

AN INVESTIGATION INTO THE EFFECTS OF COACHING
ON NON-VERBAL INTELLIGENCE TESTS ON EUROPEAN,
INDIAN AND AFRICAN CHILDREN.

A

T H E S I S

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BY



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"To have no errors is a privilege above the conditions of humanity; under it happiest is he who has fewest of them."

Horace.

1. Aims and Limitations of Present Investigation.

It is proposed in this enquiry to:-

- (a) Study the relative gains due to coaching on non-verbal tests of intelligence of unbiased samples of European, Indian and African school children between the ages of 10:6 and 12:6.

- (b) Investigate gains due to coaching not only between, but within, ethnic groups.

Subsidiary investigations are concerned with:-

- (c) The relative gains made by the sexes in the three groups.
- (d) In the case of Europeans only, the relative gains made by pupils whose initial scores

were above 100 points of IQ and those whose scores were below 100, later designated in the body of the thesis as "Upper IQ's" and "Lower IQ's". In the case of Indians and Africans there were not enough results above 100 IQ in the initial tests to warrant an investigation.

- (e) The Phenomenon of a consistent increase in standard deviation from Test 1 to Test 2 in all three ethnic groups.
- (f) The pattern of correlations between Test 1 and Test 2 in all three ethnic groups.

2. It might be just as well at this juncture to state that there is no intention of comparing the relative performance of Europeans, Indians and Africans on intelligence tests - the lack of validity of such results is realised. Although somewhat lengthy, Biesheuval's⁴ succinctly stated case against ethnic comparisons is well worth recording:

"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-white groups. The usual interpretation of these results as indicating constitutional intellectual 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 inter-racial 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 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 generalizations 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.

These difficulties have been fully discussed by Biesheuvel in a critical examination of interracial intelligence studies by means of the control group technique. He 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."

3. Using culturally loaded tests in situations alien to Indian and African children, it is obvious that the results must be viewed with reserve, but for all the limitations of the investigation certain general and specific factors emerge which if at any time in the future it is decided in Natal that intelligence tests shall be used for selection or other purposes, it is hoped will shed some light on reaction to the test situation of pupils from the different racial and cultural groups.

When closer contact with Western methods of education introduce a greater degree of sophistication into the testing situation then the first need, if one accepts the necessity for intelligence tests for diagnostic and selection purposes, is properly standardised tests, the second is further investigation into reaction to and performance on intelligence tests by African and Indian children. Why, for instance, in the present investigation did the Indian control group with only an initial test to its credit produce as much gains in points of IQ as the Experimental Group who had had two sessions of coaching in addition to the initial test? It has only been possible to offer tentative reasons for this phenomenon.

4. One very relevant factor is apparent from a survey of the pertinent literature and it is the number of conflicting results that emerge from the investigations. On the major issue of whether coaching produces greater results than practice McCorae¹² and Dempster⁷ assert that coaching has more effect than practice and Wiseman²² and Yates¹⁵ that practice has more effect than coaching.

This lack of consistency may be due as Heim and Watts⁹ point out to a lack of clarity in the meaning of the terms 'coaching' and 'Practice'. Wiseman²² has this to say on the matter :

"The crucial element in the Manchester experiment was the fact that the children had no test papers before them for the coaching periods. There seems no doubt that familiarity with the lay-out of objective tests and with methods used to indicate the correct answer is of great importance in raising scores. Vernon's concept of test sophistication is perhaps the most important single element in practice or coaching. The Manchester experiment shows that if such familiarity is not achieved, if the children do not actually work through a test, reading the instructions and the examples themselves and actually inserting the answers, then the working of items on the blackboard or the doing of isolated items "on paper" have little or no effect on the scores in later tests. Attempts by the teacher to get the children (a) to identify certain types of items and (b) to learn techniques of answering particular types seems to be ineffective if the children are not also given "total test experience".

It seems extremely probable that this is the factor which is responsible for the greater part of the gains produced by coaching in other experiments. In other words it is the practice element which produces gains, although the teacher (by virtue of his training and his experience with tests of attainment - his "professional mental set") will tend to feel that his own activities with blackboard and chalk and word-of-mouth are the more important".

Heim and Watts⁹ "aimed to differentiate clearly between (a) practice (b) coaching, to combine the technique of giving the same test repeatedly with that of giving parallel tests, and to ensure that the latter were in fact strictly parallel". They concluded that "coaching plus practice is more efficacious than practice alone, whether the practice task be the re-taking of identical or parallel tests".

In brief it would appear that the results on coaching depend on its substance and quality. Where the practice element predominates then that kind of coaching is likely to be more successful than the mere exposition and explanation of principles.

5. The literature on the subject also reveals that the performance of children of different levels of ability is another matter of controversy. Rodger¹⁷ says "clever children gained more than dull children"; Vernon²⁰ "Students with lowest scores showed greatest improvement, those with highest scores the least"; McIntosh¹³ "no relationship between level of ability and practice effect"; Peel¹⁶ "practice effect seemed to improve with the initial level of intelligence"; Vernon and Navathe²¹: "Largest gains in IQ made by those who normally constitute the border zone in allocation procedures"; Wiseman²² "Largest gains as a result of coaching made by children in the lower IQ's but in the practice groups greatest gains by those with higher IQ's."

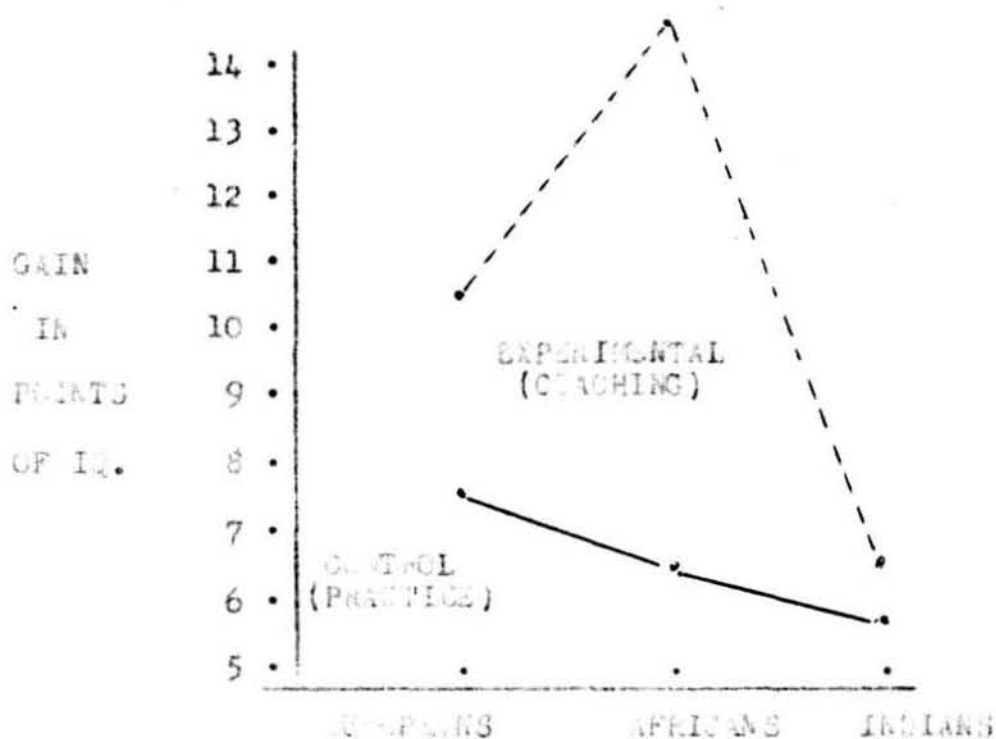
In the present investigation there was no significant difference between the gains of the higher and lower groups of IQ.

6. Another factor noted and commented on by McCrae¹⁶ and wiseman²² was the wide fluctuation found in the test results of individual children. This phenomenon

was noted in the present investigation and has been commented on.

7. Finally, Wiseman²² noted (a) a high degree of accord in the gains found from simple practice (b) most discrepant results from the use of coaching. In the light of the different methods of coaching and the relative efficiency of coaching this result would be expected.

In this investigation it is interesting to note that a steady gain is made by the control group whose initial test could be regarded as a practice one. The response of the racial groups to coaching was vastly dissimilar and can be seen in the following diagram.



8. The reaction and results of the European group are not greatly dissimilar from those of groups tested in England and provided the tests used were standardised locally there seems no reason why they should not be used for selection and diagnostic purposes.

In the case of African and Indian children more investigation is obviously needed. Appropriate tests need to be constructed and standardised and a greater degree of sophistication is required before stability is reached.

SURVEY OF THE PERTINENT LITERATURE.

As Rodger points out (see below) the lack of reliability of the old type examination prompted many Local Education Authorities in the United Kingdom to turn to the use of standardised Intelligence and Attainment Tests in their selection procedures, but perhaps not unexpectedly the unofficial coaching of children in tests of intelligence was substituted for the cramming of previous years.

The devastating effect that wholesale unofficial coaching and/or practice could have on the results of the tests prompted a series of investigations into the effect of this coaching and practice and it is a summary of these investigations that follows :-

1. A.C. Rodger¹⁷ investigating the effect of practice on Intelligence Tests says :

"Careful enquiries in recent years have shown that the traditional type of examination is often unreliable, and as a result many education committees have turned to

Intelligence and Achievement tests in connection with the important scholarship and promotion examinations which take place normally at the 11 stage. Examining bodies, though not always convinced of the validity of Intelligence Tests, have had great confidence in their reliability, as almost all such tests have reliability coefficients in excess of 0.8 and some in excess of 0.9. The increased use of Intelligence Tests in scholarship and other examinations had led, however, to a new danger. Some teachers with misdirected zeal, may be giving children practice in such tests."

In order to investigate the effects of this practice Rodger conducted an enquiry and a summary is given below :

"Six Intelligence Tests were given at fortnightly intervals to 96 children of age 11+ or 12+. Only 76 of the children were present on all occasions and consequently all the results are based on the study of 76 cases.

The IQ of the pupils tended to rise from test to test, the rise per test being about half a point of IQ in the case of children of IQ 80, one point for children of IQ 100, and one and a half points for children of IQ 120.

After practice effects had been eliminated and every care had been taken to render the standardizations of the

tests strictly comparable, it was found that, for any child, the average of the deviations of his separate IQ from the average of the six was equal to about two and a half or three points of IQ, and that this mean variation was greater with clever children and less with dull children.

A child's total range of IQ over the six tests was considerable and averaged 10 points, the highest range for any child being 24."

2. Vernon²⁰, discussing the effect of sophistication as opposed to practice in Intelligence Tests, says :

"This sophistication is not quite the same as the practice effect which has often been shown to exist when testees take identical or closely similar group tests. It is a matter of transfer, not so much of common identical elements as of methods and principles. Whether it occurs to any marked extent among children or adults of average intelligence I cannot say. But the following investigation shows that it may have a considerable effect among adults of superior ability."

The investigation consisted of administering two dissimilar tests to students at a teachers Training

College and "one or other tests was applied near the beginning of term when very few of the students knew anything at all about testing. Thereafter the students received three hours lectures and two hours practical work each week for four weeks which dealt with tests, examinations, scientific method and statistics. The practice work included an experiment on the marking of English compositions and demonstrations of the Stanford-Binet and performance tests. At the end of the period they took the other group test."

In all the groups used (4 experimental and 2 control) statistically significant gains were made. Vernon goes on to say "that the results indicate alarming possibilities of derangement of the norms for superior-adult tests. They suggest that at least two sets of norms should be published with every intelligence or new-type test, one set for novices, another for sophisticated testees."

"The results raise a number of fresh problems which require further investigation. Foremost of these is the extent of the sophistication effect in groups of average ability. My own data throw no light upon the relation of the effect to intelligence level since, owing to the method of scoring, students with the lowest scores

inevitably showed the greatest improvement, those with the highest scores the least. Secondly it is desirable to study how far transfer must be conscious and how far it is acquired by persons who not being students of psychology or education do not deliberately study testing principles and the 'language' of tests.

Lastly this investigation may have failed to reveal the maximum extent of the effect. For the students received merely twenty hours of instruction spread over four to eight weeks, only a small proportion of which had any direct bearing on test 'language'. The professional psychologist's advantage may be very much greater than that demonstrated."

3. Hugh McCrae¹² in an introduction to his own inquiry reports Dawson's work in this field and says :

"An inquiry into the effects of coaching and practice on group Intelligence Tests had been initiated by the Scottish Council for Research in Education; and a report on 'The Influence of Practice on the Results of Mental Tests' was submitted to the Mental Survey Committee of the Research Council in 1934 by the late Dr. Sheperd Dawson, giving the results of three experiments performed under his direction. As however it has not been published

it may be advisable to summarise it here for the sake of the procedure adopted, quite as much as for the results reported."

"The procedure followed by Dawson in the first experiment was to give two similar tests, one a week later than the other and find if there were any improvement at the second. The two tests used had hitherto given very similar results, but in order to be sure that any difference that might appear would not be due to differences between the tests themselves, Dawson had recourse to the following plan. Approximately 100 pupils of about the same age were arranged in order of intelligence as estimated by their teachers before the examination. Then they were divided into two parallel groups (X and Y). Group X was given the Dawson A test on 21st March, Groups X and Y were given the Dawson B test on 28th March, and Group Y was given the Dawson A test on 4th April. Thus it was possible not only to find the effect of practice, but also to find whether the tests differed appreciably and whether the Groups X and Y gave appreciably different results."

Dawson concludes that five periods of practice have very little more effect than one, which suggests that work

on a preliminary sheet is advisable and perhaps all that is necessary, but as McCrae points out this can only be assumed to be valid "when the comparison is between alternative forms of the same test". The practice effect is "confined almost entirely to the results of exactly similar tests".

McCrae in the first of two experiments and using a method similar to that of Dawson arrived at the following conclusions :-

- (i) A definite practice effect appears to exist. It may raise the median of a group by more than six points. Conflicting results make it difficult to reach any more general conclusions.
- (ii) Coaching seems to have no more effect than practice unless, perhaps, where the alternative form is used immediately before the examination.
- (iii) Even one preliminary test does much to offset the effect of previous coaching or practice.
- (iv) There are indications that the above compensation is more marked in the case of tests which give practice, that is, in the case of tests which incorporate practice material or are preceded by a practice sheet.

- (v) Fluctuations in the scores (IQ's) of the individual pupils of the groups over the series of tests occur to such an extent as to suggest that stability has not been attained.

McCrae was so concerned with the individual variations in pupils efforts in the first experiment that he decided to carry out another larger experiment with a group who had already been individually tested on the Terman-Merill revision of the Stanford-Binet Scale.

The following conclusions were drawn :-

- (i) "The effect of practice over a series of tests is to produce an average improvement; but individuals are not consistent, and at any test may score even less than on the previous ones. It cannot be said that successive practice produces equal improvements, but an average would be about two points of IQ.
- (ii) It seems clear that the first and probably also the second test of a series (even where the inter-correlation between the tests is very high) acts as a shock absorber. In view of the fact that the shock-absorbing or practice effect varies considerably from individual to individual one

cannot too strongly deprecate the custom, where any stress is to be laid upon the result, of giving only one group test of intelligence.

- (iii) Some pupils vary definitely from week to week in their ability to perform intelligence tests. If a hard and fast rule is made, based upon intelligence test scores, say, for the purpose of promotion, it follows that several of the pupils accepted will in reality be less suitable than others who are rejected. The personnel of this unfortunate group will be different if the test or day of testing is altered."

4.

McIntosh¹³, discussing the effect of practice on Intelligence Tests, states that :

"The present enquiry was made with a view to establishing the effects of practice when a group of children sat the same Intelligence Test on six occasions at weekly intervals. Two groups, henceforth noted as Group A and Group B, were tested in this manner. Both groups were drawn from Primary V children in the same school. Group A consisted of thirty-eight children of average age twelve years, while in Group B there were thirty-six children of average age 11¹⁰/₁₂. The Northern Test of Intellectual

Ability was used to find IQ's.

McIntosh summarises his conclusions as follows:

"A group test of intelligence was set on six occasions at weekly intervals to two groups of primary school children numbering thirty-eight and thirty-six respectively. There was a statically significant increase in the mean IQ between the first and the second tests, but subsequent tests gave little or no increase in the mean IQ of the groups.

A child's range of IQ over the six tests averaged about twelve points in each case, and the maximum for any child was twenty-five.

There was no relationship between level of ability and practice effect."

5.

Peel¹⁶, in 'A Note on Practice Effects in Intelligence Tests' has this to say :

"Complete age groups of boys and girls from the age group 10-11 years were tested on two occasions by different Moray House tests. A period of 4-5 weeks separated each application of the tests, and groups of some 1,200-1,600 pupils were tested in different years. The extra month of chronological age was added when the second IQ's were

computed. There was no coaching between the tests."

The conclusions he arrived at were as follows:-

"Examination of several sets of data confirm that a mean practice effect of anything up to five points of IQ may be obtained when one verbal intelligence test follows a few weeks after a similar test.

The same sets of data show that practice effect appeared to improve with the initial level of intelligence, to reach a maximum effect at somewhere about 120 to 130 points of IQ. Thereafter the effect seemed to diminish again. This characteristic feature of the differential practice effect, as shown in all five sets of data, and tests of significance showed that the trend is generally significant."

6. Vernon and Navathe²¹, in their investigation came to the following conclusions :-

- (a) The average rise after coaching was 14 points of standard score.
- (b) There was little difference in the coaching effect of different teachers.
- (c) The main effect of coaching occurs when children are coached on parallel tests.

- (d) Periods of coaching made little difference.
- (e) Largest gains in IQ made by those who normally constitute the border zone in allocation procedures.

The validity of the results were questioned on the grounds that the sample was drawn from a Preparatory School and not therefore truly representative of the school population.

7. Dempster's⁷ investigation in Southampton involved the use of two experimental groups, (one practice and one coached) and a control group.

All three groups were given the initial test. The practice group were given a Moray House Test weekly for seven weeks, the coached group given a weekly period of coaching in addition and prior to a Moray House Test for seven weeks. The results were :-

- (a) Practised Group improved by 6 points.
- (b) Coached Group improved by 9 points.

8. Wiseman²² in the Manchester Experiment set out to compare the results of coaching and practice. "The sample used was one of 381 children from thirteen primary schools. The average age was 9.9 and the children were almost entirely 'unsophisticated' having had no previous

intelligence test experience."

The result of the experiment shows:-

- (a) The rise in mean IQ for control group was 4.7 points.
- (b) " " " " " " practice " " 11.1 points.
- (c) " " " " " " coached " " 6.4 points.

Net gains for practice group was $6\frac{1}{2}$ points.

" " " coached " " $1\frac{1}{2}$ points.

- (d) The higher the IQ of the child the greater the gain as result of practice.
- (e) Larger gains as a result of coaching made by children in the lower IQ's.

Wiseman's and Vernon's deductions on the value of coaching from parallel and dissimilar tests will be discussed later and in relation to the results of this investigation.

Wiseman summarised his investigation as follows :-

- (i) "The Manchester Experiment showed that coaching from a commercially published coaching book when the children were not given any tests to work was of little effect in raising the level of tested IQ.
- (ii) It is suggested that "total test experience" is the factor in both practice and coaching which is responsible for the greater part of the improvement in the score.

- (iii) A programme of practice tests with children marking their own work is suggested as the best way to swamp the effects of unofficial coaching.
- (iv) wide fluctuations are found in the test results of individual children. Research results would be more useful to teachers if an analysis of individual children's results were included in addition to average scores for classes and groups".

9.

The Research Team of the National Foundation for Educational Research carried out two experiments :-

- (a) A Pilot Coaching Experiment¹⁵
 - (b) The London Experiment¹⁵
- (a) A Pilot Coaching Experiment, as the name implies, was a pilot investigation for the London Experiment, and was conducted in a Middlesex School with a sample of 182.
- The purpose was to compare the effect of different periods of coaching i.e. 3 hours, 6 hours, 9 hours, on the performance of a group intelligence test.
- subsidiary problems were concerned with :-
- (i) Transfer of coaching effect to dissimilar tests.

- (ii) Effect of coaching on different items of the test.

The results showed:-

- (i) Gains made after 3 and 9 hours coaching was significantly greater than that after 6 hours coaching.
- (ii) A mean gain of $8\frac{1}{2}$ points of standardised score for the experimental group as opposed to a gain of 6 points by the control group.
- (iii) A tendency for the gains in individual children to rise as the initial level of ability increased.

(b) The London Experiment.

A large experiment involving 20 schools divided into 4 groups. The results were as follows :-

- (i) Coached groups showed mean gains of between 5 and 6 points of standardised score as opposed to the control groups' gain of 2 to 3 points.
- (ii) Practice group showed mean gains of 6 points of standardised score compared with control group gains of 2 points.
- (iii) The Practice group which worked 9 Moray House Tests showed greatest gains between the first

and second test, no change between second and sixth test and further gains between sixth and eighth tests.

- (iv) As in the Pilot Experiment there was no significant gain between the groups coached for 3 and 9 hours, but the gains made by these groups were greater than those made by the six hour group.
- (v) In the coached groups the boys' gains were significantly higher than the girls'. In the practice group the position reversed.
- (vi) Tendency for coaching effects to rise with initial level of ability reaching its peak at about 125 IQ.

10.

Extracts from the Summary of the N.F.E.R. publication "Secondary Schools Examinations"¹⁵ which are relevant to this investigation are as follows :-

- (a) "The study of an actual examination showed that the performance of children in objective tests of Arithmetic, English and Intelligence were likely to be affected not only by specific preparation in the form of coaching and practice, but also by the type

of school attended and the nature of the curriculum.

- (b) Coaching raised the average scores of groups of children in Intelligence Tests by five to nine points of standardised score.
- (c) Individual children varied considerably in their responses to the effect of coaching.
- (d) Teachers varied significantly in the effectiveness of their coaching.
- (e) An increase in the amount of time given to coaching beyond about three hours produced little or no further gain.
- (f) Practice in working three or four tests similar to those used by local authorities in their examinations was at least as effective as an equivalent of coaching.
- (g) The size of the coaching effect increased with rises in the initial level of ability but the practice effect was distributed more evenly over all ranges of ability.
- (h) Approximately 50 per cent of the gains from practice were found to take place between the first and second test. Our evidence showed that no further significant gain was made until the children appeared to realise

that they were approaching the end of the practice period.

- (i) There were significant differences between the sexes in their responses to coaching and practice; boys benefited more from coaching and girls benefited more from practice.
- (j) Our evidence supports the view that the effects of coaching and practice cannot be expected to persist beyond a few months.

11. Heim and Watts⁹ in a summary to their investigation have this to say :-

"An experiment was conducted in an attempt to reconcile the conflicting results reported on coaching and practice effects in mental testing. Parallel and identical (spatial) tests were administered weekly, to 13- and 14-year old boys and girls, drawn from six schools. On the basis of the first test score, every form was divided into five equated sub-groups each of which subsequently received different treatment. Two sub-groups took the same test (Test 1) for six consecutive weeks, one of these receiving coaching but not the other. The remaining three sub-groups

took a different (parallel) test each week, receiving between sessions either coaching or discussion of previous week's errors or neither. At the final session, every sub-group took Test 7.

The experimental results are confused by the fact that inter-school differences equalled or exceeded inter-group differences. The conclusions which follow are, therefore, offered tentatively :

- (a) Discussion of errors is the most effective improver of performance on a new test.
 - (b) Coaching plus practice is more efficacious than practice alone, whether the practice task be the retaking of identical or of parallel tests.
 - (c) Coaching plus practice-on-the-same-test produces better performance on a new test than does practice alone on different tests.
 - (d) Practice alone on the same test yields the poorest result, on the criterion of performance on a new test.
- Personality differences among individuals and groups are found to contribute materially to the results. "

BACKGROUND TO THE SAMPLE

EUROPEAN EDUCATION

The administration and control of education in South Africa is vested in the Union Department of Education which falls under the executive authority of the Minister of Education, Arts, and Science. The Head of the Union Department of Education is the Secretary for Education, Arts and Science assisted by professional and administrative officers.

The legislative authority in each of the four Provinces is the Provincial Council. The Council is assisted and advised by a Director or Superintendent of Education who is responsible for Primary and Secondary education and teacher training institutions.

Schooling is compulsory for all children between the age of seven and sixteen and within these limits it is free.

A South African child enters school at an average age of 6½. He then on average spends two years in Class I and Class II. He then proceeds to Standard I in which the average age of all children in the Union is just under 9 years. An average child will take a year per Standard and reach Standard 5 when about 12½ years of age. This completes the primary stage of education in South Africa. The curriculum at this stage includes English, Afrikaans, Arithmetic, History, Geography, Nature Study, Hygiene, Religious Instruction, Music, Arts and Crafts and Physical Education.

Secondary education extends over five years and at the conclusion of Standard 10 a pupil may write a University entrance examination (Matriculation) or a School Leaving or Senior Certificate examination.

In both primary and secondary schools vocational guidance officers give advice and information on careers.

The Constitution of South Africa guarantees equal rights to both English and Afrikaans languages, and the two main principles for European schools are :-

- (a) A child shall be taught through the medium of his home language at least in the primary school.

(b) Every child shall learn a second language.

TECHNICAL COLLEGES.

Previously autonomous these institutions have now been taken over by the Union Department of Education as it was felt that a unified, co-ordinated system would better serve the rapidly expanding needs of commerce, mining and industry.

There are eleven technical colleges with 30 branches in the Union and the table below shows the growth in the number of students attending technical colleges.

TABLE. I (18)

GROWTH IN THE NUMBER OF FULL AND PART TIME STUDENTS IN TECHNICAL COLLEGES IN THE UNION.

<u>YEAR</u>	<u>FULL TIME</u>	<u>PART TIME</u>	<u>TOTAL</u>
1931	3,732	17,681	21,413
1940	5,681	20,479	26,160
1952	8,620	49,919	58,539
1955	9,159	53,380	62,539

TEACHER TRAINING.

Teachers in the Union are trained in Teachers Colleges under the Administration of the Provincial Education Departments, in the Faculties of Education of the Universities and for technical and vocational subjects, in the Technical Colleges.

UNIVERSITIES.

There are eight teaching Universities in the Union each conducting its own examinations. The University of South Africa is an examining body with an extensive division of external studies. Each University is an autonomous institution subsidised by the State to over 50 per cent of its annual expenditure.

TABLE 2. (6)

GROWTH IN THE NUMBER OF FULL AND PART TIME STUDENTS IN SOUTH AFRICAN UNIVERSITIES.

<u>YEAR</u>	<u>NUMBER OF STUDENTS.</u>
1920	2,946
1930	7,006
1940	11,220
1955	22,315
1956	23,353

SPECIAL EDUCATION AND OTHER SERVICES.

Provincial Education Departments maintain schools and institutions for the blind, the deaf and the dumb, for epileptics and the physically handicapped and for the mentally retarded.

Medical and psychological services ensure adequate medical inspection and referrals and guidance of backward and retarded children.

There is no reason to suppose that the distribution of intelligence in South African School children is anything but normal; there is certainly no reason to doubt that standards of instruction nor educational facilities are below standards set elsewhere, but it is true to say that a lovely climate providing ample opportunities for sport and outdoor activities is not generally conducive to close and sustained study. For this reason alone it may be that South African school children are below the academic level of their counterparts in Europe. This is most certainly true of University entrants, but only so because the absence of a School Certificate at a Higher level permits students to enter Universities at a relatively early age and with consequent lower academic standards.

INDIAN EDUCATION

The story of Indian Education in South Africa is really the story of Indian education in Natal.

Indian immigration began in the 1860's and the majority of the immigrants were employed as indentured labourers on the sugar farms of Natal.

From the day that the Reverend R. Stott opened a day school for the children of Indian settlers in 1869 until the Cape Town Agreement of 1927, the development of Indian education was slow and spasmodic. Despite the fact that facilities do not yet meet requirements, the development of Indian education in the last thirty-years has been phenomenal. Much of this development has been due to the unstinted efforts of the Indians themselves.

Their material development and closer contact with western culture has led to greater social integration of the Indian religious groups and to a breakdown of some of the traditional modes and taboos. The education of

women for instance is no longer frowned upon but rather encouraged and the professional working housewife is becoming commonplace. There is now little objection to the teaching of girls by men.

In the light of the present Apartheid laws it is interesting to note that in 1877 Indian children were permitted to attend European Schools and a few availed themselves of this opportunity. In fact in 1877 there were 8 Indian pupils attending the Durban Primary School.

In 1879 the Natal Government created the Indian Immigrant School Board to administer and make grants to Indian education generally.

In 1833 the sum of £15,000 was voted for this purpose and in 1881 a Mr. George Dunning had already been appointed Inspector of Indian Schools.

The Indian Immigrant School Board was abolished in 1894 and control of all Indian schools was taken over by the Natal Education Department.

The real advance in Indian education may be said to date from the Cape Town Agreement of 1927. A joint meeting of Deputations from the Government of India and the Union of South Africa met in Cape Town and amongst other things agreed that :-

"The Union Government recognises that the Indians domiciled in the Union who are prepared to conform to western standards of life should be enabled to do so."

A further clause stated that ".... and to accept the view that in the provision of educational and other facilities the considerable number of Indians who remain part of the permanent population should not be allowed to lag behind other sections of the people."

In May 1929 the Dyson Committee which had been appointed by the Provincial Executive Committee to investigate Indian education reported :-

- (a) That the existing facilities as a whole in town and country areas are inadequate for the reasonable needs of the Indian population.
- (b) That there is little left to be desired in the Government schools but that in the Government Aided Schools the general condition of the buildings and the status, salaries and methods of payment of Indian teachers are unsatisfactory.
- (c) That the grants-in-aid are inadequate on the present basis and certain changes are desirable.

Natal Education Ordinance No. 23 of 1942 made provision for the extension of free education for Indian children in Primary schools in yearly stages commencing with Class I in 1942 and consequently from the 1st January 1949, all primary pupils received free tuition in Indian schools.

The Director of Education in a Report in 1949 stated that secondary education was to become free in successive stages, i.e. no fees charged in Std. 7 and this to be extended by one additional standard each year until all classes in Indian secondary schools are free.

TABLE 3. (14)

TABLE SHOWING NUMBER OF PUPILS, TEACHERS AND EXPENDITURE
FROM 1927 to 1950.

	<u>No. of Schools.</u>	<u>Pupils.</u>	<u>Teachers.</u>	<u>Expenditure.</u> Rs.
1927	53	9,766	300	35,981
1937	107	22,669	640	96,095
1947	157	37,923	1,155	429,017
1950	1,656	1,349,254	33,316	6,610,000

Teacher Training.

In 1930 Sastri College opened in Durban as a combined High School and Training College.

In 1941 full-time teacher training classes were instituted at the Durban Indian Girls High School.

In August 1951 all teacher training classes transferred to Springfield Training College in Durban - a co-educational institution built to accommodate 240 students.

In 1955 the University of Natal instituted a Diploma in education for Indian and African students.

Technical Education.

In 1929 Evening Continuation classes were established by the Indian school teachers who formed a provisional committee. Teachers gave their services free.

The .L. Sultan Technical College was legally constituted in 1946 and classes were conducted in borrowed premises.

The M.L. Sultan Technical College Building was opened in 1956

TABLE 4. (14)

NUMBERS OF FULL AND PART TIME INDIAN STUDENTS ATTENDING TECHNICAL CLASSES IN NATAL.

1931	-	308
1937	-	485
1947	-	2,296
1957	-	4,911

University Education.

In 1934 it was decided by the Council of the Natal University College that provision be made for facilities for Non-Europeans, but in separate classes, that is the Non-European students were to be excluded from European

classes, from the library for European students and from other amenities.

TABLE 5.

NUMBER OF INDIAN STUDENTS ATTENDING THE UNIVERSITY OF NATAL.

1937	-	16
1947	-	213
1957	-	352

Such is the desire of the Indian population for education that despite the general level of poverty and the high incidence of disease the remarkable developments over the last three decades cannot satisfy the demand, and in order to partially meet this demand it has been found necessary to resort to the "platoon" system whereby one school building will house two schools, one attending in the morning and the other in the afternoon.

Up until 1955 Indian children could enter school at any age and it was not uncommon for boys of 18 and 19 to be in the same class as children of 10 and 12. According to Circular Minute 126/1954 priority of admission to Class I will be given to children of normal school age.

BANTU EDUCATION.

Pioneering in education amongst the indigenous people of South Africa was mainly the work of the Missionaries, and in fact until 1854 in the Cape, 1856 in Natal and 1903 in the Free State and Transvaal when Provincial Governments announced their willingness to subsidise Bantu education, the entire field of African education was controlled by the Missionaries.

In Natal in 1856 provision was made for £5,000 out of a Hut Tax of £10,000 to be allotted to African education and it was during this period that provisions were made for a Central Training School at Amansimtoti, now known as Adams College. Similar institutions were established at Inanda, Pietermaritzburg and Marianhill.

In 1883 the Native Primary Education Law shaped African education into a systemic whole and 1915 the South African native College at Fort Hare was opened.

The Minister of Education advised by the Union Advisory

Board on Native Education replaced the Minister of Native Affairs in control of financial matters affecting African education in 1945.

1946 saw the introduction of new salary scales for Bantu teachers, placing them in a relatively favourable position in their own community. For instance salaries for professional qualified teachers vary between £120 and £450 per annum for men and for women between £90 and £326 p.a. For professional unqualified teachers they vary between £48 and £44 annually for men and between £42 and £114 for women. Bantu Principals of schools are remunerated according to the grading of their schools and receive in addition to basic teachers salaries an amount of between £12 and £200 per annum. To all these salaries the usual cost of living allowance must be added.

The Bantu Education Act 1953 which came into force in 1954 made provision for the transfer of administration and control of Bantu education from Provincial administration to the Union Government.

In a statement by the Hon. Dr. H.F. Verwoerd, Minister of Native Affairs, in the Senate of Parliament of the Union of South Africa, 7th June 1954, the avowed aims of the Act were :-

- (a) It aims at freeing the mass of Bantu from their re-actionary conceptions - animism and witchcraft, certain phases of the cattle cult, the "doctoring" of lands as an alternative to proper cultivation and all the mass of primitive fears and taboos which are the real reason for backwardness.
- (b) It aims at proceeding from the foundations of Bantu Society giving the Bantu a pride in his own people and a desire to develop what is good in his own constitution.
- (c) It aims at making the educated Bantu a missionary to his own people, an instrument in advancing his material progress.

The Act recognises three types of schools :-

- (a) Bantu Community Schools under the control of a Bantu Authority of some kind.
- (b) Government Bantu schools either taken over from the Provinces or brought into existence by the Government.
- (c) State Aided Bantu schools.

Under the Bantu Education Amended Act 1956 a school shall not be registered if the Minister is satisfied that its establishment is not in the interests of the Bantu people or is likely to be detrimental to the physical mental or moral welfare of the pupils.

Curriculum.

The main accusation levelled against Bantu education in the past has been that it is too bookish and is insufficiently practical, and to meet this criticism, the Act

has divided the primary stage into two self-sufficient parts. Only children who have completed their seventh year will be allowed to enrol in the first course which "will include reading, writing and arithmetic through mother tongue instruction as well as knowledge of English and Afrikaans and the cardinal principles of the Christian religion."

The Bantu Education Journal, July 1955, gives as the aims of the Higher Primary School Course, "Intensified training on the foundations of the lower primary course so that the Bantu child will become a useful person capable of helping in the development of a progressive Bantu community on a Christian basis."

Arts and Crafts, tree planting, soil conservation, gardening and needlework for girls are included in the syllabus for Higher Primary education.

TABLE 6. (5)

TABLE SHOWING NUMBER OF BANTU SCHOOLS AND BANTU CHILDREN

1917 - 1956

<u>Year</u>	<u>Schools</u>	<u>Pupils.</u>	<u>Year.</u>	<u>Schools.</u>	<u>Pupils.</u>
1917	920	56,845	1945	4,373	587,586
1920	2,593	182,647	1950	5,213	746,324
1930	3,195	284,250	1953	5,602	858,079
1940	3,894	464,024	1956	6,000	1,100,000

TABLE 7. (5)

TABLE SHOWING EXPENDITURE ON BANTU EDUCATION1938 - 1954

<u>Year</u>	<u>Expenditure.</u> £.	<u>Year.</u>	<u>Expenditure.</u> £.
1938	798,583	1952	6,907,900
1943	1,425,902	1953	7,371,765
1948	4,689,271	1954	8,500,000
1949	5,452,752	1955	8,016,000
1950	5,748,525	1956	7,885,000
1951	5,973,386		

University Training.

The demand for University Training grows and the number of Bantu students at South African Universities has increased year by year.

The only University devoted entirely to the interests of non-whites is the South African Native College at Fort Hare. The Government however, is contemplating the establishment of additional Bantu Universities.

A special medical faculty at the University of Natal has recently been created for non-white students.

Bantu and other non-whites are also admitted to the Universities of Cape Town, Natal, Witwatersrand and the University of South Africa. No non-whites are enrolled at Rhodes University or at the University of the Orange Free State, Potchefstroom, Pretoria and Stellenbosch.

TABLE.8. (18)NUMBER OF BANTU STUDENTS ENROLLED IN UNIVERSITIES OF THE
UNION. 1951 - 1954.

<u>University</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
South Africa	434	484	505	1,086
Fort Hare	345	350	338	314
Witwatersrand	77	76	75	72
Natal	48	55	72	102
Cape Town	24	18	24	26

J.W. Macquarrie in Memorandum RB 225/57 of the South African Institute of Race Relations entitled, "The Implementation of the Bantu Education Act" has this to say on the qualifications of teachers demanded by the Act.

"A second and most far-reaching economy concerns the qualifications and consequently the remuneration of teachers. In education, quality is more important than quantity. By an arduous evolutionary process the professional quality of African teachers has gradually improved. Since the 1890's when little more than a Standard IV Certificate was required, the level has gradually risen until in the post war years, the Cape was able to make the Junior Certificate plus two years professional training the minimum requirement for male teachers and was well on the way to demanding the same

requirements for females.

Following the Eiselen report the Bantu Education Department has dismissed this as an expensive luxury, has lowered the minimum to a Standard VI education plus a three year course of training and has taken energetic steps to make this the normal qualification, particularly for female teachers. European education demands as a minimum qualification, the Senior Certificate plus two years of professional training."

HEALTH.

The registration of births and deaths although compulsory, is so haphazard amongst the Bantu and to a lesser degree, the Indians, that any deductions from statistical returns must be made with reservations and, at best, should only be taken to indicate general trends.

The intention of this chapter is to assess the general health standards of the three ethnic groups in order to arrive at some conclusions regarding the relative advantages one group may have over another in the performance of the tests used in the investigation.

The figures used are those issued by the Health Department of the City of Durban for 1957.

TABLE.9. (11)

MORTALITY RATES.

	<u>1956</u>		
	<u>Europeans.</u>	<u>Bantu.</u>	<u>Indians.</u>
Population	153,260	175,880	171,200
Deaths	1,373	3,430	1,661
Death Rate	8.96	19.5	9.7

1957.

	<u>Europeans.</u>	<u>Bantu.</u>	<u>Indians.</u>
Population	157,856	184,670	176,336
Deaths	1,409	4,212	1,732
Death Rate	8.92	22.81	9.8

MORTALITY RATES - ALL RACES. (11)1956.

	<u>1956</u>	<u>1957</u>
Population	519,600	538,698
Deaths	6,634	7,554
Death Rate	12.76	14.02

This over-all picture of deaths from all causes indicates that the Bantu immunity from disease, whatever the reasons, is not as great as either European or Indian. An indication of one cause may be contained in the following passage taken from the annual report of the Medical Officer of Health for Durban for 1956 with reference to the Bantu.

"Public health administration is difficult enough having regard to the adverse conditions under which slum-dwellers live, but when it has, in addition, to contend against such factors as ignorance, superstition, drunkenness, primitive practices, gambling, and the temptation of the hire-purchase system, its task becomes formidable,"

With reference to this investigation the fore-going passages may tend to give a wrong impression of the sample. Superficially the children gave no indication of being mal-nourished or disease ridden and it is the writer's opinion that health factors, whilst they must be considered, were not a major reason for any test score difference, due to the fact that in the main the pupils tested were not slum dwellers but the children of respectable Africans of the labouring class and in some cases, of professional and semi-professional people.

A more detailed analysis of death from specific causes follows:-

TABLE 10. (11)

EUROPEANS.

<u>DISEASE.</u>	<u>ALL AGES.</u>			<u>UNDER ONE YEAR.</u>		
	Male.	Female.	TOTAL.	Male.	Female.	TOTAL.
1. Tuberculosis						
(a) Pulmonary	12	5	17			
(b) Other forms	1	1	2			
2. Cancer	122	110	232			
3. Vascular lesions (Thrombosis)	65	98	163			
4. Arteriosclerosis	182	139	321			
5. Hypertension (all forms)	42	11	35			
6. Pneumonia	45	41	86	3	1	4
7. Enteritis	8	3	11			
8. Maternal deaths	-	-	-			
9. Birth Injuries	10	11	21			
10. Infection of New-born	8	6	14			
11. Other diseases of new-born	29	11	40			

TABLE.11.ILLIANS.ALL AGES.ALL AGES.UNDER ONE YEAR.

Male. Female. TOTAL. Male. Female. TOTAL

1.	Tuberculosis					
	(a) Pulmonary	20	12	32	1	-
	(b) Other forms	9	6	12		1
2.	Cancer	32	31	63		1
3.	Vascular Lesions					
	(Thrombosis)	89	64	153	1	1
4.	Arteriosclerosis	82	47	129		
5.	Hypertension					
	(all forms)	32	33	65		
6.	Pneumonia	169	151	320	47	46
7.	Enteritis	61	57	118	36	35
8.	Maternal deaths	-	15	15		
9.	Birth Injuries	11	21	32	11	21
10.	Infection of New-born	29	24	53	29	24
11.	Other diseases of New-born	58	37	95	58	37

TABLE 12. (11)

BANTU.

<u>DISEASE.</u>	<u>ALL AGES.</u>			<u>UNDER ONE YEAR.</u>		
	Male.	Female.	Total	Male.	Female.	TOTAL
1. Tuberculosis						
(a) Pulmonary	124	72	196	2	4	6
(b) Other forms	36	34	70	5	9	14
2. Dysentery	79	41	120	4	6	10
3. Pneumonia	388	412	800	199	220	419
4. Enteritis	611	517	1,128	408	355	766
5. Maternal Deaths	-	8	8	-	-	-
6. Birth Injuries	140	104	244	140	104	244
7. Infection of New-born	99	74	173	99	74	173
8. Other diseases of New-born	138	97	235	138	97	235

From an analysis of these figures it can be seen that :-

- (a) Infant mortality rates from all causes (Europeans 75, Indians 80, Bantu 652) show the tremendous preponderance of Bantu infant mortality.
- (b) The three diseases causing most death amongst Europeans (Cancer 232, Arteriosclerosis 321, and Vascular lesions or Thrombosis 163) seem to indicate a psychosomatic origin and owe little or nothing to poor conditions of living.
- (c) The four diseases causing most deaths amongst Indians (Thrombosis 153, Pneumonia 320, Arteriosclerosis 129, and Enteritis 118) would seem to stem from insanitary conditions, anxiety and low resistance to disease, probably caused by the abnormal hard work that the average Indian has to perform to maintain a reasonable standard of living.
- (d) The three main causes of death amongst the Bantu (Enteritis 1,182, Pneumonia 800 and Pulmonary Tuberculosis 196) seem to be due entirely to low physical standards of living and to poor resistance to disease.

From these comparative figures it would seem that both Indian and Africans in Durban do not maintain such a high standard of health as do the Europeans and it would therefore be fair to assume that in the matter of intelligence testing, the European has a distinct advantage.

DESCRIPTION OF THE SCHOOLS INVOLVED.

EUROPEAN GROUP.

In this group three Durban schools were used.

(a) Durban North Primary School

An English-medium school of 835 pupils and a staff of 27 plus the Principal. Situated in a pleasant residential area of Durban North. Most of the children come from professional homes, doctors, lawyers, dentists, business men, with a small sprinkling of children from artisan homes. The school is situated on a site of six acres and has two football pitches, two tennis courts, and a F.T. shelter.

(b) Northlands Primary School.

A new English-medium school opened in 1957 also situated in the residential area of Durban North. The number on the roll is 670; it has 22 teachers in addition to the Principal. Children are again drawn mainly from the professional classes with perhaps a larger proportion than the previous school of children drawn from a social group lower than the professional classes, e.g. chief clerks, foremen, and well-paid artisans.

The school has $3\frac{1}{2}$ acres of land with ample provision for playing fields.

(c) Morningside Primary School.

Opened in 1929 and situated on the Berea, again in a good residential district. There are 357 pupils in the school and a staff of 11 in addition to the Principal. There is a tendency for the professional type of person to send their children to Standard I and thereafter to send them to a different school.

By and large the parents are salaried people, clerks, artisans, etc. The school is situated on 6 acres of ground with plenty of provision for games and recreation.

INDIAN GROUP

Three schools were used.

(a) Springfield Model.

Situated in the peri-urban area of Durban and used as practising school for the Springfield Training College for Indian teachers. The pupils were fully conversant with English and were well used to test and examination situations. The school opened in 1956, is a two-storeyed building with no playing fields and the minimum space for recreation. The surrounding country is open and quite pleasant.

The school has 693 pupils and is administered and

taught by a Principal and 18 teachers. Socially, the pupils are a mixed group and although a few of the parents are professional people most of them are from the poorer Indian classes.

On the whole nutritional standards were high and the children seemed well clothed and tidy.

In a school population of nearly 700 there were 30 Muslims, 50 Christians and the remainder, Hindu.

(b) Kathiawad Primary School.

Situated almost in the centre of the city of Durban, this school was founded and largely maintained by a Hindu linguistic group - the Kathiawad. They are predominantly business people and generally speaking are wealthy. They tend to be somewhat conservative in outlook and maintain closer social contacts with India than do other groups. It was, for instance, the custom to send the daughters to India to be married.

They appear to be an urban flat dwelling group, closely bound up with the business and economic life of the city.

The school has about 500 pupils and a staff of 12 plus the Principal. There are no playing or recreational facilities whatsoever.

(c) Stella Hill Primary School.

A platoon school situated in the outskirts of Durban, adjoining Cato Manor, a notorious African and Indian slum area.

The school was founded in 1906 and most of the school still comprises the original corrugated tin building. A new brick wing including the Principal's office and another small brick building which the staff themselves are helping to build, have added greatly to the amenities. The morning school, in which the testing for this investigation was done, has 504 pupils with 18 staff and a Principal.

The children are mainly Hindu (50 Christians and 5 Muslims) and are drawn from a predominantly labouring class, gardeners, labourers, laundry workers, etc. There is a high incidence of malnutrition in this group, although the school maintains a voluntary meal service which no doubt partly allays the worst effect of malnutrition.

AFRICAN GROUP.

Two schools were used in this group, one predominantly urban, the other rural.

(a) Skukuleni Primary School.

A somewhat austere barrack type of school built in

1954. There are 775 children on the roll. The staff consists of 18 teachers and a Principal. The school is situated in Lamontville, an African suburb on the southern aspect of Durban and about 5-6 miles from the centre. It lies close to factory areas of Durban and the parents of the children in the school are mostly employed in these factories. Some of the parents are clerks, nurses and teachers.

The children are mostly Zulus with a sprinkling of Basutos, Xhosas and Tongas. There seemed to be no apparent evidence of malnutrition or poverty and the children were cheerful and co-operative if somewhat engagingly shy.

The school has three acres of land and includes a football pitch. Extra-mural activities include Scouts and Guides and singing teams. All the children in the school were born in the area and are thoroughly urban with no first hand knowledge of rural African life.

(b) Ohlange Institute.

Founded by Dr. John Langalibelele Dube of the Amaqadi tribe in 1899 for the education of African boys and girls.

Ohlange is one of the oldest and best known African schools in Natal. It is a boarding-cum-day school with 617 children on the roll. Including the Principal there are 14 members of staff to teach this number.

The High School consists of 420 children with a staff of 18 including 3 technical teachers.

It is an interdenominational institution including Catholics, Anglican, Wesleyan, Full Gospel, American Board and followers of Shembe.

Uhlanga is some sixteen miles from Durban and most parents commute daily between home and Durban. They are mostly labourers and the majority are poor.

The High School is housed in a modern brick building but the primary section consists of a large dilapidated tin building consisting of one large gloomy room in which as many as three classes work without the benefit of even a partition.

There are amply facilities for games including soccer, net-ball, tennis and quoits.

Most of the sample tested were day children who, despite the handicaps under which they worked, maintained the traditional good humour and natural charm of the African.

Because of its (the school) rural setting, the children seemed rather less sophisticated than their counterparts in Ukukuleni and rather more subdued in the test situation. Their knowledge of English too was scanty.

THE EXPERIMENT.

THE DESIGN OF THE EXPERIMENT.

1. The experimental design for each ethnic group is as shown diagrammatically below :-

GROUP	SUB GROUP	N	INITIAL TEST		FINAL TEST
COACHED	A	75	NON-VERBAL 1	COACHING	NON-VERBAL 2
	B	75	NON-VERBAL 2		NON-VERBAL 1
CONTROL	A	75	NON-VERBAL 1	-	NON-VERBAL 2
	B	75	NON-VERBAL 2		NON-VERBAL 1

In each ethnic group it was decided that there would be a coached and a control group of 150. The coached and control groups were divided into two halves, A and B, consisting of 75 each. This division enabled the two non-verbal tests to be switched around and took care of possible differences in the test.

The tests used were non-verbal test 1 and Test 2 of the National Foundation of Education Research, prepared by Lee and Jenkins (see appendix 2). Both tests are designed

for pupils in the age-range 10 to 12 inclusive. Procedure 11 i.e. without preliminary test, was adopted.

The Standardised scores on both tests have a mean of 100 and a standard deviation of 15.

The Reliability Co-efficient of Test 1 is .95, and of Test 2 .92.

The coached groups were given the initial test and one week later were coached for one half hour in the principles involved in the first half of the test they had already completed.

A week later a second coaching period of onehalf hour on the same lines was given and the final test administered in the third week.

The control group was given an initial test and three weeks later, the final test.

With an 150 scripts needed for the first test and 150 scripts for the final test, it can be seen that 600 scripts were needed for each ethnic group and a total of 1800 for the whole experiment.

THE COACHING.

The coaching for the Europeans and Indians was carried out by the writer. For the Africans, the principles involved were explained to two African teachers. They in turn,

first read out the general instructions in English and then translated into Zulu. The actual coaching was carried out in Zulu. In all cases the same procedure was followed. The teacher explained a few of the first items, for the remainder, active class participation was encouraged through question and answer and where necessary the blackboard was used.

There was no doubt in both the Indian and African groups, that all, at least understood what was required of them.

For each group it was planned that the distribution should be as shown. Owing to absences and for other reasons, all the 150 were not finally available and the actual number tested will be seen in the presentation of the results later.

EUROPEANS.COACHED GROUP.INITIAL TEST.

A	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	1
B	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	2

FINAL TEST.

A	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	2
B	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	1

CONTROL GROUP.INITIAL TEST.

A	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	1
B	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	2

FINAL TEST.

A	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	2
B	15	MORNINGSIDE	NON
	30	DURBAN NORTH	VERBAL
	30	NORTHLANDS	1

INDIANS.COACHED GROUP.INITIAL TEST.

A	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	1
B	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	2

FINAL TEST.

A	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	2
B	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	1

CONTROL GROUP.INITIAL TEST.

A	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	1
B	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	2

FINAL TEST.

A	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	2
B	25	SPRINGFIELD	NON
	25	KATHIAWAD	VERBAL
	25	STELLA HILL	1

AFRICANS.COACHED GROUPINITIAL TEST.

A	35	EKUKULENI	NON VERBAL 1
	40	OHLANGE	
B	35	EKUKULENI	NON VERBAL 2
	40	OHLANGE	

FINAL TEST.

A	35	EKUKULENI	NON VERBAL 2
	40	OHLANGE	
B	35	EKUKULENI	NON VERBAL 1
	40	OHLANGE	

CONTROL GROUPINITIAL TEST.

A	40	EKUKULENI	NON VERBAL 1
	35	OHLANGE	
B	40	EKUKULENI	NON VERBAL 2
	35	OHLANGE	

FINAL TEST.

A	40	EKUKULENI	NON VERBAL 2
	35	OHLANGE	
B	40	EKUKULENI	NON VERBAL 1
	35	OHLANGE	

EUROPEANS.

This section contains :-

1. The scores (IQ's) of the Experimental and Control groups of Test 1 and Test 2.
2. Test of Significance for :-
 - (i) Difference between means of Test 1 and Test 2 of Experimental and Control groups.
 - (ii) Difference between means of Experimental and Control groups.
3. Frequency Distributions for Test 1 and Test 2 of the Experimental and Control groups.
4. Frequency Polygons for Test 1 and Test 2 of the Experimental and Control groups.

All this information is repeated for the following groups :-

- (a) Experimental Group - Boys
Control Group - Boys
 - (b) Experimental Group - Girls
Control Group - Girls
 - (c) Experimental Group - Upper I_q's
Control Group - Upper I_q's
 - (d) Experimental Group - Lower I_q's
Control Group - Lower I_q's
5. Conclusions.

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EUROPEANS

EXPERIMENTAL GROUP

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
1	G	115	119	31	B	91	109	61	B	114	135
2	G	98	103	32	B	101	124	62	G	95	120
3	B	95	117	33	G	77	91	63	B	107	117
4	B	109	126	34	B	102	114	64	B	80	81
5	B	77	95	35	B	100	119	65	G	113	128
6	G	94	95	36	B	97	131	66	G	108	106
7	B	111	122	37	B	100	108	67	B	107	121
8	B	93	92	38	G	105	100	68	B	105	114
9	B	94	105	39	B	112	133	69	B	110	128
10	G	99	106	40	B	103	105	70	G	113	121
11	B	113	129	41	B	89	90	71	G	126	135
12	B	106	113	42	B	108	123	72	G	115	119
13	B	107	110	43	G	125	136	73	B	114	120
14	B	111	126	44	B	100	113	74	G	114	126
15	B	81	78	45	B	119	126	75	B	119	128
16	B	112	134	46	G	109	124	76	B	98	116
17	B	109	118	47	B	117	129	77	B	114	129
18	G	88	88	48	G	113	123	78	B	99	116
19	B	100	113	49	B	111	114	79	B	93	95
20	B	96	102	50	B	94	98	80	B	113	121
21	B	98	110	51	B	99	110	81	G	117	126
22	G	94	110	52	B	82	83	82	G	111	131
23	B	90	94	53	B	106	116	83	B	104	104
24	G	115	139	54	B	102	124	84	B	104	107
25	B	106	121	55	B	113	122	85	B	97	100
26	B	89	96	56	G	103	120	86	G	109	125
27	B	113	122	57	B	120	131	87	B	103	122
28	B	120	112	58	B	109	118	88	B	109	121
29	B	99	109	59	G	107	120	89	B	99	113
30	B	109	118	60	G	104	116	90	B	120	121

EXPERIMENTAL GROUP (CONTD.)

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
91	B	108	113	121	G	90	110				
92	B	97	119	122	G	97	121				
93	B	119	129	123	B	127	137				
94	B	108	119	124	G	109	120				
95	G	102	101	125	B	106	128				
96	B	113	128	126	G	107	116				
97	B	109	122	127	B	104	99				
98	G	81	96	128	G	111	115				
99	B	98	100	129	G	101	98				
100	B	115	136	130	B	106	111				
101	G	96	102	131	G	106	105				
102	B	104	108	132	G	102	118				
103	B	94	103	133	B	104	117				
104	B	124	134	134	B	106	118				
105	G	119	115	135	B	98	108				
106	B	106	120	136	G	123	126				
107	G	112	125	137	G	109	110				
108	B	81	84	138	G	112	136				
109	B	95	121	139	B	121	129				
110	G	90	99	140	G	104	125				
111	G	101	115	141	B	106	112				
112	G	100	115	142	B	105	115				
113	G	112	119	143	G	130	135				
114	B	95	108								
115	B	115	134								
116	G	106	105								
117	G	110	116								
118	G	110	123								
119	B	112	129								
120	B	119	133								

CONTROL GROUP

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
1	B	97	101	31	B	92	93	61	G	91	97
2	G	102	114	32	B	101	103	62	G	112	117
3	B	108	111	33	B	112	130	63	G	122	129
4	G	119	120	34	G	97	96	64	B	79	85
5	B	82	85	35	B	97	101	65	B	90	82
6	B	101	110	36	B	91	122	66	G	92	102
7	G	94	107	37	G	82	82	67	B	92	103
8	B	106	113	38	B	80	103	68	G	103	112
9	G	105	117	39	B	101	128	69	B	110	123
10	B	115	132	40	B	118	122	70	G	110	109
11	B	111	116	41	B	91	97	71	B	94	103
12	B	128	135	42	B	95	113	72	B	74	97
13	B	93	97	43	G	84	86	73	G	99	101
14	B	96	100	44	G	100	114	74	G	99	103
15	B	98	115	45	B	99	95	75	B	81	88
16	B	103	120	46	B	97	104	76	B	103	106
17	B	103	96	47	B	118	123	77	B	112	131
18	G	97	96	48	B	115	130	78	B	78	91
19	B	116	120	49	B	97	117	79	B	116	117
20	G	86	97	50	B	109	121	80	B	105	115
21	B	83	86	51	G	109	112	81	B	108	127
22	B	82	97	52	B	89	105	82	B	121	119
23	G	97	107	53	G	103	105	83	B	70	76
24	G	84	96	54	G	116	111	84	B	92	98
25	B	109	114	55	B	117	121	85	B	84	87
26	B	114	127	56	B	100	124	86	G	87	87
27	G	115	132	57	G	96	99	87	B	123	134
28	B	96	105	58	B	109	114	88	B	99	114
29	B	111	112	59	G	88	101	89	G	93	104
30	G	100	113	60	G	115	116	90	G	94	97

CONTROL GROUP.

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
91	B	107	109	121	B	95	103				
92	G	86	96	122	G	103	107				
93	B	113	132	123	G	111	127				
94	B	101	100	124	B	118	124				
95	G	109	117	125	B	110	129				
96	B	122	127	126	B	110	111				
97	B	102	111	127	B	97	97				
98	B	100	112	128	B	120	126				
99	B	116	120	129	B	110	116				
100	B	93	96	130	B	103	106				
101	G	96	100	131	B	81	84				
102	B	102	116	132	G	106	105				
103	G	88	91	133	G	108	114				
104	G	108	102								
105	B	104	107								
106	B	103	106								
107	G	113	119								
108	B	103	104								
109	B	111	114								
110	G	89	107								
111	B	88	94								
112	B	111	112								
113	G	98	100								
114	B	103	102								
115	B	111	116								
116	B	109	126								
117	B	117	121								
118	G	111	115								
119	B	96	100								
120	B	95	107								

EUROPEANS.1. EXPERIMENTAL GROUP.Difference between Means of Test 1 and Test 2.

<u>GROUP.</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
EXPERIMENTAL	143	105.06	115.66	10.6

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E. Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	10.45	.87	10.6	.62	.82	17.1	Yes.
Test 2.	12.85	1.08					

2. CONTROL GROUP.Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Control	133	101.34	108.73	7.39

Tests of Significance of Difference between Means of Test 1 and Test 2.

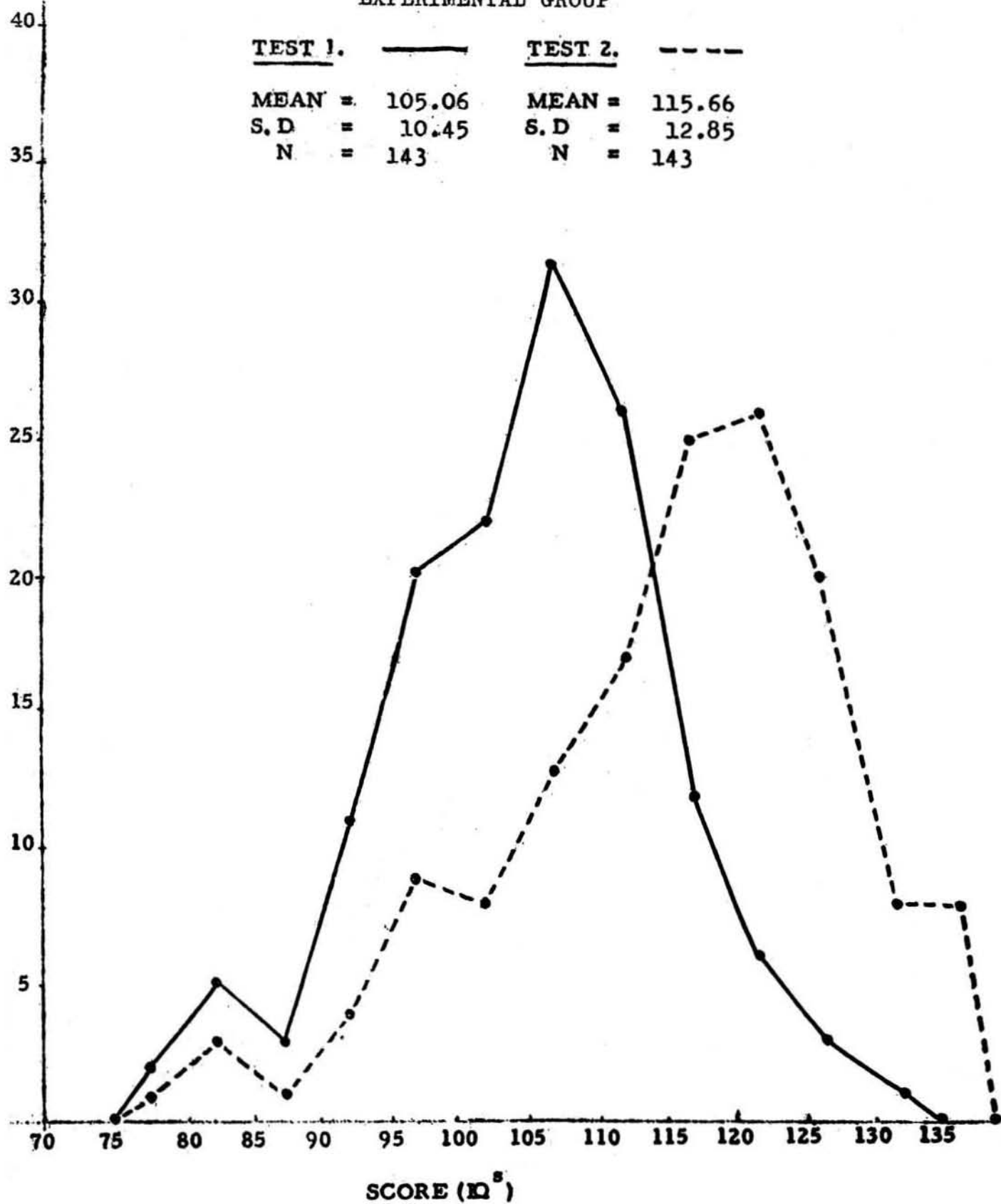
<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E. Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	12	1.04	7.39	16	.84	12.3	Yes.
Test 2.	12.6	1.08					

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP.</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.-T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	143	6.8	.57	10.6		
Control	133	6.4	.55	7.39	4.1	Yes.

EUROPEANSEXPERIMENTAL GROUP

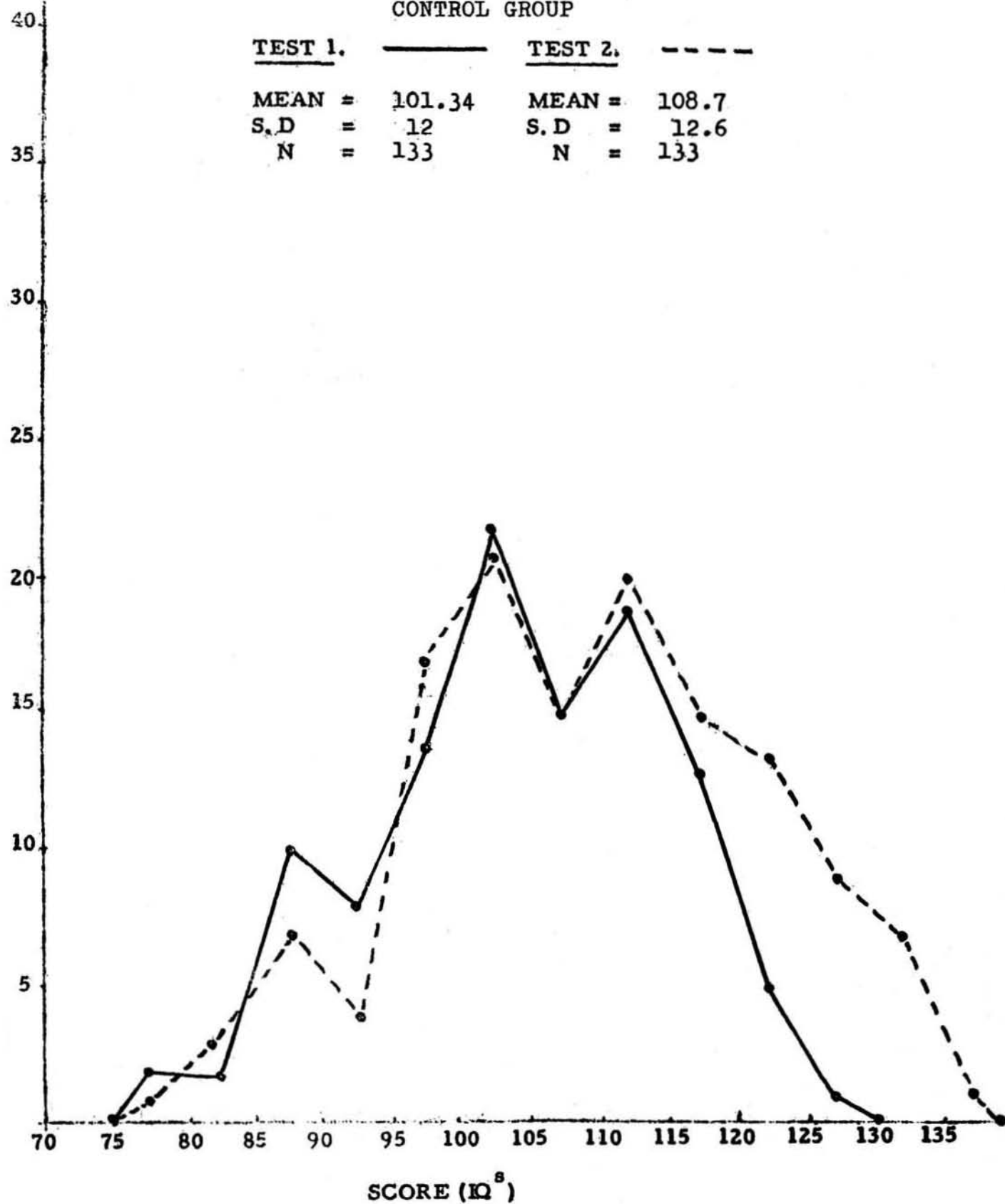
<u>TEST 1.</u>	<u>TEST 2.</u>
MEAN = 105.06	MEAN = 115.66
S. D = 10.45	S. D = 12.85
N = 143	N = 143



EUROPEANS

CONTROL GROUP

<u>TEST 1.</u>	<u>TEST 2.</u>
MEAN = 101.34	MEAN = 108.7
S.D = 12	S.D = 12.6
N = 133	N = 133



1. EXPERIMENTAL (BOYS)Difference between Means of Test 1 and Test 2.

<u>GROUP.</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Experimental	92	104.54	115.65	11.11

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	10.2	1.06	11.11	.77	.79	14.4	Yes.
Test 2.	12.3	1.3					

2. CONTROL GROUP (BOYS)Difference between Means of Test 1 and Test 2.

<u>GROUP.</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Control	89	101.82	109.90	8.08

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	11.25	1.2	8.08	.8	.82	10.1	Yes.
Test 2.	13.05	1.4					

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>Group</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.- T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	92	6.7	.7	11.11		
Control	89	5.05	.63	8.08	3.3	Yes.

Experimental Group - Boys.TEST 1.

<u>Iq.</u>	<u>f.</u>
125 - 129	1
120 - 124	5
115 - 119	8
110 - 114	14
105 - 109	22
100 - 104	14
95 - 99	14
90 - 94	7
85 - 89	2
80 - 84	4
75 - 79	1

N. = 92
 M. = 104.54
 S.D. = 10.2

TEST 2.

<u>Iq.</u>	<u>f.</u>
135 - 139	3
130 - 134	7
125 - 129	13
120 - 124	17
115 - 119	14
110 - 114	13
105 - 109	9
100 - 104	4
95 - 99	5
90 - 94	3
85 - 89	0
80 - 84	3
75 - 79	1

N. = 92
 M. = 115.65
 S.D. = 12.35

Control Group - Boys.TEST 1.

<u>Iq.</u>	<u>f.</u>
125 - 129	1
120 - 124	4
115 - 119	10
110 - 114	13
105 - 109	9
100 - 104	16
95 - 99	14
90 - 94	9
85 - 89	2
80 - 84	7
75 - 79	2
70 - 74	2

N. = 89
 M. = 101.82
 S.D. = 11.25

TEST 2.

<u>Iq.</u>	<u>f.</u>
135 - 139	1
130 - 134	6
125 - 129	7
120 - 124	12
115 - 119	9
110 - 114	13
105 - 109	8
100 - 104	13
95 - 99	9
90 - 94	3
85 - 89	5
80 - 84	2
75 - 79	1

N. = 89
 M. = 109.9
 S.D. = 13.65

E U R O P E A N S

EXPERIMENTAL GROUP - BOYS

TEST 1.

————

TEST 2.

MEAN = 104.54

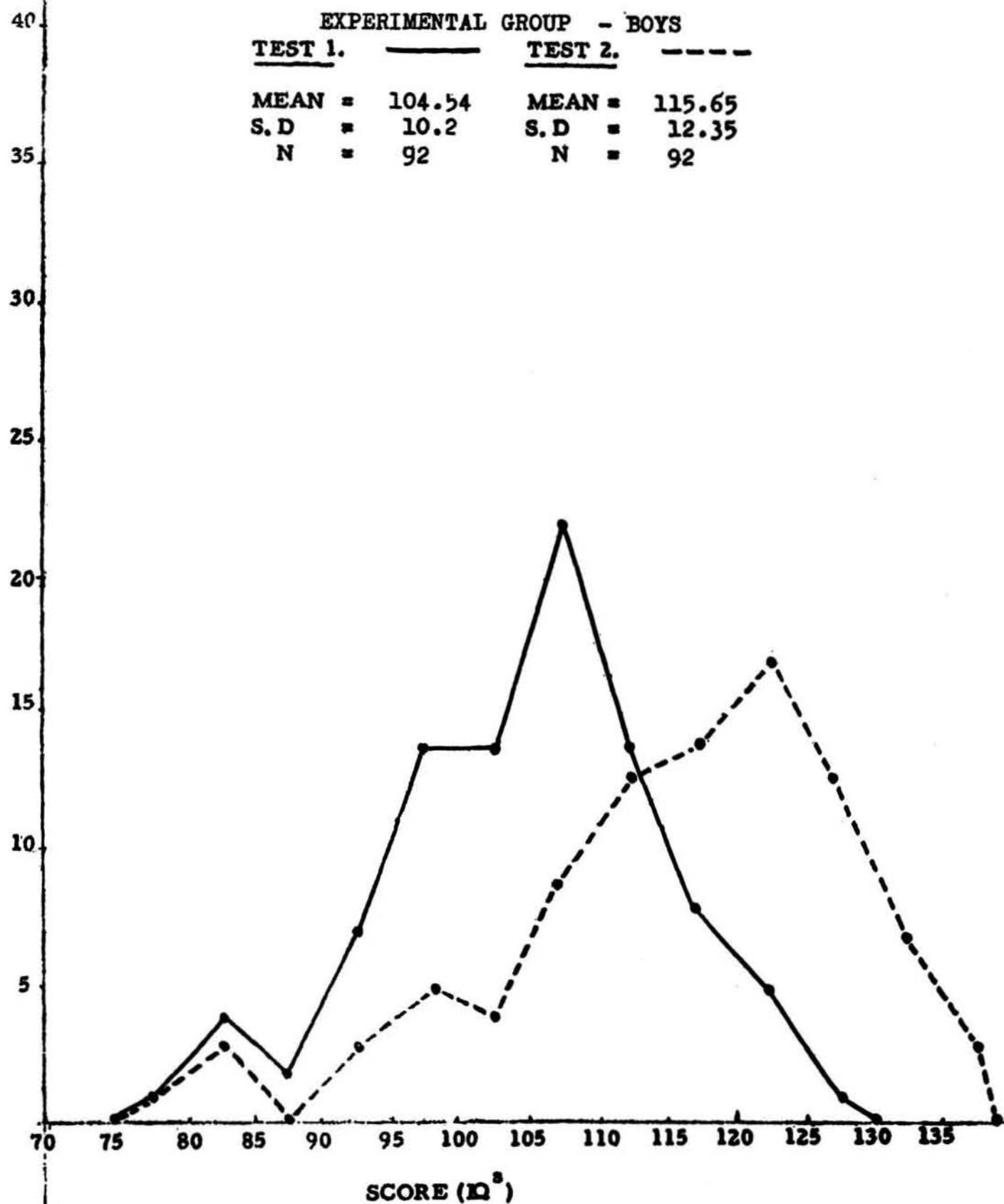
MEAN = 115.65

S.D = 10.2

S.D = 12.35

N = 92

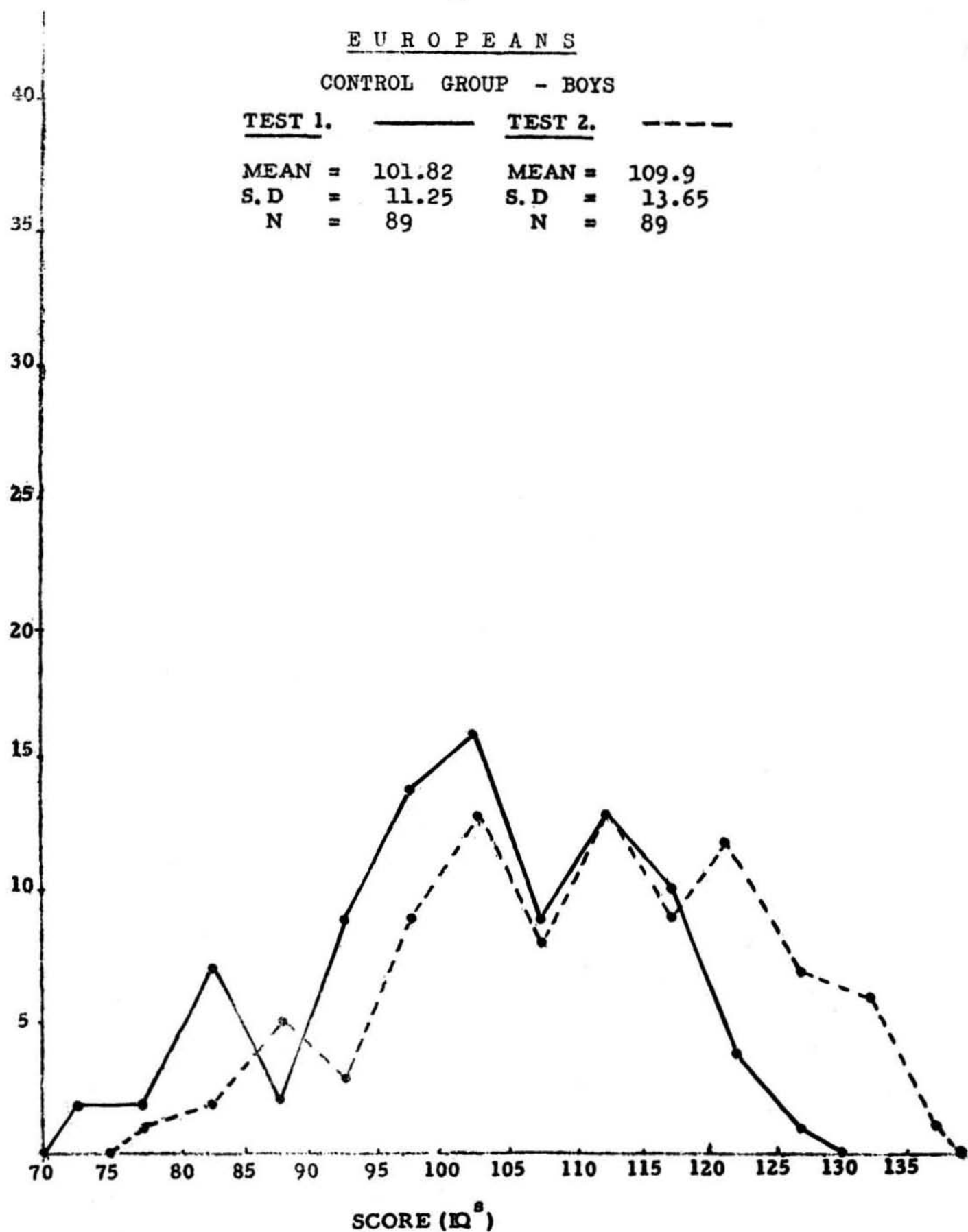
N = 92



EUROPEANS

CONTROL GROUP - BOYS

<u>TEST 1.</u>	<u>TEST 2.</u>
MEAN = 101.82	MEAN = 109.9
S.D = 11.25	S.D = 13.65
N = 89	N = 89



1. EXPERIMENTAL (GIRLS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Experimental	51	106.00	116.5	10.5

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.E.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	10.8	1.5					
			10.5	1.09	.76	9.6	Yes.
Test 2.	11.85	1.6					

2. CONTROL GROUP (GIRLS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Control	44	100.38	106.34	5.96

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.E.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	10.55	1.6					
			5.96	.81	.87	7.3	Yes.
Test 2.	10.65	1.6					

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP.</u>	<u>N.</u>	<u>S.E.</u>	<u>S.E.</u>	<u>T.1.- T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	51	7.1	1	10.5		
Control	44	5	.77	5.96	3.6	Yes.

Experimental Group - Girls.TEST 1.

<u>IQ.</u>		<u>f.</u>
130 - 134	-	1
125 - 129	-	2
120 - 124	-	1
115 - 119	-	5
110 - 114	-	11
105 - 109	-	10
100 - 104	-	8
95 - 99	-	6
90 - 94	-	4
85 - 89	-	1
80 - 84	-	1
75 - 79	-	1
		<hr/>
N. =		51
M. =		106.00
S.D. =		10.8

TEST 2.

<u>IQ.</u>		<u>f.</u>
135 - 139	-	5
130 - 134	-	1
125 - 129	-	7
120 - 124	-	9
115 - 119	-	11
110 - 114	-	4
105 - 109	-	4
100 - 104	-	4
95 - 99	-	4
90 - 94	-	1
85 - 89	-	1
		<hr/>
N. =		51
M. =		115.74
S.D. =		12.25

Control Group - Girls.TEST 1.

<u>IQ.</u>		<u>f.</u>
120 - 124	-	1
115 - 119	-	4
110 - 114	-	5
105 - 109	-	6
100 - 104	-	6
95 - 99	-	8
90 - 94	-	5
85 - 89	-	6
80 - 84	-	3
		<hr/>
N. =		44
M. =		100.38
S.D. =		10.55

TEST 2.

<u>IQ.</u>		<u>f.</u>
130 - 134	-	1
125 - 129	-	2
120 - 124	-	1
115 - 119	-	6
110 - 114	-	7
105 - 109	-	7
100 - 104	-	8
95 - 99	-	3
90 - 94	-	1
85 - 89	-	2
80 - 84	-	1
		<hr/>
N. =		44
M. =		106.34
S.D. =		10.65

EUROPEANS

EXPERIMENTAL GROUP - GIRLS

TEST 1.

————

TEST 2.

MEAN = 106

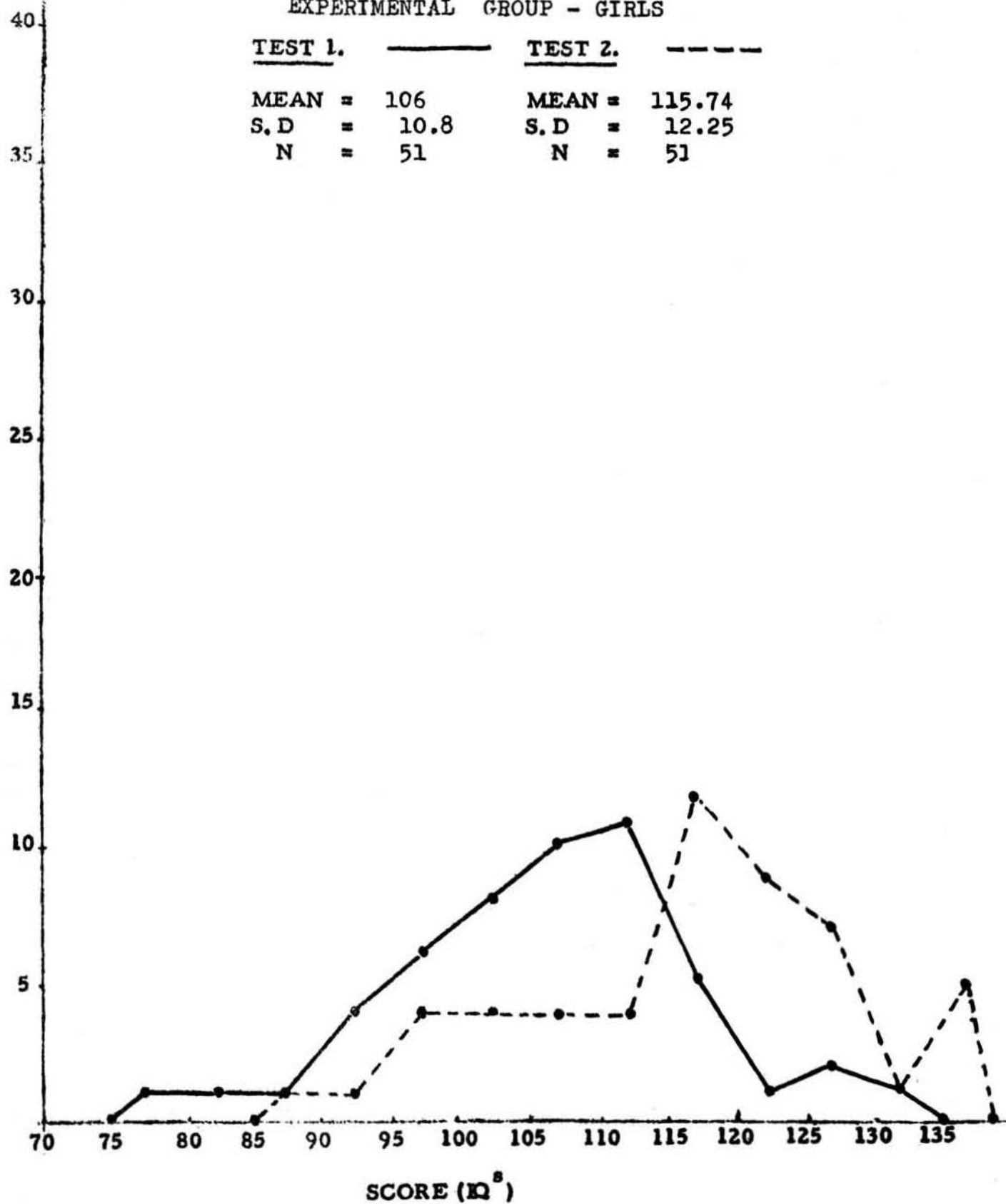
MEAN = 115.74

S.D = 10.8

S.D = 12.25

N = 51

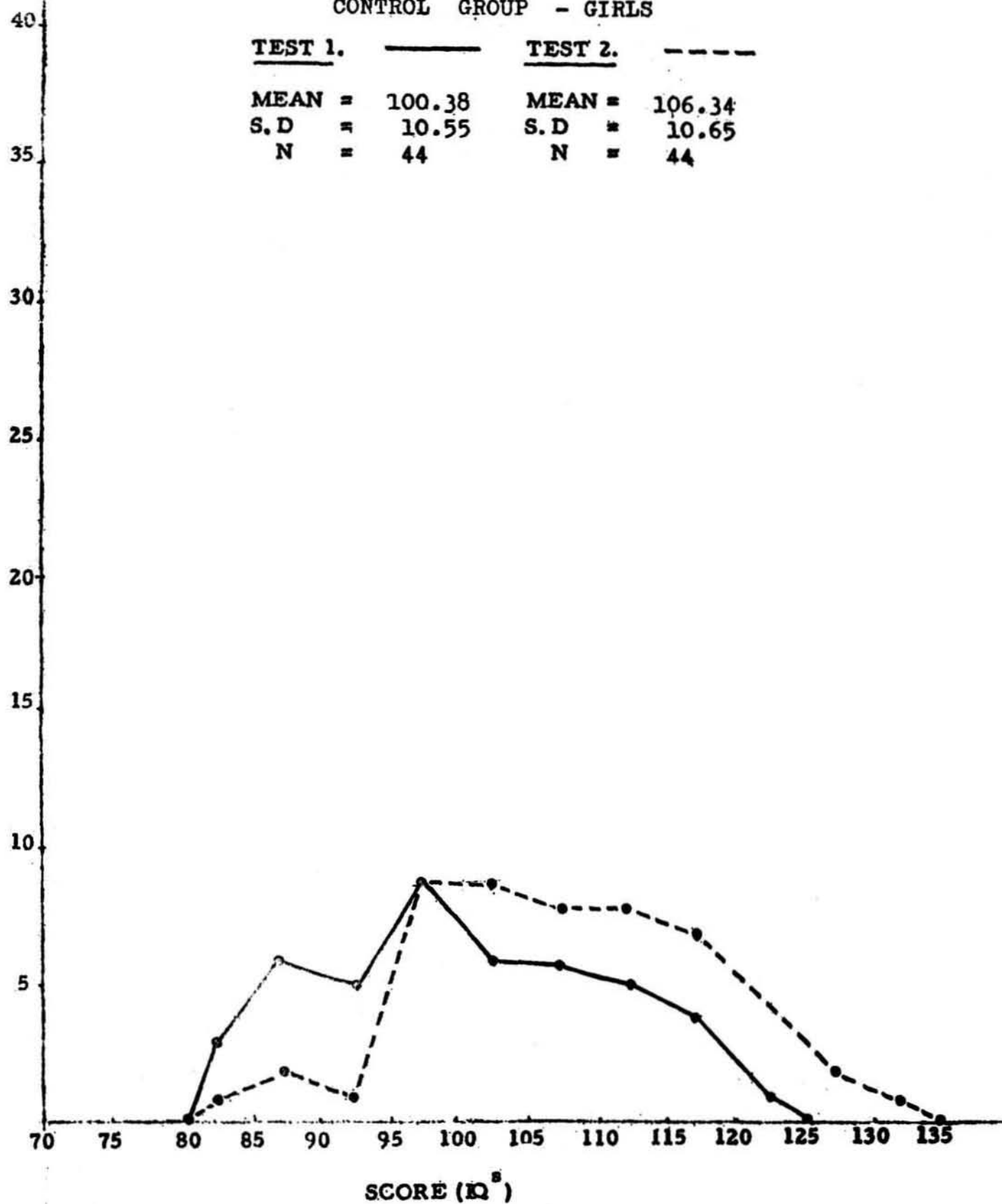
N = 51



EUROPEANS

CONTROL GROUP - GIRLS

<u>TEST 1.</u>	<u>TEST 2.</u>
MEAN = 100.38	MEAN = 106.34
S.D = 10.55	S.D = 10.65
N = 44	N = 44



1. EXPERIMENTAL UPPER IQ's.Difference between Means of Test 1 and Test 2.

<u>GROUP.</u>	<u>N.</u>	<u>Mean.T.</u>	<u>Mean.T.</u>	<u>Difference.</u>
Experimental	102	110.16	120.53	10.37

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	6.7	.67					
			10.37	.7	.64	14.8	Yes.
Test 2.	9	.9					

2. CONTROL UPPER I.Q.'s.Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Control	74	109.85	116.21	6.36

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	6.6	.76					
			6.36	1.36	.61	4.6	Yes.
Test 2	8.95	1.04					

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.- T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	102	6.2	.62	10.37		
Control	74	5.65	.66	6.36	4.4	Yes.

Experimental Group - Upper Iq's.

<u>TEST 1.</u>				<u>TEST 2.</u>			
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>
130	- 134	-	1	135	- 139	-	8
125	- 129	-	3	130	- 134	-	7
120	- 124	-	6	125	- 129	-	20
115	- 119	-	12	120	- 124	-	22
110	- 114	-	26	115	- 119	-	21
105	- 109	-	32	110	- 114	-	12
100	- 104	-	22	105	- 109	-	7
				100	- 104	-	5
	N. -		102		N. -		102
	M. -		110.16		M. -		120.53
	S.D. -		6.7		S.D. -		9

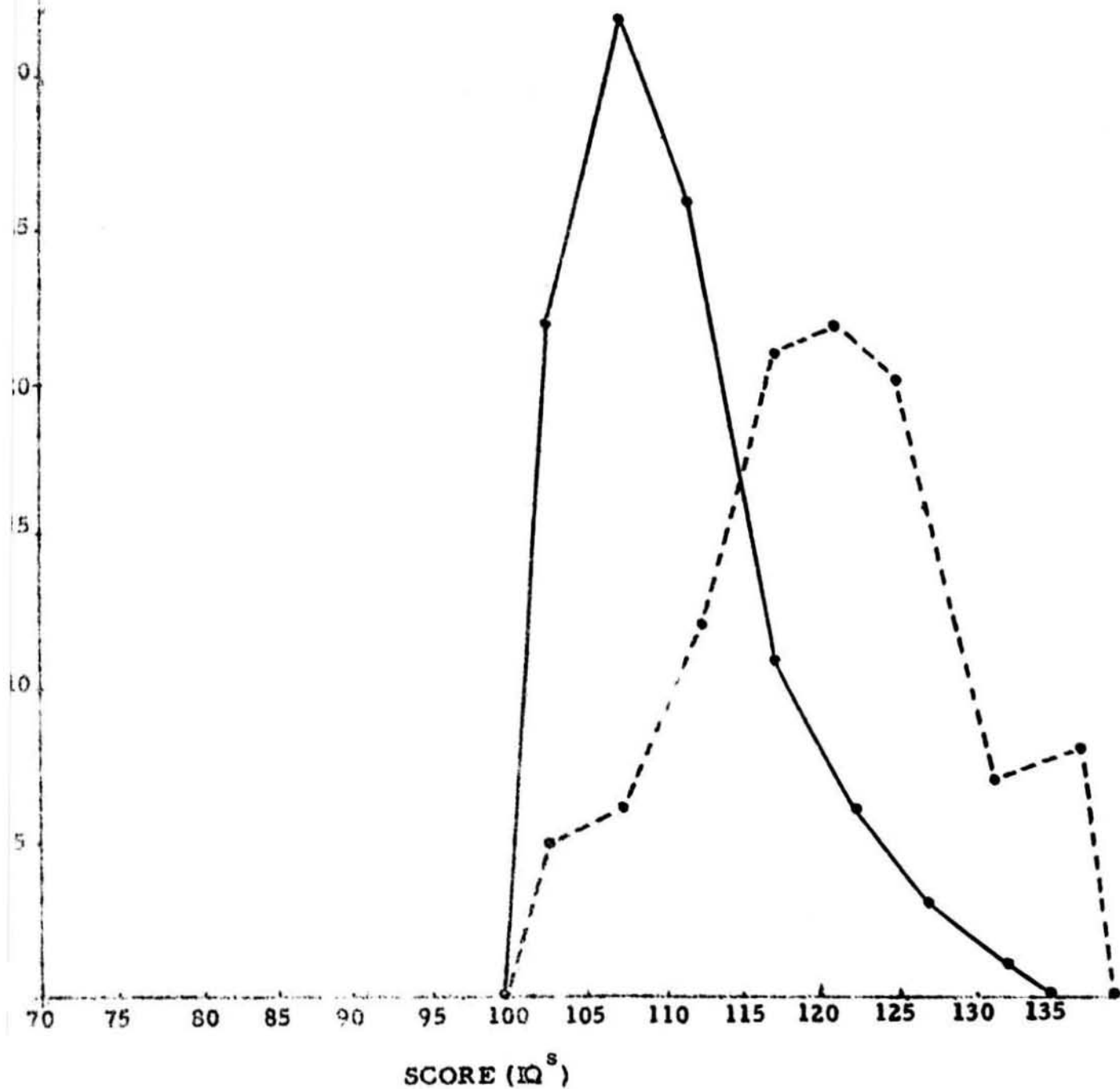
Control Group - Upper Iq's.

<u>TEST 1.</u>				<u>TEST 2.</u>			
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>
125	- 129	-	1	130	- 134	-	8
120	- 124	-	5	125	- 129	-	9
115	- 119	-	14	120	- 124	-	11
110	- 114	-	18	115	- 119	-	13
105	- 109	-	15	110	- 114	-	18
100	- 104	-	21	105	- 109	-	10
				100	- 104	-	5
	N. -		74		N. -		74
	M. -		109.85		M. -		116.21
	S.D. -		6.6		S.D. -		8.95

EUROPEANS

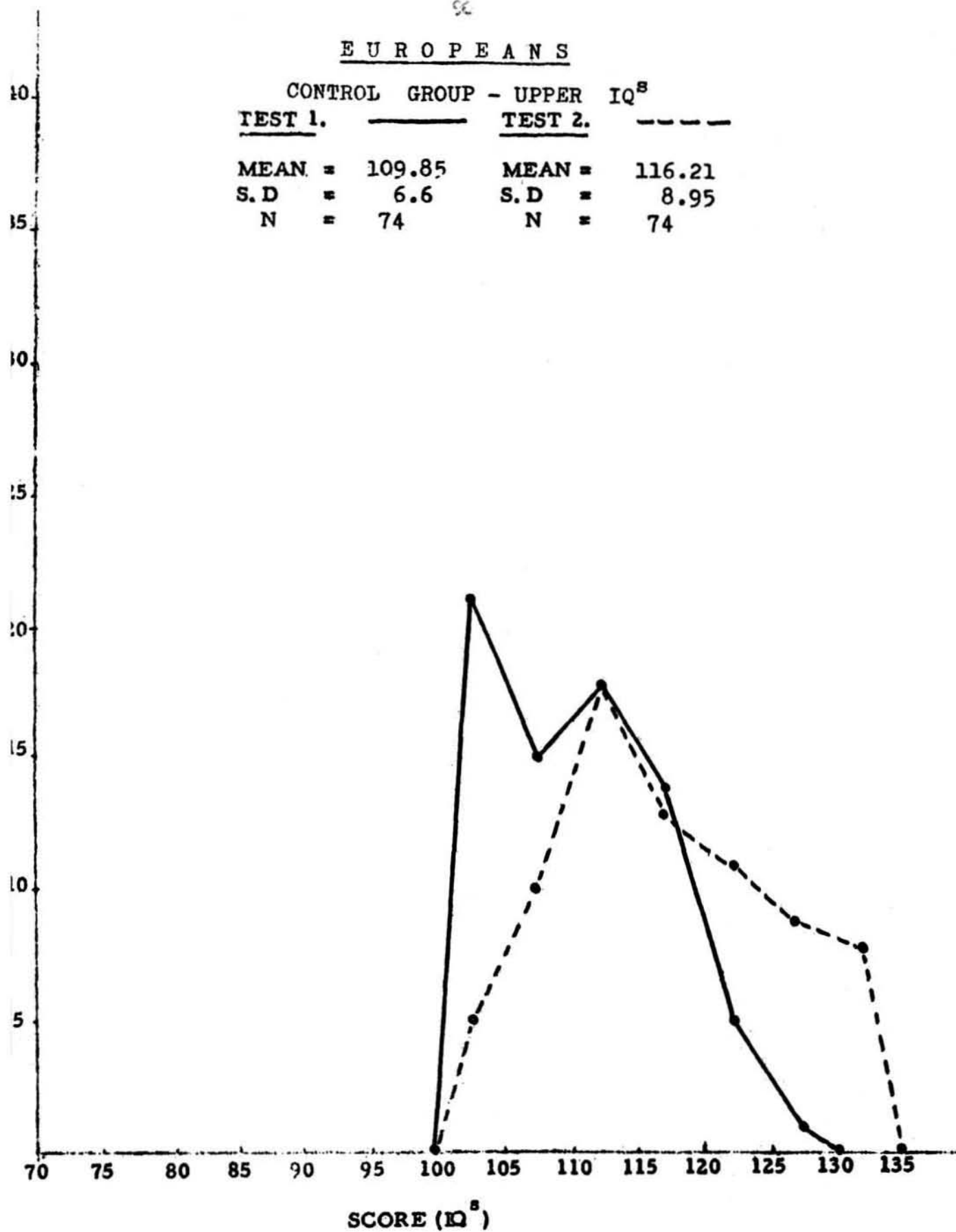
EXPERIMENTAL GROUP - UPPER IQ^s

TEST 1.	————	TEST 2.	-----
MEAN =	110.16	MEAN =	120
S.D =	6.7	S.D =	9
N =	102	N =	102



EUROPEANS

CONTROL GROUP - UPPER IQ ^B			
TEST 1.	—	TEST 2.	---
MEAN =	109.85	MEAN =	116.21
S.D =	6.6	S.D =	8.95
N =	74	N =	74



1. EXPERIMENTAL LOWER I.'s.Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Experimental	41	92.12	103.51	11.39

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E. Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	6.05	.94					
Test 2	12.85	2.0	11.39	1.45	.73	7.8	Yes.

2. CONTROL LOWER I.'s.Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Control	59	90.67	98.59	7.92

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E. Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	7.85	1.2					
Test 2	9.45	1.2	7.92	.95	.7	8.3	Yes.

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1. - T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	41	8.35	1.3	11.39		
Control	59	6.8	.89	7.92	2.2	Yes.

Experimental Groups - Lower I_q's.TEST 1.

<u>I_q</u>	<u>f.</u>
95 - 99 -	20
90 - 94 -	11
85 - 89 -	3
80 - 84 -	5
75 - 79 -	2
<hr/>	
N. -	41
M. -	92.12
S.D. -	6.05

TEST 2.

<u>I_q</u>	<u>f.</u>
130 - 135 -	1
125 - 129 -	0
120 - 124 -	4
115 - 119 -	4
110 - 114 -	5
105 - 109 -	6
100 - 104 -	5
95 - 99 -	7
90 - 94 -	4
85 - 89 -	1
80 - 84 -	3
75 - 79 -	1
<hr/>	
N. -	41
M. -	103.51
S.D. -	12.85

Control Group - Lower I_q's.TEST 1.

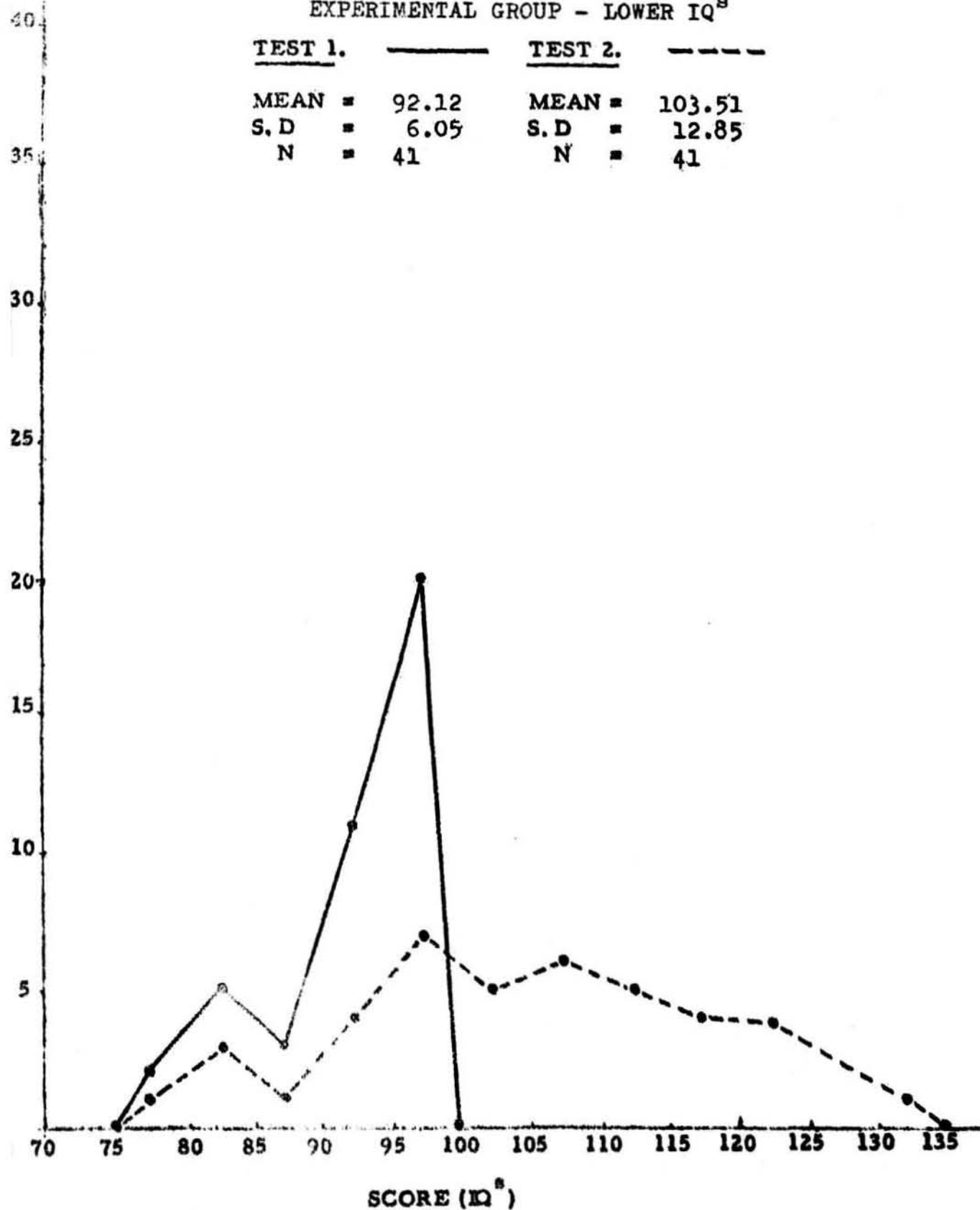
<u>I_q</u>	<u>f.</u>
95 - 99 -	23
90 - 94 -	14
85 - 89 -	8
80 - 84 -	10
75 - 79 -	2
70 - 74 -	2
<hr/>	
N. -	59
M. -	90.67
S.D. -	7.05

TEST 2.

<u>I_q</u>	<u>f.</u>
120 - 124 -	2
115 - 119 -	2
110 - 114 -	2
105 - 109 -	6
100 - 104 -	16
95 - 99 -	16
90 - 94 -	4
85 - 89 -	7
80 - 84 -	3
75 - 79 -	1
<hr/>	
N. -	59
M. -	98.59
S.D. -	9.45

E U R O P E A N SEXPERIMENTAL GROUP - LOWER IQ^s

<u>TEST 1.</u>	<u>————</u>	<u>TEST 2.</u>	<u>-----</u>
MEAN =	92.12	MEAN =	103.51
S. D =	6.05	S. D =	12.85
N =	41	N =	41



EUROPEANSCONTROL GROUP - LOWER IQ^sTEST 1.TEST 2.

MEAN = 90.67

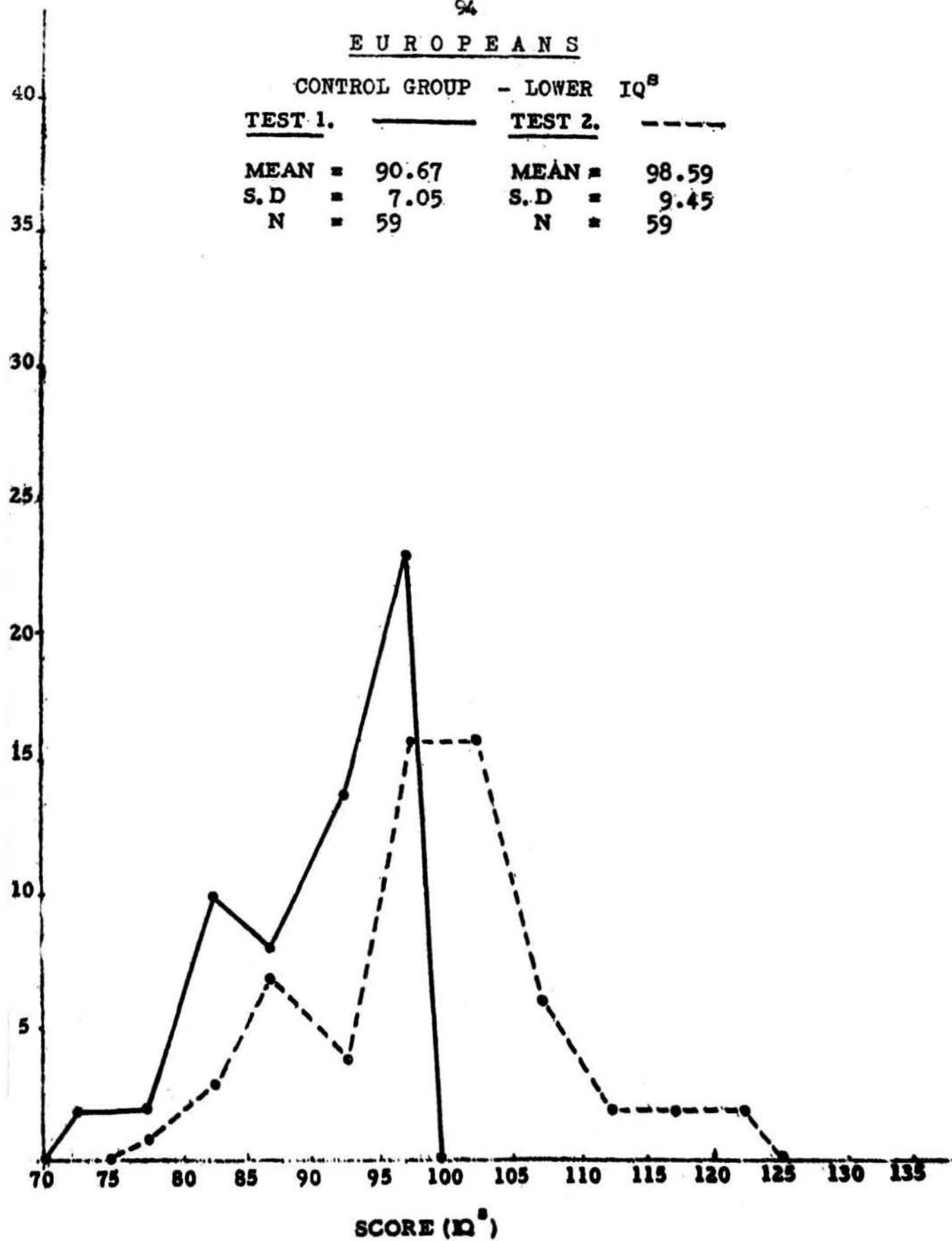
MEAN = 98.59

S.D = 7.05

S.D = 9.45

N = 59

N = 59



CONCLUSIONS.SURFINDINGS.

1. A nett increase of 3.21 points of IQ as a result of coaching, is somewhat lower than that found in investigations of a similar kind in England and Scotland. This may be accounted for by the fact that the sample is completely unsophisticated, having had no experience of group tests of intelligence and attainment.
2. Although the gain by the girls was 1.51 points of IQ, in excess of that of the boys the difference was not significant. Boys and girls then did equally well.
3. The gains due to coaching by those with an initial IQ score of 100 plus, was not significantly greater than those with IQ's of less than 100.
4. An analysis of the score of those testees who either scored less in Test 1 than they did in Test 2 or who made no improvement yields the following results :-

Scores:	-9	-8	-7	-6	-5	-4	-3	-2	-1	-0	TOTAL	P.	G.	
						2	1	2	1	4	2	12	5	7

Insofar as the range of the initial scores was between 93 - 120 the drop cannot be ascribed to intellectual causes but to subjective imponderable factors.

The obvious conclusion to draw is that in the assessment of intelligence more than one test should be used and that the highest score should be considered.

INDIANS.

This section contains :-

1. The scores (Iq's) of the Experimental and Control groups of Test 1 and Test 2.
2. Test of Significance for :-
 - (i) Difference between means of Test 1 and Test 2 of Experimental and Control Groups.
 - (ii) Difference between means of Experimental and Control groups.
3. Frequency Distributions for Test 1 and Test 2 of the Experimental and Control groups.
4. Frequency Polygons for Test 1 and Test 2 of the Experimental and Control groups.

All this information is repeated for the following groups :-

- a. Experimental Group - Boys
Control Group - Boys
 - b. Experimental Group - Girls
Control Group - Girls
5. Conclusions.

EXPERIMENTAL GROUP

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
1	G	88	95	31	G	81	101	61	G	81	84
2	B	84	91	32	G	90	93	62	B	93	112
3	B	91	97	33	G	105	111	63	B	97	114
4	B	95	101	34	B	93	97	64	G	85	88
5	G	84	86	35	B	84	77	65	B	105	115
6	G	95	101	36	G	87	85	66	B	81	82
7	G	80	78	37	B	79	94	67	G	76	84
8	B	92	86	38	G	89	99	68	G	71	70
9	B	88	85	39	B	95	97	69	G	90	96
10	G	88	103	40	G	86	87	70	B	98	110
11	G	92	99	41	G	103	110	71	G	86	92
12	G	89	95	42	G	87	95	72	G	76	70
13	G	82	77	43	B	85	87	73	B	87	95
14	B	104	115	44	G	86	96	74	B	94	115
15	B	92	114	45	B	82	79	75	B	90	100
16	G	82	94	46	B	103	125	76	B	78	89
17	G	81	82	47	B	79	89	77	G	85	81
18	G	95	110	48	G	82	96	78	G	78	92
19	G	78	94	49	G	84	81	79	G	90	95
20	G	90	100	50	B	80	77	80	B	99	103
21	G	84	85	51	G	74	91	81	G	80	88
22	B	85	88	52	G	79	70	82	B	84	92
23	G	79	96	53	B	83	88	83	G	87	96
24	B	84	83	54	B	91	91	84	G	87	102
25	B	92	90	55	G	84	100	85	B	81	75
26	B	93	92	56	G	87	97	86	B	86	96
27	B	88	103	57	G	81	93	87	G	85	98
28	G	85	96	58	G	82	89	88	B	85	90
29	G	90	92	59	G	100	103	89	G	82	84
30	G	81	95	60	B	88	94	90	B	82	95

99.
INDIANS

EXPERIMENTAL GROUP

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
91	B	92	89	121	B	82	96				
92	B	90	93	122	G	73	84				
93	B	93	89	123	G	89	95				
94	B	91	110	124	B	76	89				
95	G	79	80	125	B	85	91				
96	G	80	75	126	G	91	100				
97	G	80	74	127	G	76	81				
98	B	82	94	128	B	96	99				
99	B	82	87	129	G	89	86				
100	B	88	92	130	B	83	98				
101	G	84	95	131	B	90	100				
102	G	81	75	132	B	84	78				
103	B	88	103	133	G	105	125				
104	G	82	86								
105	G	85	88								
106	B	86	87								
107	G	83	94								
108	G	83	89								
109	G	86	100								
110	G	82	92								
111	G	92	109								
112	G	79	77								
113	G	72	72								
114	G	77	76								
115	G	80	92								
116	G	79	91								
117	B	77	88								
118	G	105	118								
119	B	96	110								
120	G	83	88								

CONTROL GROUP.

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
1	B	88	93	31	B	82	93	61	B	98	114
2	G	82	77	32	B	77	91	62	G	111	118
3	B	75	86	33	B	90	103	63	B	105	101
4	G	82	86	34	B	70	77	64	B	81	83
5	B	82	102	35	G	80	88	65	G	91	89
6	G	74	80	36	G	73	73	66	B	78	91
7	B	84	98	37	G	95	95	67	B	110	115
8	G	82	95	38	G	94	108	68	G	108	100
9	G	85	95	39	B	101	107	69	B	108	112
10	B	70	82	40	B	90	94	70	G	91	94
11	B	89	89	41	B	81	97	71	G	76	80
12	G	100	114	42	B	90	89	72	G	76	82
13	G	82	76	43	G	92	88	73	G	102	106
14	G	106	103	44	B	89	92	74	G	86	90
15	G	80	86	45	B	85	91	75	G	83	79
16	B	81	90	46	G	84	86	76	B	101	108
17	G	89	88	47	G	94	101	77	G	75	87
18	G	77	77	48	G	71	75	78	B	72	91
19	B	84	89	49	B	94	83	79	B	87	92
20	G	76	78	50	B	70	87	80	G	80	86
21	B	85	90	51	B	84	91	81	G	96	108
22	G	81	85	52	B	74	85	82	B	95	97
23	B	87	81	53	B	72	81	83	G	97	88
24	G	86	89	54	B	82	96	84	B	112	123
25	G	87	89	55	G	78	82	85	B	85	90
26	B	86	95	56	G	89	93	86	B	113	116
27	B	89	88	57	B	118	121	87	G	88	99
28	B	81	85	58	G	76	96	88	B	89	91
29	G	93	99	59	B	86	90	89	B	92	97
30	G	74	89	60	B	89	92	90	B	95	110

101.
INDIANS

CONTROL GROUP

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
91	G	81	90	121	B	104	103				
92	G	95	104	122	G	74	77				
93	B	113	107	123	B	117	124				
94	G	85	88	124	G	93	92				
95	B	102	93	125	G	75	73				
96	G	94	111	126	G	93	102				
97	B	79	88	127	G	83	90				
98	B	86	91	128	B	88	99				
99	G	85	95	129	B	91	95				
100	G	103	109	130	B	100	107				
101	B	88	95	131	G	84	96				
102	B	70	70	132	B	77	96				
103	B	82	70	133	G	88	95				
104	G	82	73								
105	B	113	121								
106	B	85	91								
107	B	89	99								
108	G	86	99								
109	G	87	95								
110	B	92	95								
111	B	83	84								
112	B	79	94								
113	B	81	83								
114	B	88	89								
115	G	80	74								
116	G	70	94								
117	G	81	75								
118	B	78	84								
119	B	78	84								
120	B	73	85								

INDIANS.1. EXPERIMENTAL GROUPDifference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Experimental	133	86.4	92.95	6.55

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	7.45	.64					
Test 2	11.45	.8	6.55	.52	.75	12.0	Yes.

2. CONTROL GROUPDifference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean T.2.</u>	<u>Difference.</u>
Control	133	87.3	92.95	5.65

Tests of Significance of difference between means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	10.7	.93					
Test 2	11.15	.97	5.65	.62	.8	8.9	Yes.

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.-T.2.</u>	<u>t.</u>	<u>Significant.</u>
experimental	133	4.05	.35	6.55		
Control	133	5.05	.43	5.65	1.6	No.

INDIANS.Experimental Group.TEST 1.

<u>I.</u>	<u>f.</u>
105 - 109	4
100 - 104	4
95 - 99	9
90 - 94	23
85 - 89	32
80 - 84	41
75 - 79	10
70 - 74	4
N. =	133
M. =	86.4
S.D. =	7.45

TEST 2.

<u>I.</u>	<u>f.</u>
125 - 129	2
120 - 124	0
115 - 119	4
110 - 114	9
105 - 109	1
100 - 104	15
95 - 99	26
90 - 94	23
85 - 89	25
80 - 84	11
75 - 79	11
70 - 74	6
N. =	133
M. =	92.95
S.D. =	11.45

Control Group.TEST 1.

<u>I.</u>	<u>f.</u>
115 - 119	2
110 - 114	6
105 - 109	3
100 - 104	9
95 - 99	8
90 - 94	15
85 - 89	32
80 - 84	27
75 - 79	17
70 - 74	14
N. =	133
M. =	87.3
S.D. =	10.7

TEST 2.

<u>I.</u>	<u>f.</u>
120 - 124	4
115 - 119	3
110 - 114	5
105 - 109	8
100 - 104	9
95 - 99	23
90 - 94	26
85 - 89	26
80 - 84	13
75 - 79	9
70 - 74	5
N. =	133
M. =	92.95
S.D. =	11.15

INDIANS

EXPERIMENTAL GROUP

TEST 1. ———

TEST 2. - - - -

MEAN = 86.4

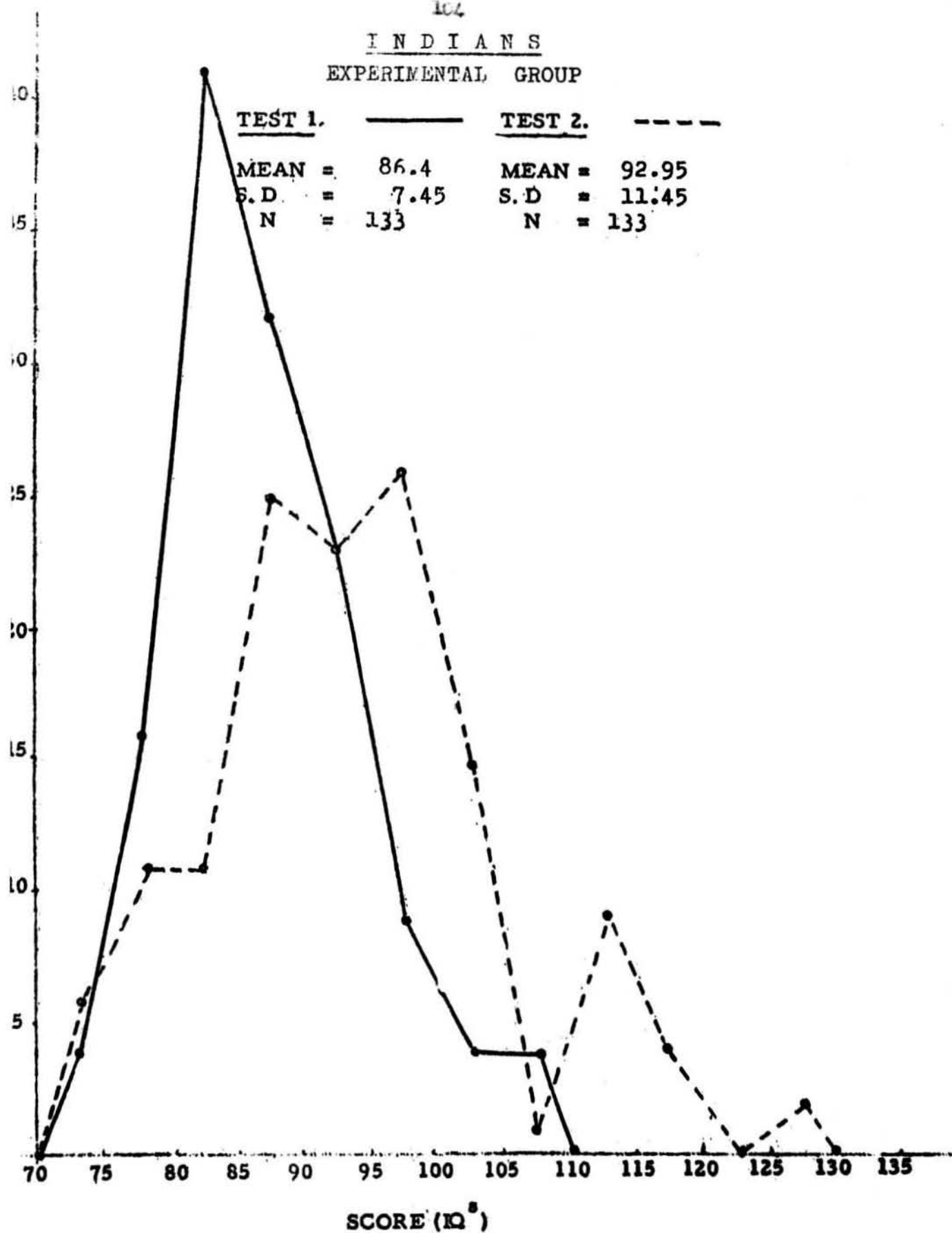
MEAN = 92.95

S.D. = 7.45

S.D. = 11.45

N = 133

N = 133



I N D I A N S

CONTROL GROUP

TEST 1.

————

TEST 2.

MEAN = 87.3

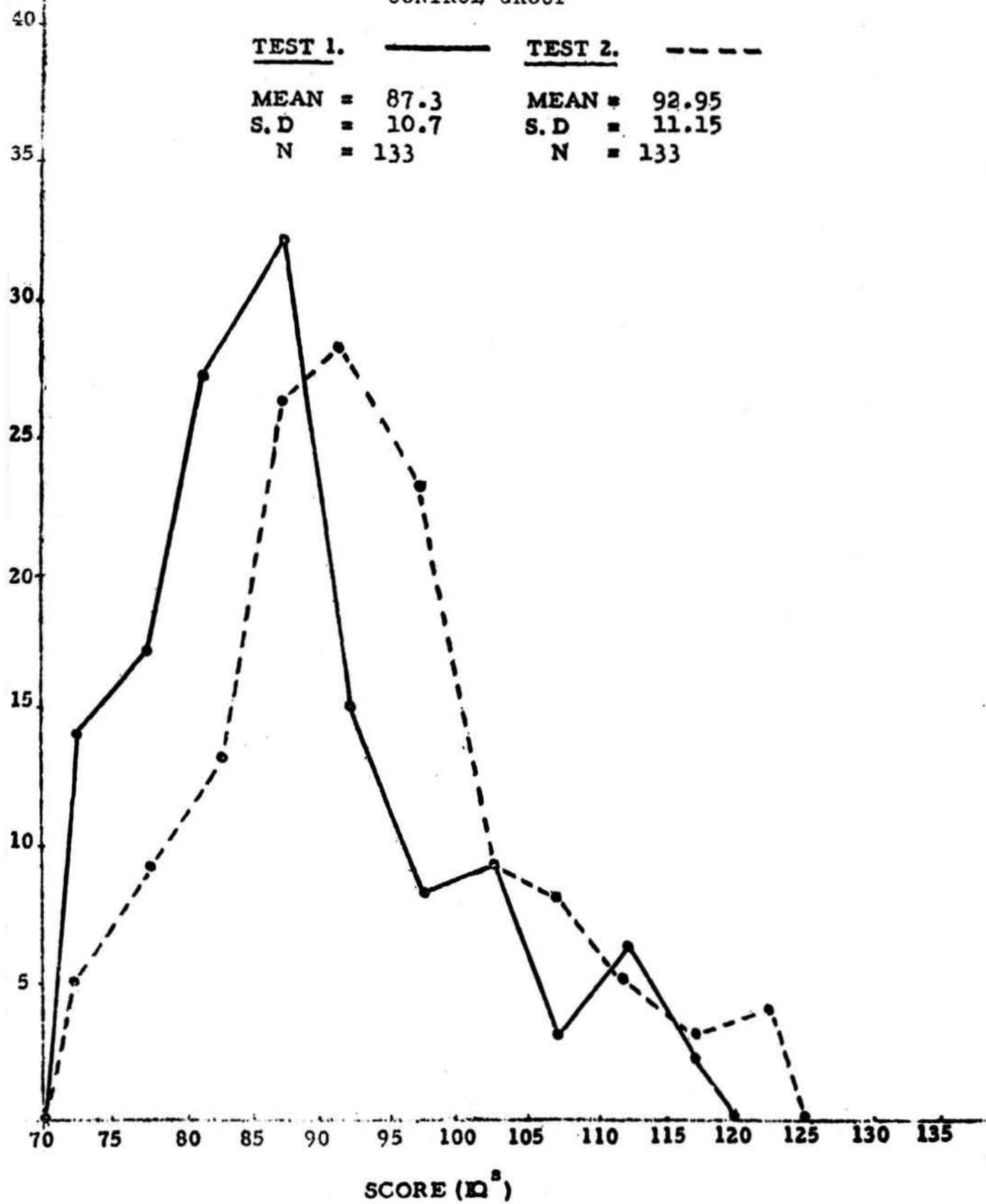
MEAN = 92.95

S.D = 10.7

S.D = 11.15

N = 133

N = 133



1. EXPERIMENTAL (BOYS)Difference between Means of Test 1 and Test 2.

<u>GROUP.</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Experimental	57	88.25	95.1	6.85

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	6.85	.9	6.85	1.07	.72	6.4	Yes.
Test 2.	11.60	1.5					

2. CONTROL GROUP (BOYS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Control	72	88.3	94.75	6.45

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	11.65	1.3	6.45	.75	.82	8.6	Yes.
Test 2.	11.25	1.3					

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.-T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	57	6.7	.9	6.85		
Control	72	4.75	.56	6.45	0.38	No.

Experimental Group - Boys.TEST 1.

<u>Iq.</u>		<u>f.</u>
105 - 109	-	1
100 - 104	-	2
95 - 99	-	7
90 - 94	-	15
85 - 89	-	12
80 - 84	-	15
75 - 79	-	5
		<hr/>
N. =		57
M. =		86.25
S.D. =		6.85

TEST 2.

<u>Iq.</u>		<u>f.</u>
125 - 129	-	1
120 - 124	-	0
115 - 119	-	3
110 - 114	-	6
105 - 109	-	0
100 - 104	-	6
95 - 99	-	9
90 - 94	-	12
85 - 89	-	13
80 - 84	-	2
75 - 79	-	5
		<hr/>
N. =		57
M. =		95.1
S.D. =		11.6

Control Group - Boys.TEST 1.

<u>Iq.</u>		<u>f.</u>
115 - 119	-	2
110 - 114	-	5
105 - 109	-	2
100 - 104	-	5
95 - 99	-	3
90 - 94	-	7
85 - 89	-	19
80 - 84	-	12
		<hr/>
N. =		72
M. =		88
S.D. =		11.65

TEST 2.

<u>Iq.</u>		<u>f.</u>
120 - 124	-	4
115 - 119	-	2
110 - 114	-	3
105 - 109	-	4
100 - 104	-	4
95 - 99	-	12
90 - 94	-	21
85 - 89	-	11
80 - 84	-	8
75 - 79	-	1
70 - 74	-	2
		<hr/>
N. =		72
M. =		94.75
S.D. =		11.25

I N D I A N S

EXPERIMENTAL GROUP - BOYS

TEST 1.

————

TEST 2.

MEAN = 88.25

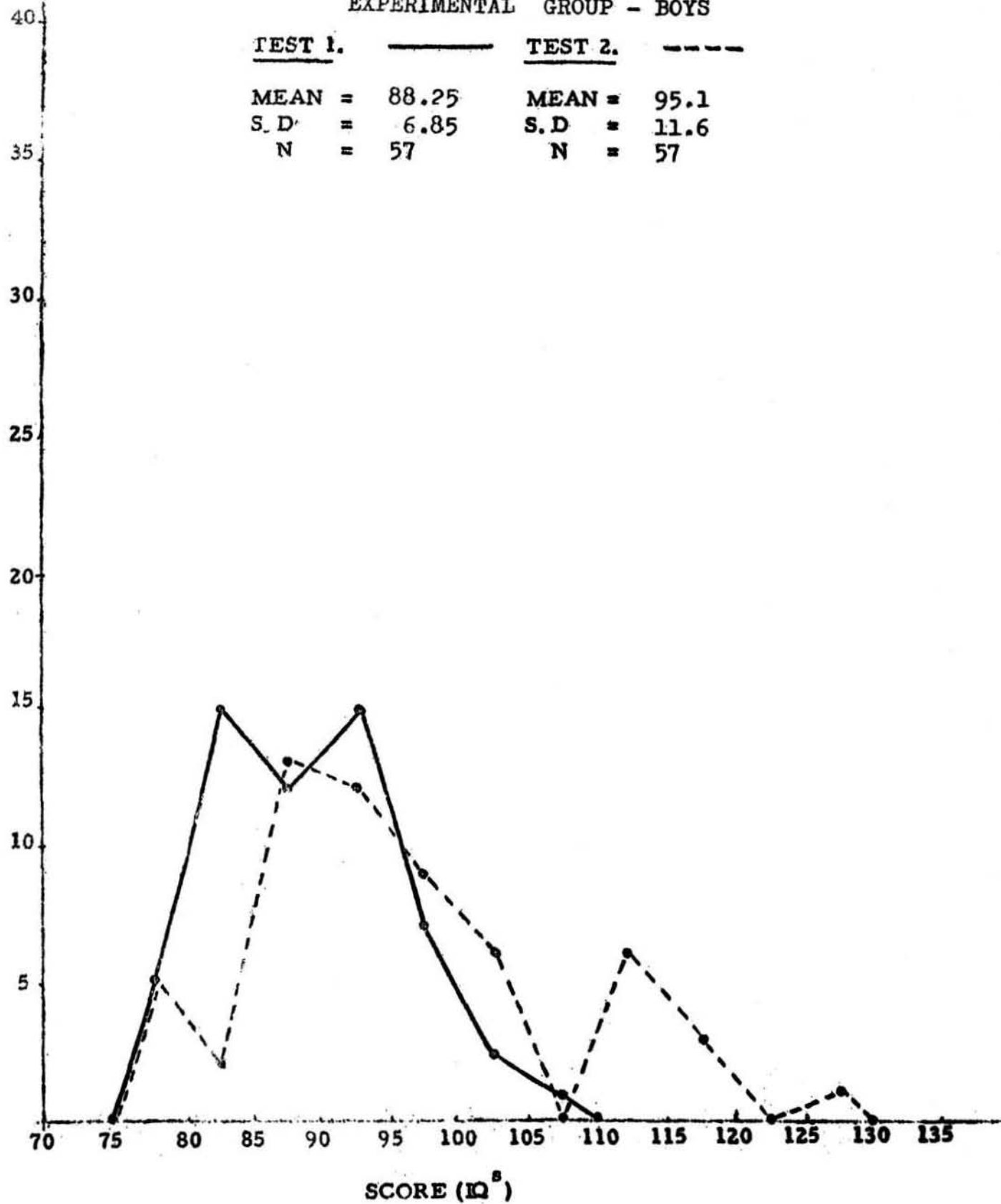
MEAN = 95.1

S.D. = 6.85

S.D. = 11.6

N = 57

N = 57



INDIANS.CONTROL GROUP - BOYS.TEST 1. ———TEST 2. - - - -

MEAN = 88.3.

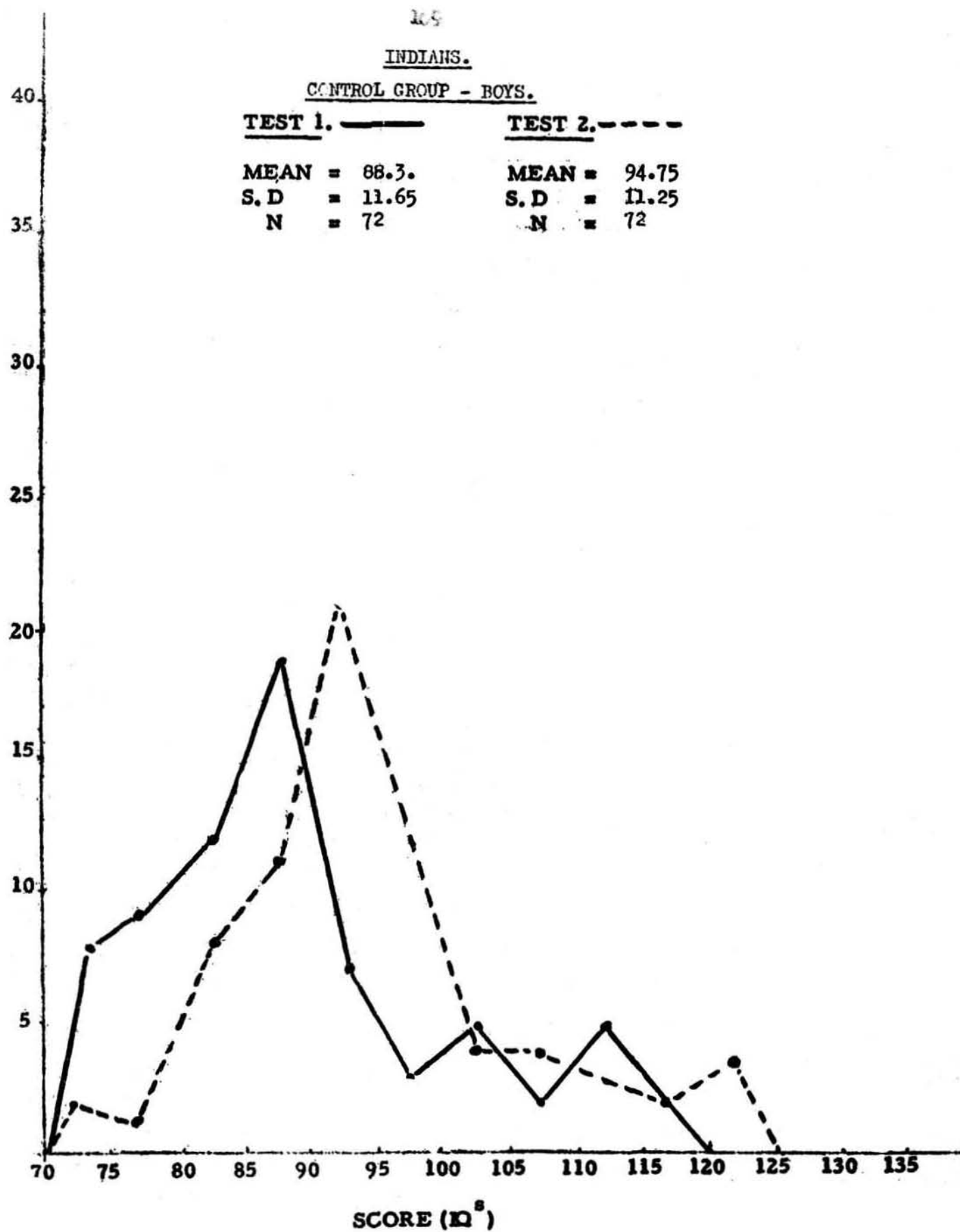
MEAN = 94.75

S. D = 11.65

S. D = 11.25

N = 72

N = 72



1. EXPERIMENTAL (GIRLS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Experimental	76	85.05	91.3	6.25

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	6	.68					
Test 2	11.05	1.2	6.25	.83	.77	7.5	Yes.

2. CONTROL GROUP (GIRLS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Control	61	86	91.95	5.95

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1.T.2.</u>	<u>S.E.Diff.</u> <u>T.1.T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	9.05	1.1					
Test 2	10.5	1.3	5.95	.89	.77	6.6	Yes.

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.-T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	76	5.3	.61	6.25		
Control	61	4.75	.61	5.95	0.34	No.

Experimental Group - Girls.

<u>TEST 1.</u>				<u>TEST 2.</u>			
<u>I₁.</u>			<u>f.</u>	<u>I₂.</u>			<u>f.</u>
105	-	109	-	3	125	-	129
100	-	104	-	2	120	-	124
95	-	99	-	2	115	-	119
90	-	94	-	8	110	-	114
85	-	89	-	20	105	-	109
80	-	84	-	26	100	-	104
75	-	79	-	11	95	-	99
70	-	74	-	4	90	-	94
					85	-	89
					80	-	84
					75	-	79
					70	-	74
N. =			76	N. =			76
M. =			85.05	M. =			91.3
S.D. =			6	S.D. =			12.05

Control Group - Girls.

<u>TEST 1</u>				<u>TEST 2.</u>					
<u>I₁.</u>			<u>f.</u>	<u>I₂.</u>			<u>f.</u>		
110	-	114	-	1	115	-	119	-	1
105	-	109	-	1	110	-	114	-	2
100	-	104	-	4	105	-	109	-	4
95	-	99	-	4	100	-	104	-	5
90	-	94	-	9	95	-	99	-	11
85	-	89	-	12	90	-	94	-	7
80	-	84	-	16	85	-	89	-	16
75	-	79	-	8	80	-	84	-	5
70	-	74	-	6	75	-	79	-	7
					70	-	74	-	3
N. =			61	N. =			61		
M. =			86	M. =			91.95		
S.D. =			9.05	S.D. =			10.5		

I N D I A N S

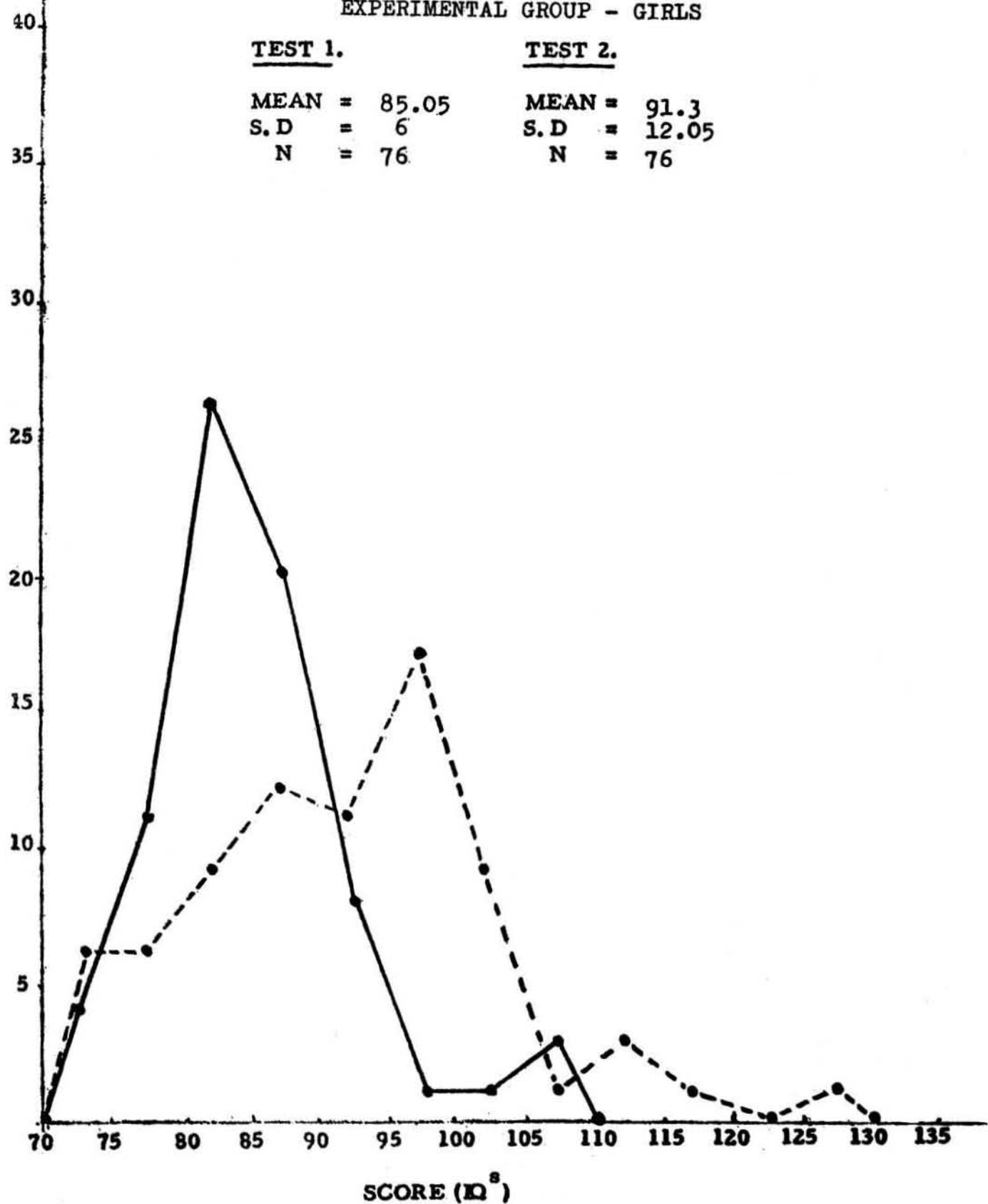
EXPERIMENTAL GROUP - GIRLS

TEST 1.

MEAN = 85.05
 S. D = 6
 N = 76

TEST 2.

MEAN = 91.3
 S. D = 12.05
 N = 76



INDIANS.

CONTROL GROUP - GIRLS.

TEST 1. ———

TEST 2. - - - -

MEAN = 86

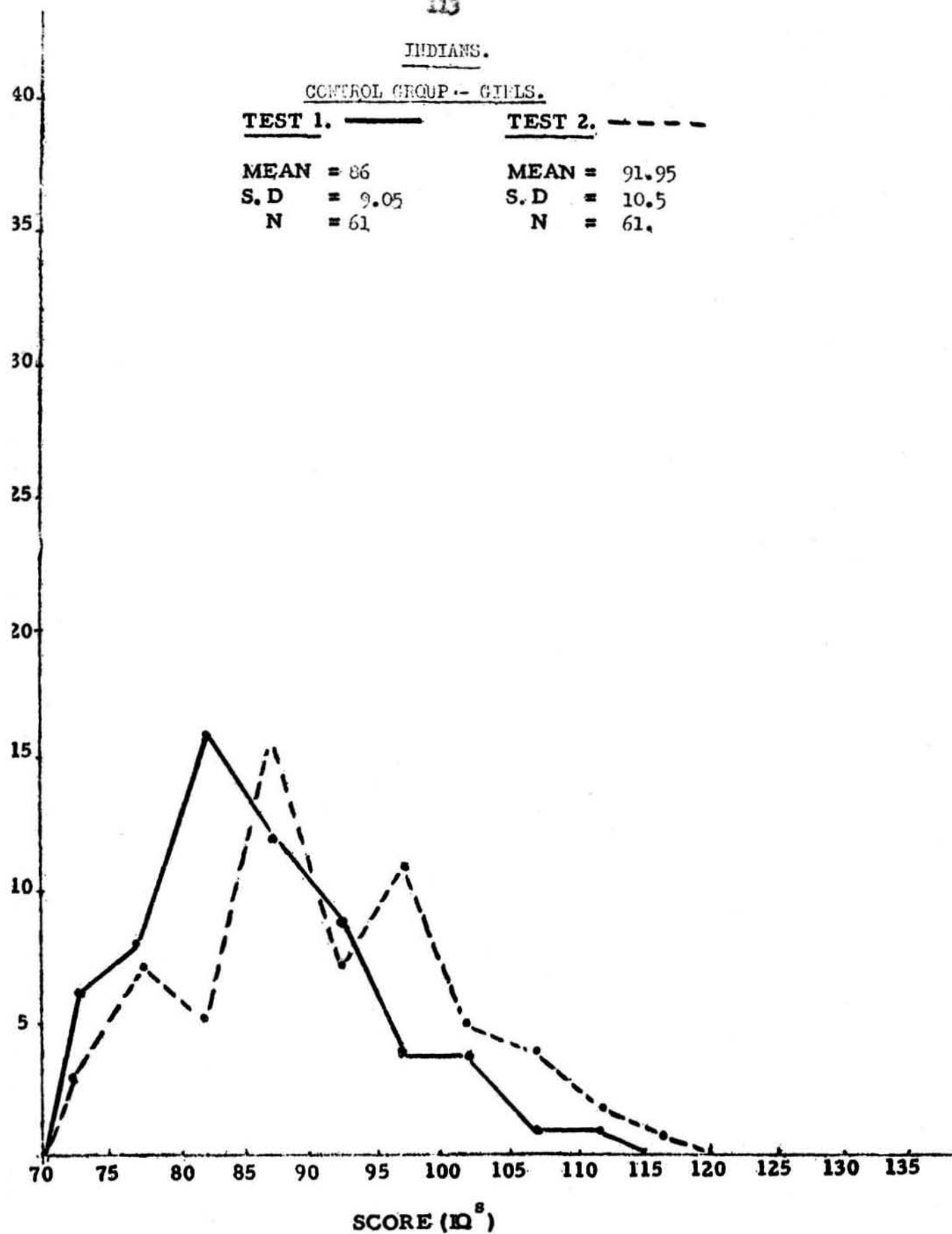
MEAN = 91.95

S. D = 9.05

S. D = 10.5

N = 61

N = 61.



CONCLUSIONSINDIANS

1. A nett increase of 0.9 points of IQ after coaching is inexplicable unless as we shall see later, we consider that in the Experimental Group, 29 testees scored between 0 - 9 points of IQ less in the second test than they did in the first.
2. As with the Europeans there was no significant difference in the gains of the sexes.
3. An analysis of the scores of those testees who either scored less in Test 1 than they did in Test 2 or who made no improvement yields the following results :-

Scores	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	TOTAL	B.	G.
	1	1	1	7	3	2	6	3	4	1	29	12	17

Individual variations have been noted in previous investigations (McCrae¹⁶) and in fact McCrae said this : "The effect of practice over a series of tests is to produce an average improvement; but individuals are not consistent, and at any test may score even less than on the previous ones. It cannot be said that successive practice produces equal improvements, but an average would be about

two points of IQ".

The Indians highly competitive attitude with its concomitant of tension may account for the relatively high degree of score fluctuation.

AFRICANS.

This section contains :-

1. The scores (IQ's) of the Experimental and Control groups of Test 1 and Test 2.
2. Test of Significance for :-
 - (i) Difference between means of Test 1 and Test 2 of Experimental and Control Groups.
 - (ii) Difference between means of Experimental and Control groups.
3. Frequency Distributions for Test 1 and Test 2 of the Experimental Group and Control Group.
4. Frequency Polygons for Test 1 and Test 2 of the Experimental and Control groups

All this information is repeated for the following groups :-

- a. Experimental Group - Boys
Control Group - Boys
 - b. Experimental Group - Girls
Control Group - Girls
5. Conclusions.

EXPERIMENTAL GROUP

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
1	G	76	101	31	B	86	102	61	G	85	105
2	B	87	106	32	G	81	100	62	B	94	103
3	B	83	103	33	G	90	101	63	G	83	99
4	B	96	99	34	G	88	104	64	G	81	95
5	B	94	99	35	G	86	94	65	G	85	99
6	B	80	104	36	G	85	118	66	G	88	90
7	B	81	90	37	G	91	109	67	G	86	102
8	B	86	98	38	B	91	92	68	B	88	106
9	B	103	117	39	B	90	107	69	G	79	96
10	G	87	104	40	B	90	96	70	G	81	82
11	B	88	108	41	B	85	93	71	G	82	93
12	B	84	106	42	B	80	98	72	G	83	82
13	G	87	98	43	B	83	103	73	G	89	105
14	B	87	94	44	B	91	116	74	B	98	107
15	B	82	101	45	G	97	97	75	B	70	97
16	G	88	119	46	G	82	92	76	B	82	108
17	B	83	98	47	G	107	122	77	G	86	114
18	G	82	100	48	G	88	109	78	G	89	109
19	G	99	97	49	G	83	87	79	G	98	94
20	B	87	98	50	G	93	114	80	B	86	106
21	G	95	94	51	G	75	92	81	B	100	114
22	B	88	98	52	G	105	107	82	G	94	99
23	B	94	122	53	B	84	98	83	B	95	111
24	G	105	116	54	G	79	93	84	G	93	109
25	G	85	96	55	G	99	118	85	B	96	116
26	G	95	100	56	B	104	126	86	G	99	120
27	G	88	101	57	B	83	105	87	B	87	103
28	G	82	97	58	G	113	126	88	G	88	108
29	G	109	122	59	B	81	95	89	B	79	102
30	G	85	91	60	B	89	109	90	G	104	122

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AFRICANS

EXPERIMENTAL GROUP (CONTD.)

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
91	B	87	106	121	G	95	111				
92	B	96	102	122	B	84	107				
93	G	86	104	123	B	100	104				
94	G	91	91	124	B	76	108				
95	B	89	92	125	G	84	96				
96	G	89	87	126	B	95	106				
97	G	86	101	127	B	92	113				
98	G	86	102	128	G	79	82				
99	G	89	107	129	G	89	111				
100	G	73	95	130	G	82	84				
101	B	82	94	131	G	90	101				
102	G	93	120	132	G	112	116				
103	G	119	122	133	G	95	100				
104	G	86	117	134	G	86	101				
105	G	85	110	135	G	92	104				
106	G	83	107	136	G	89	113				
107	G	84	111								
108	B	109	118								
109	G	89	95								
110	G	94	102								
111	B	98	105								
112	G	81	109								
113	B	87	105								
114	G	72	93								
115	B	84	105								
116	G	88	112								
117	B	92	109								
118	B	81	84								
119	G	79	97								
120	G	89	108								

AFRICANS**CONTROL GROUP.**

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
1	B	88	86	31	G	85	89	61	B	73	83
2	B	83	85	32	B	71	70	62	B	94	97
3	G	85	91	33	G	95	103	63	G	87	93
4	G	87	99	34	G	89	91	64	G	86	97
5	G	78	96	35	B	86	92	65	B	83	93
6	B	80	92	36	B	86	96	66	G	81	97
7	G	94	98	37	G	85	83	67	B	90	95
8	G	85	79	38	B	70	74	68	B	89	99
9	G	78	84	39	B	80	102	69	G	81	85
10	B	85	93	40	B	77	84	70	B	70	78
11	G	75	85	41	B	80	98	71	G	79	88
12	G	86	93	42	B	84	91	72	B	82	80
13	B	83	81	43	B	85	90	73	G	89	88
14	B	75	86	44	G	97	106	74	G	86	87
15	B	95	89	45	G	97	106	75	G	83	78
16	G	83	93	46	G	77	91	76	B	84	91
17	G	78	83	47	G	86	76	77	G	83	104
18	B	93	99	48	G	82	86	78	G	76	88
19	B	77	90	49	B	86	96	79	G	78	84
20	G	76	83	50	G	97	103	80	B	85	99
21	G	87	93	51	G	89	96	81	B	98	94
22	B	83	85	52	B	95	99	82	B	87	91
23	B	87	97	53	G	91	95	83	B	91	100
24	B	83	97	54	G	92	95	84	B	90	98
25	G	83	96	55	G	70	87	85	G	90	103
26	G	84	90	56	B	86	86	86	G	103	110
27	B	92	95	57	B	84	93	87	G	78	91
28	G	76	71	58	G	91	95	88	B	96	105
29	G	85	99	59	B	77	86	89	B	84	84
30	B	89	91	60	G	85	97	90	G	89	99

AFRICANS**CONTROL GROUP**

NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2	NO	SEX	TEST 1	TEST 2
91	G	78	90	121	B	92	104				
92	G	82	86	121	G	90	93				
93	B	91	91	123	B	88	98				
94	G	82	88	124	G	79	81				
95	B	109	123	125	G	88	88				
96	B	83	97	126	B	84	93				
97	G	86	93	127	B	77	90				
98	B	83	93	128	G	82	99				
99	B	89	105	129	G	85	98				
100	G	90	95	130	G	91	94				
101	B	79	87	131	B	77	88				
102	B	79	77	132	B	70	75				
103	G	88	90	133	G	80	89				
104	B	88	90	134	G	71	79				
105	G	88	106	135	G	86	94				
106	G	80	86	136	B	79	84				
107	G	99	102	137	G	80	88				
108	G	81	94	138	B	86	72				
109	B	77	101	139	G	77	74				
110	B	96	87								
111	G	77	91								
112	B	84	87								
113	G	90	102								
114	B	80	95								
115	G	86	87								
116	G	90	101								
117	G	90	95								
118	B	89	95								
119	G	74	83								
120	B	81	101								

AFRICANS.1. EXPERIMENTAL GROUPDifference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Experimental	136	88.75	103.3	14.55

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1.T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	8.15	.72					
Test 2.	9.65	.83	14.55	.73	.55	19.9	Yes.

2. CONTROL GROUPDifference between Means of Test 1 and Test 2.

<u>GROUP.</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Control	139	84.75	91.7	6.95

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	6.8	.58					
Test 2.	9.9	.83	6.95	.62	.65	1.2	Yes.

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.-T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	136	8.15	.7	14.55		
Control	139	3.9	.33	6.95	10	Yes.

AFRICANS.FREQUENCY DISTRIBUTIONS.Experimental Group

<u>TEST 1.</u>				<u>TEST 2.</u>					
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>		
115	-	119	-	1	125	-	129	-	2
110	-	114	-	2	120	-	124	-	7
105	-	109	-	5	115	-	119	-	10
100	-	104	-	5	110	-	114	-	11
95	-	99	-	16	105	-	109	-	30
90	-	94	-	19	100	-	104	-	27
85	-	89	-	48	95	-	99	-	25
80	-	84	-	29	90	-	94	-	17
75	-	79	-	8	85	-	89	-	2
70	-	74	-	3	80	-	84	-	5
			<hr/>				<hr/>		
N. =			136	N. =			136		
M. =			88.75	M. =			103.3		
S.D. =			8.15	S.D. =			9.65		

Control Group.

<u>TEST 1.</u>				<u>TEST 2.</u>					
<u>I_q.</u>			<u>f.</u>	<u>I_q.</u>			<u>f.</u>		
105	-	109	-	1	120	-	124	-	1
100	-	104	-	1	115	-	119	-	0
95	-	99	-	10	110	-	114	-	1
90	-	94	-	19	105	-	109	-	6
85	-	89	-	40	100	-	104	-	12
80	-	84	-	35	95	-	99	-	34
75	-	79	-	25	90	-	94	-	33
70	-	74	-	8	85	-	89	-	27
					80	-	84	-	13
					75	-	79	-	7
					70	-	74	-	5
N. =			139	N. =			139		
M. =			83.1	M. =			91.7		
S.D. =			6.1	S.D. =			9.9		

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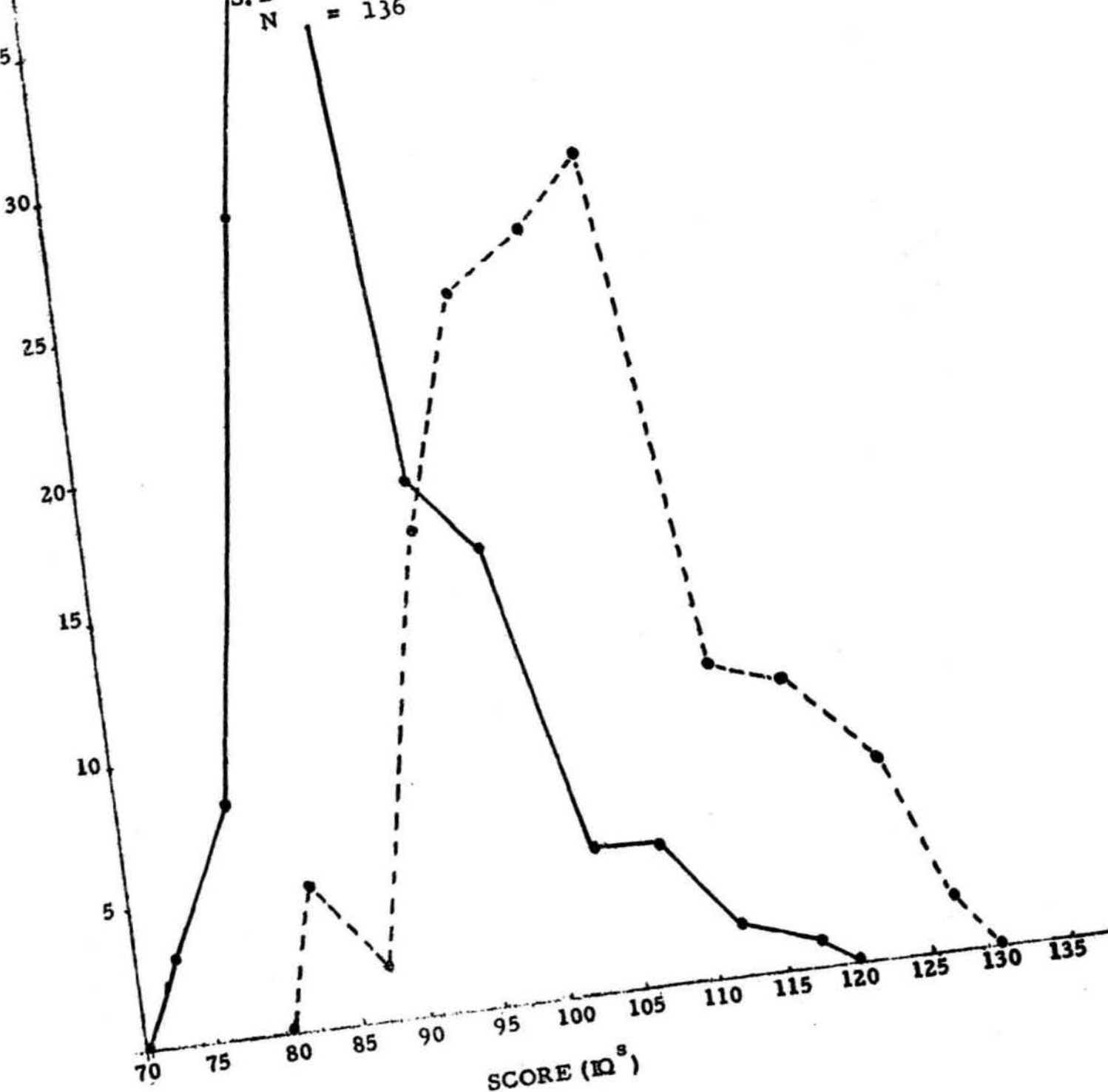
122
A F R I C A N S
EXPERIMENTAL GROUP

TEST 1.

MEAN = 88.75
S. D = 8.15
N = 136

TEST 2.

MEAN = 103.3
S. D = 9.65
N = 136



A F R I C A N S

CONTROL GROUP

TEST 1.

TEST 2.

MEAN = 83.1

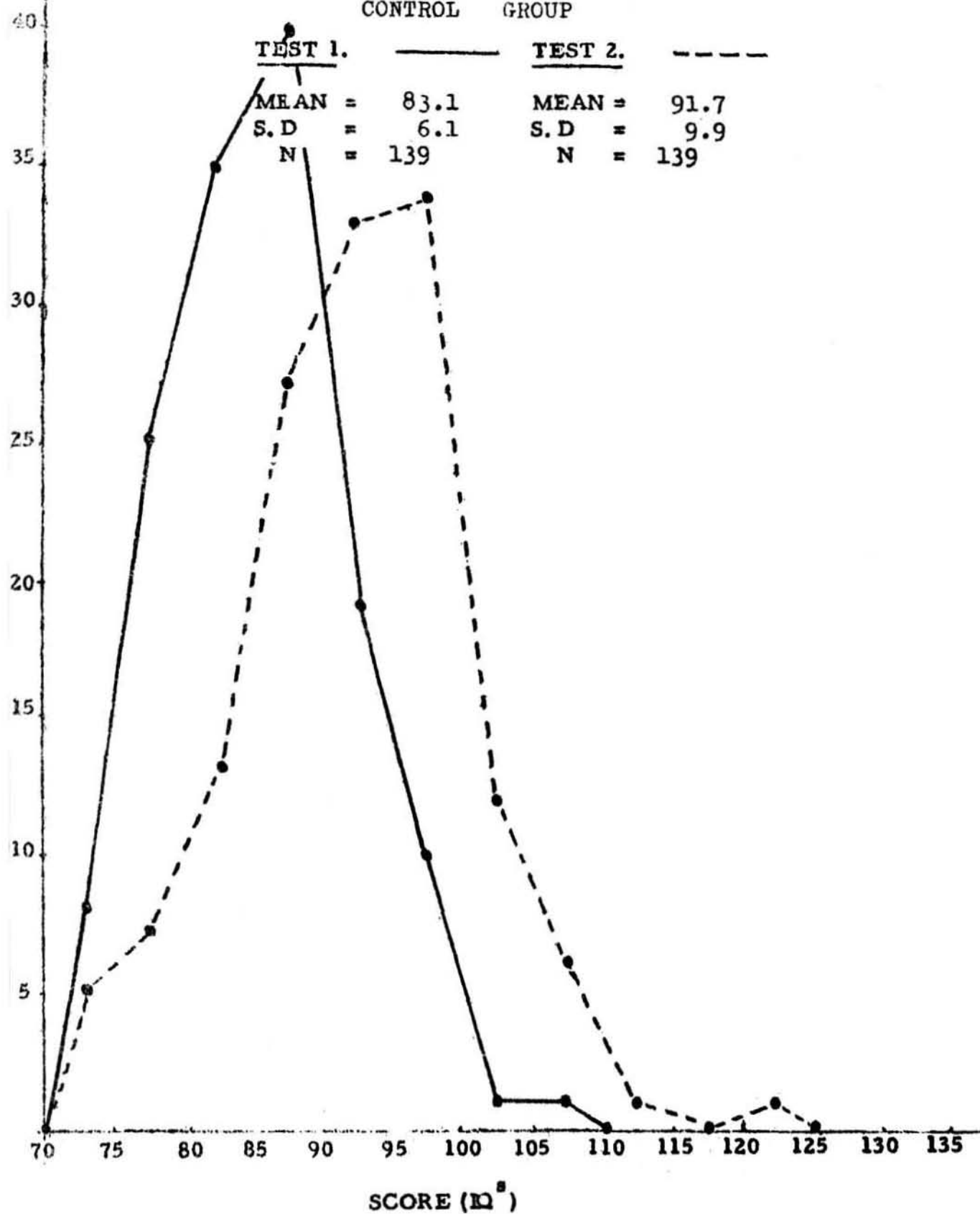
MEAN = 91.7

S.D = 6.1

S.D = 9.9

N = 139

N = 139



1. EXPERIMENTAL (BOYS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Experimental	55	88	103.65	15.65

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1.T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1.	7.05	.95					
Test 2.	8.3	1.1	15.65	1.07	.48	14.6	Yes.

2. CONTROL GROUP (BOYS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Control	65	84.55	91.55	7

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	7.1	.88					
Test 2	8.75	1.08	7	.87	.62	8.04	Yes.

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.- T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	55	7.65	1.04	15.65		
Control	65	5.25	.65	7	7.9	Yes.

Experimental Group - Boys.

<u>TEST 1</u>				<u>TEST 2.</u>					
<u>I.Q.</u>			<u>f.</u>	<u>I.Q.</u>			<u>f.</u>		
105	-	109	-	1	125	-	129	-	1
100	-	104	-	4	120	-	124	-	1
95	-	99	-	7	115	-	119	-	4
90	-	94	-	9	110	-	114	-	3
85	-	89	-	15	105	-	109	-	18
80	-	84	-	16	100	-	104	-	10
75	-	79	-	2	95	-	99	-	11
70	-	74	-	1	90	-	94	-	6
					85	-	89	-	0
					80	-	84	-	1
N. =			55	N. =			55		
M. =			88	M. =			103.65		
S.D. =			7.05	S.D. =			8.3		

Control Group - Boys.

<u>TEST 1</u>				<u>TEST 2.</u>								
<u>I_x.</u>			<u>f.</u>	<u>I_x.</u>			<u>f.</u>					
105	-	109	-	1	120	-	124	-	1			
100	-	104	-	0	115	-	119	-	0			
95	-	99	-	5	110	-	114	-	0			
90	-	94	-	8	105	-	109	-	2			
85	-	89	-	17	100	-	104	-	5			
80	-	84	-	19	95	-	99	-	16			
75	-	79	-	10	90	-	94	-	16			
70	-	74	-	5	85	-	89	-	11			
								80	-	84	-	6
								75	-	79	-	3
								70	-	74	-	3
								N.	=	65		
								M.	=	84.55		
								S.D.	=	7.1		

								N.	=	65	
								M.	=	91.55	
								S.D.	=	8.75	

A F R I C A N S

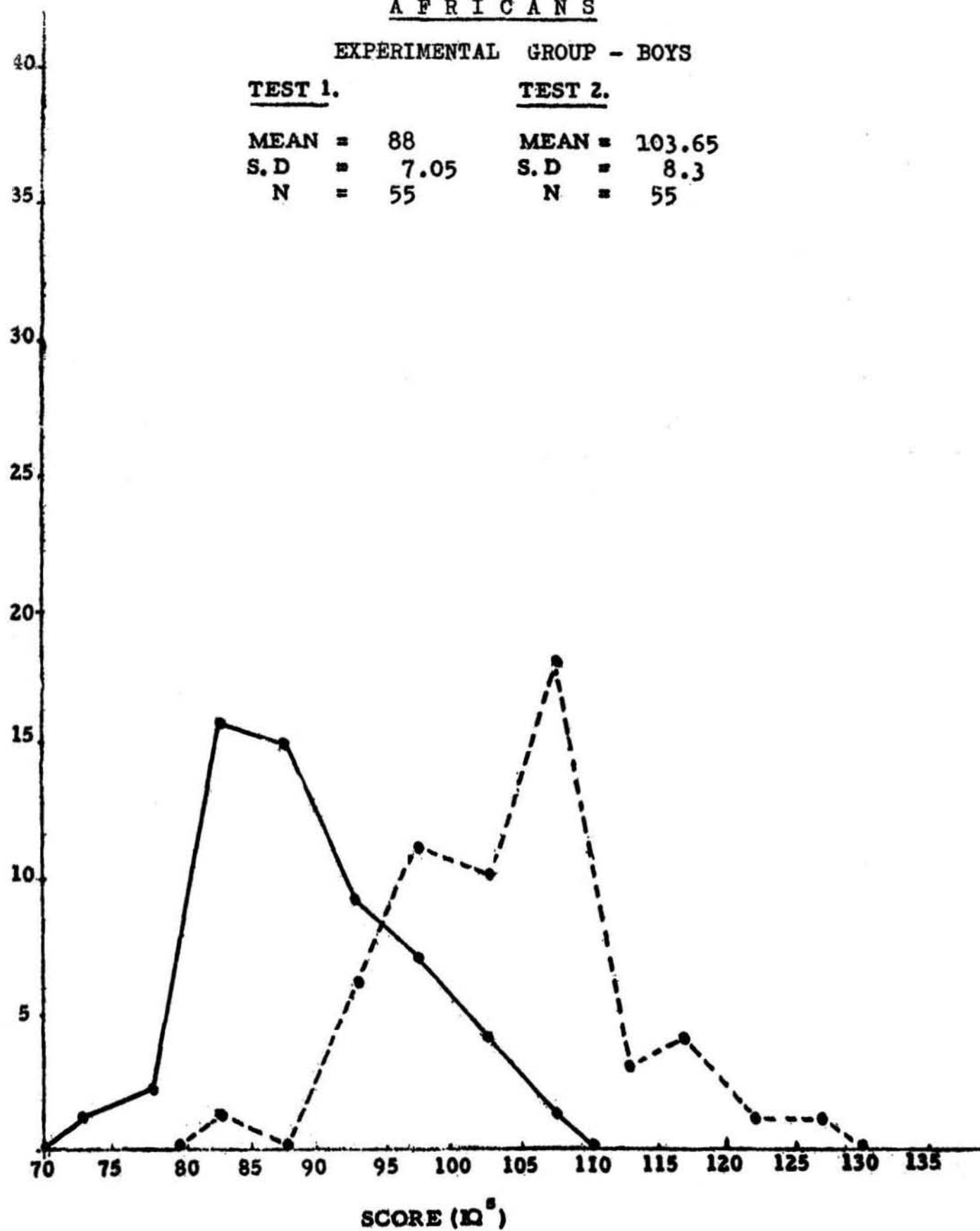
EXPERIMENTAL GROUP - BOYS

TEST 1.

MEAN = 88
 S. D = 7.05
 N = 55

TEST 2.

MEAN = 103.65
 S. D = 8.3
 N = 55



A F R I C A N S

CONTROL GROUP - BOYS

TEST 1.TEST 2.

MEAN = 84.55

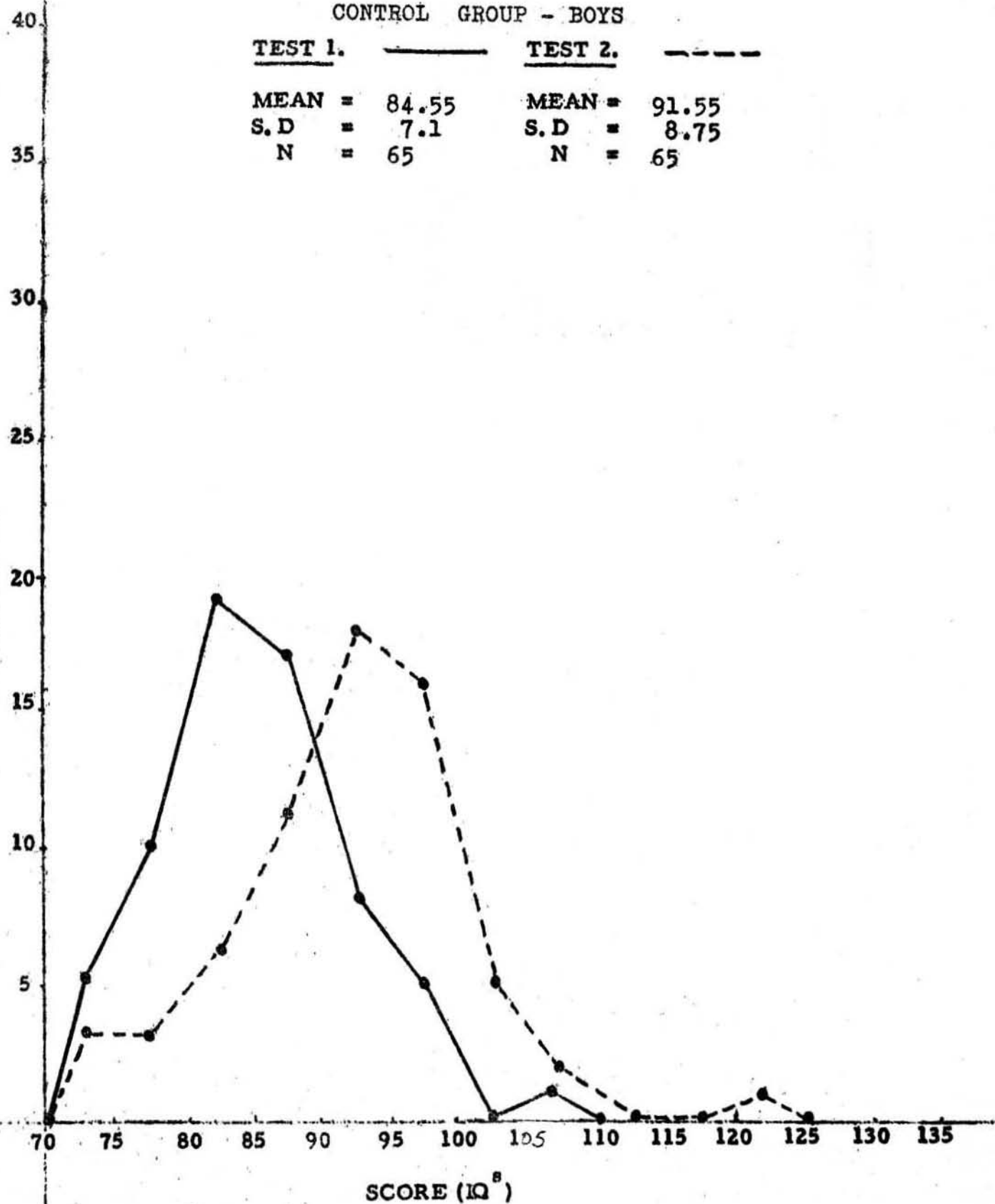
MEAN = 91.55

S.D = 7.1

S.D = 8.75

N = 65

N = 65



1. EXPERIMENTAL (GIRLS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.t.2.</u>	<u>Difference.</u>
Experimental	81	88.85	103.45	14.6

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1.T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	8.8	.97					
Test 2	10.35	1.15	14.6	.96	.59	15.2	Yes.

2. CONTROL GROUP (GIRLS)Difference between Means of Test 1 and Test 2.

<u>GROUP</u>	<u>N.</u>	<u>Mean.T.1.</u>	<u>Mean.T.2.</u>	<u>Difference.</u>
Control	74	84.9	91.8	6.9

Tests of Significance of Difference between Means of Test 1 and Test 2.

<u>Tests.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>Diff.</u> <u>T.1. T.2.</u>	<u>S.E.Diff.</u> <u>T.1. T.2.</u>	<u>r.</u> <u>12</u>	<u>t.</u>	<u>Significant.</u>
Test 1	8.6	.76					
Test 2	8.35	.97	6.9	.74	.66	9.3	Yes.

3. Tests of Significance of Difference between Means of Experimental and Control Groups.

<u>GROUP</u>	<u>N.</u>	<u>S.D.</u>	<u>S.E.</u>	<u>T.1.-T.2.</u>	<u>t.</u>	<u>Significant.</u>
Experimental	81	8.25	.92	14.6		
Control	74	4.8	1.07	6.9	7.2	Yes.

Experimental Group - Girls.

<u>TEST 1.</u>				<u>TEST 2.</u>			
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>
115 -	119	-	1	125 -	129	-	1
110 -	114	-	2	120 -	124	-	6
105 -	109	-	4	115 -	119	-	6
100 -	104	-	1	110 -	114	-	8
95 -	99	-	9	105 -	109	-	12
90 -	94	-	10	100 -	104	-	17
85 -	89	-	31	95 -	99	-	12
80 -	84	-	15	90 -	94	-	13
75 -	79	-	6	85 -	89	-	2
70 -	74	-	2	80 -	84	-	4
N. =			81	N. =			81
M. =			88.85	M. =			106.6
S.D. =			8.8	S.D. =			9.55

Control Group - Girls.

<u>TEST 1</u>				<u>TEST 2.</u>			
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>
100 -	104	-	1	110 -	114	-	1
95 -	99	-	5	105 -	109	-	4
90 -	94	-	11	100 -	104	-	7
85 -	89	-	23	95 -	99	-	17
80 -	84	-	16	90 -	94	-	16
75 -	79	-	15	85 -	89	-	16
70 -	74	-	3	80 -	84	-	7
N. =			74	N. =			74
M. =			84.9	M. =			91.8
S.D. =			6.6	S.D. =			8.35

A F R I C A N S

EXPERIMENTAL GROUP - GIRLS

TEST 1.

————

TEST 2.

MEAN = 88.85

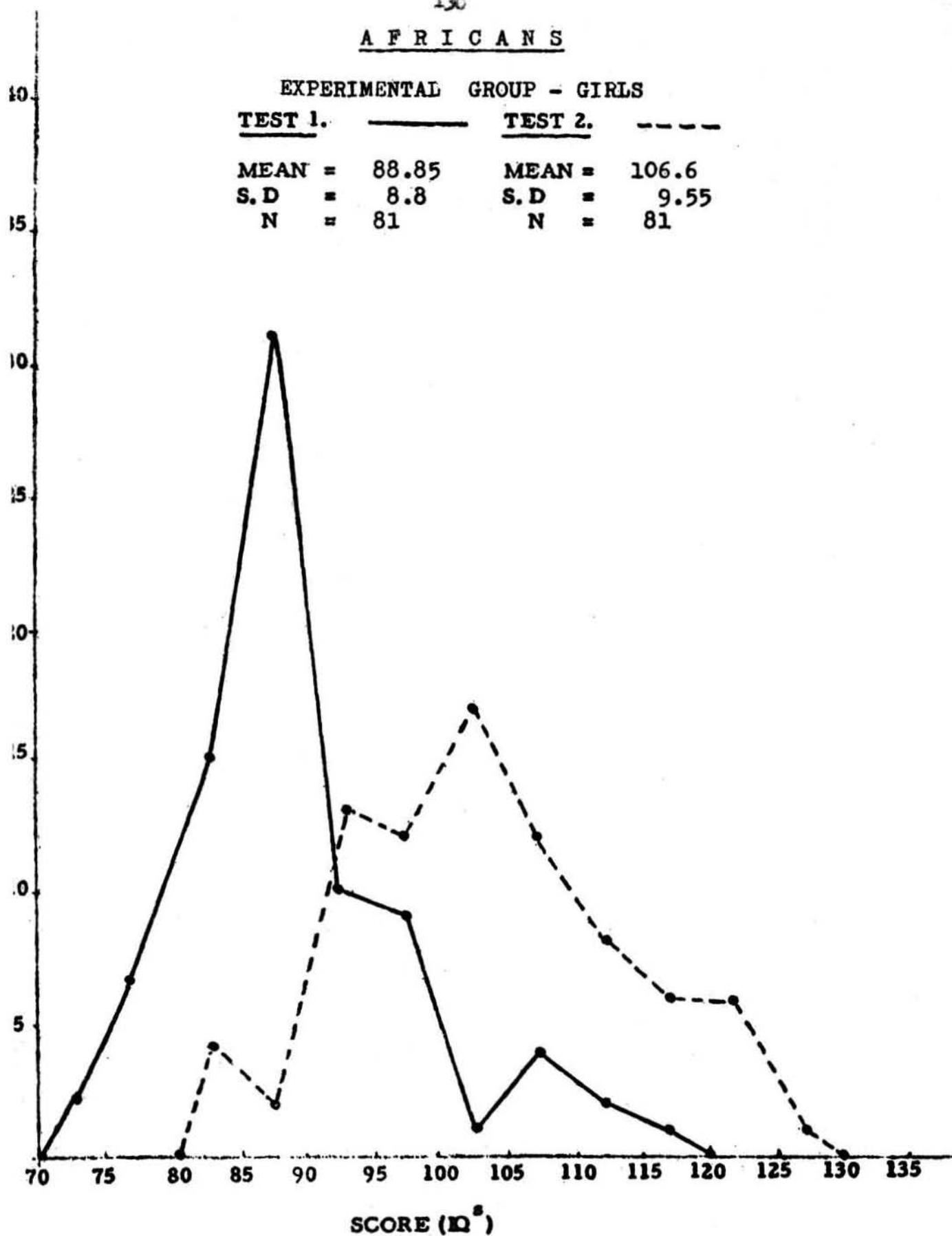
MEAN = 106.6

S.D. = 8.8

S.D. = 9.55

N = 81

N = 81



A F R I C A N S

CONTROL GROUP - GIRLS

TEST 1.TEST 2.

MEAN = 84.9

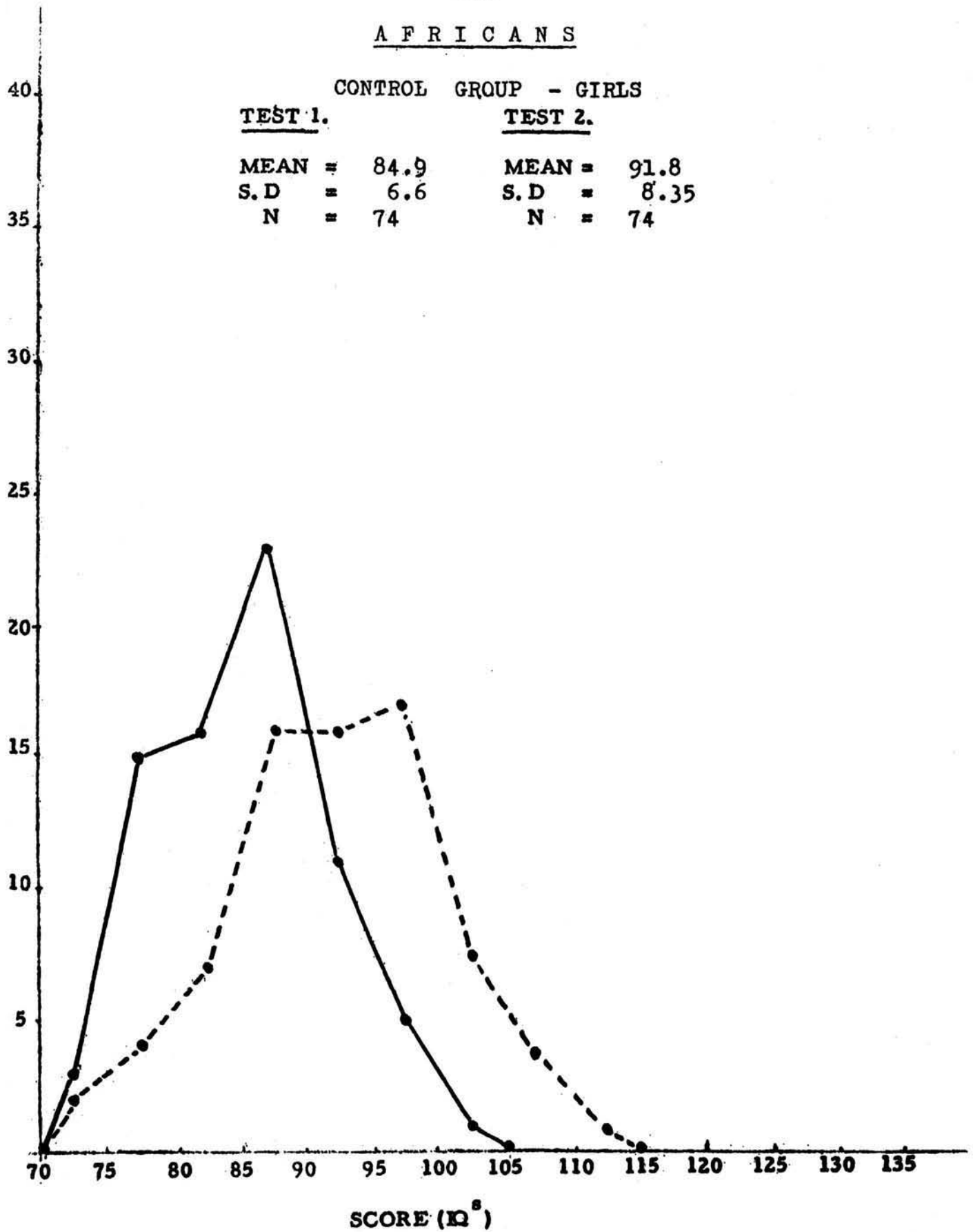
MEAN = 91.8

S. D = 6.6

S. D = 8.35

N = 74

N = 74



CONCLUSIONS.AFRICANS

1. With a nett gain of 7.6 points of IQ for the Experimental Group the Africans made the largest gain of the three ethnic groups. For the African, the initial test was a unique occasion and because of it the scores on the first Test might have been unduly depressed; this coupled with the relatively stable nature of the group may have accounted for the relatively large gains.
2. Neither sex showed any significant gain over the other.
3. An analysis of the scores of those testees who either scored less in Test 1 than they did in Test 2 or made no improvement yields the following results :-

Scores	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	TOTAL	B.	G.
						1		2	2	1	6	0	6.

If we can infer that a large number of gross variations in individual scores from one test to another is indicative of instability then conversely we can infer few variations indicate stability. This African group seems to be a stable one.

EUROPEAN : INDIANS. : AFRICANS.

This section contains :-

1. Tables showing nett increase after coaching of :-
 - a. Experimental and Control Groups.
 - b. Boys Group.
 - c. Girls Group.
2. Tables showing correlations between Test 1 and Test 2 for all groups.
3. Tables showing increase in standard deviation between Test 1 and Test 2.
4. Frequency distributions for Experimental and Control Groups.
5. Frequency Polygons for Experimental and Control Groups.
6. Summary of Conclusions.

TABLE SHOWING NETT INCREASE AFTER COACHING FOR
EXPERIMENTAL AND CONTROL GROUPS IN THE THREE
ETHNIC GROUPS.

Experimental and Control	EUROPEANS			AFRICANS			INDIANS		
	N.	MEAN.	S.D.	N.	MEAN.	S.D.	N.	MEAN.	S.D.
TEST 1		105.06	10.45 (0.87)		88.75	8.15 (0.72)		86.4	7.45 (0.64)
Experimental	143			136			133		
TEST 2		115.66	12.85 (1.08)		103.3	9.65 (0.83)		92.5	11.45 (0.80)
TEST 1		101.34	12 (1.04)		84.75	6.8 (0.58)		87.3	10.7 (0.93)
CONTROL	133			139			133		
TEST 2		108.73	12.6 (1.08)		91.7	9.9 (0.83)		92.95	11.15 (0.97)
TEST 1		9.72			4.0			-0.9	
<u>Experimental</u> <u>Control</u>									
TEST 2		0.93			11.0			-0.45	

Difference Test 2
- Test 1

i.e. Increase in
Experimental Groups
eliminating initial
difference between
experimental and
Control.

3.21

7.0

0.45

- Europeans show a nett gain of 3.21 points of Iq.
- Africans show a nett gain of 7.0 points of Iq.
- Indians show a nett decrease of 0.45 points of Iq.

TABLE SHOWING NETT INCREASE AFTER COACHING FOR
THE BOYS GR UPS IN THE THREE ETHNIC GROUPS

BOYS	EUROPEANS			AFRICANS			INDIANS		
	N.	MEAN.	S.D.	N.	MEAN.	S.D.	N.	MEAN.	S.D.
TEST 1		104.54	10.2 (1.06)		88.00	7.05 (0.95)		88.25	6.85 (0.90)
Experimental	92			55			57		
TEST 2		115.65	12.3 (1.3)		103.65	8.3 (1.1)		95.1	11.60 (1.5)
TEST 1		101.82	11.25 (1.2)		84.55	7.1 (0.88)		88.3	11.65 (1.3)
Control	89			65			72		
TEST 2		109.90	13.65 (1.4)		91.55	8.75 (1.08)		94.75	11.25 (1.3)
TEST 1		2.72			3.45			-0.05	
Experimental Control									
TEST 2		5.75			12.10			0.35	
<u>Difference Test 2</u> <u>- Test 1</u> i.e. Increase in experimental groups eliminating initial differences between experimental and control.									
		3.03			8.65			0.40	

- European boys show a nett increase of 3.03 points of Iq.
- African boys show a nett increase of 8.65 points of Iq.
- Indian boys show a nett increase of 0.40 points of Iq.

TABLE SHOWING NETT INCREASE AFTER COACHING FOR
THE GIRLS GROUPS IN THE THREE ETHNIC GROUPS

GIRLS	EUROPEANS			AFRICANS			INDIANS		
	N.	MEAN.	S.D.	N.	MEAN.	S.D.	N.	MEAN.	S.D.
TEST 1		106.00	10.8		88.85	8.8		85.05	6.00
Experimental	51		(1.5)	51		(0.97)	76		(0.68)
TEST 2		116.50	11.85		103.45	10.35		91.30	11.05
			(1.6)			(1.15)			(1.2)
TEST 1		100.38	10.55		84.9	6.6		86.00	9.05
Control	44		(1.6)	74		(0.76)	61		(1.1)
TEST 2		106.34	10.65		91.8	8.35		91.95	10.50
			(1.6)			(0.97)			(1.3)
TEST 1		5.62			3.55			-0.95	
Experimental									
Control									
TEST 2.		10.16			11.65			0.65	
<u>Difference Test 2</u> <u>- Test 1</u> i.e. increase in experimental groups eliminating initial differences between experimental and control									
		4.54			7.70			0.3	

- European girls show a nett increase of 4.54 points of I_q.
- African girls show a nett increase of 7.74 points of I_q.
- Indian girls show a nett decrease of 0.30 points of I_q.

TABLE SHOWING CORRELATIONS BETWEEN TEST 1 AND TEST 2.

<u>GROUP.</u>	<u>EUROPEANS</u>	<u>INDIANS</u>	<u>AFRICANS</u>
Experimental	.82	.75	.55
Experimental - Boys	.79	.72	.48
Experimental - Girls	.76	.77	.59
Experimental - Upper IQs	.64	-	-
Experimental - Lower IQs	.73	-	-
Control	.84	.80	.65
Control - Boys	.82	.82	.62
Control - Girls	.87	.77	.66
Control - Upper IQs	.61	-	-
Control - Lower IQs	.70	-	-

The fairly consistent relationship between European and Indian correlations and the equally consistent and relatively low correlations of the African group indicates that the scores of the latter on the first test, owing to the uniqueness of the occasion and lack of sophistication, did not do justice to their innate ability.

INCREASE IN STANDARD DEVIATION.

(14)

A.C. Rodger in his investigation found that there was a consistent increase in the standard deviations from test to test and had this to say about it: "The increase in the standard deviation from test to test is of course a result of the difference in improvement at different levels of ability. At the start of the experiment the bright and dull are a certain number of points of IQ. apart. As the testing proceeds, the dull improve by a little, the bright improve by more, so that at the end of the experiment the bright and the dull are further apart than they were at the beginning, and this is just what the increase signifies."

In the present experiment all the tests with one exception showed an increase and no doubt this can be attributed to the reasons given by Rodger above. When tested for significance (see Appendix 1) it was thought that some pattern might emerge, that is, that the Experimental Group for example might consistently show significant gains in relation to the Control Groups or that some relation between the sexes might emerge. This, however, was not so, as is seen from the tables that follow.

TABLES SHOWING INCREASES IN S.D. FROM
TEST 1 to TEST 2.

EUROPEANS.

GROUP	S.D. TEST 1.	S.D. TEST 2.	DIFF.	t.	SIGNIFICANT
Experimental	10.45	12.85	2.40	4.221	Yes
Experimental - Boys	10.20	12.30	2.10	2.901	Yes
Experimental - Girls	10.80	11.85	1.05	.941	No
Experimental - Upper IQ's	6.70	9.00	2.30	3.911	Yes
Experimental - Lower IQ's	6.05	12.85	6.80	6.376	Yes
Control	12.00	12.60	.60	1.024	No
Control - Boys	11.25	13.65	2.40	3.587	Yes
Control - Girls	10.55	10.65	.10	.104	No
Control - Upper IQ's	6.60	8.95	2.35	3.250	Yes
Control - Lower IQ's	7.05	9.45	2.40	3.267	Yes

INDIANS.

GROUP	S.D. TEST 1.	S.D. TEST 2.	DIFF.	t.	SIGNIFICANT
Experimental	7.45	11.45	4.00	7.820	Yes.
Experimental - Boys	6.85	11.60	4.75	6.138	Yes.
Experimental - Girls	6.00	11.05	5.05	8.666	Yes.
Control	10.70	11.15	0.45	.763	No.
Control - Boys	11.65	11.25	-0.40	.517	No.
Control - Girls	9.05	10.50	1.45	1.361	No.

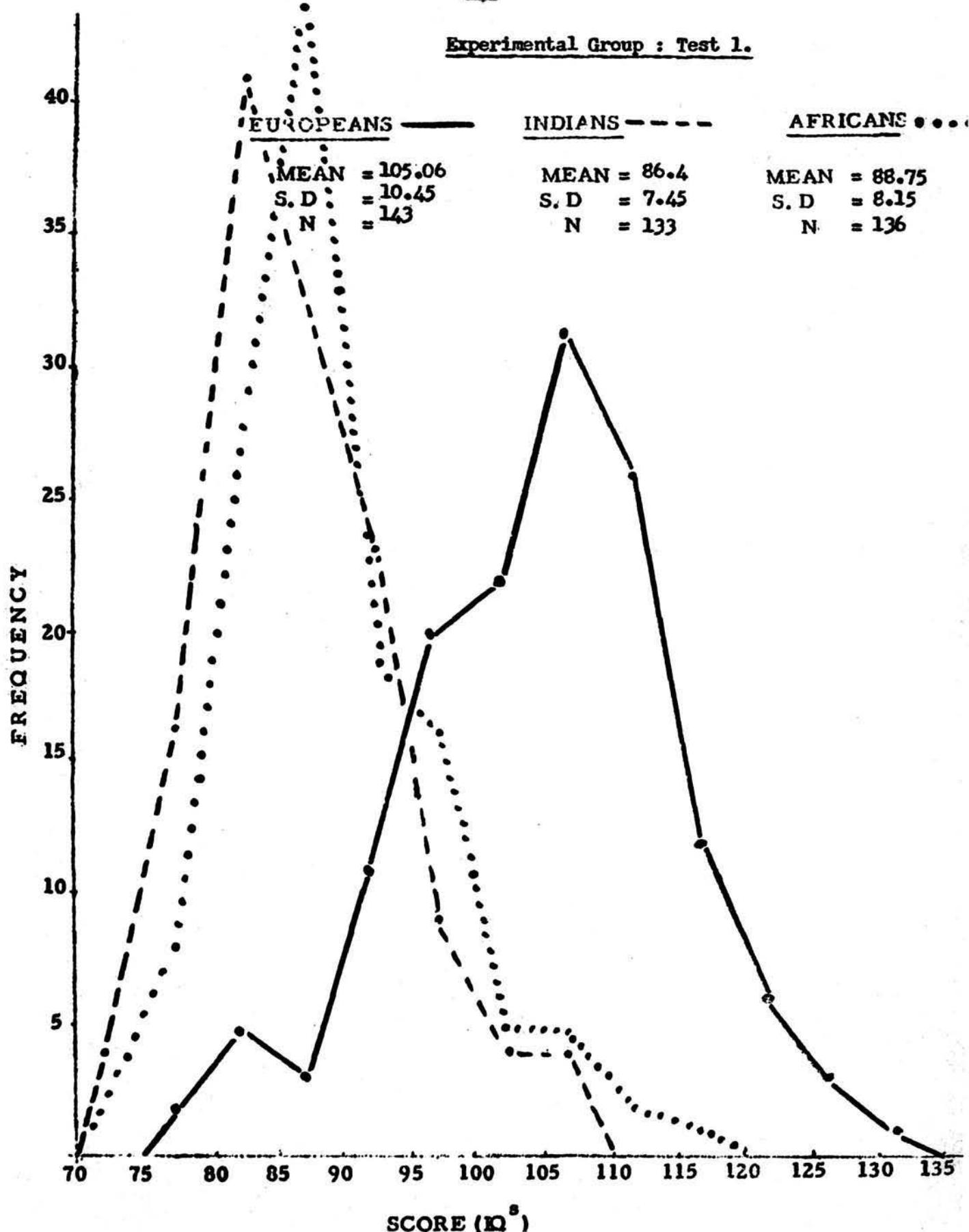
AFRICANS.

GROUP	S.D. TEST 1.	S.D. TEST 2.	DIFF.	t.	SIGNIFICANT
Experimental	8.15	9.65	1.5	2.493	Yes
Experimental - Boys	7.05	8.30	1.25	1.321	No
Experimental - Girls	8.8	10.35	1.55	1.935	No
Control	6.8	9.9	3.1	6.103	Yes
Control - Boys	7.1	8.75	1.65	3.121	Yes
Control - Girls	6.6	8.35	1.75	2.725	Yes.

EUROPEANS : INDIANS : AFRICANS.FREQUENCY DISTRIBUTIONSExperimental Group. Test 1.

<u>EUROPEANS</u>			<u>INDIANS</u>		
<u>Iq.</u>		<u>f.</u>	<u>Iq.</u>		<u>f.</u>
130 - 134	-	1	105 - 109	-	4
125 - 129	-	3	100 - 104	-	4
120 - 124	-	6	95 - 99	-	9
115 - 119	-	12	90 - 94	-	23
110 - 114	-	26	85 - 89	-	32
105 - 109	-	32	80 - 84	-	41
100 - 104	-	22	75 - 79	-	16
95 - 99	-	20	70 - 74	-	4
90 - 94	-	11			
85 - 89	-	3			
80 - 84	-	5			
75 - 79	-	2			
		<hr/>			<hr/>
N. =		143	N. =		133
M. =		105.06	M. =		86.4
S.D. =		10.45	S.D. =		7.45

<u>AFRICANS.</u>			
<u>Iq.</u>			<u>f.</u>
115 - 119	-		1
110 - 114	-		2
105 - 109	-		5
100 - 104	-		5
95 - 99	-		16
90 - 94	-		19
85 - 89	-		48
80 - 84	-		29
75 - 79	-		8
70 - 74	-		3
			<hr/>
		N. =	136
		M. =	88.75
		S.D. =	8.15

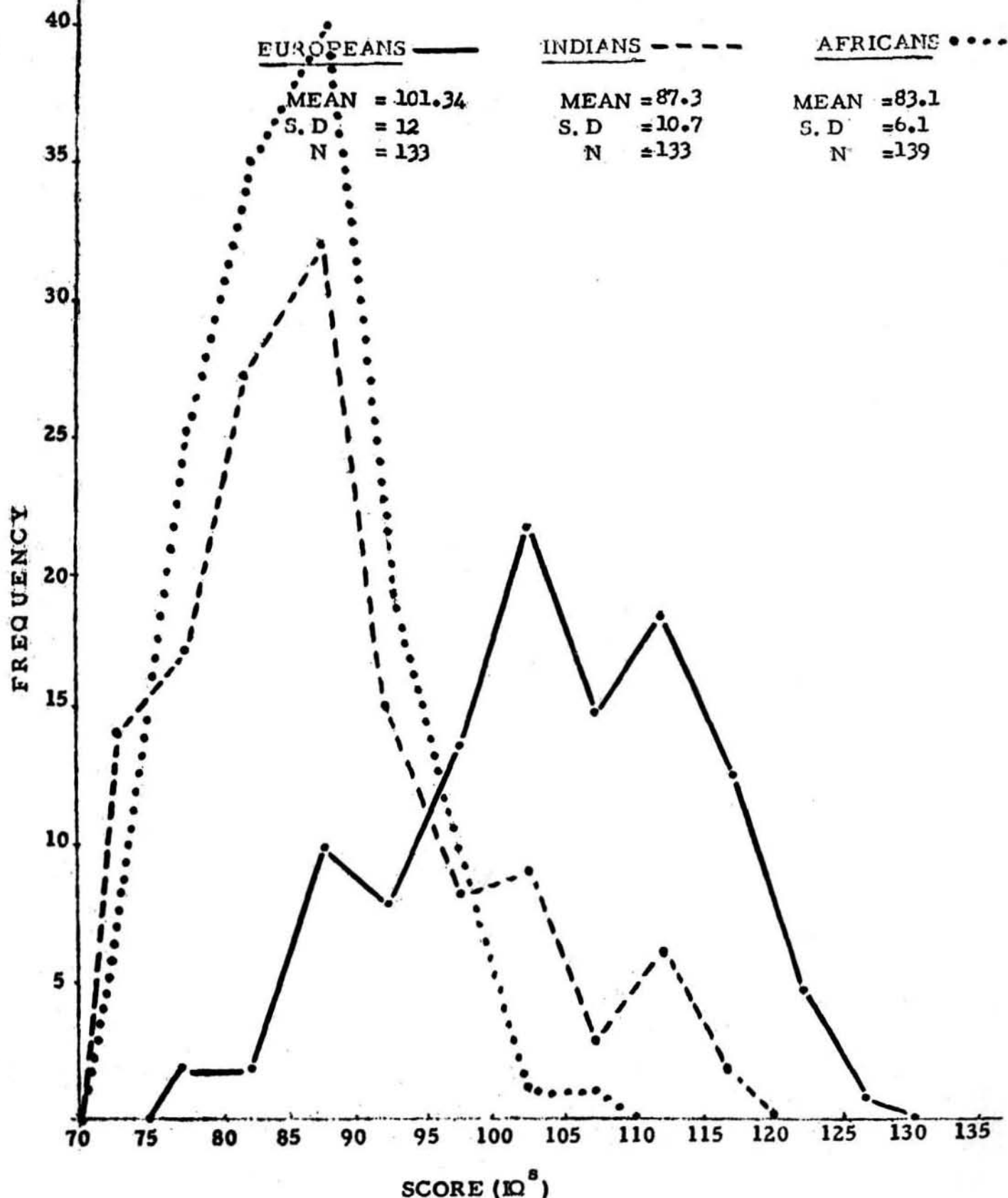
Experimental Group : Test 1.

EUROPEANS : INDIANS : AFRICANS.FREQUENCY DISTRIBUTIONS.Control Group. Test 1.

<u>EUROPEANS</u>				<u>INDIANS.</u>					
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>		
125	-	129	-	1	115	-	119	-	2
120	-	124	-	5	110	-	114	-	6
115	-	119	-	13	105	-	109	-	3
110	-	114	-	19	100	-	104	-	9
105	-	109	-	15	95	-	99	-	8
100	-	104	-	22	90	-	94	-	15
95	-	99	-	14	85	-	89	-	32
90	-	94	-	8	80	-	84	-	27
85	-	89	-	10	75	-	79	-	17
80	-	84	-	2	70	-	74	-	14
75	-	79	-	2					
N. =			133	N. =			133		
M. =			101.34	M. =			87.3		
S.D. =			12	S.D. =			10.7		

AFRICANS.

<u>Ic.</u>		<u>f.</u>
105	- 109	- 1
100	- 104	- 1
95	- 99	- 10
90	- 94	- 19
85	- 89	- 40
80	- 84	- 35
75	- 79	- 25
70	- 74	- 8
		<hr/>
N. =		139
M. =		83.1
S. . . =		6.1

Control Group : Test 1.

EUROPEANS : INDIANS : AFRICANS.FREQUENCY DISTRIBUTIONSExperimental Group. Test 2

<u>EUROPEANS</u>				<u>INDIANS</u>			
<u>Iq.</u>			<u>f.</u>	<u>Iq.</u>			<u>f.</u>
135 -	139	-	8	125 -	129	-	2
130 -	134	-	8	120 -	124	-	0
125 -	129	-	20	115 -	119	-	4
120 -	124	-	26	110 -	114	-	9
115 -	119	-	25	105 -	109	-	1
110 -	114	-	17	100 -	104	-	15
105 -	109	-	13	95 -	99	-	26
100 -	104	-	8	90 -	94	-	23
95 -	99	-	9	85 -	89	-	25
90 -	94	-	4	80 -	84	-	11
85 -	89	-	1	75 -	79	-	11
80 -	84	-	3	70 -	74	-	6
75 -	79	-	1				
N. =			143	N. =			133
M. =			115.66	M. =			92.95
S.D. =			12.85	S.D. =			11.45

AFRICANS.

<u>Iq.</u>			<u>f.</u>
125 -	129	-	2
120 -	124	-	7
115 -	119	-	10
110 -	114	-	11
105 -	109	-	30
100 -	104	-	27
95 -	99	-	25
90 -	94	-	17
85 -	89	-	2
80 -	84	-	5
N. =			136
M. =			103.3
S.D. =			9.65

Experimental Group : Test 2.EUROPEANS ———INDIANS - - - -AFRICANS


Group	Line Style	Mean	S.D.	N
Europeans	Solid	115.66	12.85	143
Indians	Dashed	92.95	11.45	133
Africans	Dotted	103.3	9.65	136

MEAN = 115.66

S. D = 12.85

N = 143

MEAN = 92.95

S. D = 11.45

N = 133

MEAN = 103.3

S. D = 9.65

N = 136

SCORE (IQ)

Control Group : Test 2.EUROPEANS ———INDIANS - - - -AFRICANS

MEAN = 108.7

S. D = 12.6

N = 133

MEAN = 92.95

S. D = 11.15

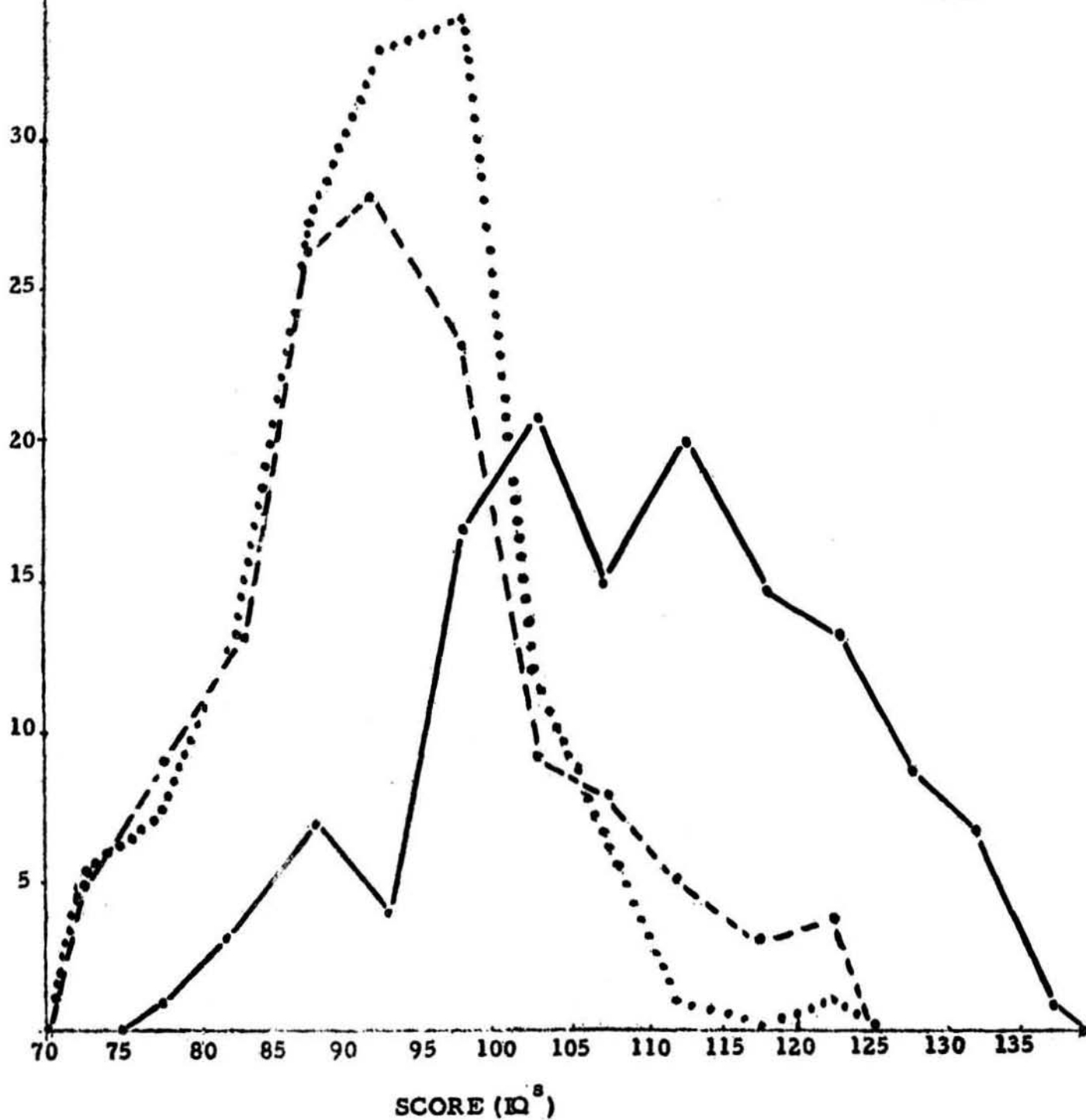
N = 133

MEAN = 91.7

S. D = 9.9

N = 139

FREQUENCY



SUMMARY OF CONCLUSIONS.

EUROPEANS

1. Gain of the Experimental Group due to coaching is 3.21 points of IQ.
 Gain of the Boys Group due to coaching is 3.03 points of IQ.
 Gain of the Girls Group due to coaching is 4.54 points of IQ.
 Gain of the Upper IQ Group due to coaching is 4.01 points of IQ.
 Gain of the Lower IQ Group due to coaching is 3.47 points of IQ.

INDIANS.

2. Gain of the Experimental Group due to coaching is 0.9 points of IQ.
 Gain of Boys Group due to coaching is 0.40 points of IQ.
 Gain of Girls Group due to coaching is 0.30 points of IQ.

AFRICANS

3. Gain of Experimental Group due to coaching is 7.6 points of IQ.
 Gain of Boys Group due to coaching is 8.65 points of IQ.
 Gain of Girls Group due to coaching is 7.70 points of IQ.

4. The high number of decreases in score from Test 1 to Test 2 in the Indian group could account for the lack of significant difference between the scores of the Experimental and the Control groups and could be accounted for by loss of attention due to lack of interest during the coaching periods.
5. Tests of significance of difference between means of Standard Deviations of Test 1 and Test 2 reveal no relationship between Experimental and Control groups nor between the sexes.

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APPENDIX I.

Estimated Covariance Matrices for(a) $x = y$ and (b) for $x + y, x - y$ where $x = \text{Test 2}$ and $y = \text{Test 1}$

To test whether the two correlated variables Test 1 (y) and Test 2 (x) have the same S.D. and to see if the correlation between $(x + y)(x - y) = 0$ and from this to conclude if there is any significant increase in S.D. from Test 1 to Test 2. 't' is found after converting the correlation co-efficient (r) to Fishers Z.

1. EUROPEANS.a Experimental Group.

Estimated Covariance matrices

(a) for $x = y$		(b) for $x + y, x - y$	
x (Test 2)	y (Test 1)	$x + y$	$x - y$
$x \quad S_x^2 = 165.1$	$r_{xy} S_x S_y = 110.1$	$x + y \quad (S_x^2 + 2r_{xy} S_x S_y + S_y^2)$	$(S_x^2 - S_y^2)$
y	$S_y^2 = 109.2$	494.5	55.9
		$x - y \quad (S_x^2 - 2r_{xy} S_x S_y + S_y^2)$	54.1

$$\text{Correlation } r \quad (x + y)(x - y) = 55.9$$

$$\sqrt{54.1 \times 494.5} = 0.342$$

$$z = .3563$$

$$t = 4.221$$

Significantly different from zero.

Control Group

x Test 2		y Test 1	
x	$s_x^2 = 158.76$	$r_{xy} s_x s_y = 127.00$	
y	$s_y^2 = 144$		

x + y		x - y	
$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
556.76		14.76	
$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
48.76			

$$\text{Correlation } r(x + y)(x - y) = \frac{14.76}{\sqrt{48.76 \times 556.76}} = .089$$

$$z = .0892$$

$$t = 1.024$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO.

x Test 2	y Test 1
$s_x^2 = 151.29$	$r_{xy} s_x s_y = 99.1$
	$s_y^2 = 104.04$

x + y	x - y
$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$
453.53	47.25
	57.13

$$\text{Correlation } r(x+y)(x-y) = \frac{47.25}{\sqrt{57.13 \times 453.53}} = .293$$

$$z = .3018$$

$$t = 2.901$$

SIGNIFICANTLY DIFFERENT FROM ZERO

Control Group - Boys

x Test 2	y Test 1
$s_x^2 = 184.96$	$r_{xy} s_x s_y = 125.9$
	$s_y^2 = 125.44$

x + y	x - y
$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$
552.2	59.52
	48.6

$$\text{Correlation } r(x+y)(x-y) = \frac{59.52}{\sqrt{48.6 \times 552.2}} = .363$$

$$z = .3803$$

$$t = 3.585$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

Experimental Groups Girls.

155.

x Test 2		y Test 1	
x	$s_x^2 = 139.24$	$r_{xy} s_x s_y = 97.25$	
y		$s_y^2 = 116.64$	

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$	
	450.38	22.6	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		
	61.38		

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{22.6}{\sqrt{61.38 \times 450.38}} = .135$$

$$z = .1318$$

$$t = .941$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO

Control Groups Girls

x Test 2		y Test 1	
x	$s_x^2 = 112.36$	$r_{xy} s_x s_y = 90.1$	
y		$s_y^2 = 110.25$	

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$	
	402.81	2.11	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		
	42.41		

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{2.11}{\sqrt{402.81 \times 42.41}} = .016$$

$$z = .016$$

$$t = .104$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO

\bar{x} Test 2	\bar{y} Test 1
$x \quad s_x^2 = 112.36$	$r_{xy} s_x s_y = 39.67$
$y \quad s_y^2 = 44.9$	

$x + y$	$x - y$
$x + y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$
205.23	36.1
$x - y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$	
46.55	

$$\text{Correlation } r(x+y)(x-y) = \frac{36.1}{\sqrt{205.23 \times 46.55}} = .369$$

$$z = .3872$$

$$t = 3.911$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

Control Group Upper I.Q.'s

\bar{x} Test 2	\bar{y} Test 1
$x \quad s_x^2 = 80.1$	$r_{xy} s_x s_y = 35.83$
$y \quad s_y^2 = 43.56$	

$x + y$	$x - y$
$x + y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$
194.32	36.54
$x - y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$	
52	

$$\text{Correlation } r(x+y)(x-y) = \frac{36.54}{\sqrt{194.32 \times 52}} = .363$$

$$z = .3803$$

$$t = 3.250$$

SIGNIFICANTLY DIFFERENT FROM ZERO

x Test 2		y Test 1	
x	$s_x^2 = 163.04$	$r_{xy} s_x s_y = 56.75$	
y		$s_y^2 = 36.6$	

x + y		x - y	
$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$	
313.94		127.24	
$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		86.94	

$$\text{Correlation } r(x+y)(x-y) = \frac{127.24}{\sqrt{313.94 \times 86.94}} = .77$$

$$z = 1.0203$$

$$t = 6.376$$

SIGNIFICANTLY DIFFERENT FROM ZERO

Control Group Lower I.Q.'s

x Test 2		y Test 1	
x	$s_x^2 = 89.3$	$r_{xy} s_x s_y = 46.63$	
y		$s_y^2 = 49.7$	

x + y		x - y	
$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$	
232.26		42.67	
$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		45.74	

$$\text{Correlation } r(x+y)(x-y) = \frac{42.67}{\sqrt{232.26 \times 45.74}} = .401$$

$$z = .4248$$

$$t = 3.267$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

Experimental Group

x Test 2		y Test 1	
x	$s_x^2 = 129.96$	$r_{xy} s_x s_y = 64$	
y	$s_y^2 = 55.5$		

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$	
	313.46	74.46	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		
	57.46		

$$\text{Correlation } r(x+y)(x-y) = \frac{74.46}{\sqrt{313.46 \times 57.46}} = .555$$

$$z = .6256$$

$$t = 7.82$$

SIGNIFICANTLY DIFFERENT FROM ZERO

Control Groups

x Test 2		y Test 1	
x	$s_x^2 = 123.2$	$r_{xy} s_x s_y = 95.41$	
y	$s_y^2 = 114.49$		

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$	
	428.51	8.71	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		
	46.87		

$$\text{Correlation } r(x+y)(x-y) = \frac{8.71}{\sqrt{428.51 \times 46.87}} = .061$$

$$z = .0611$$

$$t = .763$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO.

Experimental Groups Boys

177.

x Test 2		y Test 1	
$x s_x^2 = 134.56$		$r_{xy} s_x s_y = 57.22$	
y		$s_y^2 = 46.92$	

x + y		x - y	
$x + y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
259.92		86.64	
$x - y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
67.04			

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{87.64}{\sqrt{259.92 \times 67.04}} = .663$$

$$z = .7981$$

$$t = 6.138$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

Control Group Boys

x Test 2		y Test 1	
$x s_x^2 = 125.44$		$r_{xy} s_x s_y = 107.5$	

x + y		x - y	
$x + y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
475		9.12	
$x - y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
45			

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{9.12}{\sqrt{475 \times 45}} = .062$$

$$z = .0621$$

$$t = .517$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO.

x Test 2		y Test 1	
x	$s_x^2 = 121$	$r_{xy} s_x s_y = 51.05$	
y	$s_y^2 = 36$		

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$	
	259.1	85	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{85}{\sqrt{259.1 \times 54.9}} = .713$$

$$z = .9533$$

$$t = 8.666$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

Control Girls

x Test 2		y Test 1	
x	$s_x^2 = 110.25$	$r_{xy} s_x s_y = 73.15$	
y	$s_y^2 = 81.9$		

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$	$(s_x^2 - s_y^2)$	
	274.05	28.35	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		
	110.25		

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{28.35}{\sqrt{274.05 \times 110.25}} = .162$$

$$z = .1634$$

$$t = 1.361$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO.

AFRICANS.Experimental Group

x Test 2		y Test 1	
x	$s_x^2 = 93.12$	$r_{xy} s_x s_y = 43.26$	
y		$s_y^2 = 66.42$	

x + y		x - y	
$x + y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
244.06		26.7	
$x - y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
75.02			

$$\text{Correlation } r(x + y)(x - y) = \frac{26.7}{\sqrt{244.06 \times 75.02}} = .197$$

$$z = .1995$$

$$t = 2.493$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

Control Group

x Test 2		y Test 1	
x	$s_x^2 = 98.01$	$r_{xy} s_x s_y = 43.75$	
y		$s_y^2 = 46.24$	

x + y		x - y	
$x + y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
231.75		51.77	
$x - y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
56.75			

$$\text{Correlation } r(x + y)(x - y) = \frac{51.77}{\sqrt{231.75 \times 56.75}} = .453$$

$$z = .4883$$

$$t = 6.103$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

x Test 2		y Test 1	
x	$s_x^2 = 68.89$	$r_{xy} s_x s_y = 28.08$	
y	$s_y^2 = 49.7$		

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$ 174.75	$(s_x^2 - s_y^2)$ 19.19	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$		

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{19.19}{\sqrt{174.75 \times 62.43}} = .183$$

$$z = .1850$$

$$t = 1.321$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO.

Control Group Boys

x Test 2		y Test 1	
x	$s_x^2 = 76.56$	$r_{xy} s_x s_y = 38.52$	
y	$s_y^2 = 43.56$		

x + y		x - y	
x + y	$(s_x^2 + 2r_{xy} s_x s_y + s_y^2)$ 197.16	$(s_x^2 - s_y^2)$ 33	
x - y	$(s_x^2 - 2r_{xy} s_x s_y + s_y^2)$ 43.08		

$$\text{Correlation } r_{(x+y)(x-y)} = \frac{33}{\sqrt{197.16 \times 43.08}} = .358$$

$$z = .3746$$

$$t = 3.121$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

x Test 2		y Test 1	
x	$s_x^2 = 106.09$	$r_{xy} s_x s_y = 53.74$	
y		$s_y^2 = 77.44$	

x + y		x - y	
$x - y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
291.48		29.05	
$x + y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
76.05			

$$\text{Correlation } r(x + y)(x - y) = \frac{29.5}{\sqrt{291.48 \times 76.05}} = .195$$

$$z = .1935$$

$$t = 1.935$$

NOT SIGNIFICANTLY DIFFERENT FROM ZERO.

Control Group Girls

x Test 2		y Test 1	
x	$s_x^2 = 69.72$	$r_{xy} s_x s_y = 38.52$	
y		$s_y^2 = 43.56$	

x + y		x - y	
$x - y (s_x^2 + 2r_{xy} s_x s_y + s_y^2)$		$(s_x^2 - s_y^2)$	
190.8		26.16	
$x + y (s_x^2 - 2r_{xy} s_x s_y + s_y^2)$			
35.76			

$$\text{Correlation } r(x + y)(x - y) = \frac{26.16}{\sqrt{190.8 \times 35.76}} = .316$$

$$z = .3271$$

$$t = 2.725$$

SIGNIFICANTLY DIFFERENT FROM ZERO.

APPENDIX II.

This test is Copyright

NON-VERBAL TEST 1

(A SCALE OF NON-VERBAL MENTAL ABILITY)

by J. W. JENKINS, M.Sc., Ph.D.

AGES: 10.0—12.11

TIME: 30 minutes

Not to be filled in by pupil

DO NOT TURN OVER THIS BOOKLET UNTIL YOU ARE TOLD**FILL IN THE FOLLOWING PARTICULARS:**

SURNAME (in BLOCK CAPITALS)

CHRISTIAN NAME(S)

SEX (BOY or GIRL)

NAME OF SCHOOL

CLASS

AGE YEARS

DATE OF BIRTH: Date Month Year
(Write the month as a word)

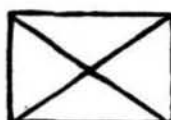
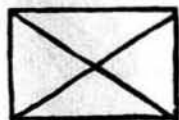
TO-DAY'S DATE 19

READ THE FOLLOWING CAREFULLY:

1. In this book there are some sets of puzzles. Do them as well as you possibly can.
2. You may not have time to do them all, but every five minutes you will be told to stop and go on to the next page.
3. You need not ask any questions because in each set you are told what to do.
4. Most of the puzzles are easy, but a few are quite hard.
5. Work steadily on without wasting any time.
6. Be sure to stop whenever you are told.
7. If you alter any of your answers do so CLEARLY.

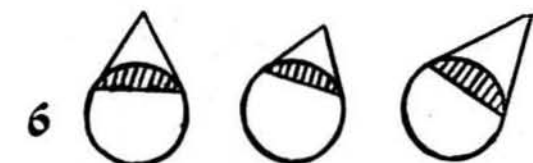
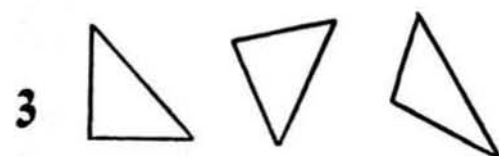
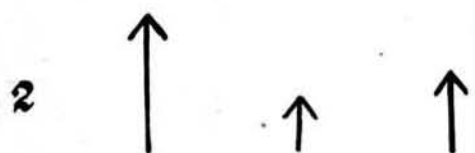
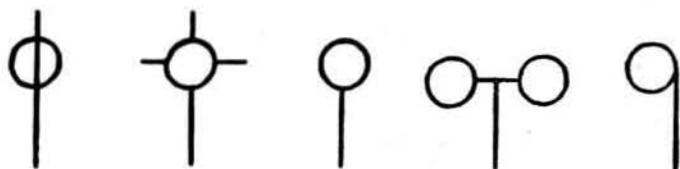
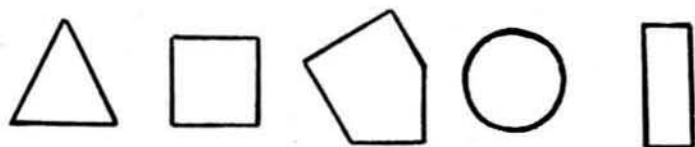
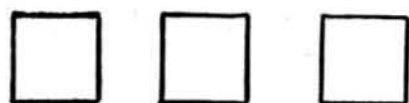
8. While you are waiting to start, find the figure in the row below which is most unlike the other four and draw

PAGE	SCORE	
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
TOTAL		
AGE	Years	Completed Months
Standardised Score		
Initials of Marker(s)		



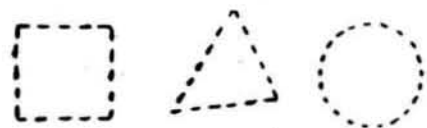
On the left of each of the rows below there are three figures which are alike. On the right there are five more figures: **find which one of these is most like the three figures on the left, and draw a line under it.** (The first one has been done for you.)

EXAMPLE



GO STRAIGHT ON TO THE NEXT PAGE

8



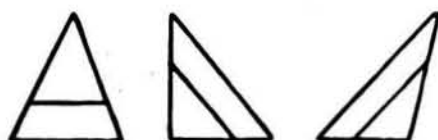
9



10



11



12



13



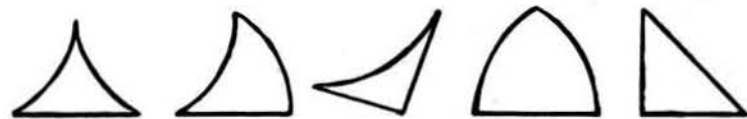
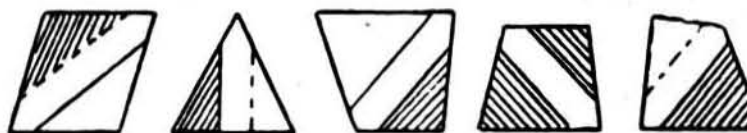
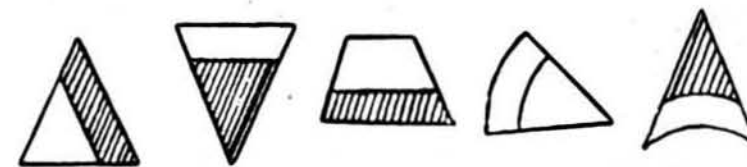
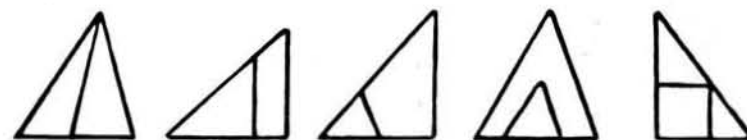
14



15



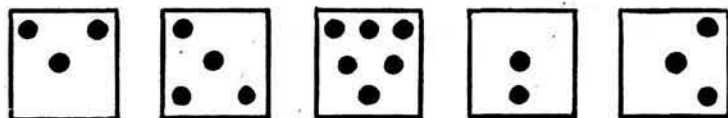
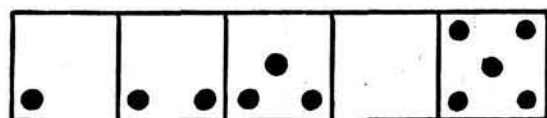
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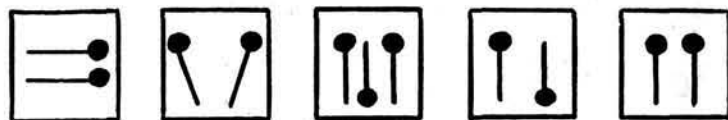
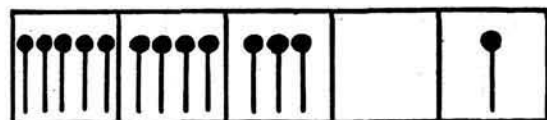
DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

To the left in each of the lines below there are five squares arranged in order. **ONE** of these squares has been left empty. Find which one of the five squares on the right should take the place of the empty square and draw a line under it. (The first one has been done for you.)

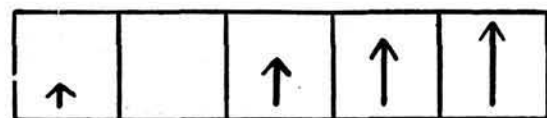
EXAMPLE



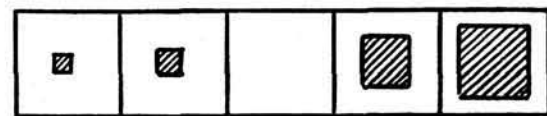
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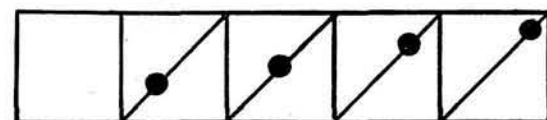
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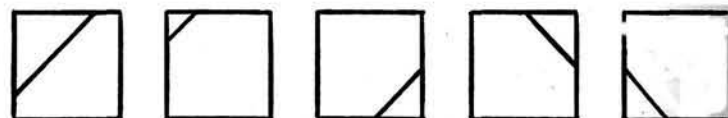
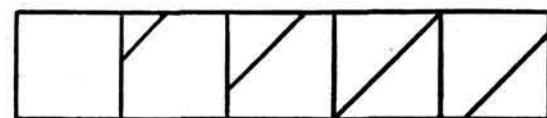
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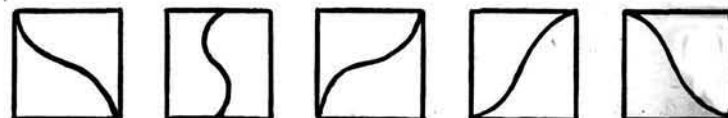
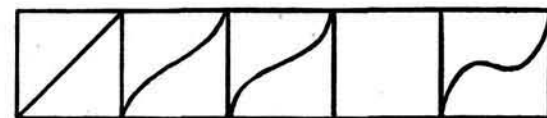
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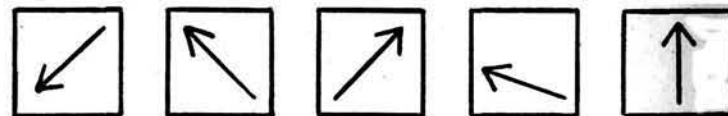
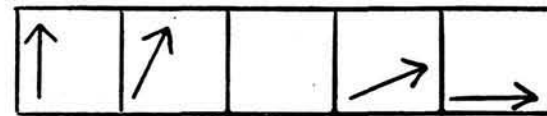
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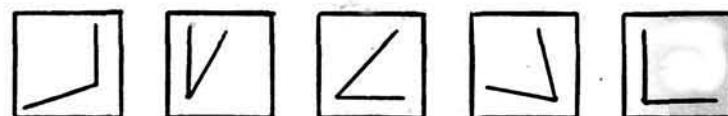
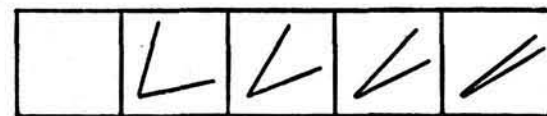
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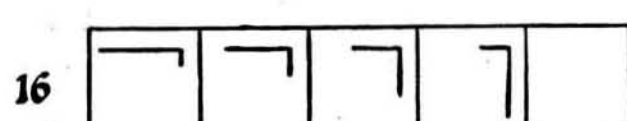
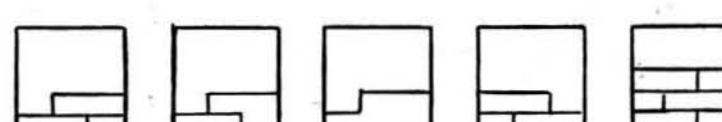
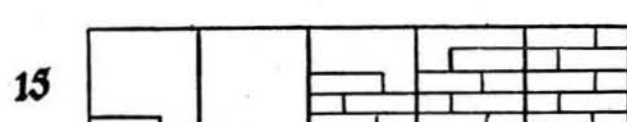
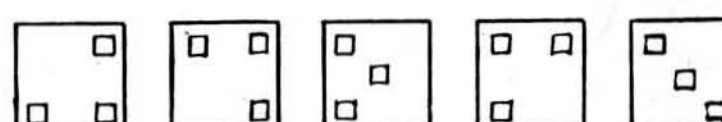
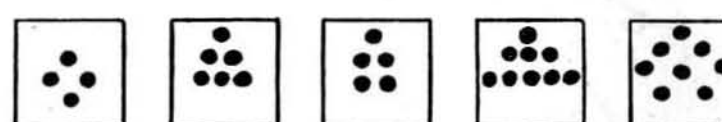
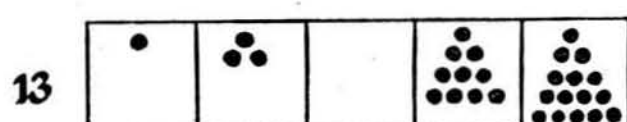
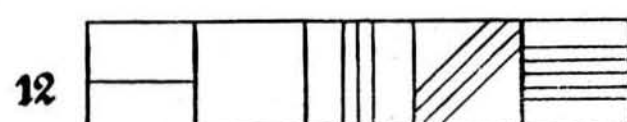
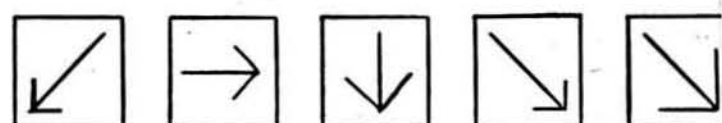
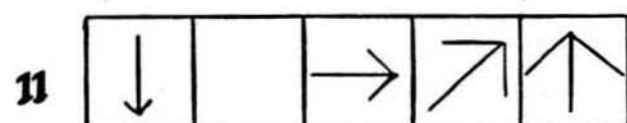
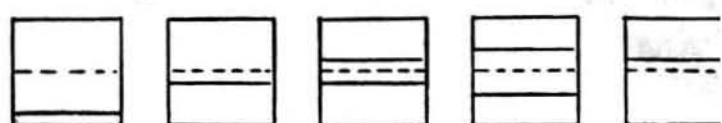


7



8

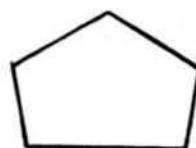
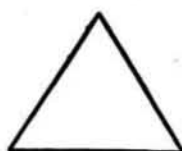




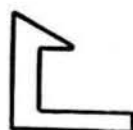
DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO

In each of the rows below there are five figures. Find ONE figure in each row which is most unlike the other four and draw a line under it. (The first one has been done for you.)

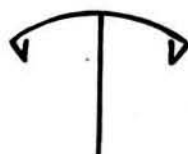
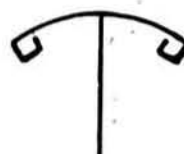
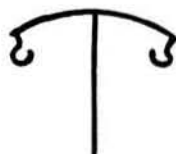
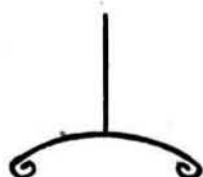
EXAMPLE



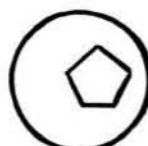
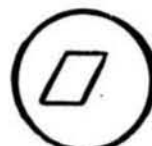
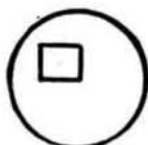
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2



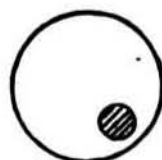
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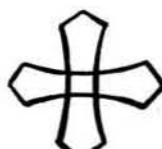
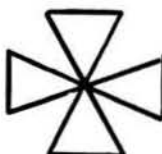
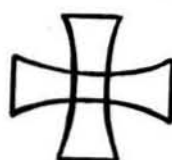
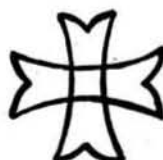
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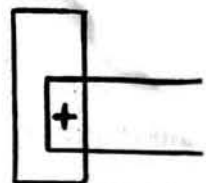
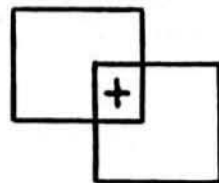
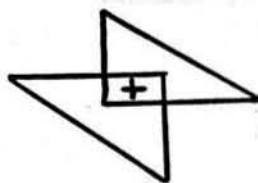
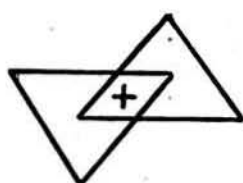
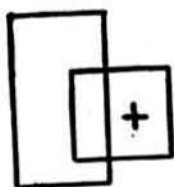
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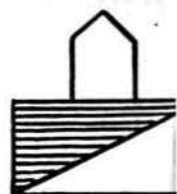
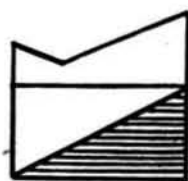
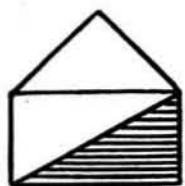
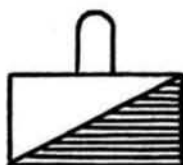
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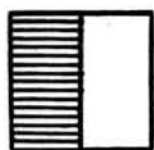
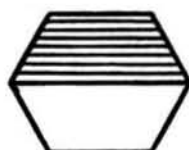
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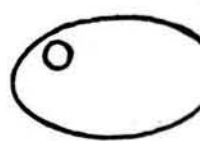
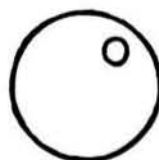
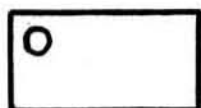
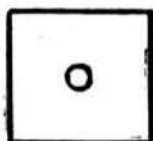
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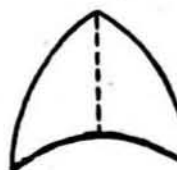
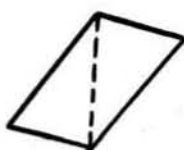
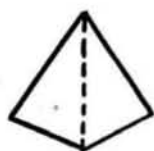
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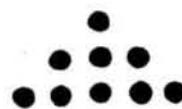
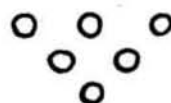
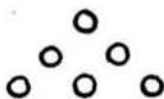
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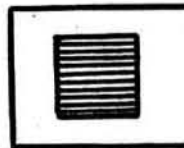
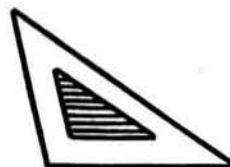
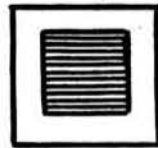
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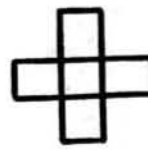
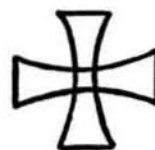
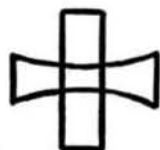
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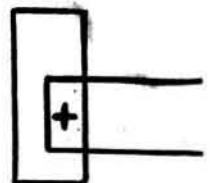
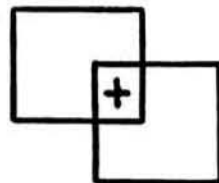
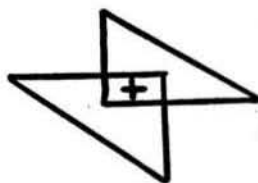
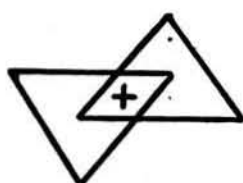
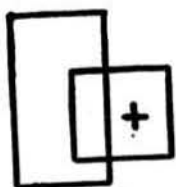


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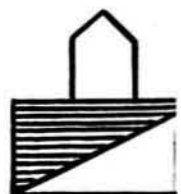
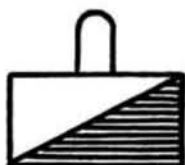


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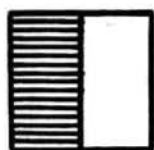
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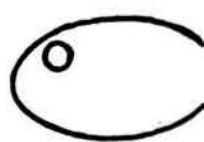
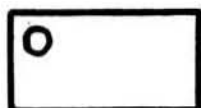
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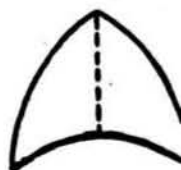
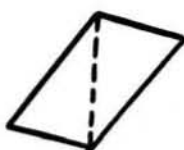
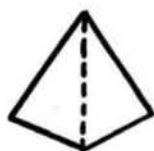
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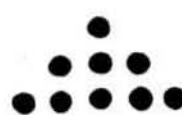
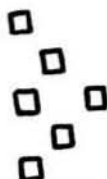
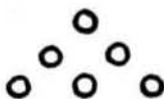
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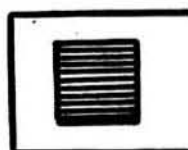
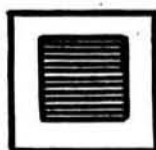
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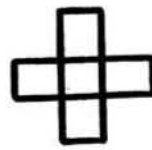
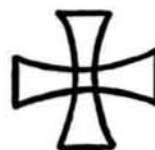
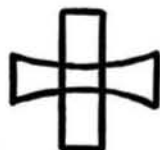
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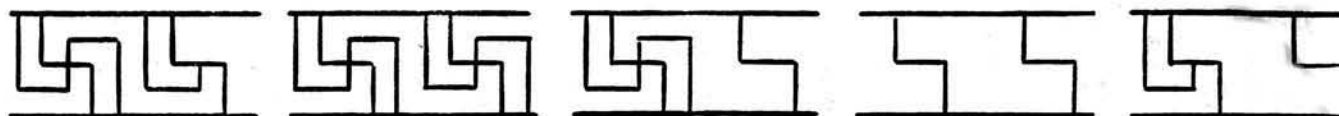


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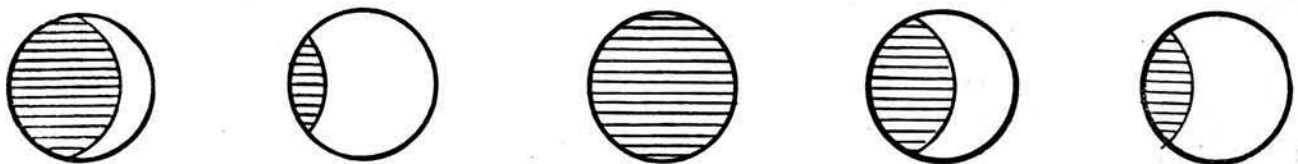


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8



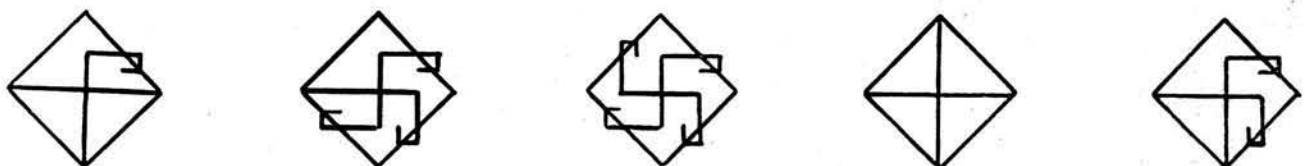
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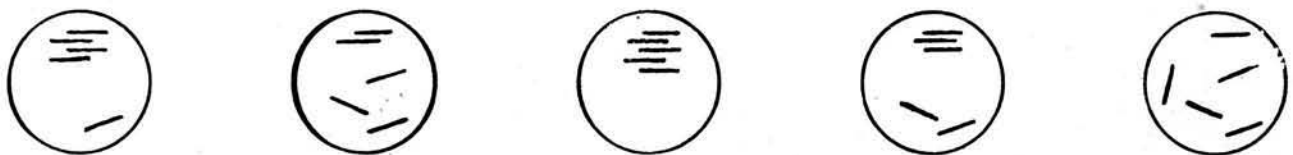
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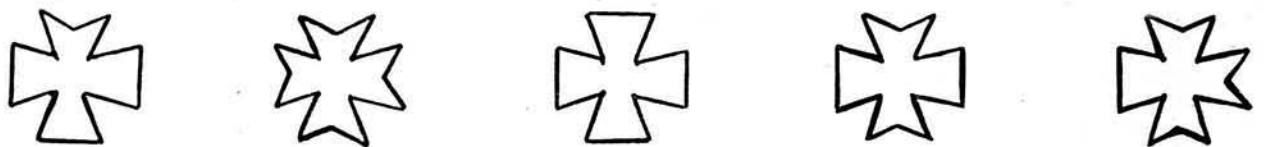
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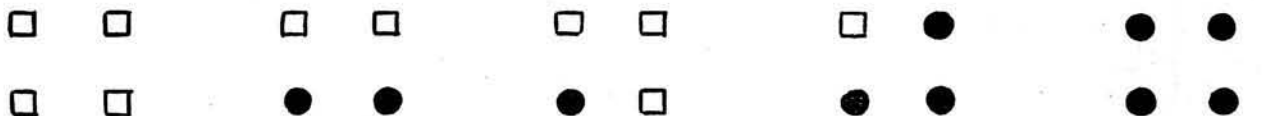
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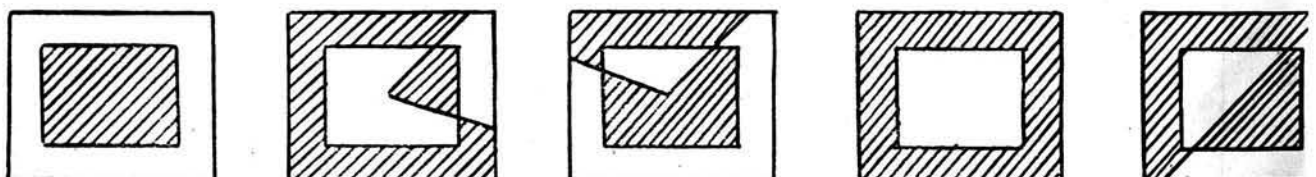
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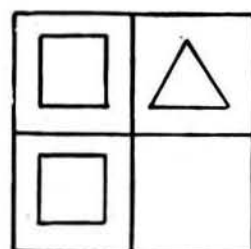
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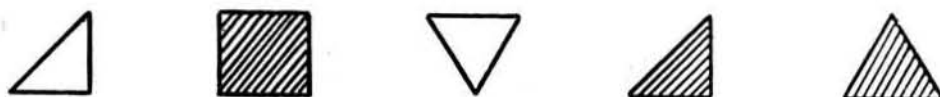
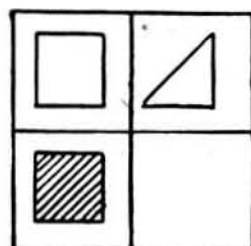
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In the big square on the left of each line below, one of the four small squares has been left empty. One of the five figures to the right should fill the empty square. Find this figure and draw a line under it. (The first one has been done for you.)

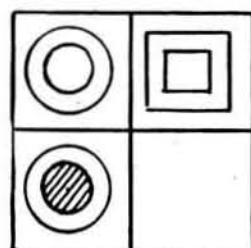
EXAMPLE



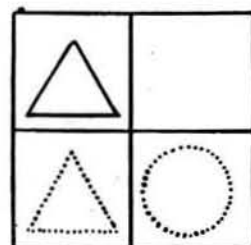
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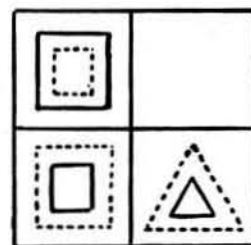
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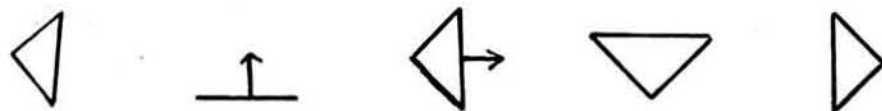
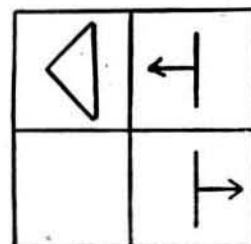
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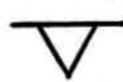
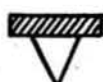
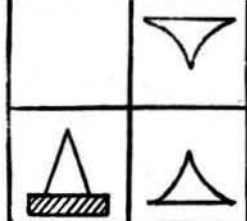


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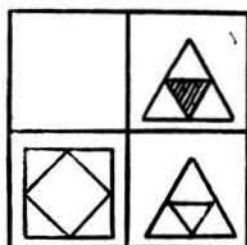


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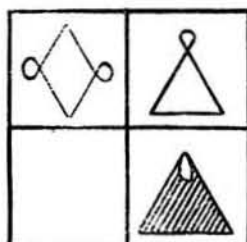
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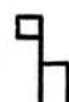
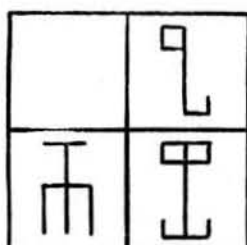
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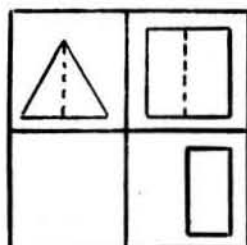
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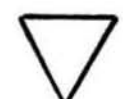
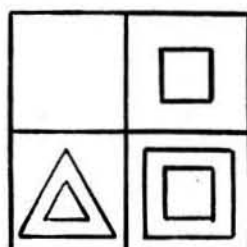
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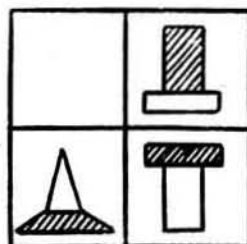
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11

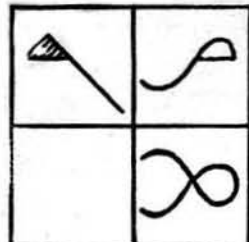


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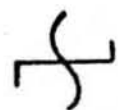
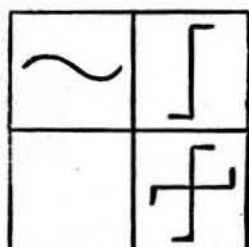


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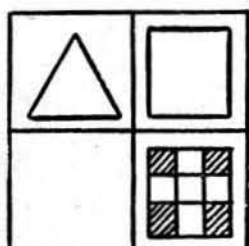
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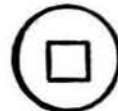
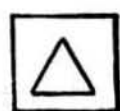
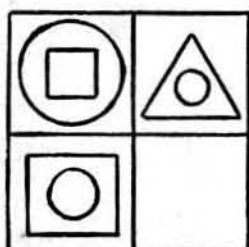
4



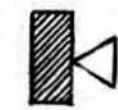
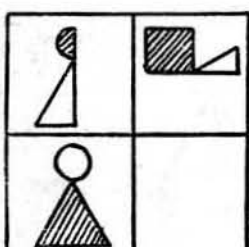
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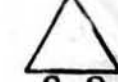
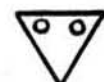
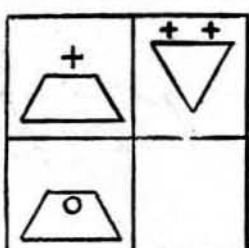
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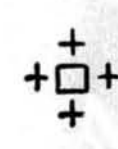
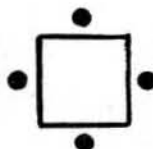
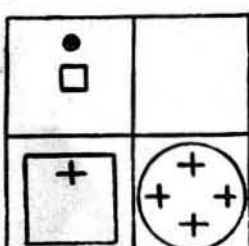
17



18



19



**NATIONAL FOUNDATION FOR EDUCATIONAL RESEARCH IN ENGLAND
AND WALES**

NON-VERBAL TEST 2

by D. M. LEE, M.A., and J. W. JENKINS, M.Sc., Ph.D.

AGES: 10.0—12.11

TIME: 30 minutes

DO NOT TURN OVER THIS BOOKLET UNTIL YOU ARE TOLD

FILL IN THE FOLLOWING PARTICULARS:

SURNAME (in BLOCK CAPITALS)

CHRISTIAN NAME(S)

SEX (BOY or GIRL)

NAME OF SCHOOL

CLASS

AGE YEARS

DATE OF BIRTH: Date Month Year
(Write the month as a word)

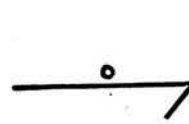
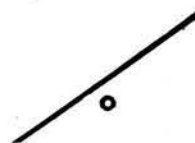
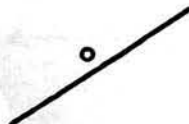
TO-DAY'S DATE 19

READ THE FOLLOWING CAREFULLY:

1. In this book there are some sets of puzzles. Do them as well as you possibly can.
2. You may not have time to do them all, but every five minutes you will be told to stop and go on to the next page.
3. You need not ask any questions because in each set you are told what to do.
4. Most of the puzzles are easy, but a few are quite hard.
5. Work steadily on without wasting any time.
6. Be sure to stop whenever you are told.
7. If you alter any of your answers do so CLEARLY.
8. While you are waiting to start, find the figure in the row below which is most unlike the other four and draw a line under it.

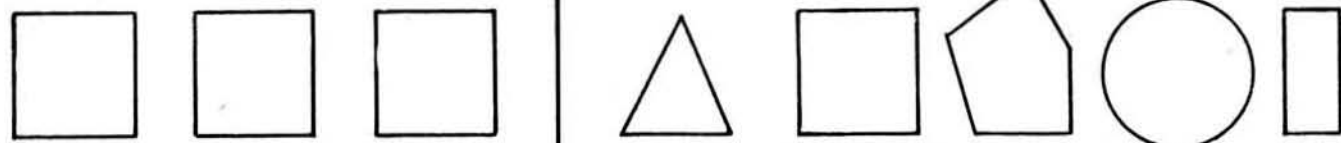
Not to be filled in by pupils

PAGE	SCORE	
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
TOTAL		
AGE	Years	Completed Months
Standardised Score		
Initials of Marker(s)		



On the left of each of the rows below there are three figures which are alike. On the right there are five more figures: **find which one of these is most like the three figures on the left, and draw a line under it.** (The first one has been done for you.)

EXAMPLE



1.		
2.		
3.		
4.		
5.		
6.		
7.		

8.



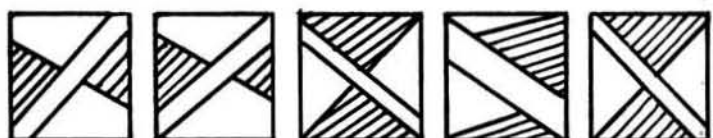
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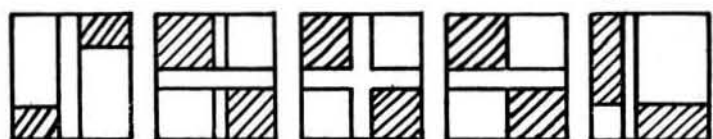
10.



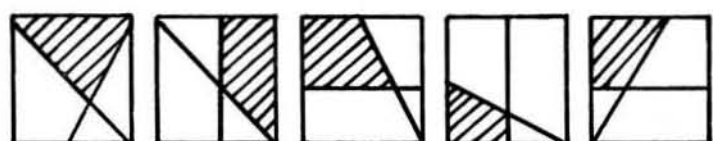
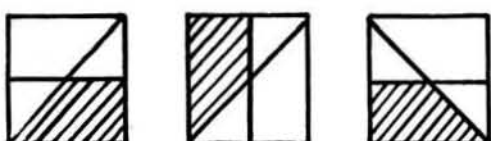
11.



12.



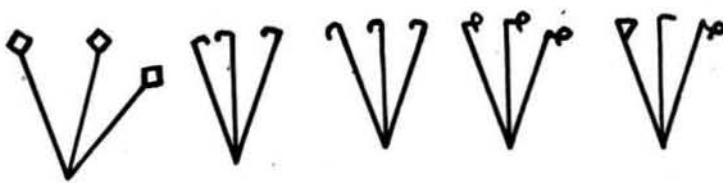
13.



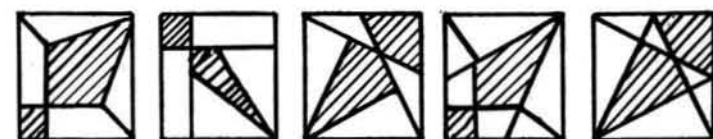
14.



15.

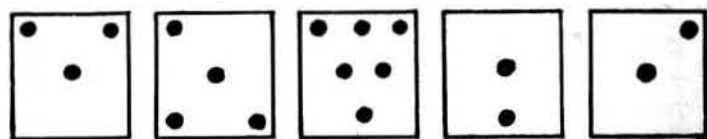
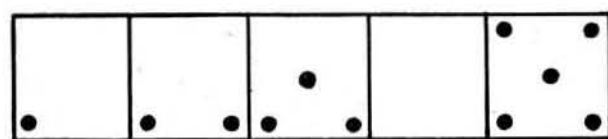


16.

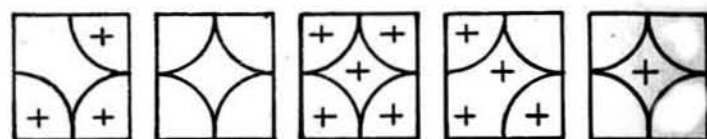
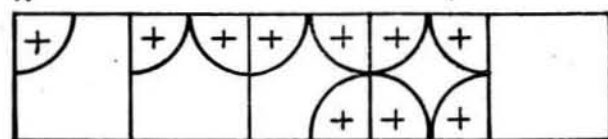


To the left in each of the lines below there are five squares arranged in order. **ONE** of these square has been left empty. Find which one of the five squares on the right should take the place of the empty square and draw a line under it. (The first one has been done for you.)

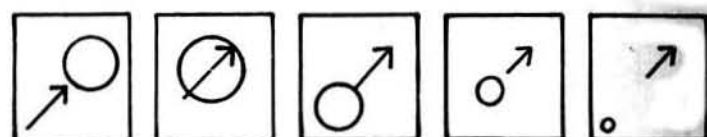
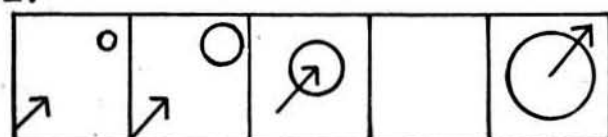
EXAMPLE



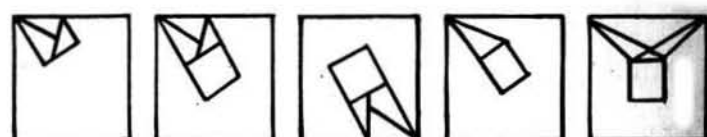
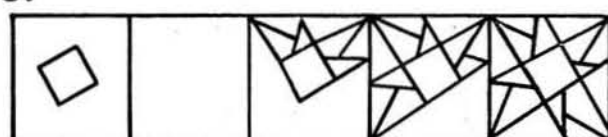
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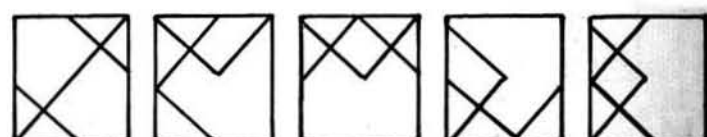
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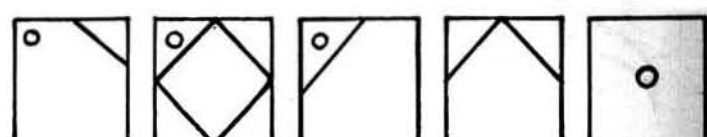
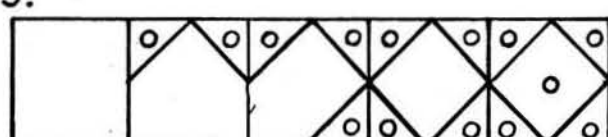
3.



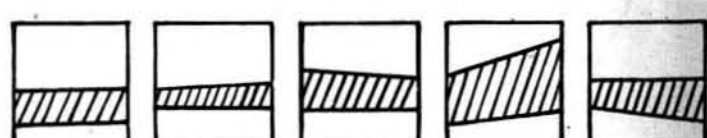
4.



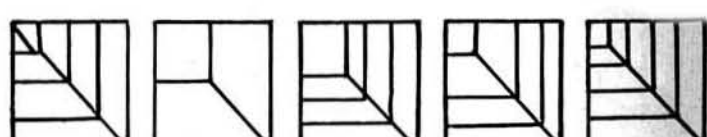
5.



6.

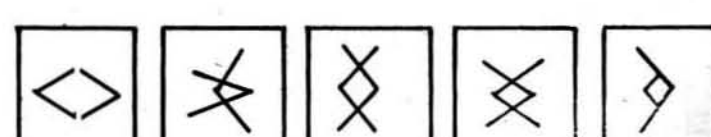
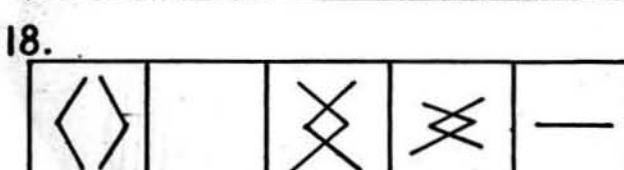
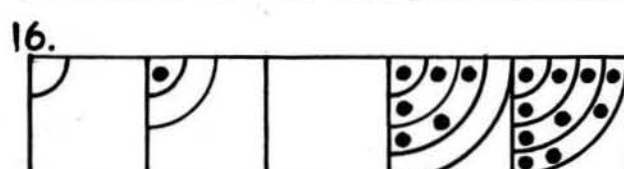
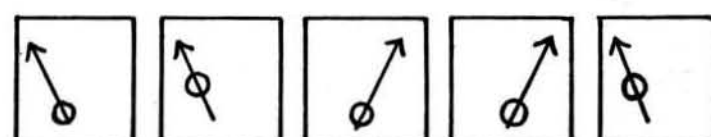
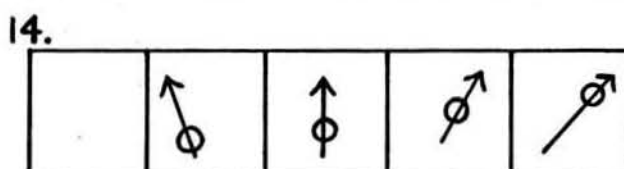
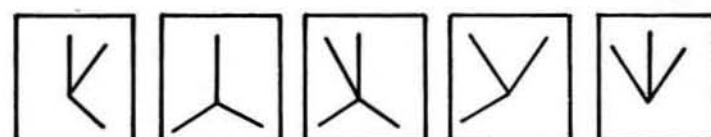
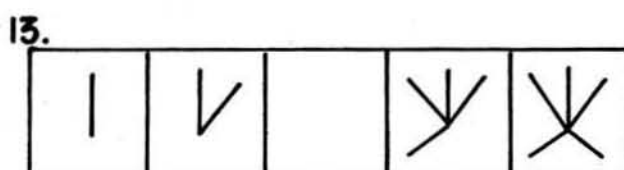
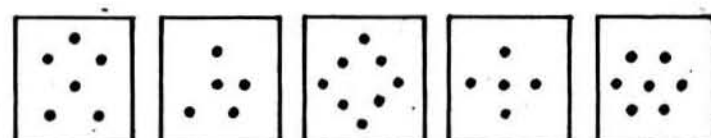
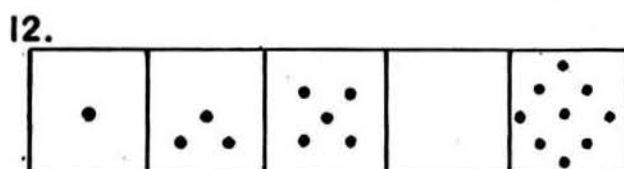
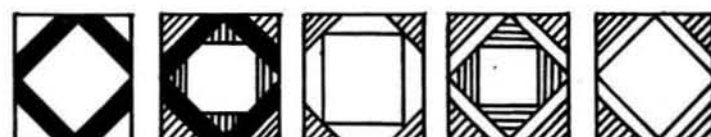
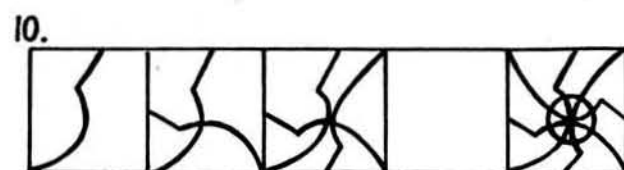
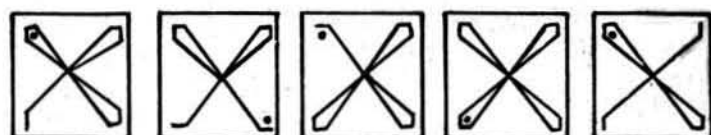
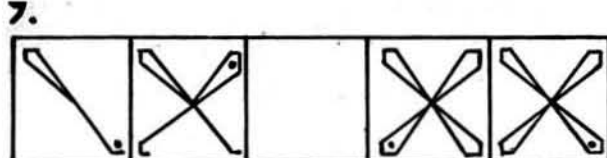


7.



8.

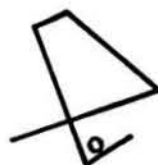
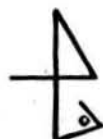
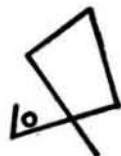




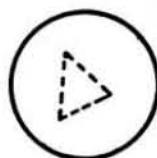
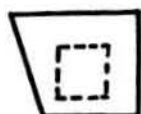
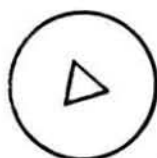
8.



9.



10.



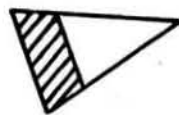
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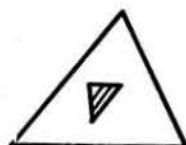
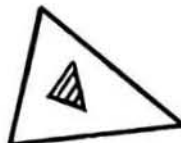
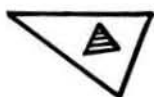
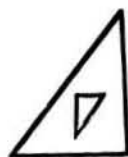
12.



13.



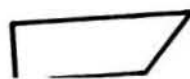
14.



15.



16.

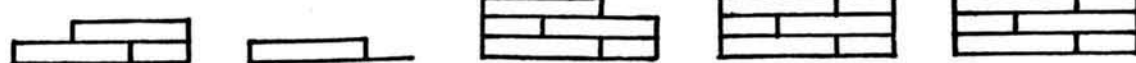


Each of the sets of figures below can be arranged in order. Think of each set arranged in order and draw a line under the ONE which comes in the middle. (The first one has been done for you.)

EXAMPLE



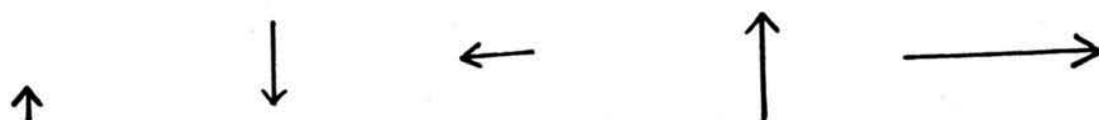
1.



2.



3.



4.



5.

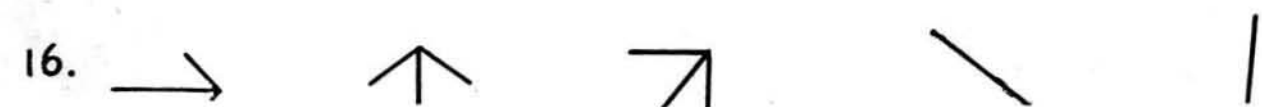
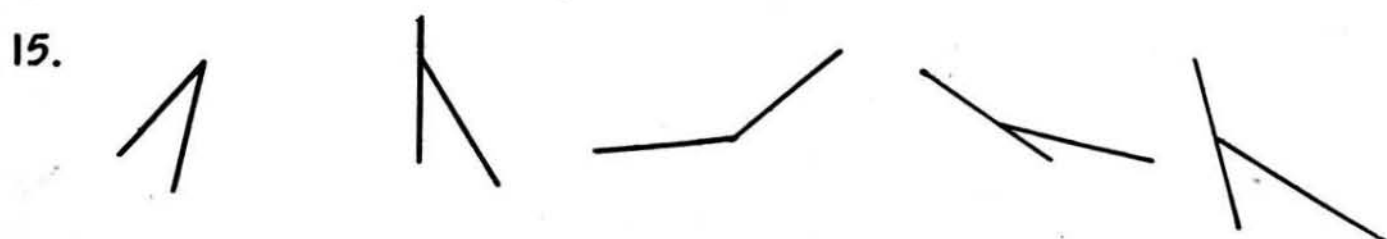
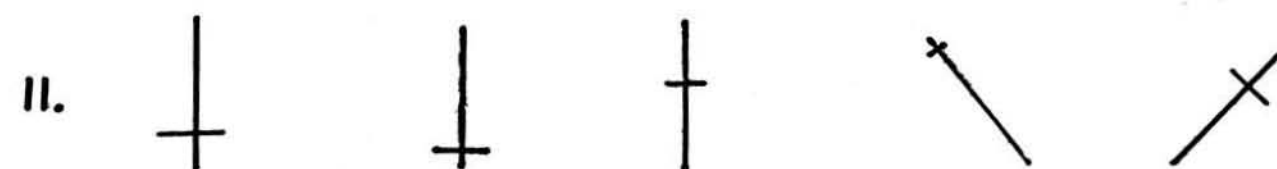


6.



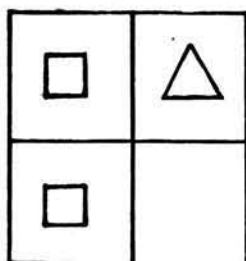
7.



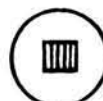
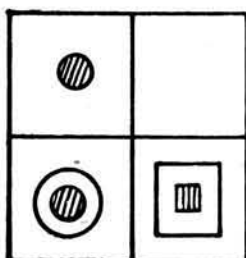


In the big square on the left of each line below, one of the four small squares has been left empty. One of the five figures to the right should fill the empty square. Find this figure and draw a line under it. (The first one has been done for you.)

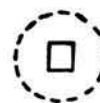
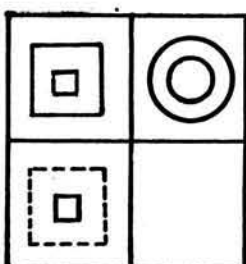
EXAMPLE



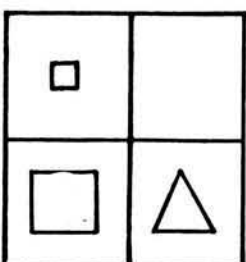
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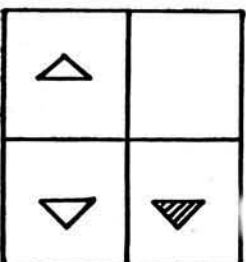
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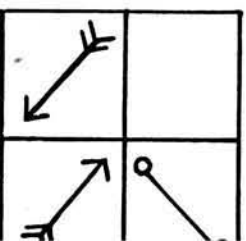
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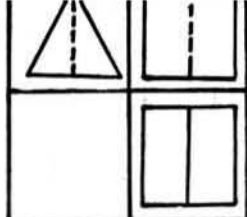
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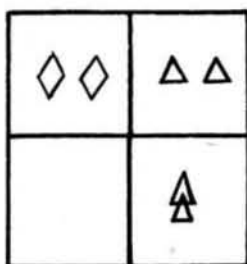
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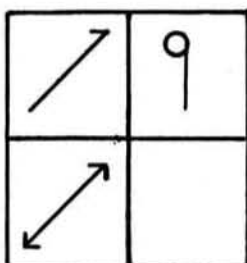
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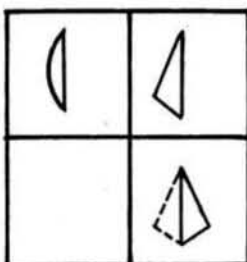
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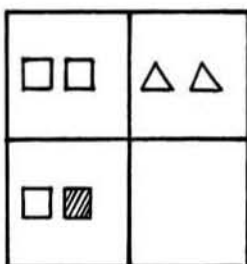
8.



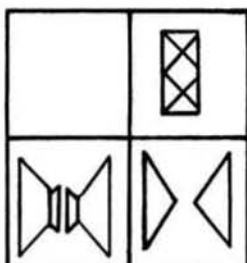
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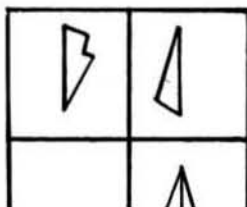
10.



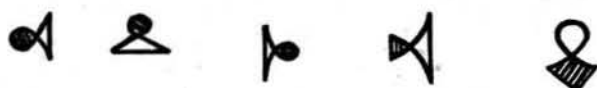
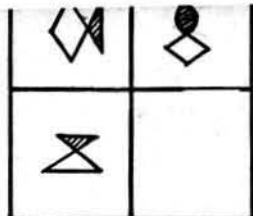
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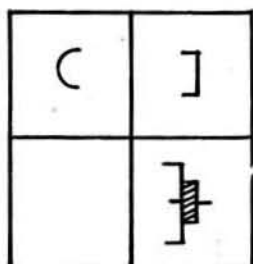
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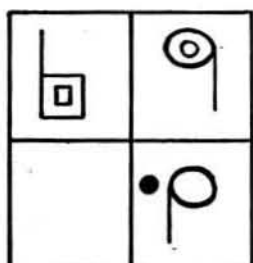
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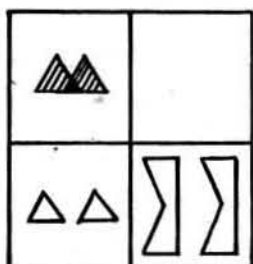
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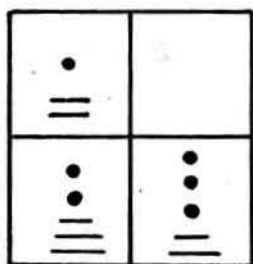
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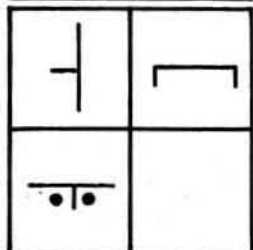
16.



17.



18.



19

