071	5.679	6.329	9.176

1) Table XLVI, p. 442, gives the numbers in each age group and the mean ages.

In the Matrices Test also, the older pupils did not surpass the younger in any of the standards. In this test, however, there was no significant reversal of expected results as in the case of the New South African Group Test raw scores at the standard five and six levels although, as indicated in the table below, there was a tendency in this direction even in the Matrices Test. All the raw scores in the test that have been presented separately before are now brought together as well as those of the supplementary study of standard five. The median scores for corresponding ages given by Raven (1938) are also shown within brackets for comparative purposes.

TABLE LXI

MEAN RAW SCORES IN THE PROGRESSIVE MATRICES TEST WITHIN STANDARDS BY AGE[1)]

Age Group	Standards			
	II (P: > .05)	IV (P: > .05)	V (P: > .05)	VI (P: > .05)
(A)	26.857 (28)	34.571 (37)	36.231 (41)	40.667 (44)
(B)	24.718 (33)	32.660 (41)	37.244 (44)	38.691 (44)
(C)	26.035 (37)	32.725 (44)	36.382 (44)	39.500 (44)
(D)	26.783 (41)	33.731 (44)	36.710 (44)	38.747 (44)
(E)	27.176 (44)	32.962 (44)	34.571 (44)	38.667 (44)

1) Table XLVI, p. 442, gives details of the mean ages of and the numbers in the various age groups dealt with below.

The Raven Matrices Test did not prove to be of very much value during this analysis mainly because its norms reach their peak at the relatively early age of fourteen or so and there is no fine differentiation of performance during the 'teens. The majority of the sub-sample of this analysis were 14 or more years in age and all of them had to be judged according to the norms for age 14 or for adults. For this reason, only standards two and four in the table above are really useful for comparative purposes[1].

Although the Matrices Test was not sensitive enough for the upper age levels, it did bring out that the older pupils did not achieve higher scores than the younger within the same grade. Now, raw scores in intelligence tests should increase with age, other things equal. Raven's norms, indicated within brackets in the table above, show a consistent rise with age, but not the Indian subjects. This is clear in the case of standards two and four. The reason for this seems to be that while the English subjects of Raven's standardisation sample presumably improved in educational attainments with age, the older Indian children remained fixated with the younger in the same standard due to late entrance into school. And it has already been shown that despite the fact that its contents are not directly of a scholastic nature, performance in the Matrices Test is very significantly determined by the factor of schooling.

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1) Notcutt (1949) used the Matrices Test with Zulu children in Durban and had this to say about it: "..... the form of distribution of an age-group sample of those (Matrices) scores depends more on the test than on the group tested. To increase one's score on Progressive Matrices from 44 to 50 is a far more difficult task than to increase it from 24 to 30 .....". And again: "A test like the Progressive Matrices is not really suitable for making inferences about the 'true' distribution or the 'real' rate of growth of intelligence. For studying this, a test built on the principles of Thorndike's CAVD is required".

It must be made clear at this stage that the failure of the older pupils to achieve significantly higher raw scores than the younger in all the tests - both intelligence and scholastic - with the solitary exception of the problem arithmetic test in standard two, is in itself sufficient evidence of the retarding effects of delayed schooling. The fact that the older students were actually surpassed by the younger to a significant extent in many of the tests at the upper grade levels impels one to go beyond this mild conclusion and to suspect that active damage is being done to the mental development of children whose schooling is delayed and that the longer the delay the more severe the harm.

Within the grade range studied, the superiority of the younger pupils is greatest at standard six. Their lead diminishes as one goes down the grade range and at standard four there is approximate equality. Lower down, at standard two, it is the older students who seem to do better and in one case, namely, problem arithmetic, they are significantly superior to the younger. It would be of interest to know how the two groups compare below standard two. It must be remembered that the pupils have already had three years of schooling before the standard two stage was reached. It is probable that if one goes lower down to standard one, sub-standard two and finally to sub-standard one it will be found that the older pupils surpass the younger in raw scores in both intelligence and scholastic tests all the way down[1]. It is almost certain that the older

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1) There is some evidence for this from a study carried out while the writer was engaged in teacher-training. As part of their practical work, some of his students were asked to test children in sub-standard one at the end of their first year of school life, with the Progressive Matrices. As the children's version of the test was not available, the conventional, 1938 version was used. The testing was carried out individually but to expedite the programme, senior primary school students were used to record the responses of the subjects after the instructions had been given by the tester. The children

(Footnote continued next page)

children have a mental age advantage over the younger at school entry, so that, provided no selective factor is operating, the child who enters school at the age of eight will be more "educable" than the child who begins school at the age of five. It seems that the older children maintain their lead up to the standard two level after which the gap narrows more rapidly than it did before until parity is attained at standard four after which the younger students outpace the older[1)].

It may be argued that the increasing inferiority of the older pupils beyond the standard four stage may be due to motivational factors rather than to an actual mental slowing down. With the onset of puberty, for instance, extraneous interests and distractions, internal changes and the appearance of self-consciousness might affect performance in tests. But decline in motivation cannot be accepted as the sole cause for the inferior showing of the older boys for, if operative, these factors would adversely influence performance in scholastic tests rather than performance in, say, a non-verbal intelligence test. And it has already been shown that, both in the non-verbal and verbal sections of the New South African Group Test and also in the Matrices Test, the older lag behind the younger.

(continuation of footnote 1) from previous page)

were divided into two broad age groups - those up to 8.9 years of age and those 9.0 years and above. There were 128 pupils in the former and 79 in the latter. The mean score of the younger group was 15.078 and that of the older, 18.101. The results are in the expected direction, but not much reliance can be placed on them in view of the lack of experience of the testers, the use of the 1938 version of the Matrices instead of the children's test, and the employment of pupil-recorders - some of whom might have consciously or unconsciously assisted or hindered the subjects in their task.

1) An extension of this research, in the future, to grades below standard two down to sub-standard one, including tests of intelligence on the very first day that children of varying age are enrolled at school would be most rewarding. Such an investigation among the African population would be very desirable.

It seems rather that the increasing superiority of the younger students in the upper grades of the primary school is due to an actual stunting in the mental development of the older boys, a stunting that has probably set in even before school entry, that is to say, during the idle years of waiting for school places in an intellectually barren environment and that this arrest becomes sharply apparent as the challenge to mental accomplishment becomes more and more severe in the higher grades. If this interpretation of the growing inferiority of the older children in the upper standards is correct, then it would imply that the non-provision of adequate school facilities for Indians is doing more serious harm than is generally suspected. What is happening is not a mere delay of so many years in schooling, that can be made up later, but an actual dwarfing of mental potential that seems to be permanent. From the data available up to standard six, it seems that the scar of delayed schooling will show up more and more with increasing levels of education - that is, if the late-starters "survive" until the higher levels[1].

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1) Munn (1956) discusses a hypothetical experiment which has some relevance to this problem. He says: "Suppose that we separate identical twins at birth and bring them up in widely different environments ... One is reared, let us say, by foster parents of very low intelligence and in some isolated community with extremely poor educational opportunities and a general intellectual impoverishment. The other is reared in the home of well-educated foster parents, where it is read to, sent to good schools, and given every opportunity to be stimulated intellectually and to acquire knowledge. Being identical, these twins have identical brains to begin with, and the inherent growth processes are the same in each.

"We shall assume that, given average opportunities to learn, the intelligence of these twins would be average ..... The only difference between them would be the environmental one already posited. Suppose now, that this environmental difference continued until the early teens and also that the intelligence of the twins was then measured....

"There is no doubt whatever about the general outcome of such an experiment. The twin brought up in an impoverished intellectual environment would be below the other in its test performance, and below the level it might have attained if reared under average conditions. And the twin given superior opportunities would doubtless have a higher level of performance than it would have attained if reared under average conditions.

(Footnote continued next page)

Reverting to the hypothesis of the study of educability, it appears that so far from being more educable than the younger, the older pupils are, in reality, less educable. Any expectation, therefore, of expediting the education of children who enter school late, in the belief that they have at their command a dammed up reservoir of mental ability that will enable them to master school work more easily than younger children and so skip grades, must be doomed to disappointment at the upper levels of the Indian primary school. The research does indicate the probability that an accelerated programme of tuition for the late-starters might bring them some benefit at the earliest levels, but this is a matter for further investigation.

The study of relative progress shows that, in every set of raw scores examined, namely, those of the Matrices, vocabulary, problem arithmetic and mechanical arithmetic tests, it is the youngest group that shows the greatest amount of progress from standard two to six and the oldest group the least, while the intermediate group maintains its middle position consistently. This constitutes another line of evidence that the younger children in a class are more educable than the older.

As pointed out at the beginning of this account, the major obstacle in the way of Project III was the possibility that in dealing with children within the same age limits but varying in grade (study of retardation) and with pupils within the same grade but varying in age (study of

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(Footnote continued from previous page)

> "What might happen if the twins were now brought together and given good opportunities in a comparable environment? Would the one who was handicapped earlier, now catch up with the other? That is a question which we cannot answer with any degree of assurance. The level of intelligence of this twin would probably improve, but would it improve as much as it might have improved without the earlier environmental handicap? There is a good possibility that it would not. Early in life we learn how to learn, and each accomplishment prepares the way for others. There is a 'snowball' effect. Early educational handicaps are not easily overcome".

educability), one would be dealing, not with random groups, but with samples automatically selected on the basis of parental intelligence. What light do the results shed on this possibility?

It was hoped that control of the socio-economic status of pupils would serve to match them for both parental intelligence and cultural and material standards of their homes. This was done on the basis of established findings that the socio-economic position of adults is positively correlated with their intellectual level. It has also been pointed out that this association has been found to hold in the case of children as well, a point confirmed for Durban Indians during Project II, by means of a crude classification of paternal occupations. For this reason, a scale for the measurement of socio-economic status was carefully devised.

The scale showed that parents higher in the socio-economic scale did, indeed, succeed in securing school places for their offspring at earlier ages than the less favoured parents (Table XIV, p. 387) and, on the basis of past researches, one is justified in assuming that their children were, on the whole, potentially better endowed than those of lower status. The refined partial correlational analyses in the study of relative retardation and the coarser chi-square tests employed in the study of relative educability did not, however, reveal any significant association between performance in both intelligence and scholastic tests and socio-economic standing for the sub-samples employed.

The correlational analyses did show a consistent, significant connection between test scores and status but this association was found to be due in every case to the fact that school standard was correlated with both scores and socio-economic status. When social status was partialled out, the net correlations between scores and grades remained significantly high but when school standard was partialled out, socio-

economic status was not found to be significantly associated with test scores. It was concluded that schooling was crucial in the determination of performance in intelligence and attainment tests and that any possible influence exerted by variations in hereditary background and home environment was overwhelmed by this factor and was not worth considering seriously in the sub-samples being studied.

This independence of test scores and socio-economic status is brought out in the tables below which show the actual mean scores of the students of low and high status already dealt with in Tables XLIII, XLIV and XLV (pp. 439-441). It will be seen, however, that although social status is statistically a non-significant factor in the present sub-sample, it is not entirely impotent as a study of the I.Q.'s will show.

TABLE LXII

MEAN SCORES BY SOCIO-ECONOMIC STATUS OF STANDARD SIX STUDENTS OF THE SAME AGE

Tests	Low Status N: 100 Mean Age: 15.6 Years Status: 1.440	High Status N: 100 Mean Age: 15.6 Years Status: 3.840
Matrices: Raw Scores	37.330	39.210
New SAGT: Combined I.Q.'s	76.230	78.820
--------: Non-Verbal I.Q.'s	78.090	82.500
--------: Verbal I.Q.'s	76.540	77.480
Vocabulary: Raw Scores	47.830	47.780
Problem Arithmetic: Raw Scores	10.380	10.290
Mechanical Arithmetic: Raw Scores	9.020	9.290

TABLE LXIII

MEAN SCORES BY SOCIO-ECONOMIC STATUS OF STANDARD FOUR STUDENTS OF THE SAME AGE

Tests	Low Status N: 86 Mean Age: 13.5 Years Status: 1.233	High Status N: 86 Mean Age: 13.5 Years Status: 3.651
Matrices: Raw Scores	32.698	32.872
New SAGT: Combined I.Q.'s	77.896	78.826
--------: Non-Verbal I.Q.'s	82.233	82.058
--------: Verbal I.Q.'s	75.547	77.581
Vocabulary: Raw Scores	33.209	32.895
Problem Arithmetic: Raw Scores	6.942	6.698
Mechanical Arithmetic: Raw Scores	5.616	5.244

TABLE LIV

MEAN SCORES BY SOCIO-ECONOMIC STATUS OF STANDARD TWO STUDENTS OF THE SAME AGE

Tests	Low Status N: 106 Mean Age: 11.6 Years Status: 0.943	High Status N: 106 Mean Age: 11.6 Years Status: 0.943
Matrices: Raw Scores	25.519	25.613
New SAGT: Combined I.Q.'s	79.000	80.170
--------: Non-Verbal I.Q.'s	84.519	85.415
--------: Verbal I.Q.'s	75.274	76.245
Vocabulary: Raw Scores	16.651	17.302
Problem Arithmetic: Raw Scores	3.396	3.274
Mechanical Arithmetic Raw Scores	1.972	1.877

It will be noted that the differences between the mean scores of the low and high status groups are very small. There is a tendency for the high status groups to be almost consistently ahead of the low status groups in the intelligence tests but the chi-square tests showed the differences to be non-significant. The means of the scholastic tests are also similar for the two groups.

The fact that socio-economic status differences did not appear in the test scores of the subjects of Project III but did in the case of Project II cannot be ascribed to any bluntness of the measuring scale used in the present study. The scale to measure was made as sensitive as circumstances permitted. It is true that a coarse classification of fathers' occupations in Project II was sufficient to bring out status differences in scores but, as has already been mentioned, the sample of that project was more heterogeneous in economic distribution. Also, it has been shown that the estimated product-moment coefficient of correlation between paternal occupation and scores in the full scale was +.550, which is further evidence of the validity of the scale (Project II, Table XLIII, p. 215).

If these unexpected results mean anything at all, it is that schooling is of overwhelming importance in the determination of intelligence and scholastic test scores as compared with socio-economic status. In the present sample, it must be no doubt true (as established by past researches) that, on the whole, the children from high status homes were intellectually more favourably endowed than the children from low status homes)[1]. But it is no less true, as Munn (1955) points out, that poten-

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1) There are, of course, limits to inheritance. The offspring of mentally superior parents are not all mentally superior and the offspring of defective parents do not all prove to be defective. Thus Fleming (1943) points out: "..... parent-child correlations in intelligence, while positive, are usually in the region of +.50, which cannot be called high".

tiality means naught without the proper stimuli for growth that the environment provides and, in modern society, the school is perhaps the most important environmental agency in the promotion of mental development.

This point was mentioned by Gordon as far back as 1923 though he did not specifically investigate it. Surveying the pathetically low scores of his canal-boat and gypsy children in intelligence and school tests, he wrote: "The ..... important question suggested by these results is whether there is any mental development apart from mental effort and such mental exercise as are generally associated with school life. The answer to this question probably depends on the social environment of the children. In a good social environment a child's development would not be so dependent on the effects of schooling as in a poor social environment in which there was little or no intellectual life. Further it would seem that too long a delay in a beginning of school life has had a very injurious effect on such children as have been tested, that, in fact, it is almost impossible to make up for such delay".

How does schooling make for improved performance in intelligence tests? No test of intelligence pretends to-day to measure native ability. Acquired knowledge and skills are also inevitably measured in the process. The school is the agency par excellence not only for the dissemination of such knowledges and skills but also in providing the occasions for the use, refinement and development of the various kinds of thought processes that are involved in the working of an intelligence test. Without the stimulus provided by the school and the nagging, incessant challenge towards higher and higher levels of mental attainment, the intellect must wither and settle into an inertia characteristic of children in unenlightened institutions or in isolated, backward areas.

Ausubel (1954) stresses this point. Surveying the overwhelming evidence on the deleterious effects of environmental deprivation on mental development and the criticisms made against them, he writes: "Unqualified dismissal of these findings ..... is unwarranted when they are considered in the larger context of related evidence. In the first place, the very grossness of the findings and their consistent replication by many independent investigators in different parts of the world compensate in part for their methodological weaknesses. Second, they are consistent with observational and clinical data on the children concerned, with studies of animal deprivation, and with studies of older children growing up in orphanages and in depressed rural areas ..... Serious and prolonged deprivation, especially during late infancy and the preschool years, seems capable of inflicting permanent damage on intellectual growth".

Throughout this entire report care has been taken not to be drawn into the controversial field of the nature and meaning of intelligence. Whenever the term "intelligence" has been used, test-intelligence has been implied except on rare occasions when mental capacity has obviously been meant (though without further definition). Intelligence has been defined in a variety of ways, such as: "a general capacity of the individual consciously to adjust his thinking to new requirements" (Stern); "the property of so recombining our behaviour patterns as to act better in novel situations" (Wells); "a biological mechanism by which the effects of a complex of stimuli are brought together and given a somewhat unified effect in behaviour" (Peterson); "seeing the point of a problem and adapting what one has learned to the novel situation" (Woodworth); "ability to learn" (Buckingham); "the capacity of adjusting oneself to one's environment" (Colvin); "ability to carry on abstract thinking" (Terman); "the power of good responses from the point of view of truth or fact" (Thorndike); "a movement from trial and error towards increas-

ingly abstract controls" and "the ability to learn actions or to perform new actions that are functionally useful" (Freeman). Other definitions are more elaborate, for example, that of Stoddard (1941): "Intelligence is the ability to undertake activities that are characterised by (1) difficulty, (2) complexity, (3) abstractions, (4) economy, (5) adaptiveness to a goal, (6) social value, and (7) the emergence of originals, and to maintain such activities under conditions that demand a concentration of energy and a resistance to emotional forces"[1]. And, of course, we have Spearman's (1927) classic conception of g as descriptive of the ability to educe relations and correlates as well as the various multifactor theories that have been elaborated since. We thus have a variety of opinions, not really contradictory, in regard to the meaning of intelligence, but no matter which conception of it is adopted, it is almost certain that the school is the premier institution in the development of the capacities subsumed under it.

The most important practical implication of the study of the effects of delayed schooling is that great harm is being done to the mental growth of those children who are being denied school facilities until a late age. The study of retardation shows that thirteen-year-olds in standard two score, on an average, about 20 points of I.Q. below thirteen-year-olds in standard six, an average loss of 5 points of I.Q. for every year of delay in school entrance. Even in the Matrices Test which is not scholastic in content there is a loss of 26 points of percentile rank in four years - an average of 6 points per year.

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1) Garrett (1953) describes such omnibus definitions as being "too broad to be wrong and too vague to be useful".

The evidence from the study of educability indicates that the older students suffer a growing inferiority in relation to the younger beyond the standard four level in raw scores in the New South African Group Test. The younger pupils bloom forth, so to speak, while the older slow down. There appears to be an actual stunting in the intellectual growth of the delayed students, the degree of stunting being proportional to the amount of delay. For every year of school missed, there is a sacrifice of a certain increment of mental development.

Apart from the national problem that this state of affairs represents, in that the mental potential of a group of its future citizens, so far from being developed to its fullest by a positive, dynamic programme of the best kind of education, is actually being allowed to deteriorate and decay through disinterest and consequent inaction, there is the humanitarian aspect. A harsh sentence, seemingly effective throughout life, is being passed on many little children, resulting in minds that could have been more highly developed and personalities that could have been richer.

Such a waste in mental potential should not be tolerated in any civilised society. It is not that one is faced with a problem whose solution one cannot see. The illness is obvious, the cure is equally obvious, namely, the provision of sufficient school buildings[1] and a general

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1) As already pointed out, the present policy of the educational authorities in Natal is to alleviate this problem by extension of the platoon system whereby the same building is made to serve two schools, one in the morning and the other in the afternoon. Working within restricted hours, morning and afternoon schools are imparting a kind of "emergency education", if it can be called education at all. The fact that children are not incapacitated mentally in the afternoon as revealed by Project I does not condone the system which has so many defects of other kinds that it must surely constitute an ever-present reproach to the professional conscience of the architects of the scheme.

raising of educational standards in Indian schools. The financial involvements should be the least important of the "difficulties" to be considered in applying the remedy.

Reference must be made to the implications of this research for interracial studies of intelligence. The present investigation may be described as an intra-racial study of intelligence, one of the purposes of which was to study the amount of intellectual retardation brought about by one environmental factor, namely, schooling, within a single ethnic group. It was found that four years of delay in schooling could depress the I.Q. by as much as 18 points in a non-verbal test, 21 points in a verbal test and 21 points in a combined test if the testing is done when the normal and delayed children are both in standard six. These figures have been taken from the study of relative progress (Table LVI, p. 467)[1].

Children delayed by four years, achieve I.Q.'s in the 60's and 70's, those delayed by two years in the 70's and 80's and those normal in age-grade status, by European standards, in the 90's (Table LVI, p. 467). Among the last-named group, nine-year-olds in standard two attain the European mean in non-verbal I.Q. It is true that one is dealing here with selected subjects who have not failed any grade before but against this is a host of other factors the effects of which would be to depress scores relative to Europeans, such as a generally lower socio-economic background, inferior school facilities, language-medium difficulties, etc.

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1) Similar results are obtained if the study of relative retardation is used as the source (Table XXXVII, p. 428) or the study of relative educability (Table LVII, p. 475).

The table on p. 498 summarises the whole thesis of Project III and also constitutes a sequel to Project II. It must, therefore, be regarded as the most crucial one in this account. It illustrates, at each grade level, (a) the actually achieved I.Q. of all the pupils in that grade; (b) the estimated loss in I.Q. at that grade level, due to delayed entrance into school; and (c) the depression in I.Q. at any particular grade resulting from handicap in English. The estimated I.Q.'s have been computed on the basis of losses shown in Table LVI, p. 467 of the study of relative progress as against the overageness of the group by the European norms shown in Table XXII, p. 409[1]. Thus, to derive the estimated I.Q. at the standard two level, the problem was stated in the following way: If there is a loss of 23.354 points of I.Q. for four years of delay in schooling, how many points would be lost for a delay of 2.35 years? The achieved I.Q.'s were presented previously in Project II, Table LV, p. 228. Figures for the non-failure group of standard six pupils of Project II, not given before, are also included at the bottom of the table.

This research has also revealed the amount of loss in I.Q. caused by another environmental factor, namely, the Indian child's handicap in English, from the standard two to the standard six level.

Logue's (1954) view that language difficulties were the all-important factor in depressing Indian scores below the European norms in a verbal test of intelligence must be modified as follows: At all levels, from standard six to two, delay in schooling is more important than linguistic handicaps in lowering verbal I.Q.'s as shown in Table LXV.

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1) The European age norms were adjusted to correspond to the dates on which the Indian pupils were tested, hence the discrepancies between them and the norms shown in Table III, p. 313.

TABLE LXV

ACHIEVED AND ESTIMATED I.Q.'S OF INDIAN PUPILS BY SCHOOL STANDARD

	Standard	N	Type of Test	Median Age (Years)	Achieved I.Q.	Normal Age for Grade (Years)	Degree of Over-ageness (Years)	Esti-mated I.Q.	Difference in I.Q. due to delayed Schooling	Difference in I.Q. due to handicap in English
PROJECT III										
	VI	306	Non-verbal Verbal	15.73	82 78	13.33	2.40	93 91	11 13	2
	V	336	Non-verbal Verbal	14.67	82 77	12.36	2.31	92 89	10 12	3
	IV	313	Non-verbal Verbal	13.94	81 75	11.22	2.72	95 91	14 16	4
	III	361	Non-verbal Verbal	12.71	83 75	10.21	2.50	97 91	14 16	6
	II	377	Non-verbal Verbal	11.54	85 76	9.19	2.35	99 89	14 13	10
PROJECT II										
	VI	738	Non-verbal Verbal	15.94	84 82	13.91	2.03	93 93	9 11	0

Weakness in English becomes progressively less potent in reducing verbal I.Q.'s as one proceeds upwards in the grade scale. Thus, considering actually achieved I.Q.'s, one will note from Table LXV that a difference of 9 points between non-verbal and verbal I.Q.'s at the standard two stage is progressively attenuated to 4 points at the standard six level. (In Project II, the difference at standard six was 2 points). In terms of estimated I.Q.'s, the corresponding figures would be 10 points and 2 points. As shown in Project II, non-verbal and verbal I.Q.'s become identical for Indian subjects beyond the standard six stage.

This discussion leads to a point raised in Project II, which was considered but not finally disposed of. The question was whether Indian schools could do very much more than what they are already doing in the matter of improving the standard of attainment in English, in order to bridge the gap between non-verbal and verbal I.Q.'s in the primary schools. As mentioned above, the discrepancy ranges from 2-4 points in standard six to 9 points of I.Q. in standard two. At face value, the figures suggest that there is some room for improvement in the lower grades but not much in the upper standards. Language, however, is intimately connected with the thought processes (Vinacke, 1952) and it is probable that even in the working of a "non-verbal" test, verbalisation is involved in a subtle way. It is suggested, therefore, that the school should use all means at its disposal to foster the ability to "think in English", to inculcate habits of clear, logical thought and to encourage the art of making fine discriminations in meaning and idiom. It is feared, however, that the rewards of all such efforts will be severely limited so long as schooling is withheld from children at the very time of life when they would benefit most from it.

What is the moral of Table LXV for inter-racial testing of intelligence? It is this: that if one does not match racial groups exactly for all possible relevant factors, results will be misleading and even mischievous. Since the tests used in such studies are invariably those prepared for and standardised on subjects of European descent whose schooling has been normal, non-European groups will almost always appear "inferior". The present intra-racial investigation has shown that even within the same ethnic group one environmental factor alone can make large differences between I.Q.'s that are actually achieved and I.Q.'s that might have been scored had normal opportunities for development been present. Note that all the estimated non-verbal I.Q.'s in Table LXV approach the European norms fairly closely.

No socio-economic differences in test scores appeared within the Indian group in Project III. The explanation given was that the sample of Project III was homogeneously low in status and that because of gross inequalities in opportunity for schooling the relatively finer differences that socio-economic factors are known to be responsible for, were almost completely masked. This does not mean that status differences in test scores would not be present in the scores of Indian and European students, contrasted as groups. Project II has shown that, even within an Indian group, reasonably diverse in social conditions, status differences appear. Since the difference in status between Indians as a whole and Europeans is almost certainly much greater than differences between two halves of the Indian community that might be labelled "low" and "high", it follows that research might reveal substantial economic differences in the test scores of Indians as against those of European students.

From these considerations, one may conclude that there are four major factors responsible for the depressed I.Q.'s of Indian school children

relative to Europeans, namely, (a) delay in entering school, (b) inferior educational facilities, (c) weakness in English, and (d) low socio-economic status. Since all four are "environmental" factors, it follows that they can be remedied. If they are, the evidence is, that no substantial differences in performance would appear between Indian and European pupils in both intelligence and scholastic tests.

(H) ABSTRACT:

A study of the relationship between the performance level of Indian pupils in intelligence and scholastic tests and their age of school entrance was the subject of Project III.

The sample consisted of 1,693 boys from 12 schools in the alluvial flats area of Durban. In socio-economic status, this is one of the poorer Indian localities of Durban. The pupils ranged in age from 8.0 to 20.5 years and were spread out from standard two to six. None of them had ever failed a class before, so that any overageness-for-grade was due solely to the fact that schooling had been delayed because of failure to find accommodation in the congested schools of the area.

Besides its immediate, practical relevance for Indian education, the study had a theoretical aspect as well. It was concerned with the nature - nurture problem and sought to show the extent to which a single environmental factor, namely, schooling, could influence performance in intelligence and attainment tests within the same ethnic group.

The investigation was undertaken from three angles, each with its own working hypothesis. They were labelled (a) the study of relative retardation, (b) the study of relative educability, and (c) the study of relative progress.

The hypotheses, respectively, were as follows:-

(a) Of a group of pupils of the same age but varying in school standard, those in the upper grades will achieve higher raw scores in mental and scholastic tests than those in the lower grades, other things equal.

(b) Of a group of pupils in the same school standard but varying in age, the older, presumably more advanced in mental age and experience, will achieve higher raw scores in mental and scholastic tests than the younger other things equal.

(c) Given a group of late- (older children) and a group of early-starters (younger children) in standard two, the older, by virtue of their advantage in chronological and, presumably, mental age, will show greater progress from grade to grade and finish at standard six at a significantly higher level of mental and scholastic attainment than the younger, other things equal.

Hypothesis (a) was tested by the technique of partial correlation and Hypothesis (b) by means of chi-square tests and one-way analyses of variance. It was not found necessary to apply any test of statistical significance in the study of Hypothesis (c).

The instruments used were a questionnaire, the Progressive Matrices Test of intelligence, the New South African Group Test of intelligence (non-verbal and verbal), and scholastic tests of vocabulary, problem arithmetic and mechanical arithmetic. A scale for the measurement of socio-economic status was also designed to match pupils for home background (and, indirectly therefore, for parental intellectual level).

Hypothesis (a) was confirmed consistently at three age levels. Pupils in the upper grades scored progressively higher in terms of I.Q.'s, raw intelligence-test scores and raw attainment-test scores than those in the lower grades but of the same age. The powerful effect of schooling as a factor in determining performance level in both intelligence and attainment tests was brought out in clear-cut terms.

Hypothesis (b) was disproved almost consistently through all the four grades studied, the solitary exception occurring at the standard two level where the older pupils surpassed the younger in problem arithmetic. In many cases, the results were the reverse of what was hypothesized, the younger surpassing the older at significant levels of confidence.

In the Matrices Test, no significant differences between the younger and older students appeared throughout all four grades. In non-verbal, verbal and combined I.Q.'s on the South African Group Test, the early-school-starters were consistently and significantly ahead of the late-starters in all the standards. With educational level fixed for all, chronological age became a handicap to the older. What was unexpected, however, was the fact that the younger students proved to be significantly superior to the older even in raw scores in the Group Test at the standard six and five levels from a position of more or less equality at standards four and two. In the scholastic tests also, the younger children in standard six scored significantly better than the older in vocabulary and problem arithmetic, and, in standard five, in vocabulary. There were no notable differences in performance in the other subjects at any grade level except that in standard two, the older boys headed the younger in problem arithmetic, as mentioned above.

This evidence, in terms of raw scores, was interpreted as indicating not only that the older pupils were not superior to the younger in

educability but that they were actually inferior in this respect in the upper grades of the primary school; that, in fact, the older, because of their delay in schooling, were stunted in mental growth and that this impairment became more and more evident with the growing challenge to the intellect of the higher grades; and that, therefore, the damage must be regarded as permanent.

The results of Hypothesis (c) confirmed the conclusions of the first two hypotheses. The early-school-starters, after being somewhat behind the older in standards two and three went on to surpass the older boys by the time standard six was reached.

There is some evidence that, below the standard two level, the older pupils are superior in intelligence and scholastic tests to the younger (in raw scores, not quotients) and that this superiority increases as one goes further down the grade scale. The crucial point seems to be standard four. It is at about this stage that the younger children seem to achieve stable parity with the older after which they draw ahead.

In the sample of Project III, it was found that although parents higher in socio-economic status secured school places for their children at earlier ages than those of lower status, this factor was not significant in the determination of test scores when matched against the factor of age at school entrance.

The investigation revealed that weakness in English was a significant factor, though not as important as believed in the past, in depressing Indian scores relative to Europeans in the upper grades. As one goes down the grades from standard six to standard two, the discrepancy between scores in non-verbal and verbal tests of intelligence becomes greater as command of English decreases. Nevertheless, even at the standard two level

where mastery of English is weakest, grossly delayed schooling plays a more important role in lowering intelligence-test scores than does handicap in the language medium of Indian schools.

The research confirmed two outstanding generalisations that have appeared in the past as a result of investigations among less-privileged groups, namely, an intelligence level below the national norm and a decline in intelligence quotients with increasing chronological age.

It was pointed out that failure of the Natal educational authorities to provide sufficient school buildings to accommodate all Indian children of 5 plus years and above was causing serious and permanent damage to the intellectual growth of those affected and that, in the light of this finding, nothing less than an immediate regularising of the situation would be satisfactory.

The study also brought to light how misleading results of inter-racial comparisons of intelligence levels could be if the factor of schooling, particularly of age of school entrance, is not taken into careful account. It was predicted that if Indian and European school children were matched for age of school entry, quality of educational facilities, language and socio-economic status, all alleged innate, racial differences in intelligence-test scores would disappear.

ANNEXURE:

U N I V E R S I T Y O F N A T A L

INSTITUTE FOR SOCIAL RESEARCH

School Register (Serial) Number of Pupil: .....

QUESTIONNAIRE

Please get the help of your teacher and parents when filling this questionnaire as it is very important that what you write should be correct.

After you think you have completed it, ask the boy next to you to look through your questionnaire to see if you have missed out any answer.

A PERSONAL DETAILS

(1) Name of school: .....

(2) Surname(s) as in School Register in full: .....

.....

(3) Christian name(s) as in School Register in full: .....

.....

(4) Standard: .....

Division: .....

(5) Correct date and year of birth: .....

(6) Home address in full: .....

.....

(7) Telephone number (home, shop or office): .....

(8) Religion? (Hindu, Moslem, Christian, etc.): .....

(9) To which Home Language group do you belong? (Do not put down English even if you talk only that at home, but write down Tamil, Hindi, Telegu, Urdu, Gujurati, etc.):

.....

B SCHOOL HISTORY

(1) Did you attend a "private" school before being placed in a Government or Government-Aided School? Underline - YES NO

(2) If you attended a "private" school, how long were you there?

.....

(3) In which Government or Government-Aided School did you first start schooling?

.....

(4) Write down below the name which you gave in the first Government or Government-Aided School to which you went:

Surname(s): .....

Christian Name(s): .....

(5) How old were you when you entered a Government or Government-Aided School for the first time? (Ask your parents):

..... Years ..... Months

(6) A child can be taken in a Government or Government-Aided School if he is over FIVE years of age. If you entered such a school after completing the age of SIX, what was the reason for the delay? (Ask your parents):

.....

.....

.....

FROM THIS POINT ONWARDS DO NOT "COUNT"
ANY PRIVATE SCHOOL EDUCATION IN YOUR ANSWERS

(7) Have you had any "double promotions" since you started school? Underline: YES NO

(8) If you have had "double promotions", how many times? .....

(9) Have you ever failed and spent more than one year in any class or standard since you started school? Underline: YES NO

(10) If you have failed, how many times? .....

(11) Fill in the Table below working carefully backwards year by year, starting with the year 1957 and filling next to it the name of your present school and the Standard you are in. (If you have failed at any time, remember that the Class or Standard in which you failed will appear more than once in the last column. If you have had a double promotion at any time, a Standard will be missing in the last column. Fill the Table in pencil first, then use ink if you are satisfied with it and your teacher has checked it):-

Year	Name of School	Standard or Class
1957	.....	.....
1956	.....	.....
1955	.....	.....
1954	.....	.....
1953	.....	.....
1952	.....	.....
1951	.....	.....
1950	.....	.....
1949	.....	.....
1948	.....	.....
1947	.....	.....
1946	.....	.....
1945	.....	.....
1944	.....	.....

C TEACHERS' SECTION

(To be filled in only after the pupil has completed his sections and has handed back the questionnaire finally)

(1) Admission Register No. of Pupil: .....

(2) Exact Date of Admission to present School: .....

(3) Class or Standard in which placed on Admission: .....

JUDGMENTS

(Please underline your judgments below. You are urged to make them reasonable, avoiding undue severity or undue laxity).

(4) Quality of pupil's school work:
Underline:
a) Very Good
b) Good
c) Average
d) Poor
e) Very Poor

(5) Assuming that he intends to study that far, what are the pupil's chances of completing every standard up to and including Standard V without failing at any time in the future? (Standard VI teachers should omit this question):

Underline:
a) Very Good
b) Good
c) Reasonably fair
d) Poor
e) Very Poor

D PARENT'S SECTION

The University is carrying out a research in Indian schools and it would like to know what you think about certain educational matters. Please read all the questions below first and then answer them. Your help will be appreciated.

(1) Below are given six reasons why parents send their BOYS to school. Underline THREE which you think are the most important:-

(a) To become a good citizen.
(b) To get a good job or position later.
(c) To learn to like all things nice and beautiful (for example, art, music, literature, etc.).
(d) To develop a good character.
(e) To develop a healthy body.
(f) To learn facts (or get knowledge) about the world.
(g) If there is any other reason not given above and which you think is very important why boys should be sent to school, please write it below.

.....

.....

.....

(2) Now look over the three reasons you have picked above and put them down in order, starting with the one you think most important, then writing the second most important, and, lastly, the third most important:-

First: .....

Second: .....

Third: .....

(3) Below are given seven reasons why parents send their GIRLS to school. Underline THREE which you think are the most important:-

(a) To become a good citizen.
(b) To get a good job or position later.
(c) To learn to like all things nice and beautiful (for example, art, music, literature, etc.).
(d) To develop a good character.
(e) To develop a healthy body.
(f) To learn facts (or get knowledge) about the world.
(g) To become a good housewife.
(h) If there is any other reason not given above and which you think is very important why girls should be sent to school, please write it below:

.....

.....

.....

(4) Now look over the three reasons you have picked above and put them down in order, starting with the one you think most important, then writing the second most important, and, lastly, the third most important:-

First: .....

Second: .....

Third: .....

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