

PART II

CHAPTER I

THE CONSTRUCTION AND STANDARDIZATION OF SCHOLASTIC TESTS

Tests, far more scientific than those that have so far been devised, can still be only the beginning, never the end of the examination of the school child.

Sir Cyril Burt



In this chapter the purpose and the aim of the tests are set out, and the need for scholastic tests is indicated. Some of the difficulties which have been met in connection with the construction and standardization of these tests are touched on because their presence has, in some measure, determined the item selection and choice of sample. The construction and standardization, the uses and limitations of the tests are described. In Appendix H is a table of norms for these tests which are designated by the term "My" tests on the graphs simply because that was how I had labelled them for the person who drew the graphs for reproduction! I have since, for easier reference, named the tests which are described in this chapter "S-G Tests".

1. PURPOSE OF THE TESTS

In the development of a testing programme a clear purpose is required, and the tests must fit the decisions to be made. (Cronbach, 1949.) It is necessary, therefore, to state clearly the purpose of the tests described in this chapter. It is: To attempt to produce a technique of assessment more scientific than an "old-type examination" which would help in the grouping and subsequent adjustment of Standard V pupils to the secondary school.

VI

2. THE AIM OF THE S-G TESTS

i. General

The aim of these tests is to provide tests measuring as scientifically as possible the scholastic attainment in English and in arithmetic of normal English-speaking children who have successfully completed Standard V in Natal schools.

ii. Specific

The more specific aims of the tests are:

- a. to provide a common standard of marks by which pupils from many different primary schools may be compared;

- b. to ensure the giving and marking of tests with a minimum of delay;
- c. to facilitate assessment and grouping at the beginning of the year of Standard VI pupils;
- d. to avoid the "back-wash" effect on the primary school which appears to result from many kinds of assessment or selection for secondary school purposes. Assessment for secondary school purposes should be part of the secondary school guidance programme. That is why these tests have been drawn up on the Standard V syllabus, but are to be given at the beginning of Standard VI, i.e. at the beginning of the secondary school course. In addition, it is hoped that their use at this stage may help in the prediction of success at the end of Standard VI.

In addition the tests are:

- e. to resemble as closely as possible teacher-made tests;
- f. to be short enough to be given within the normal school period, i.e. 40 minutes. (The time limit for the arithmetic test is 42 minutes.)

3. THE NEED FOR STANDARDIZED TESTS

The scholastic tests which the National Bureau of Educational and Social Research has made available (see p. 9 of this work) cannot be used for purposes of assessment with a view to ultimate choice of courses in the secondary school for the following reasons:

- i. The tests were not designed primarily for selecting pupils for future work. (Vernon, 1940.)
- ii. The tests are standardized on the total school population of the Republic so that the subject matter covered is too general for the specific syllabus of the Natal Education Department.
- iii. The tests are available to many different people so that their contents are no longer confidential. In any selection it is essential that no pupil has had the opportunity of a preview of the test (or tests) used for this purpose.

In 1959 when this research was started, the National Bureau of Educational and Social Research had already started on the re-

standardization of its scholastic tests of English but the norms were not available. No new scholastic tests had been standardized for arithmetic. Money-sums were in sterling in the National Bureau arithmetic tests, but since this currency is no longer used in the Republic, pupils are taught not sterling but decimal system sums. The tests in both these subjects provide norms for groups of standards, not one standard only.

In the English (a) old form and the (b) new form:

- (a) the junior test includes Stds. 4 - 8 ; ages 10.5 -15.5 years.
- (b) the senior test includes Stds. 6 - 10; ages 12.11-17.9 years.

In the tests with time limits of 12, 18, 20 or 24 minutes, pupils in the lowest standard in each level will "complete" the test too soon. This results in little spread of marks for each age-range. The Arithmetic tests, too, with time limits of 20 minutes and norms for standards 2 to 8, and ages 2 to 17 years inclusive, have the same lack of spread of marks for each age-range.

These two factors, viz. norms for groups of standards, and little spread of marks for each age-range, are additional reasons why these scholastic tests of the National Bureau of Education and Social Research cannot be used for the selection or allocation of pupils to secondary school streams or levels.

It appeared that there was a need to standardize tests which could be used for the specific purpose of helping in the adjustment and grouping of pupils at the beginning of the secondary school course, and which were standardized for Natal schools. As Vernon (1960, p.92) says:

Teachers and psychologists who use tests for educational guidance would do better to build up their own local percentile norms for the type of schools they are concerned with, and to revise these periodically, rather than rely on what are probably outdated national age norms.

4. DIFFICULTIES IN THE CONSTRUCTION AND STANDARDIZATION OF THE S-G TESTS

1. Decimalization was introduced in the Republic in 1961. In anticipation of the change in arithmetic teaching which the new

currency would bring, problems could not be used in the arithmetic test. (See, too, No. 5, 1, a. in this section.)

ii. The New South African Group Test of intelligence has one set of norms for English-speaking pupils and another for Afrikaans-speaking pupils so that it is not possible to make direct comparison between Afrikaans and English scores. (Nat. Bureau of Educ. & Soc. Res. 1956.) (The full implications of two sets of norms have been discussed in Part I, Chapter III, "Intelligence" and "Scholastic tests".)

iii. Research in schools is extremely difficult for staff members of the Faculty of Education of this University because of the exploratory course which it holds for aspirant teachers during the first two weeks of February each year. The course opens almost simultaneously with the schools in Natal so that it was not possible for me to start giving tests in the schools until the third week in February. Testing in the schools continued until the end of the first week of March, i.e. after full-time classes had started at the University; and during two weeks in March a colleague had to try to do a double share of work because of my absence.

The preliminary tests in the research project had been completed by the end of November, 1960. The marking, item analyses, calculation of discrimination and difficulty values, selection of items, drawing up of new tests, typing, duplicating, checking, making arrangements to visit the twelve schools, had all to be completed before 1st February, 1961, when the "Teachers' Exploratory Course" began. I found that, after having completed two weeks' work on this course, to determine time limits for the tests, to drive myself 1200 miles by car and to test 1356 pupils in seventeen days was indeed a Herculean task!

5. THE CONSTRUCTION AND STANDARDIZATION OF THE TESTS

1. General

I had originally intended to standardize scholastic tests for both English and Afrikaans Standard VI pupils in European schools

in Natal. These tests were to have been in home language, arithmetic, history and geography. This intention had, unfortunately, to be abandoned because in 1959 there were different norms for the intelligence test which is used in the schools, namely the New South African Group Test. This would have meant that I would have had to work with two separate samples of pupils which would have entailed a task too vast for one person working quite alone. The implications of these separate norms have been discussed in Part I, Chapter III, "Intelligence tests" and "Scholastic tests".

In April, 1960, copies of the examination which had been set for their Standard V pupils at the end of 1959 were obtained from principals of primary schools. Papers were obtained of examinations in first language, i.e. Afrikaans and English, and in arithmetic, history, geography and nature study.

After consideration of the fact that in the majority of selection procedures standardized tests in home language and arithmetic only were used, the construction and standardization of the following were undertaken:

English:

Reading Study
Language Usage
Vocabulary
Spelling

Arithmetic:

Mechanical

The English tests are truly objective, i.e. the answers are multiple-choice and are marked with a stencil, and the subject matter is that which was originally chosen by teachers. The subjective element came in only where I purposely chose for reading study those extracts which contained less "blood-and-thunder". The questions set are those which were actually set by the teachers, except for some that had to be slightly reworded in order to make it possible to obtain an answer from a multiple-choice of five. This type of answer was necessary to ensure objectivity as well as speed and ease of marking.

Two factors had to be considered in the drawing-up of the Arithmetic tests:

- a. the school children were changing their money sums from £.s.d. to rand and cents; the problem arithmetic tests of the schools contained money sums;
- b. reading ability enters into a problem arithmetic test.

Because of these two factors problem arithmetic was excluded. The Arithmetic test does not emphasize the speed factor, because some of the sums are long and require working out on rough paper, and the time limit was determined by allowing 90% of pupils in each of two classes of average pupils to complete the test. (See Table 19.)

ii. The preliminary form of the "S-G" tests

- a. Items were selected from the examination papers which had been set by principals and/or teachers of primary schools. Precautions were taken not to include any item which was not in the syllabus laid down by the Natal Education Department. In addition, no item was chosen unless a similar, though obviously not necessarily an identical, item appeared in examination papers from at least two schools. Quite frequently items happened to be identical, i.e. sums, language questions, spellings, vocabulary and even reading study selections.
- b. 120 items were selected for each of the four tests in English, i.e. Reading Study (comprehension), Language Usage, Vocabulary, Spelling, and in Arithmetic (mechanical only).
- c. The questions were reformulated only when it was necessary to do so in order to present a choice of five answers; these answers I had, of course, to supply.
- d. In each question in the Spelling test the one word which was spelt incorrectly was the word which had been taken from the school lists; four distractors were given.
- e. In order to avoid undue fatigue to the pupils and to facilitate the giving of the tests, each of the four tests in English was divided into two sections in which the questions were as similar as possible. Each section consisted of 60 questions which were arranged from easy to difficult as they appeared to me from my experience of having taught Standard V pupils.
- f. The Arithmetic test was divided into four sections in which the questions were as similar as possible, and arranged from easy to difficult. Each section consisted of 30 sums.

- g. Each test was bound separately, with instructions and examples on the first page.
- h. Separate answer sheets were used. These were very similar to those in use with many of the newer type of standardized objective tests. The answers, except in Arithmetic, were to be given by choosing one from a group of five, marked A, B, C, D, E, and indicating the letter chosen by marking the appropriate space on the answer sheet.
- i. In the Arithmetic test the sums had to be worked out on rough paper and the answer only had to be given in the appropriate place on the question paper.
- j. There was no time limit. Sufficient time was allowed for all pupils to complete the questions.

iii. Selection of schools

In consultation with principals of schools and the Vocational Guidance Organizer of the Natal Education Department, an attempt was made to select an equal number of boys and girls who were pupils representative of all socio-economic areas of Durban. In making this selection, the following had to be kept in mind:

- a. The Natal Education Department had given permission for this testing to be done with the express request that, where possible, a whole class should be tested each time.
- b. Schools which had Standard V classes large enough to make testing worthwhile had to be selected.
- c. It seemed wiser to try to choose all co-educational schools in order to have the same socio-economic areas for boys and girls.
- d. It was not always possible to give the test in a school which would have been selected, because there were parallel classes, one English-medium and one Afrikaans-medium, and the principal did not wish to have these classes treated differently.
- e. Schools which were selected had to include a Standard VI class. This was a necessary precaution in order to minimize the re-testing of pupils at secondary schools in 1961.
- f. Schools could be visited only after 17th October when I had completed my lectures to my students at the University.
- g. The tests had to be given as late as possible in the year.

- h. The testing programme had to be planned in such a way that it would not coincide with, precede, or be too near the end-of-year school examinations.

The tests were given with the help of principals and staff during October and November, 1960, at seven primary schools. (See Table 15.)

The tests were given to 400 pupils whose dates of birth and intelligence quotients on the New South African Group Test had been obtained. These intelligence quotients had to be used because only normal pupils, i.e. those with an I.Q. 85 and above were to be included in the testing.

The results of some pupils had to be discarded for one or more of the following reasons:

- (i) No intelligence quotient was available.
- (ii) The intelligence quotient was 84 or below.
- (iii) The home language of the pupil was not English.
- (iv) The pupil was absent for one or more tests.

iv. Results

The following are the numbers of pupils whose results were used:

Boys 169, Girls 143, Total 312. (See Table 16.)

Stencils were used to mark the answer sheets for English, i.e. Reading Study, Language Usage, Vocabulary, and Spelling. The Arithmetic tests were marked in the usual way.

Table 11

Medians obtained in the Tests

Test	Median	Total number of items
English:		
Reading Study	95.3	120
Language Usage	85.4	120
Vocabulary	82.75	120
Spelling	55.74	120
Arithmetic	73.4	120

v. Preparation of final form of tests

a. Item analyses. These were calculated for each test, taking separately the tests of those pupils whose marks were above the median and those whose marks were below the median. Percentages for each item were then calculated.

b. The difficulty value of each item for each test. This was read from the S.D. table or sigma table ($\frac{X}{\sigma}$) in McCall (1939, pp. 507-508).

c. The discrimination value of each item for each test. This was read from the onion-shaped graph according to Mosier and McQuitty (1940, pp. 57-65).

d. Arrangement of test items. Only those items which had a valid discrimination value were included.

Items were arranged from 'easy' to 'difficult', with the easier items first, i.e. these were also "power" tests.

By considering first the difficulty value, and then the discrimination value, two forms, A and B as nearly identical as possible, were arranged for each test. (See Table 17.)

The schools had usually set examination papers in which language usage and vocabulary were combined. It was found necessary to combine these two sections in the final form of the test because separate tests in Language Usage and in Vocabulary would have been too short.

The number of items in each test was

Arithmetic:

Mechanical	20
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English:

Language and Vocabulary	35
Reading Study	20
Spelling	35

e. S.D. values of items. The S.D. value of each item of each final test form and the number of the item on the preliminary test form are given in Table 17.

It should be noted that in the Reading Study and Language and Vocabulary tests the items could not be arranged exactly in 'easy to difficult' sequence because the questions, although selected with due regard to difficulty value and discrimination value, had to be placed with the reading study passage or question to which each applied. An attempt was made to have items of the same, or as nearly as possible the same, difficulty value on the two forms of each test. (See Table 17.)

f. Test booklets. In their final form the four tests were bound as one booklet, each test commencing with a page of instructions and examples; there was one booklet for Form A and another for Form B of the tests.

g. Answer sheets. Separate answer sheets were provided for these tests, too, a place being provided for the answers to the Arithmetic test as well. An attempt was made to draw up the answer sheet in such a way that all the necessary information and marks for each pupil were recorded on one easily handled form. This was to minimize the keeping of extra records which takes time and can sometimes cause avoidable errors.

h. Time limits. Average Standard VI classes, i.e. those with a range of I.Q. 90-117, were selected at three different schools which were not used for any other testing.

Both the A and B forms of the final tests in Arithmetic and in English, i.e. Reading Study, Language and Vocabulary and Spelling, were given by me to the pupils at these three (1, 2, 5) schools. (See Table 18.) At the first two schools (1 and 2) sufficient time was given to allow 90% of the pupils to complete each test. It was found that the arithmetic test was far too long. Every effort was made to avoid undue fatigue to the pupils and to avoid extending the time of a test much beyond a normal school period (40 minutes). On the other hand a test should not be too short. Five sums were deleted from both form A and B of

the Arithmetic test in such a way that the remaining fifteen sums in each form of the test corresponded as closely as possible in regard to difficulty value. Additional average Standard VI classes (No. 3 and No. 4, Table 19) were selected at two different schools and the shortened form of the Arithmetic test was given and timed according to the same method as had previously been used.

An average was calculated of the time taken for each test, and this average time was set as the time limit for each test, calculated separately. The same time limit was set for Form A and Form B (see Table 19) of each test.

At the third school (No. 5, Table 18) a trial testing was given and the time limits appeared satisfactory, i.e. 90% of the class completed the tests. (Richardson, 1956.)

A separate booklet of instructions was prepared for the tester and in this the time limit for each test was stated. Stencils were provided for the marking of the tests.

The final forms, both A and B of the four tests, were given to 1356 Standard VI pupils in secondary schools during February and March, 1961.

It should be mentioned that in all the testing - preliminary, timing and final - care was taken to start the testing programme with the first part, or form A, of the test at alternate schools. In all the testing, too, I, myself, gave as many of the tests as possible and supervised the testing in every school.

vi. Selection of schools for the final form of the tests

In choosing schools where the tests should be given the following factors had to be borne in mind:

- a. In Natal Standard VI forms part of some primary schools, some secondary schools, or the whole school, some schools include all primary and secondary classes.
- b. The lowest form in the school had to be Standard VI in order to reduce to a minimum the re-testing of the November 1960 test-group.

- c. The Standard VI forms had to be large enough to make testing worthwhile.
- d. Where possible whole classes had to be tested.
- e. Some schools are co-educational, some for boys only and some for girls only. An attempt had to be made to include all types of schools.
- f. Equal numbers of boys and girls were required.
- g. The larger schools are situated in Durban and Pietermaritzburg but schools in the north, south and inland had to be included if a cross-section of all socio-economic groups was to be in the sample.
- h. Some schools from each grade, i.e. H1, H2, H3, had to be included in the selection.

Again, after discussion with the Vocational Guidance Organizer of the Natal Education Department who had personal knowledge of the secondary schools, twelve schools were selected for this testing programme. (See Table 20.)

vii. The testing programme

Schools re-opened on 1st February 1961, but I could not start testing until 24th February. (See "Difficulties in the construction and standardization of S-G tests".) With the help of the principals and staff of the schools both forms of all four tests were given to 1356 pupils within seventeen days.

The final forms, form A and form B of the tests, were marked and the results were recorded on the answer sheets.

Of the 1356 pupils tested it was possible to use the marks of 1044; 312 results were discarded for one or more of the following reasons:

- a. No intelligence quotient was available. (No pupil with an I.Q. 84 or below was included in the testing.)
- b. The intelligence quotient was 84 or below.
- c. The pupil's home language was not English.
- d. The pupil was absent for one or more of the "S-G" tests, or one or more of the school tests.

- e. The pupil had left school sometime between April, 1961 and November, 1961.
- f. I had taken the precaution of including in the preliminary testing only those primary schools which had a Standard VI and whose pupils would therefore, it was assumed, not transfer at the beginning of Standard VI to a secondary school with a Standard VI. There were, nevertheless, some pupils who had been tested in November, 1960 in Standard V at a primary school who had transferred to secondary schools. They had also to be tested with the rest of the Standard VI class in the secondary school in February and March, 1961. The results of these pupils were not used.

For each of the 1044 pupils the following information was then available:

- a. date of birth,
- b. intelligence quotient,
- c. marks gained in the Standard VI examinations in November, 1961,
- d. marks gained on the "S-G" tests in February and March, 1961,
- e. For a group "G" (see Table 21) the marks which the pupils had gained at the end of Standard V in 1960 had also been obtained. (See "Validity" and "Reliability".)

viii. Statistical procedures

Group G consisted of 58 boys and 82 girls, the latter being in three classes of 28, 31 and 23 pupils; each class was in a different school. (See Table 21.)

These were the largest groups which it was possible to obtain, for it was possible to find only in the largest secondary schools sufficiently large groups from one primary school. The reasons for this are that in June 1960 there were only 5782 English- and Afrikaans-speaking pupils in Standard VI in schools of the Natal Education Department (Natal. Education Dept., 1961d); some of these pupils were attached to primary schools and some to secondary

schools, and in this research the administration of the final form of the tests was restricted to English-medium classes in those secondary schools which included Standard VI. These secondary schools receive pupils into Standard VI from more than one primary school, many of which are co-educational; in addition, pupils from one primary school may transfer to many different secondary schools. This meant that it was difficult to find a sufficiently large group of pupils from one primary school. The map of Natal facing page 28 will make this situation clear.

a. Validity. To determine the validity of the tests the results of the Group G (see Table 21) were used. The outside criterion was that of the school examination marks of the Group G at the end of 1960.

The time lapse between the school examination and "S-G" tests was five to six months. Results from four schools, each calculated independently, were used in this calculation.

Content validity was catered for in the test items which sample the subject matter areas directly. (Garrett, 1959.) The correlation coefficients for validity are given in Table 12 on the following page.

Table 12
The Correlation Coefficients for Validity

School	N	Arithmetic		Language & Vocabulary		Reading Study		Spelling	
		A	B	A	B	A	B	A	B
1	28	* .63	^x .46	* .74	* .68	^{xx} .39	^{**} .51	.07	.08
2	31	* .75	* .75	^{**} .54	^{**} .54	^{**} .52	^x .44	* .62	^{**} .52
3	23	^{**} .56	^{**} .55	.08	.11	^{**} .58	.33	^{**} .63	* .74
4	58	* .55	* .56	* .72	* .60	.05	.05	^x .32	* .42

* P < .001

^{**} P < .01^x P < .02^{xx} P < .05

From Table 12 it will be seen that, if one applies the criteria of Garrett (1959), the validity of the test of:

- 15 items Arithmetic ranges from marked to high,
- 35 items Spelling ranges from negligible to high,
- 35 items Language and Vocabulary ranges from negligible to high,
- 20 items Reading Study ranges from negligible to marked.¹

The only criterion by which it was possible to measure validity was the result of school examinations, and teachers' marks are not always reliable.

Except in Reading Study A with r .39 the low correlations are low for both form A and B of the "S-G" test in each subject for one school only. This could be because the marks of the school were obtained on tests by teachers in each school independently and the teaching and marking vary from school to school. Arithmetic, which is the least subjective school mark, consistently shows the highest correlations.

Chance effects, too, enter even when the same procedure (test) is used twice in rapid succession. (Cronbach, 1949.)

1. r 's from:

- \pm .00 to \pm .20 very low, negligible,
- \pm .20 to \pm .40 low; present but slight,
- \pm .40 to \pm .70 substantial or marked,
- \pm .70 to \pm 1.00 high to very high.

High correlations are desired by everyone, but Cronbach says that a coefficient as low as .30 is of definite practical value, and that if use of the test permits of better judgement with it sufficiently to justify the cost, it would be sound to use the test.

Brogden (1949) shows that benefit from a selection programme increases in proportion to the validity coefficient.

b. Reliability. The reliability of the "S-G" tests was determined by correlation of the results of the two forms of each test (Lindquist, 1951) which were obtained for Group G. (See Table 21.) The two forms of the test were given on consecutive days to the same pupils. Results from four schools, each calculated independently, were used in the calculation.

Table 13

The Correlation Coefficients for Reliability

School	N	Arithmetic	Language & Vocabulary	Reading Study	Spelling
1	28	.62	.83	.78	.75
2	31	.76	.84	.62	.85
3	23	.62	.75	.78	.78
4	58	.71	.77	.69	.85

$P < .001$ in all cases except Arithmetic at school (3) where $P < .01$.

If the criteria which are used by Garrett (1959) (see footnote 1) are applied to the figures in Table 13 it will be seen that the reliability of the test of:

35 items	Language and Vocabulary	ranges from high to very high;
35 items	Spelling)
20 items	Reading Study	} ranges from marked to high/very high.
15 items	Arithmetic	

If the length of the two latter tests had been increased the reliability coefficient would have increased. (Cronbach, 1949.)

Increase in length would, however, have defeated three of the aims of the "S-G" tests:

- (i) not to fatigue the pupils who would have to do all four tests on one day;
- (ii) not to exceed the usual length of the kind of tests given in schools (Richardson, 1956);
- (iii) not to exceed the length of a normal school period (40 minutes). The "S-G" tests had to be as similar as possible to teachers' tests.

"In a test intended for predicting a definite criterion, reliability is less important than predictive validity." (Cronbach, 1949, p. 128.) Low reliability should not be a discouragement to use of the test provided that the predictive validity is satisfactory. (ibid.)

c. Predictive value. A random sample of 130 pupils of each sex was drawn from the complete results of 495 boys and 549 girls, i.e. a total of 1044 pupils spread throughout twelve different schools. This sample was chosen by using tables of random sampling. (Fisher and Yates, 1938.)

The results of these 130 boys and 130 girls were taken separately. The correlation coefficients which were obtained from the correlation of results of "S-G" tests given in February and March, 1961, with the results of school examinations at the end of 1961, are given in Table 14 on the following page.

Table 14

The Correlation Coefficients for Predictive Value

Sex	N	Arithmetic		Language & Vocabulary		Reading Study		Spelling	
		A	B	A	B	A	B	A	B
Boys	130	.62	.66	.66	.72	.60	.55	.68	.67
Girls	130	.49	.58	.69	.70	.59	.53	.67	.66
Boys and Girls	260	.55	.62	.67	.71	.59	.54	.68	.67

All of these correlations are significant, $P < .001$ with d.f. = 100

The time lapse between "S-G" tests and the school examinations was approximately ten months.

Again, if the criteria which are used by Garrett (1959) (see footnote 1) are applied to the figures in Table 14 it will be seen that the predictive value of the test of:

35 items	Language and Vocabulary	is substantial to high,
35 items	Spelling) is substantial.
15 items	Arithmetic	
20 items	Reading Study	

Even a coefficient of .20 may mean that the test may still make an appreciable practical contribution. One has to be satisfied that a "good" validity coefficient is that coefficient which is the best that one is able to get, even if it is low. (Cronbach, 1949.) If the test measures what no other test measures, or if the test permits us to make a better judgement than we could make without it, i.e. sufficiently better to justify the cost, then the validity coefficient can be considered a "good" one. (ibid.)

The difficulties presented by the use of school marks as an outside criterion are well known to those who are involved in devising tests for school children; and when the variation of coefficients is great from even one school to the next, one can

expect considerable variation when the number of schools increases; and there were twelve schools (see Table 20) from which the marks were obtained and used in the determining of the predictive value of the S-G tests. The fairly consistent correlations noted here, in contrast to the differences in those in the validity table, (Table 12), however, might be explained by the fact that the marks which were used in determining the predictive value were obtained on tests which had been set by the Natal Education Department. There was a set scheme of marking and all schools wrote the same paper. (See p. 71 of this work.)

ix. Norms

Percentile norms have been calculated for boys and girls by using the results of the "S-G" tests, form A only, and are given in Appendix H. Norms have been derived for boys and girls taken as one group. (See Appendix E.)

6. USE OF THE S-G TESTS

i. These tests can be used as part of the assessment for allocation to a group or a stream.

ii. They can indicate which pupils are achieving below Standard V level in English and in arithmetic. They could, thus, help in the guidance and adjustment of pupils at the beginning of Standard VI.

iii. Teachers' estimates can be scaled on them.

iv. They provide a means of comparison at the beginning of Standard VI of achievements in English and in arithmetic of pupils from any and all English-medium schools in Natal. (See "Purpose of the tests" in this chapter.)

7. CAUTION IN THE USE OF THE S-G TESTS

If one wishes to show that a test is beneficial, the goodness of the decision to which it leads must be estimated. The practical usefulness for institutional decisions is not adequately shown by a positive validity coefficient alone. (Cronbach, 1949.)

If the use of S-G tests is able to help at all in the adjustment of new pupils in Standard VI, and there is every indication that this is the case, they should be beneficial.

This is the first attempt to construct and standardize scholastic tests with scientific norms in accordance with the syllabus for Standard VI pupils of Natal schools of the Provincial Education Department. (See p. 7 of this work.)² It follows that their results are only provisional, that their value may be limited and their accuracy low. Imperfect as they are, they may, however, be of some interest and service until better tests become available. (Burt, 1921.)

It is a first attempt in Natal, too, to find a scientific procedure which in the time available offers the greatest yield of relevant, important and interpretable information (Cronbach and Gleser, 1957) in regard to Standard VI pupils.

The tester is likely to rely more than is justified on a test unless he recognizes how fallible the test is. He should remember that while an erroneous favourable decision may be irreversible, an erroneous unfavourable decision, though reversible, is unjust; it disrupts the morale of the individual and retards his development. (Cronbach, 1949.)

These tests will be useful only as long as the syllabi for English and Arithmetic for Standard VI remain what they were in 1959.

If the cutting scores laid down by the Natal Education Department for the A level, O level, School Leaving Certificate and Failure are altered, then, obviously, the cutting scores of the S-G tests will require adjustment.

2. The tests to which reference is made in the Report of the Director of Education for 1936 (Natal. Education Dept., 1939) were drawn up for reading and arithmetic. Concerning them Mr. C.M. Booyesen stated in a letter to me (16/2/63) that he laid no claim to scientific accuracy in the norms for these tests, but that the reading test, nevertheless, gave a "useful and usable indication of the pupil's reading ability as regards speed and comprehension." (ibid.) The arithmetic test covered "all possible bonds and also the main processes with numerals and weights and measures". (ibid.) I have, unfortunately, been unsuccessful in my efforts to obtain copies of these tests.

CHAPTER II

SUMMARY OF SUGGESTIONS

There is need for a host of enthusiastic voices calling attention to our lacks and urging their remedy
Announce your hypotheses. If you are cautious, you will announce them as hypotheses which need to be tested.

J.M. Stephens

The suggestions which have been made in this dissertation are summarized here for convenience. They are arranged in the same order in which they appear in the various chapters and under the headings to which they refer.

PART I CHAPTER II

SECTION A - STREAMING

Streaming and grouping

1. Flexibility should be the keynote in any grouping policy.
2. There should be large groups for some kinds of instruction, small groups for some kinds of learning, and individual assignments for some kinds of work.
3. Provision should be made for bright pupils who work better on their own where "problem-solving" is the task in hand.
4. Pupils should be placed in "sets" for separate subject areas.
5. Grouping of pupils in the primary school according to age-grade (standard) should be replaced by grouping on the basis of modern psychological knowledge of pupil growth and maturation processes.
6. The physical, intellectual, emotional and social needs of the individual should be considered in the grouping of pupils.
7. The dynamics of the social group should be used in the learning situation.
8. Grouping should take into account the fact that boys in pre-adolescence (9 to 12+ years) generally need to be with men.

9. In grouping pupils for instruction cognizance should be taken of the importance which pre-adolescents and young adolescents attach to membership in a group of sex and age peers.

SECTION C - DISCUSSION OF THE ISSUES INVOLVED
IN SELECTION AND STREAMING

Control of education

10. Divided control of education in the Republic of South Africa should be ended by the placing of all secondary education under the control of the provinces. Centralization of education should not take place for many reasons, one of the most important being that each province knows, understands and can best provide for the special conditions within the province.
11. Until there is unity of control there should be a common curriculum for Standard VI pupils in the vocational high schools and the provincial schools of Natal.
12. Local authorities should be allowed the utmost freedom to experiment according to their own particular requirements.

Transition from primary to secondary school

13. Secondary education should be made part of the continuous process of education of which primary education forms the first part.
14. Consultation and co-operation between heads of the primary and secondary schools and adequate follow-up studies of the pupils should be part of the normal procedure.

15. Transition from primary to secondary school should be made as pleasant and constructive as possible, with a positive approach to this integration on the part of teachers, parents and pupils already enrolled. (See "Wishes of the parents" in Part I, Chapter III.)

General or special education

16. There should be a common middle school for early adolescence, i.e. from the age of approximately twelve years or a little older to fifteen years or a little older.

Needs of the pupil

17. There should be a school environment in which authority is exercised in a clear but protective and democratic way, so that there is provision for creative learning and co-operative enterprise, and a deeper understanding of every child's need for security. These measures will help to improve the mental health of pupils.
18. The use of the Security-Insecurity Test at the beginning of Standard VI would help to find those pupils who need special care and assistance, and so prevent further difficulties for the pupil and the school.

Failure

19. Every child should be provided with a continuity of learning experiences so that he/she may progress at his/her own rate in order that fear of failure will be eliminated.
20. Every effort should be made to prevent failure.

21. Every effort should be made to prevent retardation.
22. Adequate guidance from the beginning of her/his school career as well as remedial education should be available to every child.
23. As long as the age-grade (standard in this country) system exists and unequal children are expected to progress at the same pace, provision should be made for pupils to be given time to "catch-up". Some pupils may need special help only once, others may need it frequently, and especially after illness and/or long holidays.
24. In the present system, where failure appears to be inevitable, special provision, treatment and help should be available for pupils who have failed. From the repetition of a standard they should derive benefit and not a feeling of inferiority, worthlessness and depression.
25. When pupils are transferred on age to the secondary school, arrangements should be made to help them to make up what has been skipped. This is particularly necessary in the basic subjects which form the foundation of secondary school work.
26. Consideration should be given to the possibility of not expecting pupils to pass all subjects at the same time.
27. Consideration should be given, too, to the fact that a large number of pupils who are repeating the standard in a group with only a few pupils who have not failed can produce a group level of aspiration so low that it will cause the non-failures to drop their level of achievement and to fail.
28. The pupil's social position, i.e. his acceptance in the group, needs to be improved if his learning is to be facilitated.

29. Teachers of infant classes should have smaller numbers of pupils than is at present the case.
30. Readiness for school should be determined. This includes:
- i. Physical readiness in which difficulties of muscular control and co-ordination, defects of speech, hearing and sight should be discovered as early as possible. The child's eyes should be tested for convergence. In addition, teachers should be taught how to use a simple "Vision Testing Chart", which should be used if a pupil appears to have any educational or vision difficulty; the pupil should, in need, be referred for further examination.
 - ii. Emotional readiness should be observed.
 - iii. Readiness for reading should be assessed by means of special tests.
 - iv. Readiness to start number work should also be assessed.

Guidance

31. Guidance should start in the first class in the educational system, and should be continuous throughout the child's career.
32. A knowledge of the principles of guidance should be required of every teacher.
33. Knowledge of testing and counselling techniques should be required only of specialists trained for the task.
34. Trained personnel only should be responsible for the guidance programme in schools.

35. Adequate provision in time-table arrangements should be made for the duties of guidance specialists whose work should not be subsidiary to other teaching responsibilities.

Types of children

36. Pupils should not be typed, i.e. the brightest should not automatically be academic, the second best vocational, and the dull practical.
37. Specialization should not, on psychological grounds, take place until the pupil has turned fifteen or even sixteen years of age.
38. The aims of a policy of differentiation should be defined in unambiguous terms.

The comprehensive school

39. Natal should attempt to provide a common middle school curriculum, at different levels of subject matter (there are already two levels), adequate guidance of pupils, and differentiated courses within a framework which realizes the aims of the comprehensive school.
40. If there is enforcement of zoning regulations all schools should provide the same courses.

Selection vs. allocation

41. Selection to streams in the secondary school should be replaced by allocation of pupils to levels of study and/or sets in subject areas.

Education for girls

42. An investigation into the difference in performance of the sexes at the time of differentiation should be undertaken.
43. Equality of educational opportunity should be provided for girls.
44. Research into the provision of technical education for girls should be instituted.

Human resources

45. Steps should be taken to make the best provision possible for those pupils who are intellectually gifted, talented and those who have creative thinking ability.
46. For such pupils an "A+" level (i.e. higher than and different from the present A stream), though of itself inadequate for meeting the needs of the gifted, should be introduced as a first step.
47. Such pupils should be taught by superior teachers.
48. Teacher training should include courses and practice in teaching on different levels, especially in one classroom, as well as in teaching the intellectually gifted, talented pupils and those with creative thinking ability.

Increasing demands on the teacher

49. One of the first considerations of any educational system should be the mental health of the teachers for on it depends the happiness of the children whom they teach.

50. To those teachers who are particularly involved in the allocation of Standard VI and VII pupils to groups and streams special assistance should be given.
51. The number of pupils per teacher should be reduced.
52. The salaries of teachers should be increased.

Research

53. A bureau for research and educational measurement should be established to meet the needs of this Province.
54. Such a bureau should function within the Faculty of Education of the University of Natal.
55. It should share expenses and projects with the Natal Education Department to the benefit of both.
56. There should be investigation and small scale experiments, especially in connection with selection and streaming in secondary schools.
57. Opportunities for research and study, within and outside the school, should be afforded to teachers.
58. Teachers should be encouraged and assisted to broaden their educational horizons.

PART I CHAPTER III

METHODS, PROCEDURES AND TECHNIQUES OF SELECTION

Old-type examinations

59. Unless the precautions suggested by Vernon (1957a), (i.e. unless "they are constructed by persons with experience of psychometric techniques, tried out beforehand, and properly standardized on the test population") are observed, old-type examination results should not be used for selection or allocation of pupils to groups, streams or courses.

Essays

60. Essay marks may be included in such a programme if these are obtained from the results of three essays for each pupil and all the essays of all the pupils are marked by three examiners.

Oral examinations

61. An objective oral examination may be useful in borderline cases.

Standardized tests

(1) Intelligence tests

62. Pidgeon's (1961a, 1961b) warning about the wrong use of the intelligence test should always be borne in mind.
63. It should not be assumed that if the "EA=MA" the pupil is really getting the best from her/his schooling.
64. An intelligence test should be used only by those who are trained to assess the validity, reliability and predictive value of any test used.

65. The result of more than one intelligence test should be used in any decisions taken about the pupil.
66. New kinds of prognostic tests should not be used as part of any selection or allocation procedure until they have been tried out experimentally by psychologists concerned in pupil guidance.
67. There is need for further investigation into the provision of scientifically accurate standardized tests with common norms for both language groups.
68. If common norms are impossible of attainment, the situation should be accepted, as it is in some schools in Wales.
69. Until further research has been conducted on its predictive value in the selection and allocation of secondary school pupils to streams in Natal, it is suggested that the New South African Group Test (of intelligence) should not be used for this purpose.

(ii) Scholastic tests

70. Tests in English (home language) and arithmetic which have been standardized on the Natal syllabus should be used, among other criteria, in the selection or allocation of English-speaking pupils to groups and/or streams in the secondary school.
71. The construction and standardization of similar tests for Afrikaans-speaking pupils should be undertaken.
72. Tests of whatever kind in the other official language should not be used for purposes of grouping and/or streaming pupils, unless it be for instruction in that language.

73. Language tests for grouping and/or streaming in the secondary school should be in the pupil's home language only.
74. A pupil whose home language is neither Afrikaans nor English should receive special consideration, as should an Afrikaans-speaking pupil who is in an English-medium school and vice versa.

Spatial and mechanical tests

75. Research on their use in selection in this Province should be undertaken before these tests are used in Natal schools.

Tests of interests

76. Interest questionnaires should not be used in selection or allocation of pupils to streams in the secondary school.

Measures of personality

77. These measures of personality could be used in the consideration of pupils who are borderline.

The psychological examination

78. The use of a psychological examination should be considered in decisions on those pupils who are on the borderline in selection programmes.

Age

79. Transfer of all pupils to the secondary school should take

place at early adolescence. Exceptions should be allowed on the recommendation of the principal in consultation with the parents.

80. In Natal, in the present circumstances, no pupil should remain in the primary school beyond the end of the year in which he has turned fourteen years of age.
81. Such transfer procedure, however, should be determined on psychological principles and not by administrative expediency.

Estimates

82. Scaled primary teacher estimates should be used as one of the bases of grouping Standard VI pupils at the beginning of the secondary school.
83. The possibility of using S-G tests (see Part II, Chapter I) for the purpose of scaling the estimates of primary school teachers should be explored.
84. The assessments of the principals of the primary schools should also be used as one of the bases of grouping Standard VI pupils at the beginning of the secondary school.

An exploratory or "bridge" year

85. With adequate guidance in the primary school, sound principles of grouping pupils at the beginning of Standard VI, a common middle school and flexibility an exploratory year should not be necessary.
86. If such a year is to be retained it should be truly exploratory, i.e. the behaviour of pupils should be observed and

interpreted. Pupils should be given the opportunity of studying a wide variety of subjects; different methods of teaching different children should be explored; different class groupings should be tried out; there should be experimentation with the success of different children with different teachers.

The preparation class

87. This procedure should not be used in Natal schools.

The probationary class

88. Experiment with this type of class in the consideration of borderline pupils might well be instituted in Natal schools.

The interview

89. Experiment with the type of interview which is used successfully in Northumberland might be introduced for the purpose of reaching decisions on border-zone cases.

Group observational techniques

90. The suitability of these techniques for the assessment of borderline pupils in the Natal situation might profitably be tried out.

Panel procedures

91. Experiment with these procedures, too, might be instituted for decisions on borderline pupils.

The pupil's background

92. In the guidance of a pupil consideration of her/his home background is necessary. Even more essential is it that such consideration be given in decisions on borderline pupils.
93. Consideration of unequal educational opportunities should be noted on the child's record card, which should be used in guiding the pupil.

Contact between primary and secondary schools

94. Regular contact between the two principals concerned with the pupil at the time of transition should be facilitated in every way.

Record cards

95. Properly kept records should form the basis of any decisions on the pupil.

The pupil's wishes

96. The pupil's wishes should be ascertained.
97. The necessary help should be forthcoming to ensure that the pupil understands that, as far as it is humanly possible to judge, the decision has been made with her/his best interests in view.

The wishes of the parents

98. The wishes of the parents should be paramount, unless the parents are such bad parents that they have abandoned the child and know nothing of her/his progress and needs. There are two provisos which should, nevertheless, be observed:
- i. If failure by the child proves the parents to have been over-ambitious the pupil should then follow the course originally indicated. If, on the other hand, the pupil's progress shows that he/she would be better in a more demanding stream or course, the position should be reviewed with the parents.
 - ii. No effort should be spared in trying to obtain the parents' consent for the pupil to pursue the more advanced course if this course is indicated by the selection or allocation procedures which have been used.
99. Parents should be informed of the reasons for and the implications of new policies in education.
100. Parents should be encouraged to discuss with the principals of schools any decisions on the school career of their children.

PART II CHAPTER I

CONSTRUCTION AND STANDARDIZATION OF TESTS

101. The S-G tests may be used at the beginning of Standard VI as one of the bases of grouping pupils.

102. Summary of suggestions in regard to allocation of pupils at the beginning of Standard VI

This procedure should include, at least, the following bases:

- i. Parents' wishes. These should be paramount but reversible if proved wrong after the first year. No decision about a child should be taken without prior consultation with the parents.
- ii. Correctly kept records.
- iii. Standardized scholastic tests in English and arithmetic.¹
- iv. The pupil's background, i.e. home and school.
- v. The pupil's co-operation in any decision.
- vi. Assessment of the primary school principal.
- vii. Scaled estimates of primary school teachers.
- viii. Transfer on age as well as on achievement. Discretion should be used in the case of very immature children.

It is suggested that the S-I test should be given early in Standard VI but not as part of the assessment for allocation to groups. (See Part I, Chapter II, Section C, "Needs of the pupil".)

103. Summary of suggestions in regard to allocation of pupils at the beginning of Standard VII.

This procedure should include, at least, the following bases:

- i. Parents' wishes. These should be paramount but reversible if proved wrong after the first year. No decision about a child should be taken without prior consultation with the parents.

1. The S-G tests have been devised for this purpose. English tests for pupils whose home language is English.

- ii. Correctly kept records.
- iii. Standardized scholastic tests in English and arithmetic.
- iv. The pupil's background, i.e. home and school.
- v. The pupil's co-operation in any decision.
- vi. Assessment of the secondary school principal.
- vii. Scaled estimates of secondary school teachers.

104. Summary of suggestions in regard to borderline and doubtful cases at the beginning of Standard VI and Standard VII

Because human beings defy exact measurement (McIntosh, 1959), and because injustice may result from the attempt to make fine discriminations at the borderline which is drawn between success and failure in any examination, selection or allocation (Watts, Pidgeon and Yates, 1952), borderline and doubtful cases should have careful consideration with a supplementary study along scientific lines (Burt, 1947); some of these have been suggested in Part I, Chapter III, and merit experimentation. They are listed here again for the sake of completeness.

- i. An objective oral examination.
- ii. Measures of personality.
- iii. A psychological examination.
- iv. The probationary class.
- v. The kind of interview used in Northumberland.
- vi. Group observational techniques.
- vii. Panel procedures.

The first aim of this treatise was to offer suggestions and something which might be useful in the Natal situation. The suggestions number 101, 102, 103 and 104 are offered with two reservations. The first is that no procedure of assessment or allocation is infallible. By judicious choice of procedures, however, it is possible to minimize the errors which can arise (Yates and Pidgeon, 1957), although none can be used as a crutch of authority on which the decision-maker may lean. The second reservation is well expressed by Vernon (1957a, p. 168) who states:

Whatever may be the system of allocation or selection to different types of secondary education, the choice and application of the best methods of assessing children, and the correct treatment and interpretation of their results, are technically complex matters. Without in any way questioning the importance of the teachers' contribution, and of parents' wishes, we would insist that the procedures should be planned and supervised by persons with adequate psychological and statistical training.

The second aim of the treatise was to bring into the orbit of discussion in Natal (i) the implications of developments in the other provinces of the Republic and other countries that have faced, or are facing, a situation similar to that of Natal, as well as (ii) some of the recently expounded ideas in the fields of psychology, especially those of educational, child and social psychology, mental hygiene, mental testing and research on creativity and gifted children. These implications and ideas have been related to the problems of selecting and streaming in Natal schools, and suggestions toward the solution of these problems have been offered.

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APPENDICES

APPENDIX A

TABLES RELEVANT TO PART II, CHAPTER I

TABLE 15Schools Used in the Preliminary Testing

School	Grade
1	P1
2	P2
3	P2
4	P3
5	P3
6	P3
7	P4

P denotes primary

P1 " over 600 pupils

P2 " 450-599 "

P3 " 300-449 "

P4 " 100-299 "

TABLE 16Numbers of Boys and Girls Used in the Preliminary Testing

School	Boys	Girls	Total
1	37	27	64
2	24	26	50
3	52	34	86
4	14	16	30
5	19	15	34
6	13	16	29
7	10	9	19
	169	143	312

The following Table 17 gives for forms A and B of each test:

1. item, i.e. item number of the final form of the test;
2. x No., i.e. item number of the preliminary form of the test;
3. S.D., i.e. difficulty value as determined from the table in McCall (1939), pp. 507-508.

TABLE 17

Difficulty Values of Test Items

Arithmetic

Item	Form A		Form B	
	x No.	S.D.	S.D.	x No.
1	53	41.75	41.50	4
2	47	42.00	41.50	73
3	44	44.25	44.50	35
4	43	44.50	44.50	28
5	16	45.75	45.75	50
6	94	46.50	46.50	93
7	49	47.00	47.00	108
8	20	47.00	47.25	54
9	58	48.20	48.20	75
10	15	50.00	49.75	8
11	111	51.00	51.00	116
12	33	51.25	51.25	25
13	11	53.50	53.50	41
14	60	54.00	54.00	81
15	57	55.25	55.25	45

N.B. The sums in this paper required no practice items because they were set in the usual form.

x. Question number on preliminary form of the test. (i.e. when 120 questions were set.)

S.D. Difficulty value.

Table 17 continued
Language and Vocabulary

Item	Form A		Form B	
	x No.	S.D.	S.D.	x No.
1) 2) 3)	Practice questions			
4	109	43.50	42.75	41
5	105	45.50	52.00	45
6	44	51.25	48.34	35
7	101	53.00	51.50	43
8	68	47.00	46.25	7
9	117	45.00	45.00	116
10	56	47.00	48.50	58
11	119	51.75	49.50	60
12	100	46.75	47.25	99
13	38	50.25	49.75	40
14	37	50.50	51.00	39
15	98	50.00	52.50	97
16	87	41.75	42.00	60
17	24	42.50	42.75	59
18	10	43.00	43.00	40
19	91	44.25	43.75	67
20	11	44.50	44.50	19
21	104	44.50	44.50	84
22	4	45.00	44.50	58
23	113	45.50	45.50	18
24	90	45.75	45.75	46
25	41	46.50	46.50	37
26	76	46.50	46.50	103
27	26	46.75	46.75	96
28	101	47.25	47.50	111
29	54	48.00	48.00	69
30	99	48.20	48.20	50
31	27	49.00	48.75	56
32	98	49.50	49.75	16
33	45	50.00	50.00	23
34	92	52.50	50.75	85
35	22	53.25	53.25	116
36	57	53.25	53.50	105
37	51	56.25	56.25	118
38	110	58.00	58.50	80

Items 4-15
taken from
original
language
test.

Items 16-38
taken from
original
vocabulary
test.

Items 1, 2, 3 for practice only in both forms of the test.

x. Question number on preliminary form of the test.
(i.e. when 120 questions were set.)

S.D. Difficulty value.

Table 17 continued

Reading Study

Item	Form A		Form B	
	x. No.	S.D.	S.D.	x. No.
1) 2) 3)	Practice questions			
4	70	50.50	41.50	110
5	69	53.00	42.25	109
6	27	43.75	45.50	108
7	29	45.00	48.20	105
8	26	49.50	48.50	106
9	30	52.25	41.75	99
10	40	43.75	47.25	100
11	36	44.00	41.75	83
12	38	44.00	45.00	87
13	39	46.00	45.00	90
14	34	46.00	50.25	88
15	120	41.25	50.25	84
16	119	43.75	43.50	60
17	116	46.00	46.00	58
18	112	50.25	49.00	56
19	118	51.00	50.75	57
20	80	41.50	51.00	59
21	78	49.00	45.00	15
22	9	45.00	49.50	20
23	8	57.25	52.75	18

Items 1, 2, 3 for practice only in both forms of the test.

x. Question number on the preliminary form of the test. (i.e. when 120 questions were set.)

S.D. Difficulty value.

Table 17 continuedReading Study

The difficulty values of items on the two forms of the test are given together to show that there are items of almost similar S.D. value on each form.

Form A	Form B
S.D.	S.D.
41.25	41.50
41.50	41.75
43.75	41.75
43.75	43.50
43.75	45.00
44.00	45.00
44.00	45.00
45.00	45.25
45.00	45.50
46.00	46.00
46.00	47.25
46.00	48.20
49.00	48.50
49.50	49.00
50.25	49.50
50.50	50.25
51.00	50.25
52.25	50.75
53.00	51.00
57.25	52.75

Table 17 continued

Spelling

Item	Form A		Form B	
	x No.	S.D.	S.D.	x No.
1) 2) 3)	Practice questions			
4	99	41.75	41.75	106
5	37	42.00	42.00	95
6	68	42.00	42.75	97
7	111	44.00	44.25	72
8	45	46.00	46.00	74
9	33	47.00	47.00	98
10	8	48.00	47.50	90
11	117	48.00	48.20	22
12	84	48.75	48.75	114
13	42	49.00	49.00	87
14	107	49.00	49.50	50
15	23	49.75	49.75	109
16	60	50.50	50.50	115
17	86	50.50	50.75	67
18	30	50.75	50.75	76
19	102	51.00	51.50	64
20	82	51.75	51.75	85
21	47	52.00	52.00	56
22	63	52.25	52.25	101
23	15	52.25	52.25	100
24	44	52.75	52.75	112
25	40	53.50	53.50	6
26	93	53.50	53.75	88
27	118	54.25	54.25	62
28	35	54.50	54.50	39
29	43	55.25	55.00	49
30	58	55.25	55.25	65
31	70	55.50	55.50	71
32	108	55.50	55.75	25
33	12	56.25	56.25	55
34	104	56.50	56.50	75
35	16	57.50	57.50	57
36	48	58.25	57.50	59
37	10	58.50	58.50	94
38	66	60.00	59.00	69

Items 1, 2, 3 for practice only on both forms of the test.

x. Question number on the preliminary form of the test. (i.e. when 120 questions were set.)

S.D. Difficulty value.

TABLE 18

Schools Used in Determining Time Limits

School	Area	Sex	Kind
1	City	Co-educational	Primary and Secondary
2	City	Co-educational	Primary
3	City	Boys	Primary and Secondary
4	City	Girls	Primary and Secondary
5	Town	Co-educational	Primary and Secondary

TABLE 19

Time Limits for the Final Form of the Tests

School	Reading Study		Language and Vocabulary		Spelling		Arithmetic	
	Form A	Form B	Form A	Form B	Form A	Form B	Form A	Form B
1	24 40	28 07	14 35	21 00	20 30	21 00	59 15	59 04
2	24 52	22 30	17 57	15 20	17 22	15 15	83 50	37 00
3							*48 30	*42 57
4							*37 40	*41 55
	48 92	50 37	31 92	36 20	37 52	36 15	85 70	83 112
	<u>50 37</u>		<u>36 20</u>		<u>36 15</u>		<u>83 112</u>	
	4) <u>100 09</u>		4) <u>68 52</u>		4) <u>74 07</u>		4) <u>171 02</u>	
	25 mins.		17 mins.		18 mins.		42 mins.	

Seconds were omitted from the final time limits.

* Times for the Arithmetic test were those taken at schools No. 3 and 4.

TABLE 20

Schools Used for the Final Testing

School	Grade	Area	Sex
a	H1	Durban (City)	Girls
b	H1	Pietermaritzburg (City)	Boys
c	H2	Pietermaritzburg (City)	Girls
d	H2	Inland (Central) (Town)	Co-educational
e	H2	Inland (Central) (Town)	Co-educational
f	H3	Durban (Suburb)	Co-educational
g	H3	Outside Durban (Town)	Co-educational
h	H3	Coast (South) (Town)	Co-educational
i	H3	Inland (North) (Town)	Co-educational
j	H3	Durban (City)	Boys
k	H3	Durban (Suburb)	Co-educational
l	H3	Inland (Central) (Town)	Co-educational

H denotes secondary

H1 " over 600 pupils

H2 " 400-599 "

H3 " under 400 "

TABLE 21

Schools Used in Determining Reliability and ValidityGroup G: used for reliability and validity.

Total: 140 pupils

School	Sex	Boys	Girls
1. Durban	Girls		28
2. Durban	Girls		31
3. Pietermaritzburg	Co-educational		23
4. Pietermaritzburg	Boys	58	
		58	82

APPENDIX B

CIRCULAR OF THE NATAL EDUCATION DEPARTMENT ON
DIFFERENTIATION IN SECONDARY CLASSES

CIRCULAR MINUTE NO.109/1961.

N.E.D. NO. 59/6.

NATAL EDUCATION DEPARTMENT.

20th June, 1961.

TO PRINCIPALS OF ALL GOVERNMENT EUROPEAN SECONDARY AND
HIGH SCHOOLS AND ALL PRIMARY SCHOOLS WITH STD VI
CLASSES.

DIFFERENTIATION IN SECONDARY CLASSES.1. Need for Differentiation.

In accordance with modern educational concepts, it is essential to provide courses of study suited to the capabilities of individual pupils.

To meet the requirements of the lower intelligence group attempts were made in the regulations of both the Junior Certificate and the Senior Certificate to extend the subject range with the introduction of certain practical subjects. This did not accomplish the purpose of giving courses within the scope of the weaker pupils as the main core of subjects had to be taken in competition with the brighter pupils.

Later the Practical Course was introduced in an attempt to go one step further. It still failed in its purpose as, again, a core of subjects had to be taken on the higher level.

Hence, if suitable courses are to be provided for all types of pupils, courses which are differentiated in the main core of subjects must be provided.

2. Number of Streams.

While in more densely populated countries three streams are usually provided, it is felt that more than two streams would be impractical in Natal owing to the relatively small number of pupils. Hence it has been decided to introduce only two streams.

3. Extent of Differentiation.

It has been decided that differentiation should start in Standard VII and continue to Standard X.

4. The Names of the Two Streams.

The 1st stream shall be called the "Advances (sic) Stream" and the 2nd stream the "Ordinary Stream".

In this way the possible stigma attaching to a stream called "Lower" or "Practical" will be avoided.

Every school must offer at least one course in each stream.

5. General Nature of the Streams.

- (a) Advanced Stream. This will in general approximate to our present Junior Certificate and Senior Certificate Courses. It will cater for the more intelligent section of the pupils. Some limitation on the free choice of subjects is embodied in the regulations.
- (b) Ordinary Stream. In this stream differentiation in the syllabus and in the examination will occur. For example a subject such as Arithmetic occurs in both streams. The syllabuses will differ, certain sections of the Advanced syllabus being omitted or amended in the Ordinary syllabus. Further, the type of examination paper will differ. The Ordinary Paper will be simpler and more direct.

6. Subjects in the two Streams.

(a) Subjects for Advanced Stream.

Syllabuses will be provided and examination papers set at the Advanced Level on the following subjects:

Schedule A.

English A	Arithmetic (to Junior Certificate only.)
Afrikaans A	Mathematics
English B	Additional Mathematics (Senior Certificate Only.)
Afrikaans B	Physical Science (not to be taken with Physics or Chemistry.)
Latin	Physics
Greek	Chemistry
	Biology (not to be taken with Botany.)
History	Botany
Geography	Geometrical Drawing
	Bookkeeping.

(b) Subjects for Ordinary Stream.

Syllabuses will be provided and examination papers set at the Ordinary Level on the following subjects:

Schedule B.

English A	
Afrikaans A	
English B	
Afrikaans B	
History	
Geography	
Social Studies	(not to be taken with History or Geography.)

Arithmetic (to Junior Certificate only).

Mathematics.

General Mathematics (to Junior Certificate only - not to be taken with Arithmetic or Mathematics).

Physical Science.

Biology.

General Science (not to be taken with any other Science).

Geometrical Drawing.

Bookkeeping.

Health Education.

- (c) Subjects common to both Streams. Only one syllabus will be provided and question papers of only one standard will be set in the following subjects which may be included in either the Advanced or Ordinary Courses.

Schedule C.

Agriculture	French
Housecraft	German
Art	Hebrew
Music	Zulu B
Biblical Studies	
Handicrafts	
Typing and Office Routine	
Shorthand and Typing.	(This may replace Typing and Office Routine in Stds IX and X only).

7. Certification.

- (a) External Examinations (Stds. VIII and X).

The certificates to be issued will differ for the two streams. The names of the certificates will be:-

Natal Junior Certificate (Advanced Grade)
 Natal Junior Certificate (Ordinary Grade)
 Natal Senior Certificate (Advanced Grade)
 Natal Senior Certificate (Ordinary Grade)

The subjects will not be indicated as Advanced or Ordinary Grade since the grade of the certificate will indicate this.

In the Advanced Grade two standards of pass will be indicated: Pass with Merit and Pass. In the Ordinary Grade Pass Certificates only will be issued. Matriculation Exemption can only be gained on the Natal Senior Certificate (Advanced Grade).

- (b) Internal Examinations (Stds VI, VII and IX).

In Standard VI the requirements for promotion are as set out in Section 9(c)(i) and (ii). A lower standard of achievement as given in 9(c)(iii) will entitle the pupil to a Standard VI Leaving Certificate.

Since the case of the weaker pupil from Standard VII upwards has been met by the provision of differentiated courses, the need for special requirements for a Leaving Certificate in Standards VII and IX falls away. Hence Standards VII and IX certificates will be issued on the basis of the promotion pass only. A pupil who fails to satisfy the requirements for promotion will thus not be given a certificate for that standard. Std. VII and IX certificates will be issued in two grades - Ordinary and Advanced.

The requirements for promotion in Standards VII and IX remain unchanged except that the Leaving Certificate requirements fall away.

(c) Schedules.

In Standard VI there are three standards of pass - Advanced, Ordinary and Leaving. These will be shown in the Schedules as P(A), P(O) and L respectively.

In Standards VII and IX there will be only two standards of pass according to the stream - Pass in the Advanced Grade and Pass in the Ordinary Grade. These will be shown in the schedules by the symbols P(A) and P(O) respectively.

8. Grouping.

(a) Junior Certificate (Ordinary Grade).

1. Main Language.
2. Second Language.
3. Arithmetic or General Mathematics.
4. A Science.
5. Any other subject chosen from Schedule B.
- 6 & 7. Any two other subjects chosen from Schedules B and/or C.

(b) Junior Certificate (Advanced Grade).

1. Main Language.
2. Second Language.
3. Arithmetic.
4. A Science.
5. Any other subject chosen from Schedule A.
- 6 & 7. Any two other subjects chosen from Schedules A and/or C.

- NOTES: (i) Not more than two science subjects may be included.
- (ii) Every pupil must take both official languages unless special exemption has been obtained from the Director of Education.

- (iii) Pupils desiring to obtain Matriculation Exemption in the Senior Certificate Examination must select their subjects in conformity with the relative regulations.

(c) Senior Certificate (Ordinary Grade).

1. Main Language.
2. Second Language.
3. A Science.
4. Any other subject chosen from Schedule B.
- 5 & 6. Any two other subjects chosen from Schedules B and/or C.

(d) (1) Senior Certificate (Advanced Grade).

1. Main Language.
2. Second Language.
3. A Science.
4. Any other subject chosen from Schedule A.
- 5 & 6. Any two other subjects chosen from Schedules A and/or C.

(ii) Senior Certificate (Advanced Grade) with Matriculation Exemption.

1. Main Language.
2. Second Language.
3. A Science.
4. Mathematics or Third Language.
5. Any other subject chosen from Schedule A.
6. Any other subject chosen from Schedule A or C.

- NOTES:
1. Not more than 2 Science subjects may be included.
 2. Every pupil must take both official languages unless special exemption has been obtained from the Director of Education.
 3. The Third Language shall be chosen from Latin or German or French.

9. Requirements for Entry into the two Streams.

(a) Stage.

Separation into the two streams can best be done at the end of the Standard VI year since the course in this standard, while still general in character, contains certain exploratory features. Every effort should be made to prepare Std VI pupils for the work of the secondary school. (See Schools Handbook, Chapter IV Section 5 (iii) (d)).

(b) Standard VI Examination Requirements.Subjects and Marks.

1. Main Language	300
2. Arithmetic	200
3. 2nd Language	200
4. History	100
5. Geography	100
6. General Science	100
7. One other subject	100

N.B. This seventh subject will be selected from Third Language (Latin or German), Mathematics and Health Education in considering a pass into the High Stream. If the pupil fails to qualify for promotion to the Advanced Stream then for the Ordinary Stream or the Leaving Certificate the selection will be from the above subjects and Housecraft or Handicrafts. The subject in which the pupil obtains his best marks shall be included in the schedule.

(c) Requirements for passing Standard VI.(i) Advanced Stream.

Main Language	45%
Arithmetic	40%
2nd Language	35%
Three other Subjects	40%
Aggregate of seven subjects	50%

(ii) Ordinary Stream.

Main Language	40%
Arithmetic or Second Language	30%
Two other Subjects	40%
Aggregate of seven subjects	35%

(iii) Leaving Certificate Requirements.

Main Language	35%
Two other subjects from the seven listed subjects	30%
Aggregate of seven subjects	30%

(d) Control of Standard VI Examination.

In view of the wide variation of standards of work by the pupils, of the type of examination papers and of the standard of marking in different schools, some measure of control is necessary. The following method will be adopted:-

1. In the course of this year (1961) specimen papers and mark schemes in all subjects of the examination will be sent to schools as a measure to secure uniformity of standard.
2. For the examination at the end of 1961 and thereafter, two subjects will be controlled each year, the subjects varying from year to year.
3. The form of control will be:-
 - (i) The Department will appoint examiners and moderators in the two subjects.
 - (ii) Papers will be set in the subjects and a mark scheme drawn up.
 - (iii) One copy of the examination paper and mark scheme will be sent to all schools having a Standard VI. These will be strictly confidential. The school may duplicate the papers where necessary.
 - (iv) The Department will name the day and time for the writing of these papers, so as to ensure that all pupils throughout Natal write at the same time, thus avoiding leakage of knowledge of the paper from school to school.
 - (v) The papers will be marked by the school concerned. Strict adherence to the mark scheme is essential.
 - (vi) The subjects to be controlled will not be known in the schools until late in the year. The set papers will be forwarded to the schools as late as possible before the date set for the holding of the examination.
 - (vii) The Inspectors of Schools will control the marking at the schools by scrutinising some of the scripts when visiting the schools early the following year. In selecting schools for the scrutiny of marking the Inspector will make use of the examination schedules submitted by the schools.
 - (viii) The scrutiny exercised by the Inspector will not, unless special circumstances demand it, affect the promotions for the year under review but he will take steps, if necessary, to ensure that standards are maintained in future.

4. Cases warranting special consideration should be referred to the District Inspector.

10. Reduction in Number of Courses.

It is considered desirable for practical reasons to reduce the number of courses offered in our schools. Where courses other than those listed are in existence, and where schools wish to continue with these courses, Principals should make special application for those courses to continue.

11. Courses Authorised for Advanced Level.

(a) Courses leading to Matriculation Exemption.

1.	M.L.	2L	P.Sc.	Maths.	Hist.	Lat.
2.	"	"	Bio.	"	"	"
3.	"	"	P.Sc.	"	"	Germ.
4.	"	"	Bio.	"	"	"
5.	"	"	P.Sc.	"	"	Fr.
6.	"	"	Bio.	"	"	"
7.	"	"	P.Sc.	"	"	Geog.
8.	"	"	Bio.	"	"	"
9.	"	"	"	Lat.	"	"
10.	"	"	"	Germ.	"	"
11.	"	"	P.Sc.	Maths.	Geog.	Bookk.
12.	"	"	Bio.	"	"	"
13.	"	"	"	"	"	HseCr.
14.	"	"	P.Sc.	"	"	Art
15.	"	"	Bio.	"	"	"
16.	"	"	P.Sc.	"	"	Geo.D.
17.	"	"	"	"	"	Agric.

(b) Senior Certificate Courses. (Not leading to Matriculation Exemption.)

1.	M.L.	2L	Bio.	Geog.	Bookk.	T. & O.
2.	"	"	"	"	"	Handicr.
3.	"	"	"	HseCr.	"	T. & O.
4.	"	"	"	Agric.	"	Handicr.
5.	"	"	"	Geog.	"	Art.
6.	"	"	"	"	"	HseCr.

12. Courses at Ordinary Level.

At this stage it is not proposed to lay down specific courses for the ordinary grade. These will be devised to suit the peculiar requirements of the school concerned.

In the large town schools it will be possible to cater for the two streams in different class groups. This will not be the case in the small country school where both streams will have to be taken by one teacher at the same time.

In such a school it will be possible for one teacher to take a grouped class of Advanced and Ordinary stream pupils if the subject taken is the same. Hence to a very large extent it will be necessary for both streams to take the same subjects in their courses. This will be possible because many of the subjects included in Schedule A are also included on the Ordinary level in Schedule B.

All proposed courses in this grade should be submitted for approval on or before 15th September, 1961. (See paragraph 14.)

13. Selection of Course.

- (a) If a pupil has obtained a promotion pass to the Advanced stream, every endeavour should be made to persuade the parents to allow him to take the Advanced Course to which he will be most suited. If, however, the parent insists on the Ordinary Course, then the pupil should be admitted to this course.
- (b) If a pupil passes Standard VI at the Ordinary grade only, P(O), he cannot be admitted to the Advanced grade. If the parent insists on the Advanced grade, then the pupil must repeat Standard VI in the hope that he will obtain the higher pass in the following year.
- (c) A pupil who passes Standard VII, VIII, or IX Ordinary grade may transfer to the Advanced grade, but he must repeat that standard in the Advanced grade.

14. Procedure.

It is proposed to introduce differentiation, as outlined above, in our schools from the beginning of 1962.

All pupils at present in Standard VI will, therefore, be separated into the two streams at the end of this year. To this end the examination in Standard VI will be conducted as set out in this Circular. Specimen papers and mark schemes in all subjects of the examination will be sent to schools as soon as possible.

Principals should submit on or before 15th September, 1961, the list of courses which they propose for their school. Special representations should be made in respect of any proposed course not included in the authorised lists. Courses already in existence at the school should also be listed in the application, and if desired, representations should be made for the retention of these courses.

The differentiated courses will be introduced into Standard VII only 1962. Existing courses will, if necessary, be carried through to Standard X.

PJS/MP
13.6.1961.

(sgd:) P.J. Scott
for DIRECTOR OF EDUCATION

APPENDIX C

LETTER FROM DR. P.H. BOSHOFF

Extract from letter dated 12th January, 1962, from Dr. P.H. Boshoff.

I made the statement that besides school tests, I.Q. tests, many factors have to be considered as well, such as home environment and medical state of health. In respect of the latter field, one in my position will tend to exclude general medical conditions such as malnutrition, glandular imbalance, parasitic diseases (worms, bilharzia, etc.) malaria, blood dyscrasias, tonsil troubles, etc., in favour of eye conditions about which I can speak with more authority.

I am writing about the few cases I remembered, and generally about the rest. These I'd like to divide into (i) particularly impressive results; (ii) the general result obtained.

- (i) (a) Pieter S.: saw him at age of 9 years old, son of headmaster. He was on his way to Witrand Institute, Potchefstroom, where he was to spend his life with feeble-minded and imbeciles. The father wanted to know whether perhaps he was only in Gr. II at age of 9 and stuck there because perhaps of eyesight. I found the child to be allergic, vision normal but he had many scars in the choroid. Treatment by anti-allergic methods and cancelling of Witrand Institute gave a marvellous result. This boy matriculated a few years ago and with a first class pass. I have lost trace of him since then.
- (b) Rory W. - saw him at age of 5 with diagnosis from children's specialist that he was absolutely mentally defective and that he had degenerative cavities in the brain. He looked it. He was slaving and completely apathetic. The eyes could not be assessed but were normal except for intense allergy. Treatment by the family doctor on my instructions against allergy yielded a good result. Rory "woke up", became interested and after a month mouthed his first words. He had several treatments, plays normally, is now in Std. IV, 17th in a class of 25, not brilliant but able to benefit in an ordinary school.
- (c) Peter v.R., was seen by me when he was 9 years old in Std. II. He had spring catarrh (allergy) and was kept back in Std. II the next year. Anti-allergic treatment saw him 2nd in class in Std. II the same year. Two years later his father told me that he was getting stupid again and whether treatment would not perhaps help. After treatment he moved from 21st out of 25 in class to first position. After 3 or 4 years he again dropped in performance and was again rehabilitated in the same way. He is in Matric. this year.
- (d) Gerrie v.Gr. at age of 8 was a complete mongolian idiot with all the physical and mental backwardness in such cases. An attack of allergic conjunctivitis forced us

to treat. He immediately started waking up mentally and went on moderately well at school. I saw him two years later when they specially brought him to me from Melsetter to show the marvellous result. He is now in boarding school in Delmas, is in Std. VIII and has never failed a year. I saw him for specs. 9 months ago but he still had the dry hair, flat occiput, etc. of a mongolian idiot.

I have a few more similar cases but cannot think of them just now. I may include here a fairly intelligent child but an absolute delinquent at the age of 12, son of a member of parliament at the moment. On treating his allergy the child totally rehabilitated within 4 months without expert guidance and psychiatrists who were given up long ago by the parents.

- (ii) In general, and here my records run into two thousand, it is always most impressive how a child improves on anti-allergic treatment. These are children with spring catarrh in various stages, sometimes not obviously sick. They are children who have itchy, red, watering eyes, runny noses, persistent coughs, bad appetite, highly strung, nervously mobile, tummy aches for no reason, temperatures for a day and then O.K. again, moody, bed-wetters, etc. In 95% of such cases after treatment they (the parents) express satisfaction mainly on how well they are now doing at school.

Such allergies may persist for 20 years in such an individual and he stays stupid. I venture to say that the I.Q. can be improved in 15% of all school children by anti-allergic treatment.

The eyesight may be deficient in a child but that is discovered sooner or later. Especially must longsightedness be watched for because that leads to eyestrain, headaches, feeling of fatigue, disinclination to read, indifference, etc. I dare say that in school clinics, the ophthalmologist invariably disregards this condition but every year the standard of medical work improves and it can be left untouched.

Eye balance is very important and is never tested for in public institutions which includes school clinics. Such lack of convergence was first discovered by the late Dr. N.A. Stutterheim.¹ It leads to bad orientation in all ball games, fatigue in study, general lassitude, disinclination to use the eyes. He has had wonderful results.

1. Reference here is made to the work of Dr. N.A. Stutterheim (1946).

Research on this topic is also reported in the unpublished thesis of Dr. D.Z. de Villiers (1956). He found specific cases of lack of convergence especially among students, both Bantu and White, at University level.

If so many possibilities exist in ophthalmology what may not be in the Ear, Nose and Throat, Psychiatric, Neurologic, Pediatric, etc., fields.

The few specially described cases are cases which were hopeless and would have stayed hopeless.

P.S. Those exceptional cases must have had oedema of the brain of allergic origin - hence their response. I did many similarly retarded children without such brilliant results.

APPENDIX D

NEED FOR THE USE OF STANDARDIZED TESTS

The need for the use of standardized tests is shown by the following figures obtained during this study. (See, too, Tables 23 and 25.)

Correlations obtained for Group G, November, 1960
(See Table 12.)

Reading Study

<u>School</u>	<u>Reading Study</u>	<u>r.</u>
1	⁸ .3888	r_1
2	.5204	r_2
3	.5821	r_3
4	.04619	r_4

- a. r_1 and r_2 :
z = -.599 (insignificant).
- b. r_1 and r_3 :
z = .846 (insignificant).
- c. r_1 and r_4 :
z = 1.512 (insignificant).
- d. r_2 and r_3 :
z = -.03 (insignificant).
- e. r_2 and r_4 :
z = 2.282 (significant at 5% level).
- f. r_3 and r_4 :
z = 2.370 (significant at 5% level).
- g. In Table 12 these have been converted to two decimal places.

The correlations obtained in determining the validity of the tests differ from one another. Six calculations have been completed for it was thought that this was a sufficient number to show that from one school to another marks can vary significantly. The correlations for schools 1, 2 and 3 are significant correlations.

This implies that the marks of three schools have a significant correlation with marks obtained on the S-G tests, but that in two instances the schools' marks differ significantly from one another. The need for the use of standardized tests is indicated.

In comparing the correlations of the marks from different schools with the marks obtained on the S-G tests use was made of the formula:

$$z = \frac{zr_1 - zr_2}{\sqrt{\frac{1}{N_1-3} + \frac{1}{N_2-3}}}$$

where zr_1 = z value of r_1

zr_2 = z value of r_2

r_1 and r_2 calculated correlation coefficients

N_1 = size of sample in school (1)

N_2 = size of sample in school (2)

zr_1 and zr_2 were obtained from a table for conversion of correlation coefficients to z-marks. (Arkin and Colton, 1950.)

APPENDIX E

SEX DIFFERENCES IN ACHIEVEMENT

The differences in the achievement of boys and girls in each of the four S-G tests were determined and the following results were obtained:

<u>Test</u>	<u>Significance of difference in achievement</u>	
Arithmetic	1.35	No significant difference
Language and Vocabulary	1.42	No significant difference
Reading Study	.06	No significant difference
Spelling	4.55	Significant at 1% level.

Except for Spelling in which the girls did better than the boys, there was no significant difference in the achievement of boys and girls in the S-G tests.

In spite of this difference in Spelling, however, it has been considered wiser to treat boys and girls as one group in all four tests. This will make possible comparisons with the other tests and with school marks in subsequent use in schools of the S-G tests. (See Table 23.)

APPENDIX F

OGIVE CURVES

Marks obtained in each subject were converted to percentages and the cumulative frequencies were also expressed as percentages.

Each of the graphs shows the Ogive curves for S-G tests (my tests) in February/March, 1961, and the school tests, i.e. tests set by the Natal Education Department in November, 1961, in the subjects indicated, and marked by teachers in the schools.

The conclusions which are drawn from the graphs in figures 2, 4, 6 and 8, have taken into account the Natal Education Department requirements for passing Standard VI in the following:

	<u>A-level</u>	<u>O-level</u>	<u>School leaving</u>	<u>Fail</u>
Main language	45%	40%	35%	34%
Arithmetic	40%	30%	30%	29%

(See Appendix B.)

These are the cut off scores which the schools used in their end of the year examinations; for easy reference they are called "School's cut off scores", e.g. Tables 22, 26, in this section.

FIG.1.

ARITHMETIC

MY TEST —————
SCHOOL TEST - - - - -

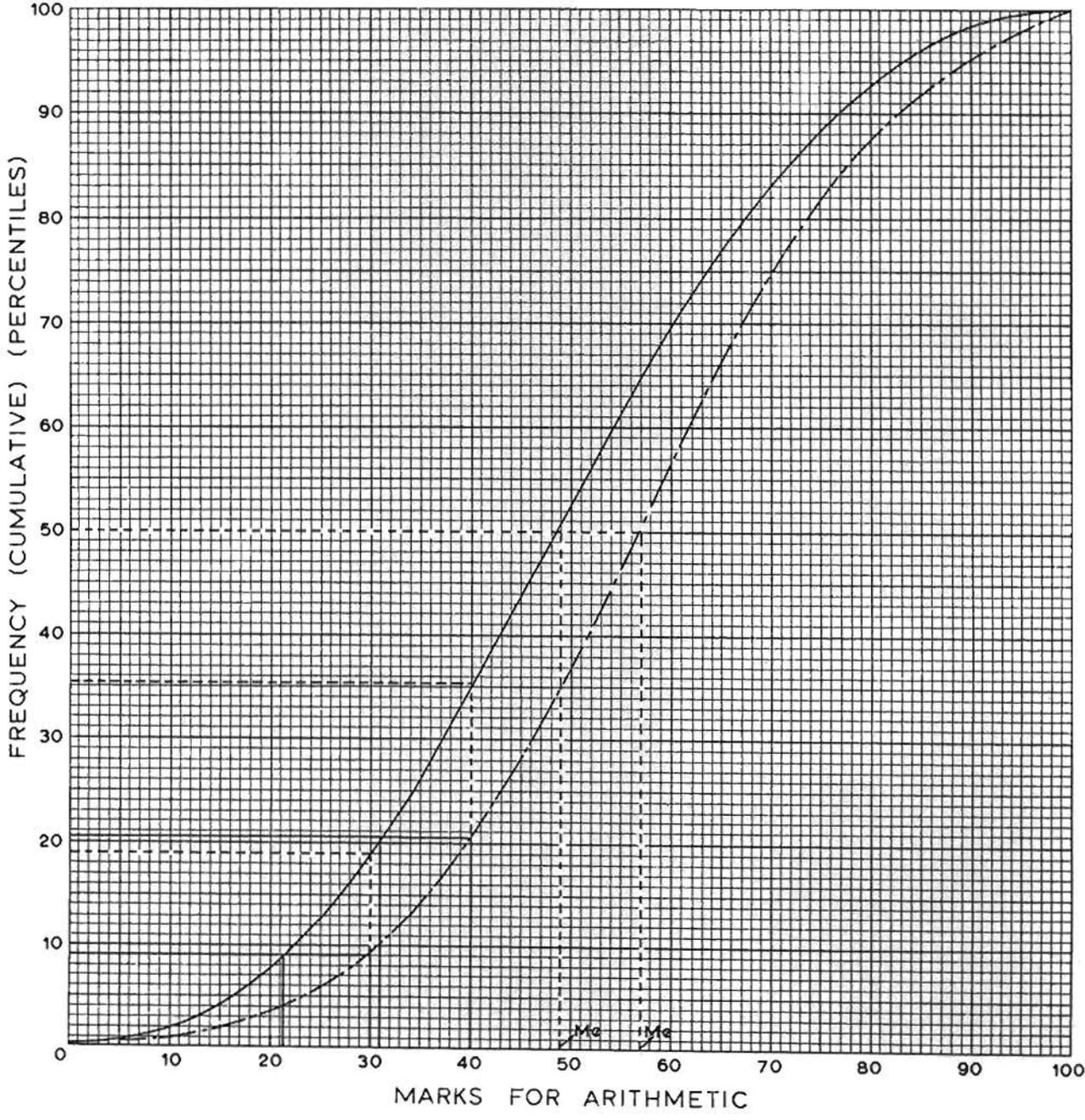


FIG. 2

FIGURES FOR FIG. 1. —
NORMAL DISTRIBUTIONS

MY TEST ———
SCHOOL TEST - - - -

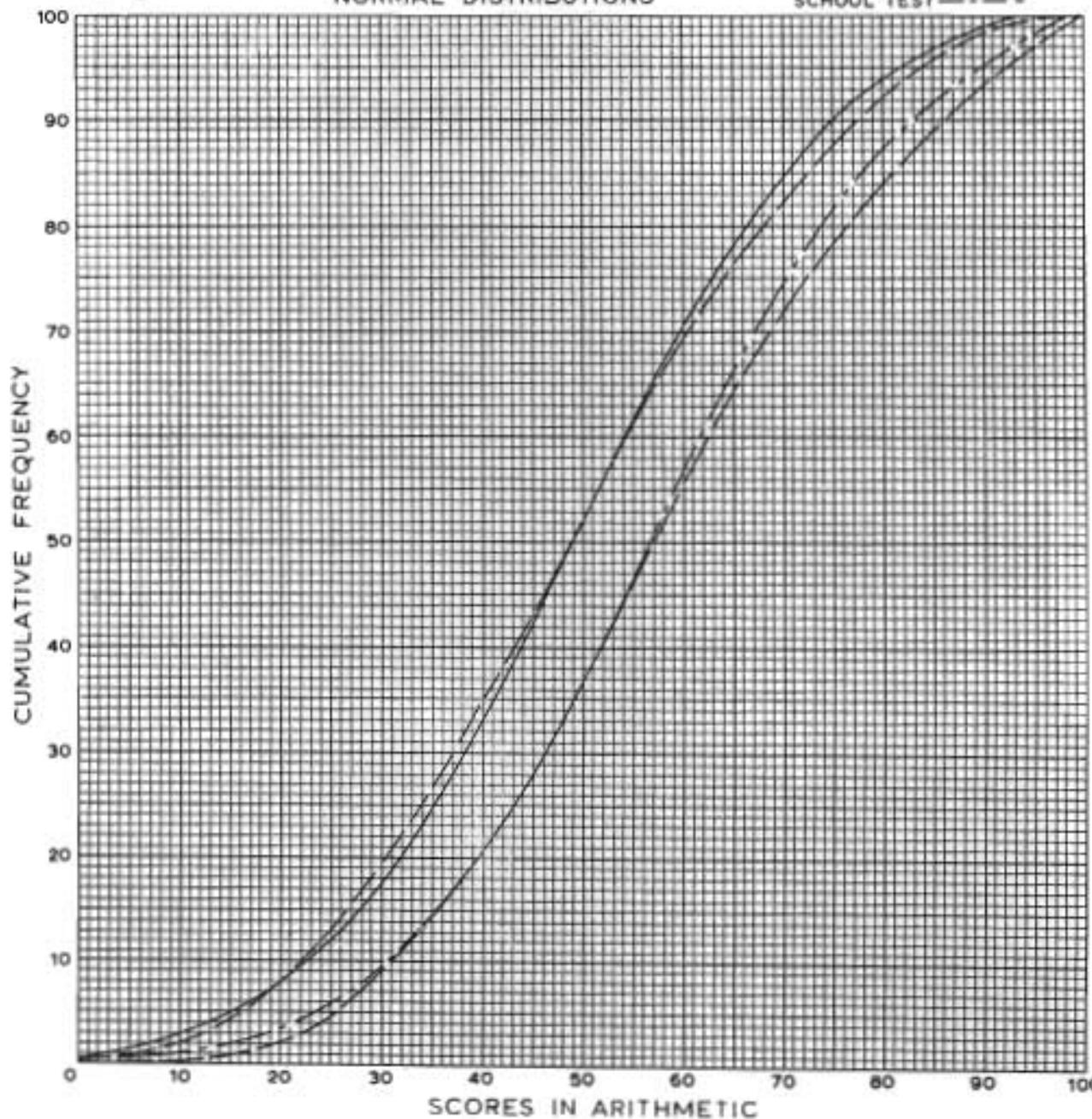


Figure 2.

This shows the Ogive curves for Arithmetic tests, i.e. my test and the school test, when raw scores have been converted into standard scores, the distributions having the same average and standard deviation.

From these Ogives for standardized scores the following conclusions are drawn from fig. 2:

- i. a. In the school test 19.5% of the pupils obtained 39% or less.
- b. In my test 31.5% of the pupils obtained 39% or less.

This implies that, taking normal distribution of the sets of scores into account, the standardized test (my test) sets a higher standard than does the school test and that if the standardized test were used for streaming, 12% fewer pupils would be streamed in the A stream or level.

- ii. a. In the school test 8.5% of the pupils obtained 29% or less.
- b. In my test 16.5% of the pupils obtained 29% or less.

In this case 8% fewer pupils would reach the O stream or would obtain a school leaving certificate if the standardized test were applied.

- iii. a. The median score in the school test is 57%.
- b. The median score in the standardized test is 49%.

FIG. 3.

LANGUAGE AND VOCABULARY

MY TEST ———
SCHOOL TEST - - -

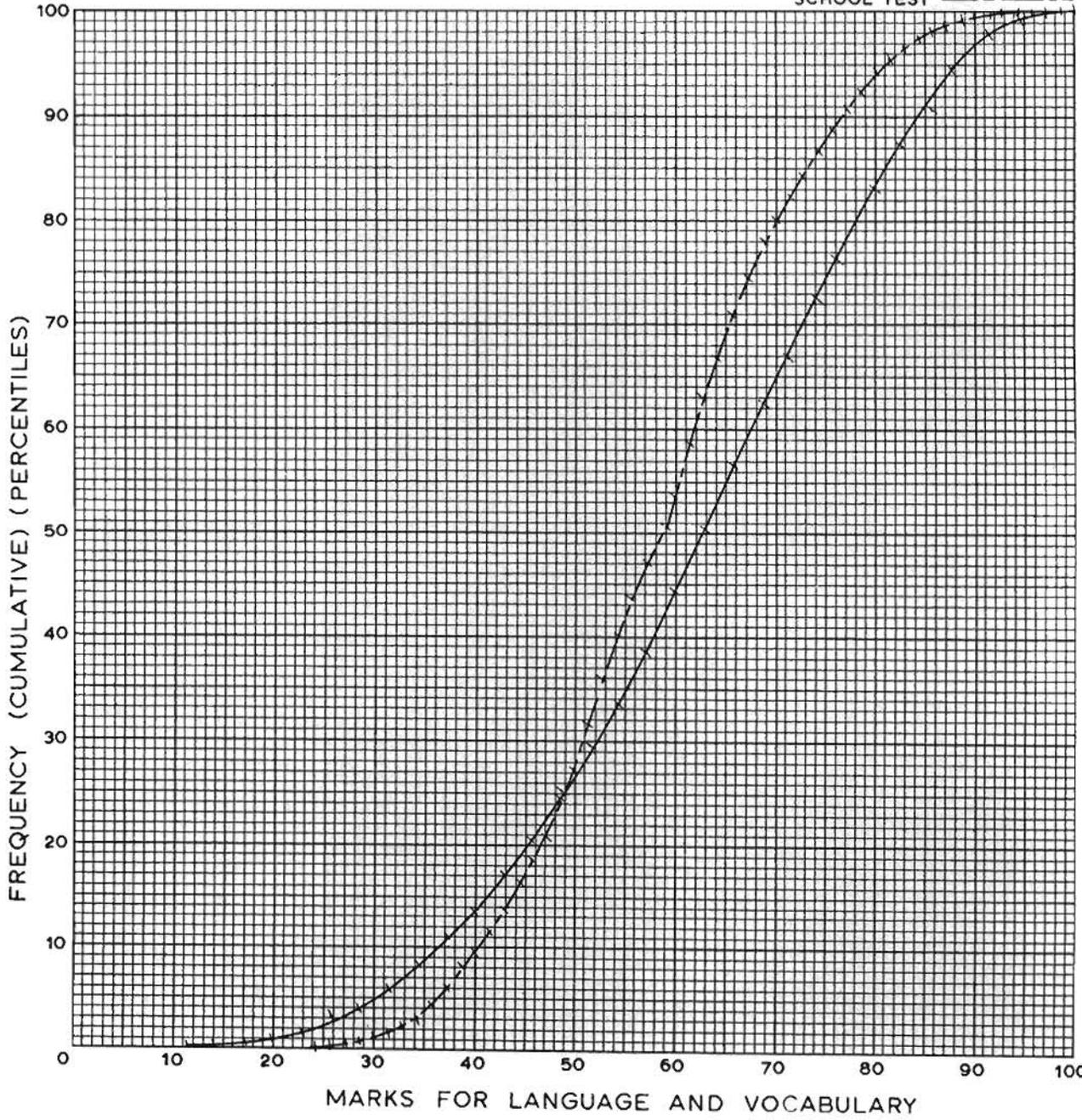


FIG. 4.

LANGUAGE AND VOCABULARY: OBSERVED FREQUENCY
 CONVERTED INTO NORMAL FREQUENCY DISTRIBUTION

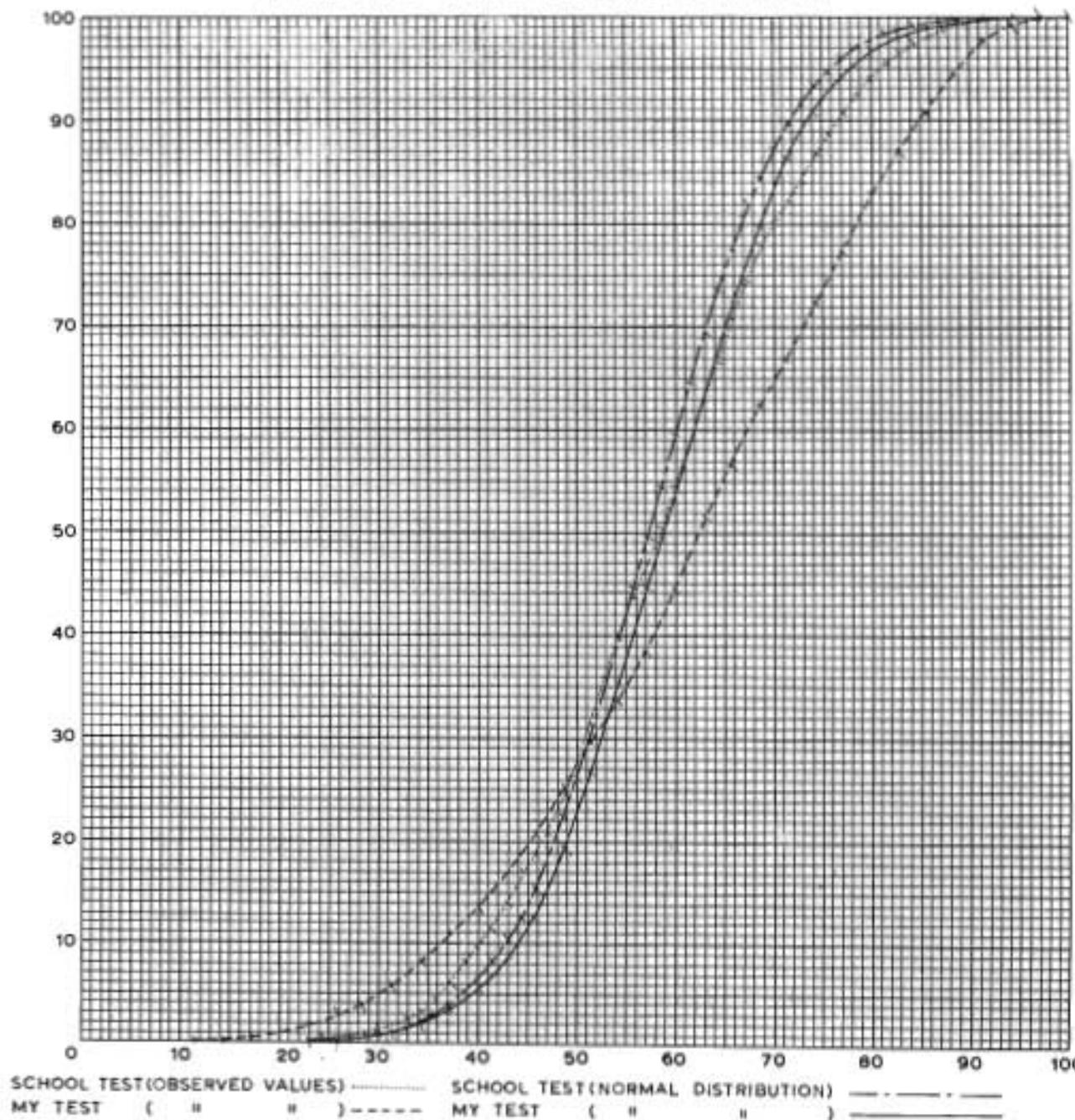


Figure 4 shows the Ogives when the raw scores for Language and Vocabulary tests, i.e. my tests and the school tests, have been converted into standard scores with the same average and standard deviation.

From the Ogives for the normal scores, the following conclusions can be drawn from fig. 4:

- i. a. In the school test 12% of the pupils obtained 44% or less.
b. In my test 10% of the pupils obtained 44% or less.
- ii. a. In the school test 5.9% of the pupils obtained 39% or less.
b. In my test 4.5% of the pupils obtained 39% or less.
- iii. a. In the school test 2% of the pupils obtained 34% or less.
b. In my test 2% of the pupils obtained 34% or less.
- iv. a. The median score in the school test is 57%.
b. The median score in my test is 59%.

FIG. 5

READING TEST (RAW SCORES)

MY TEST

SCHOOL TEST

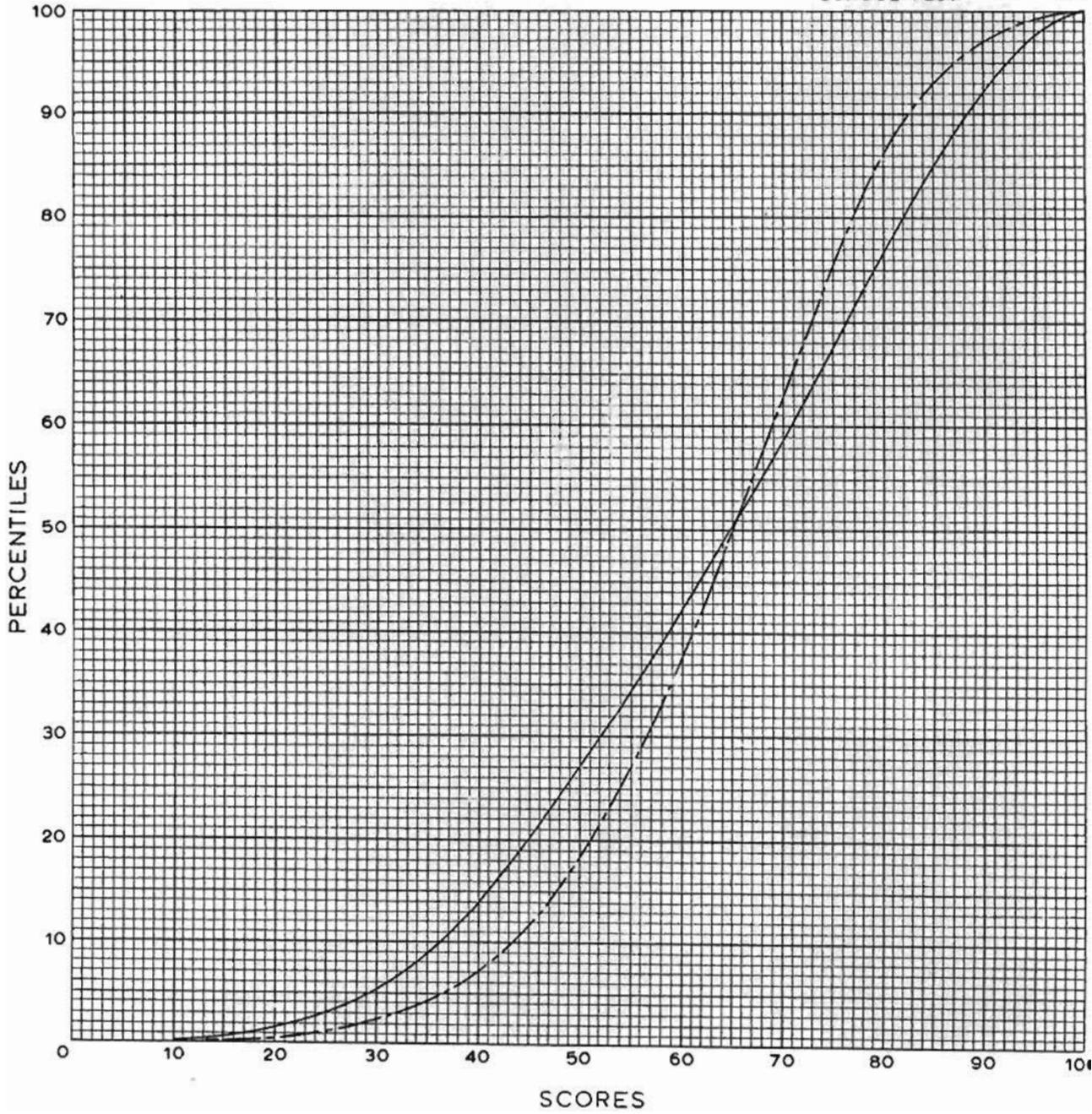


FIG. 6

READING TEST: OBSERVED DISTRIBUTION
CONVERTED INTO A NORMAL FREQUENCY DISTRIBUTION.

MY TEST ———
SCHOOL TEST - - -

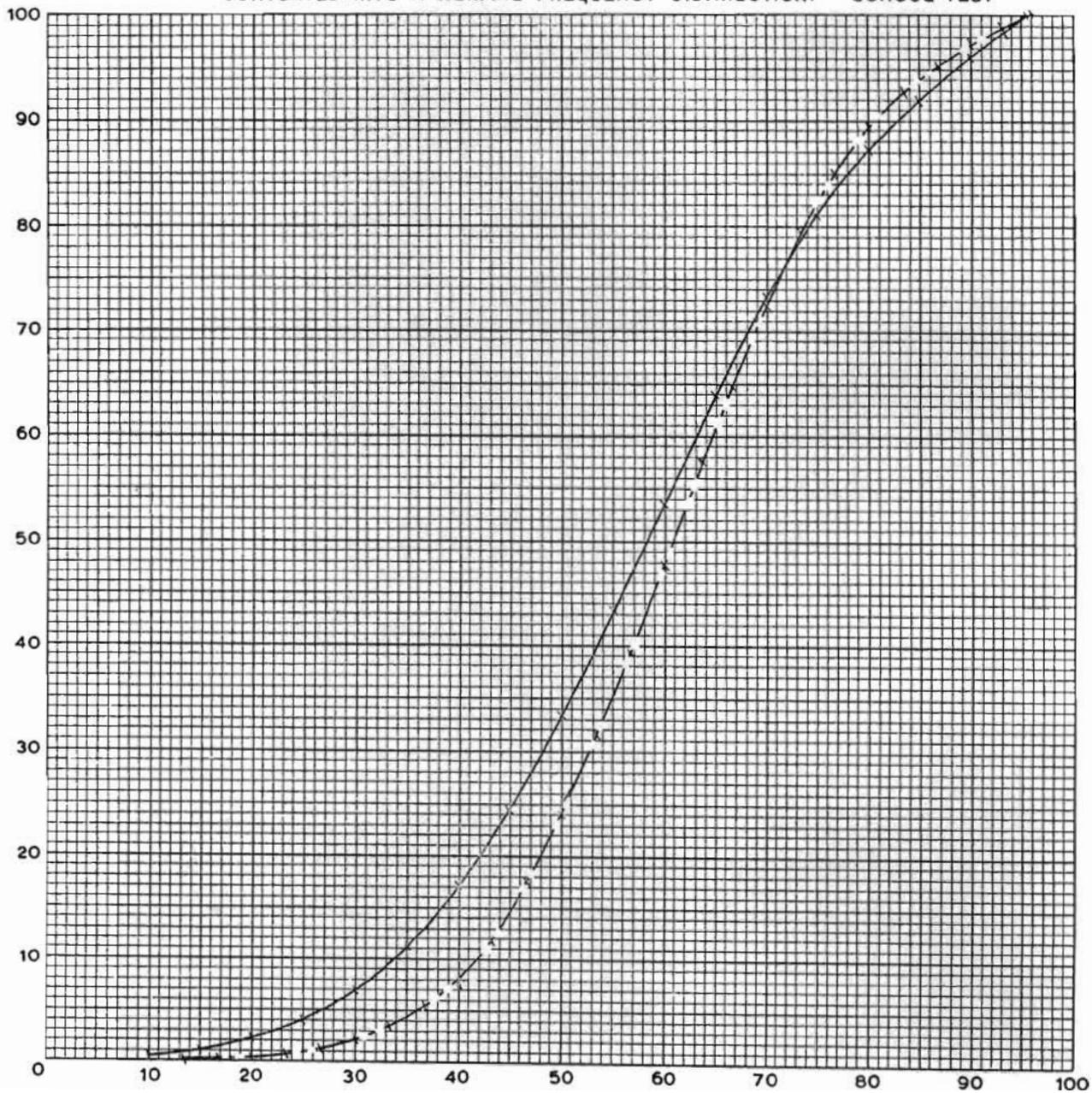


Figure 6 shows the Ogives for the Reading Study tests, my test and the school test, raw scores being converted into standard scores with the same average and standard deviation.

The following conclusions can be drawn from fig. 6:

- i. a. In the school test 13% of the pupils obtained 44% or less.
b. In my test 23% of the pupils obtained 44% or less.
- ii. a. In the school test 7% of the pupils obtained 39% or less.
b. In my test 16% of the pupils obtained 39% or less.
- iii. a. In the school test 4% of the pupils obtained 34% or less.
b. In my test 10% of the pupils obtained 34% or less.
- iv. a. The median value for the school test is 61%.
b. The median value for my test is 58%.
- v. a. For scores $> 72\%$ the standardized test (my test) is easier than the school test.
b. For scores $< 72\%$ the school test is the easier of the two tests.

FIG. 7.

SPELLING

MY TEST —————
SCHOOL TEST - - - - -

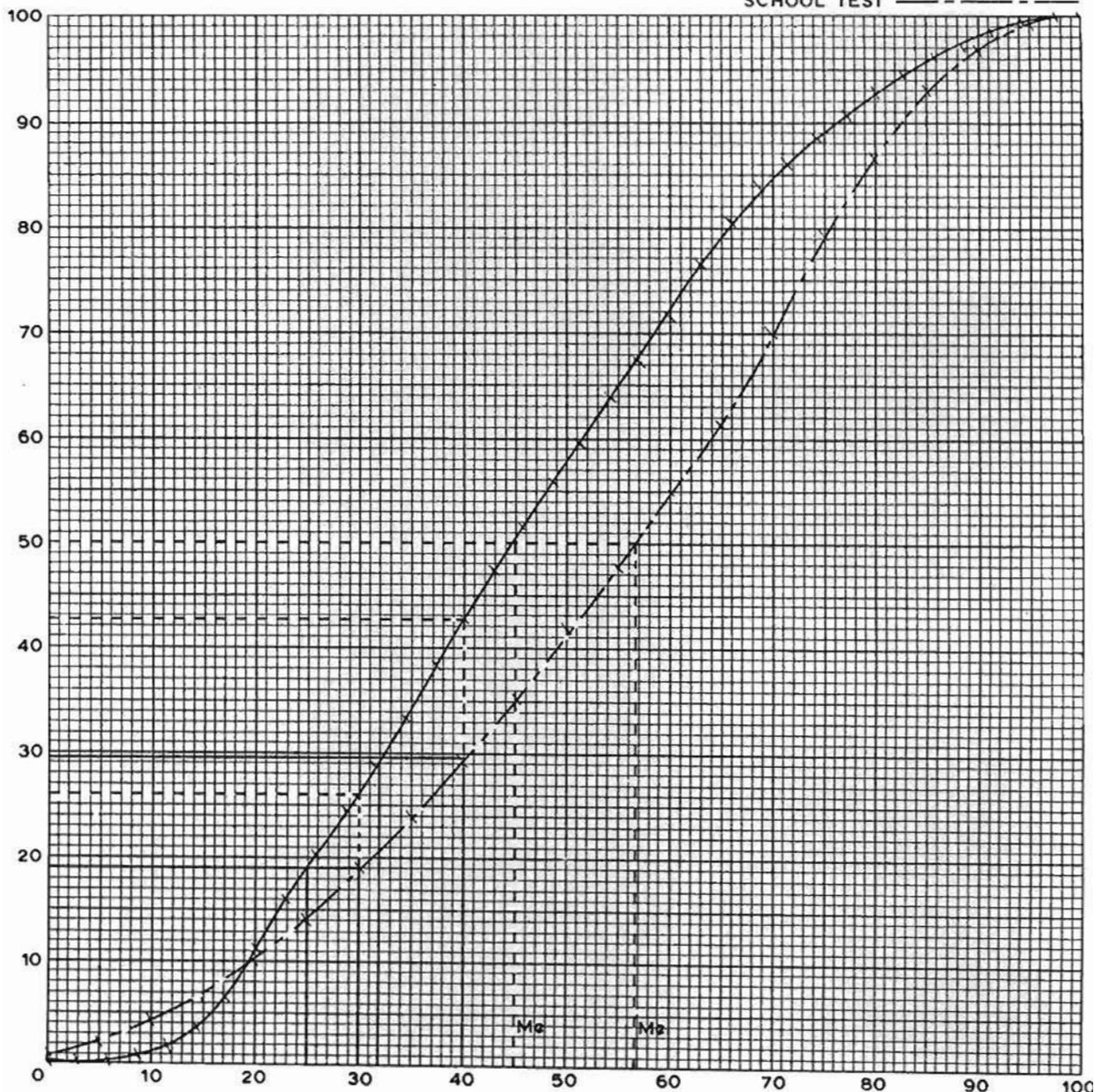


FIG. 8.

SPELLING

SCHOOL TEST (NORMAL DISTRIBUTION) ————
MY TEST (" ") —————
SCHOOL TEST (OBSERVED DISTRIBUTION) ······
MY TEST (" ") - - - - -

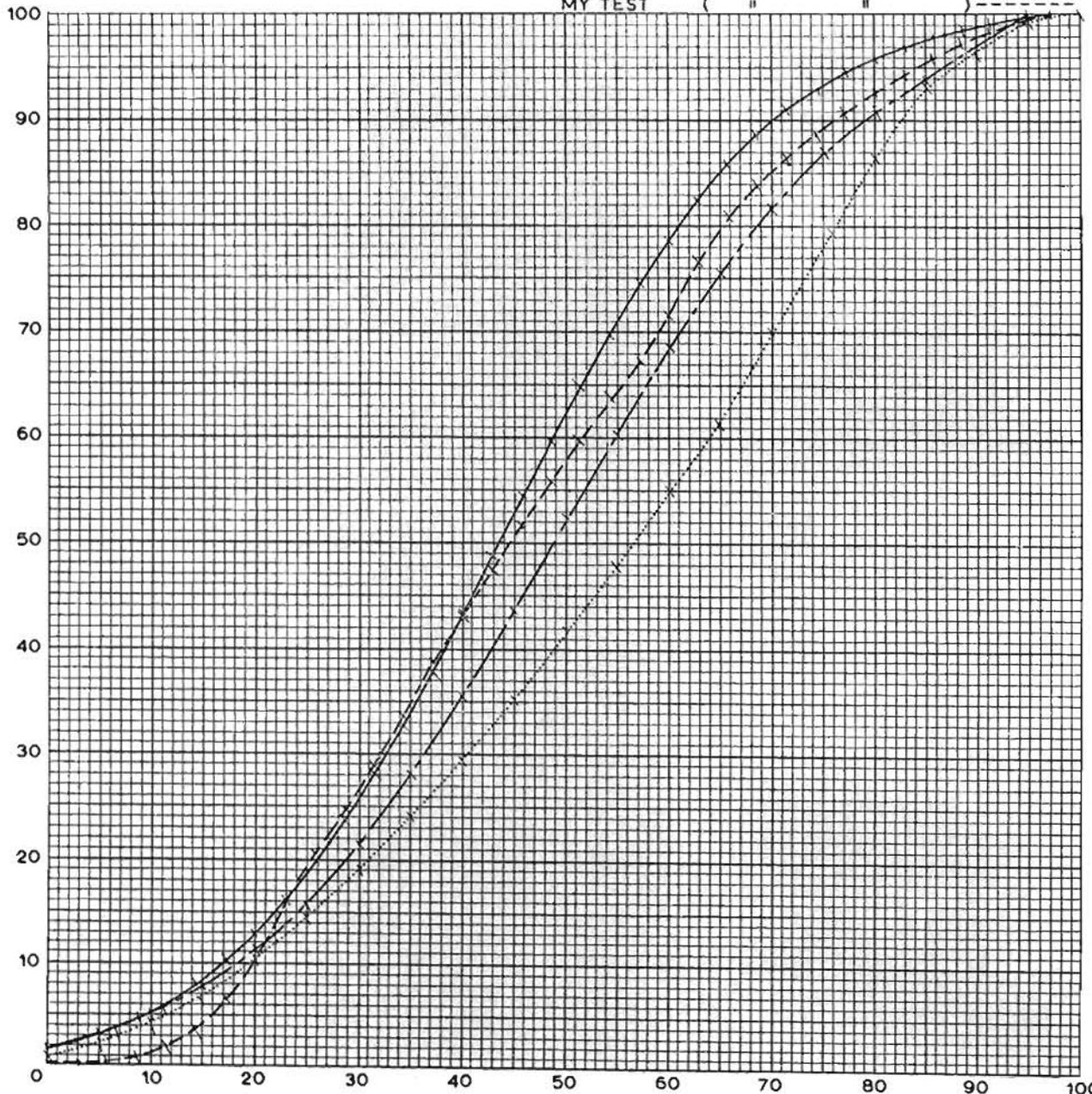


Figure 8 shows the Ogives for Spelling tests, i.e. my test and the school test, raw scores being converted into standard scores with the same average and standard deviation.

The following conclusions can be drawn from the normal distributions in fig. 8:

- i. a. In the school test 42% of the pupils obtained 44% or less.
b. In my test 51% of the pupils obtained 44% or less.
- ii. a. In the school test 34% of the pupils obtained 39% or less.
b. In my test 41% of the pupils obtained 39% or less.
- iii. a. In the school test 26.5% of the pupils obtained 34% or less.
b. In my test 32% of the pupils obtained 34% or less.
- iv. a. The median value for the school test is 48.9%.
b. The median value for my test is 43.5%.

TABLE 22

Percentages of Pupils in Each Level,
Using School's Cut Off Scores

Test	% in A level	% in O level	School leaving	% who fail
Arithmetic	i.e. 40% and over	30 - 39%	30 - 39%	29% and less
School test	80.5	11.0	-	8.5
My test	68.5	15.0	-	16.5
Main Language	45% and over	40 - 44%	35 - 39%	34% and less
Language & Vocabulary				
School test	88.0	6.5	3.5	2.0
My test	90.0	5.5	2.5	2.0
Reading Study				
School test	87.0	6.0	3.0	4.0
My test	77.0	7.0	6.0	10.0
Spelling				
School test	58.0	8.0	7.5	26.5
My test	49.0	9.5	9.5	32.0

Observations:

Marks in all these subjects (see subjects in Appendix B) are among the marks which are used for streaming in Natal. It would appear, therefore, that:

- i. Failure in Spelling could jeopardize a pupil's chances of selection to the A-level.
- ii. A pass mark of 45% in English makes a very large A-level group.
- iii. Achievement in Arithmetic only could be the deciding factor in selection to the A-level.

APPENDIX G

CUT OFF SCORES

Cutting Scores

The choice of a cutting score is based on personal, social and economic values, as well as on practical considerations; it cannot be made scientifically.

1. The arguments which favour a high critical score include the following:

- i. A boy who is unlikely to succeed if accepted wastes educational resources and the time of the teacher which might have been better spent on more promising pupils.
- ii. The presence of such a boy in the group can lower the level of achievement of the group.
- iii. If the boy is going to fail at the end of the year, it would be better for him to face the fact at once, to avoid the waste of a year and to start immediately in a more suitable course of study.

2. On the other hand, arguments which favour a downward shift of the cutting score are:

- i. Tests are fallible, and a decision to admit a boy is really a decision to give him the opportunity of further testing by means of his class performance. A rejected boy cannot be given this opportunity, for erroneous rejection cannot be corrected.
- ii. A refusal to promote may mean a total loss to higher education, for it prevents further investigation.
- iii. A failure is not a total loss. A boy may gain a lot from having been in the A-level class, even if he drops out later. (Stellwag, 1955.)
- iv. When the country so urgently needs more, better educated workers it is important to include those who may not succeed in order to ensure that those who will ultimately succeed may not be excluded. (Cronbach, 1949.)

It is obvious that the lowest practicable cutting score will be chosen, and that these cut off scores can be determined only by

means of a standardized test.

In Part II, Chapter I, under the heading "Use of the S-G Tests", I have stated that these tests can be used as part of the assessment for allocation to a group or a stream. I do not wish to imply that they should be used at the beginning of Standard VI to stream pupils. They should be used as part of a preliminary assessment of the pupils which should start at the beginning of Standard VI, *and continue throughout the year.*

If these tests were to be used for the selection of pupils to an A or O level very similar percentages of marks which are used by the Natal Education Department for selection of pupils at the end of Standard VI would probably need to be determined. Because it is not my intention that they should be so used, I have not calculated these percentages for the S-G tests.

The cut off points on which I have decided seem to indicate that all but a very small percentage of pupils could reach the A-level by the end of Standard VI. (See Part I, Chapter III, "Intelligence".)

The following are the cut off scores which have been chosen:

TABLE 23
Cut Off Scores for S-G Tests

Test	A-level	O-level	School leaving	Fail
<u>Arithmetic:</u>				
School's cut off score	40%	30%	30%	29%
My cut off score for				
boys	5	4	4	3
girls	5	4	4	3
<u>Language and Vocabulary:</u>				
School's cut off score	45%	40%	35%	34%
My cut off score for				
boys	15	13	11	10
girls	15	13	11	10
<u>Reading Study:</u>				
School's cut off score	45%	40%	35%	34%
My cut off score for				
boys	8	7	6	5
girls	8	7	6	5
<u>Spelling:</u>				
School's cut off score	45%	40%	35%	34%
My cut off score for				
boys	11	10	8	7
girls	13	12	10	9
<u>Total English:</u>				
School's cut off score	45%	40%	35%	34%
My cut off score for				
boys	34	30	25	22
girls	36	32	27	24

Because it has been decided to have common norms for boys and girls for each test (see p.334) the cut off scores for Spelling and total English are those which have been determined for the boys.

TABLE 24

Cut Off Scores for the S-G Tests Expressed as Percentages
and Percentile Ranks

Test	A-level	O-level	School leaving	Fail
Arithmetic: (15 items)	5	4	4	3
	33%	27%	27%	20%
Percentile Rank	23.7	15.4	15.4	7.9
Standard Score	43.25	39.9	39.9	35.9
Language and Vocabulary: (35 items)	15	13	11	10
	43%	37%	31%	29%
Percentile Rank	17.1	11.0	5.9	3.8
Standard Score	40.6	37.75	34.5	33.0
Reading Study: (20 items)	8	7	6	5
	40%	35%	30%	25%
Percentile Rank	13.9	8.9	5.2	3.4
Standard Score	39.2	36.8	34.2	31.75
Spelling: (35 items)	11	10	8	7
	31%	29%	23%	20%
Percentile Rank	28.9	24.6	16.0	11.1
Standard Score	44.5	43.4	39.9	37.25
Total English (90 items)	34	30	25	22
	38%	33%	28%	24%
Percentile Rank	15.6	9.2	3.2	1.1

The percentages are given to the nearest whole number to facilitate the use of the tests in the schools. It is these percentages which have been used to obtain the figures in Table 25.

Pupils who have scores within the range given in the following figures should be considered borderline cases, i.e. between a failure and school leaving certificate.

Arithmetic	21% - 26%
Language and Vocabulary	30% -
Reading Study	26% - 29%
Spelling	21% - 22%
Total English	25% - 27%

Borderline limits between the other levels of passing can be determined in the same way.

Pupils who have scores equal to or less than the percentage given in the column headed "Failure" are likely, in the present situation, to fail at the end of Standard VI.

TABLE 25

Percentages of Pupils in Each Level When Using the School's and My Cut Off Scores
(See pp. 336 to 346.)

Test	School's cut off score on school test graph		My cut off score on school test graph		My cut off score on my test graph		School's cut off score on my test graph	
Arithmetic Fig.2*								
A level	40% & over	80.5	33% & over	88.5	33% & over	80.0*	40% & over	68.5
O level	30 - 39%	11.0	27 - 32%	5.0	27 - 32%	7.0*	30 - 39%	15.0
Fail	29% & less	8.5	20% & less	3.5	20% & less	8.0	29% & less	16.5
Language and Vocabulary Fig.4								
A level	45% & over	88.0	43% & over	91.0	43% & over	92.5	45% & over	90.0
O level	40 - 44%	6.5	37 - 42%	6.0	37 - 42%	4.5	40 - 44%	5.5
School leaving	35 - 39%	3.5	31 - 36%	2.5	31 - 36%	2.0	35 - 39%	2.5
Fail	34% & less	2.0	29% & less	.5	29% & less	.5	34% & less	2.0
Reading Study Fig.6								
A level	45% & over	87.0	40% & over	93.0	40% & over	84.0	45% & over	77.0
O level	40 - 44%	6.0	35 - 39%	3.0	35 - 39%	6.0	40 - 44%	7.0
School leaving	35 - 39%	3.0	30 - 34%	1.5	30 - 34%	4.0	35 - 39%	6.0
Fail	34% & less	4.0	25% & less	1.0	25% & less	4.0	34% & less	10.0
Spelling Fig.8								
A level	45% & over	58.0	31% & over	78.5	31% & over	74.0	45% & over	49.0
O level	40 - 44%	8.0	29% & 30%	2.5	29% & 30%	3.0	40 - 44%	9.5
School leaving	35 - 39%	7.5	23 - 28%	6.0	23 - 28%	8.0	35 - 39%	9.5
Fail	34% & less	26.5	20% & less	11.5	20% & less	13.0	34% & less	32.0

* These percentages have been obtained from the graphs in

Fig. 2: Arithmetic

Fig. 4: Language and Vocabulary

Fig. 6: Reading Study

Fig. 8: Spelling

From the percentages in this table it is obvious that scientific tests, (S-G tests, i.e. my tests) place different percentages of pupils in each level for each subject from those so placed by the school's tests.

From these figures the following observations are made:

1. It is only in the school's Spelling test that the percentage of pupils in the A level approximates that percentage which was actually in the A level, i.e. 62%, in 1961. (See Table 22.)
2. If Arithmetic and English tests are to be used in selection it would appear that higher percentages for a pass into the A level will be required. Only in this way will they be adequate criteria in obtaining 62% of the pupils in the A level and 38% of the pupils in the O level. (See Part I, Chapter II, Section C, "Human resources".)

APPENDIX H

PERCENTILE NORMS

TABLE 26
Percentile Norms
1. Arithmetic

Marks	Percentile Rank
0	.2
1	1.0
2	3.3
3	7.9
4	15.4
5	23.7
6	35.5
7	46.6
8	58.2
9	69.5
10	78.4
11	85.5
12	92.3
13	97.0
14	99.5
15	100.0

Table 26 continued

ii. Language and Vocabulary

Marks	Percentile Rank
0	.1
1	.1
2	.1
3	.1
4	.1
5	.1
6	.6
7	.9
8	1.7
9	3.2
10	3.8
11	5.9
12	8.2
13	11.0
14	13.6
15	17.1
16	20.6
17	25.3
18	29.6
19	33.4
20	38.4
21	44.2
22	51.5
23	56.7
24	62.5
25	66.8
26	72.3
27	77.1
28	83.0
29	87.0
30	90.6
31	94.5
32	97.9
33	99.2
34	99.9
35	100.0

Table 26 continuediii. Reading Study

Marks	Percentile Rank
0	.3
1	.3
2	.3
3	.4
4	1.7
5	3.4
6	5.2
7	8.9
8	13.9
9	21.0
10	27.0
11	34.4
12	42.5
13	49.9
14	59.6
15	67.6
16	76.5
17	84.9
18	92.1
19	97.6
20	100.0

Table 26 continued
iv. Spelling

Marks	Percentile Rank
0	.1
1	.2
2	.4
3	.9
4	2.0
5	3.6
6	6.6
7	11.1
8	16.0
9	20.4
10	24.6
11	28.9
12	33.5
13	38.6
14	42.9
15	47.3
16	51.4
17	55.9
18	59.3
19	63.8
20	67.1
21	71.6
22	76.5
23	80.8
24	83.9
25	85.8
26	88.4
27	90.7
28	92.8
29	94.3
30	96.0
31	96.9
32	98.3
33	99.3
34	99.9
35	100.0

Table 26 continued

v. English Total
(Language and Vocabulary, Reading Study, Spelling)

Marks	Percentile Rank	Marks	Percentile Rank
0	-		
1	-	46	37.50
2	-	47	40.30
3	-	48	42.50
4	-	49	44.60
5	-	50	47.00
6	-	51	49.20
7	-	52	52.30
8	-	53	54.00
9	-	54	55.90
10	-	55	58.20
11	.01	56	61.00
12	.04	57	62.70
13	.07	58	65.20
14	.10	59	67.10
15	.13	60	68.90
16	.17	61	71.50
17	.20	62	73.30
18	.35	63	74.90
19	.50	64	76.60
20	.70	65	78.40
21	.90	66	80.50
22	1.10	67	82.40
23	1.60	68	83.20
24	2.40	69	85.30
25	3.20	70	86.20
26	4.40	71	87.50
27	5.50	72	88.70
28	6.80	73	90.10
29	8.00	74	91.80
30	9.20	75	92.80
31	11.40	76	93.90
32	12.50	77	95.10
33	14.30	78	95.60
34	15.60	79	96.50
35	17.40	80	97.20
36	19.10	81	98.00
37	20.30	82	98.40
38	22.30	83	98.90
39	24.70	84	99.30
40	26.50	85	99.60
41	28.80	86	99.90
42	30.70	87	99.90
43	32.80	88	100.00
44	34.30	89	-
45	36.30	90	-

APPENDIX I

GRAPHS ON NORMAL PROBABILITY PAPER FOR THE CONVERSION
OF RAW SCORES ON THE S-G TESTS TO STANDARD SCORES

FIG. 9.

SCHOOL TEST — ARITHMETIC

NORMAL PROBABILITY PAPER

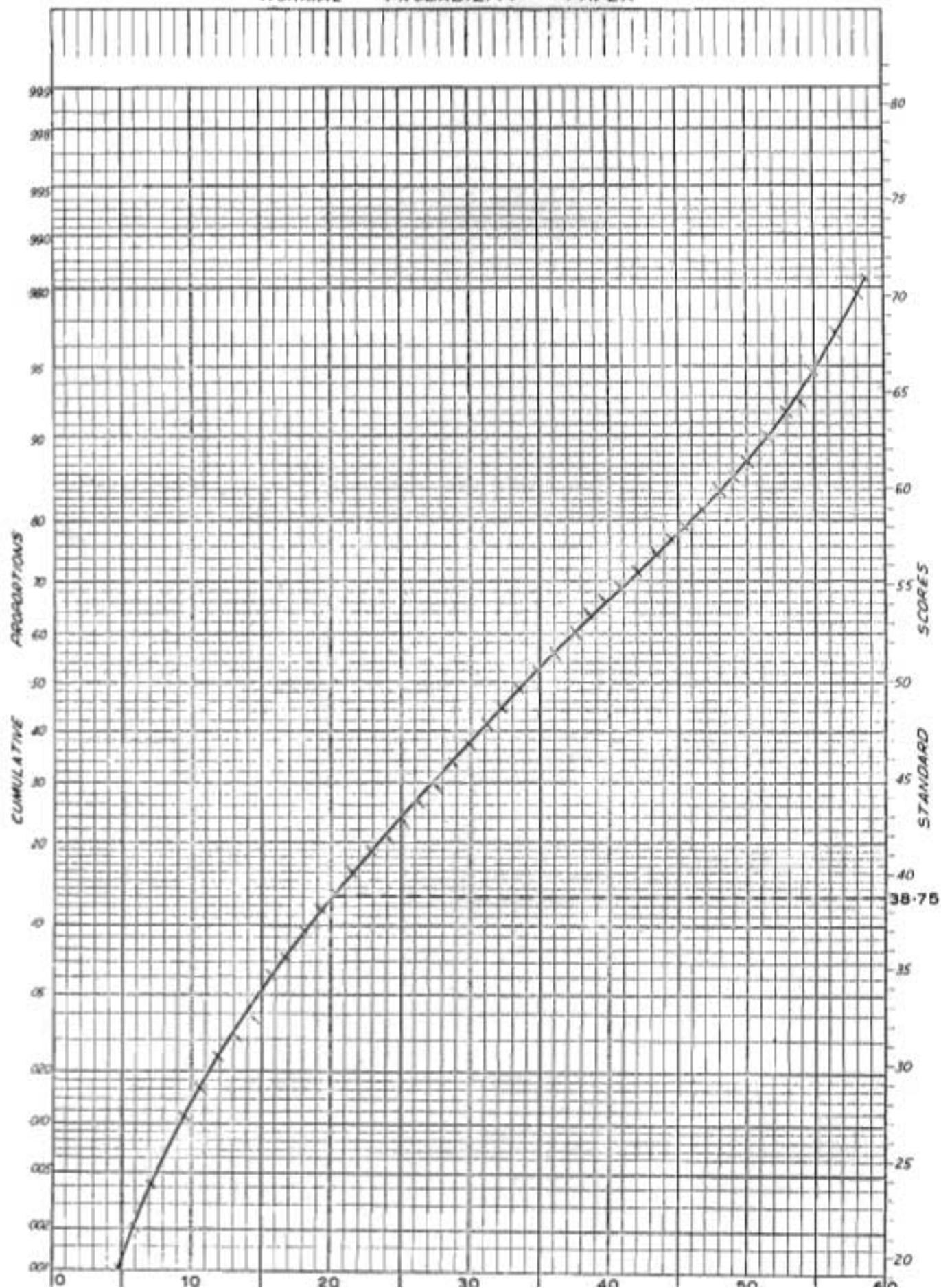


FIG 10

S - G TEST — ARITHMETIC

NORMAL PROBABILITY PAPER

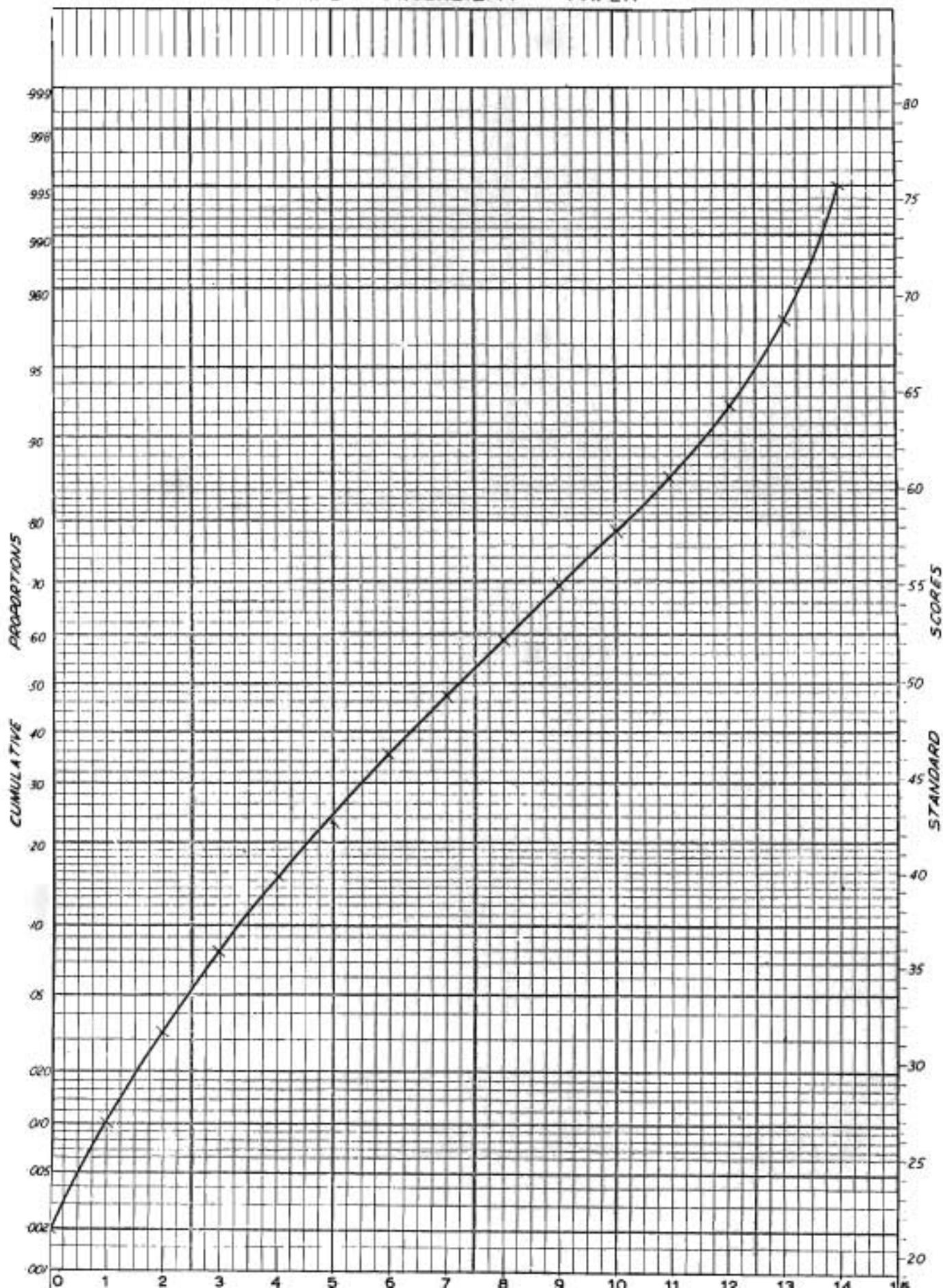


FIG. 11. SCHOOL TEST — LANGUAGE AND VOCABULARY

NORMAL PROBABILITY PAPER

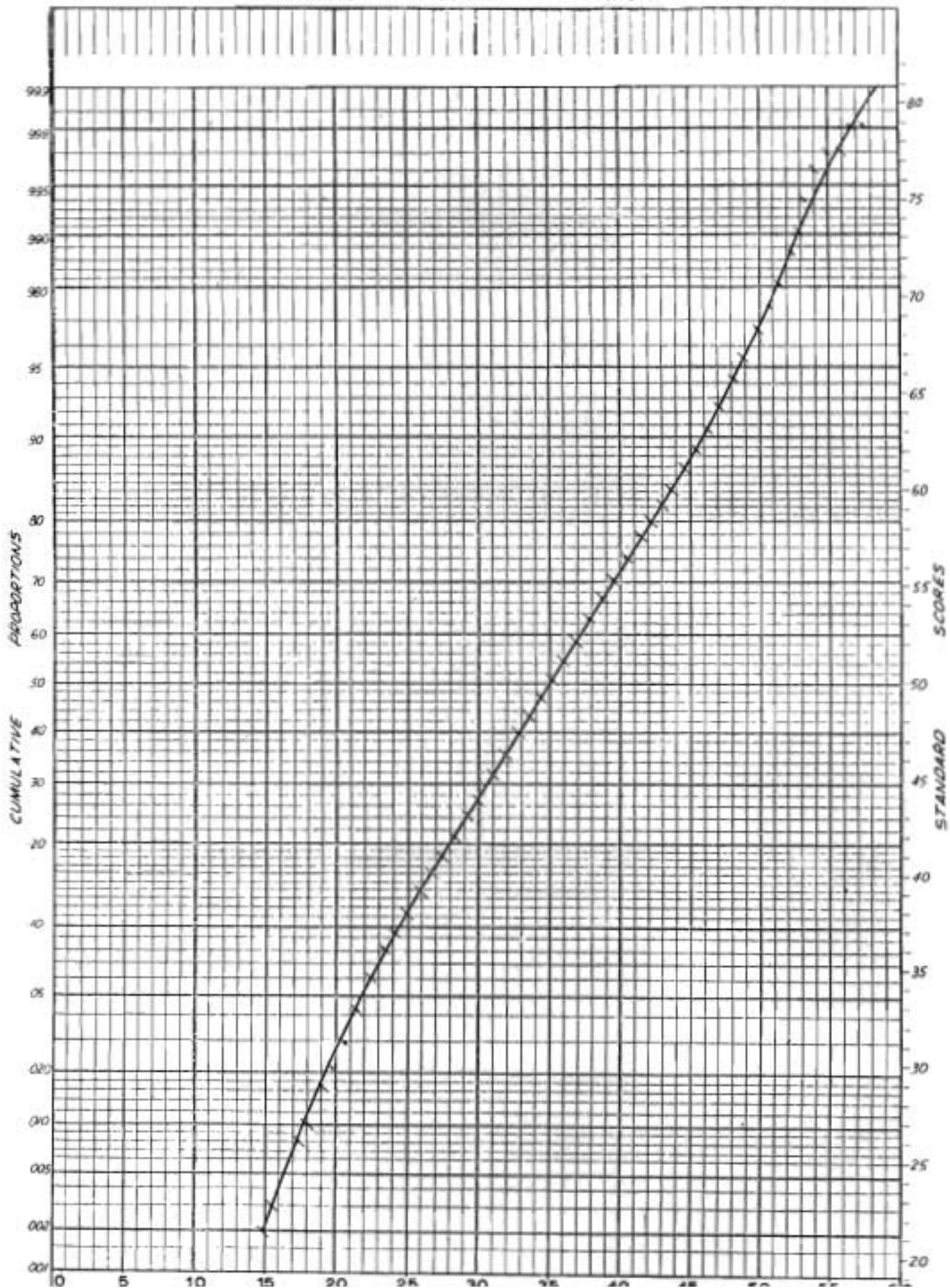


FIG. 12 S - G TEST — LANGUAGE AND VOCABULARY

NORMAL PROBABILITY PAPER

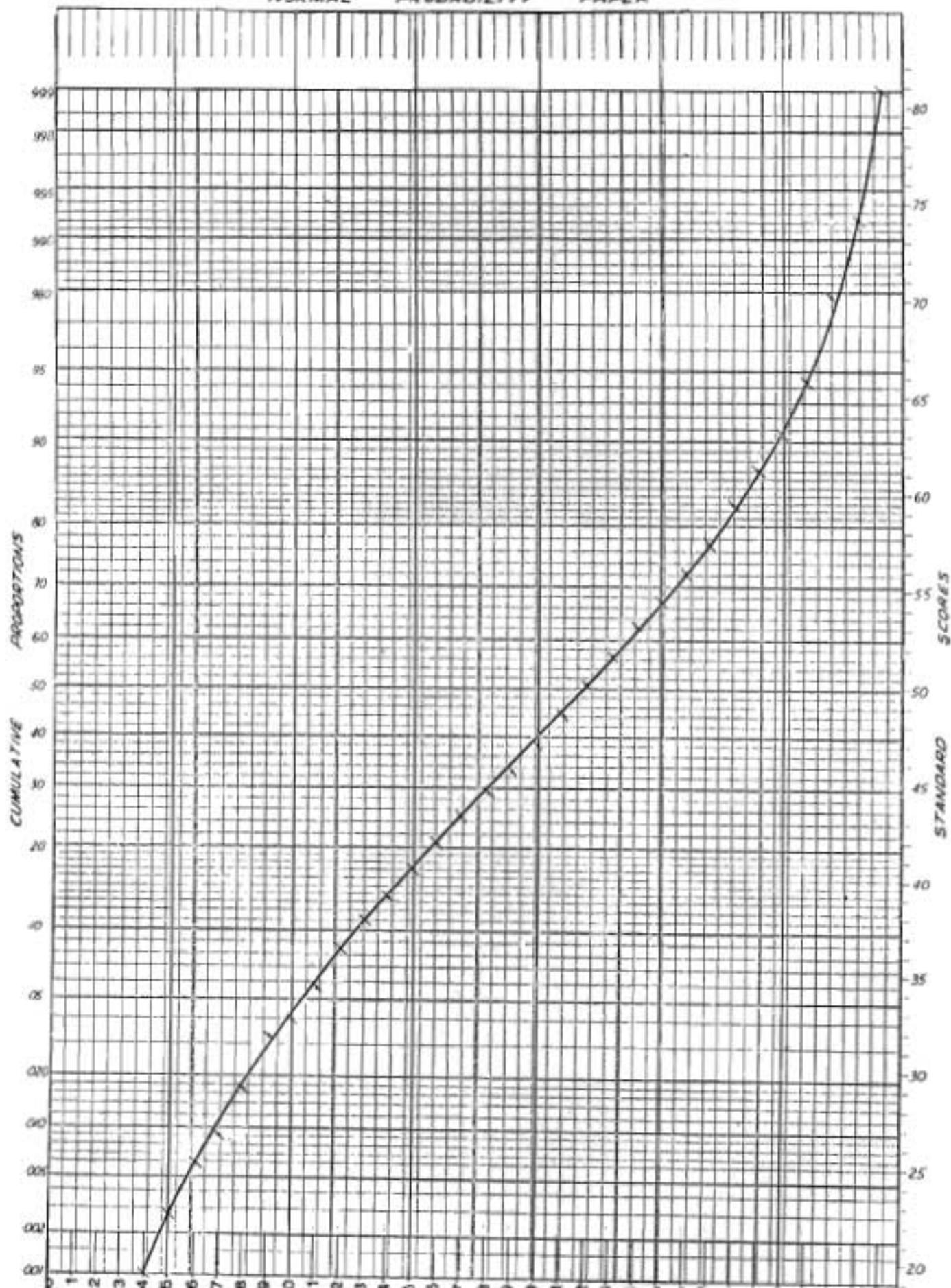


FIG. 13.

SCHOOL TEST — READING STUDY

NORMAL PROBABILITY PAPER

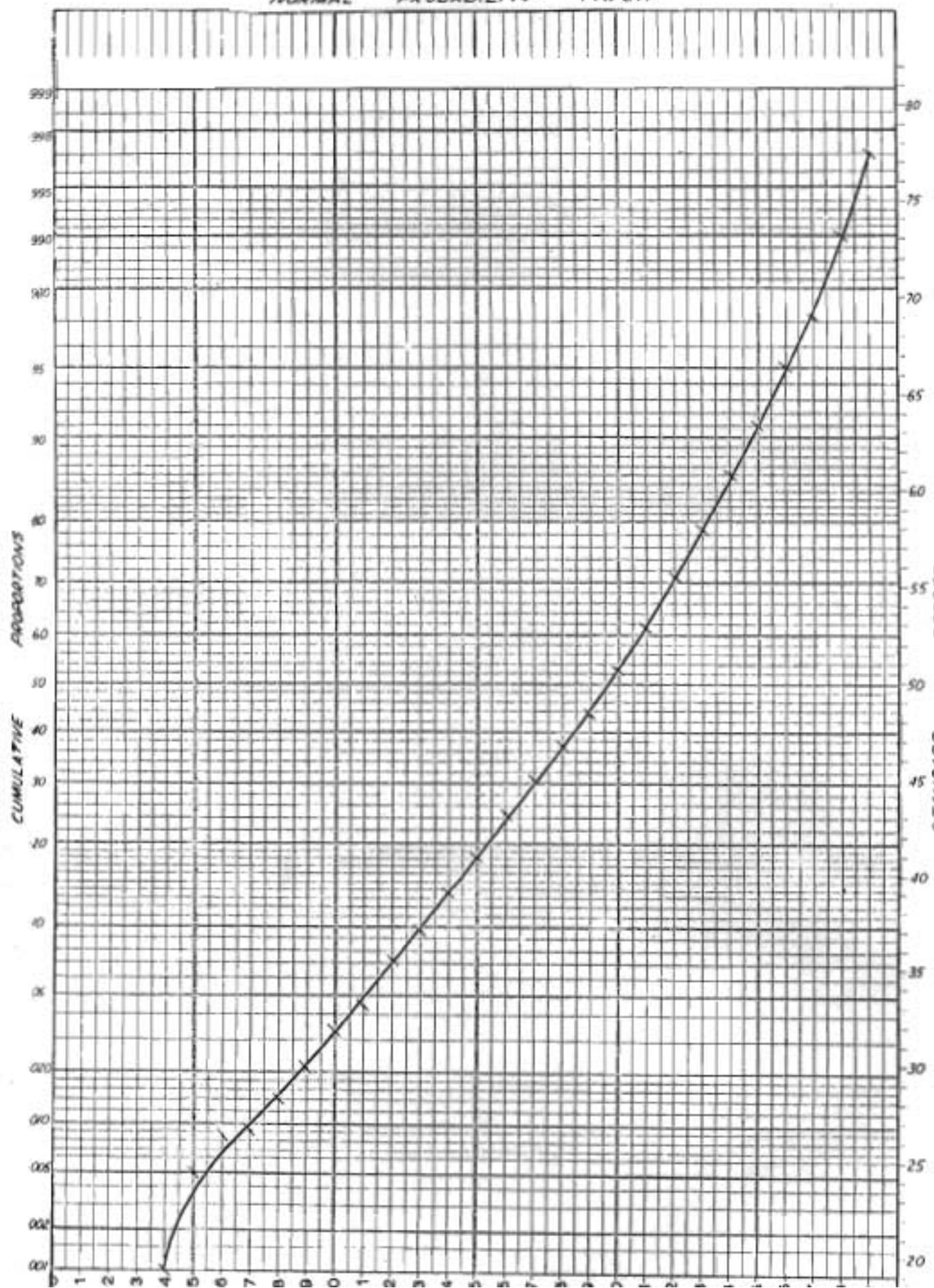


FIG. 14. S-G TEST — READING STUDY

NORMAL PROBABILITY PAPER

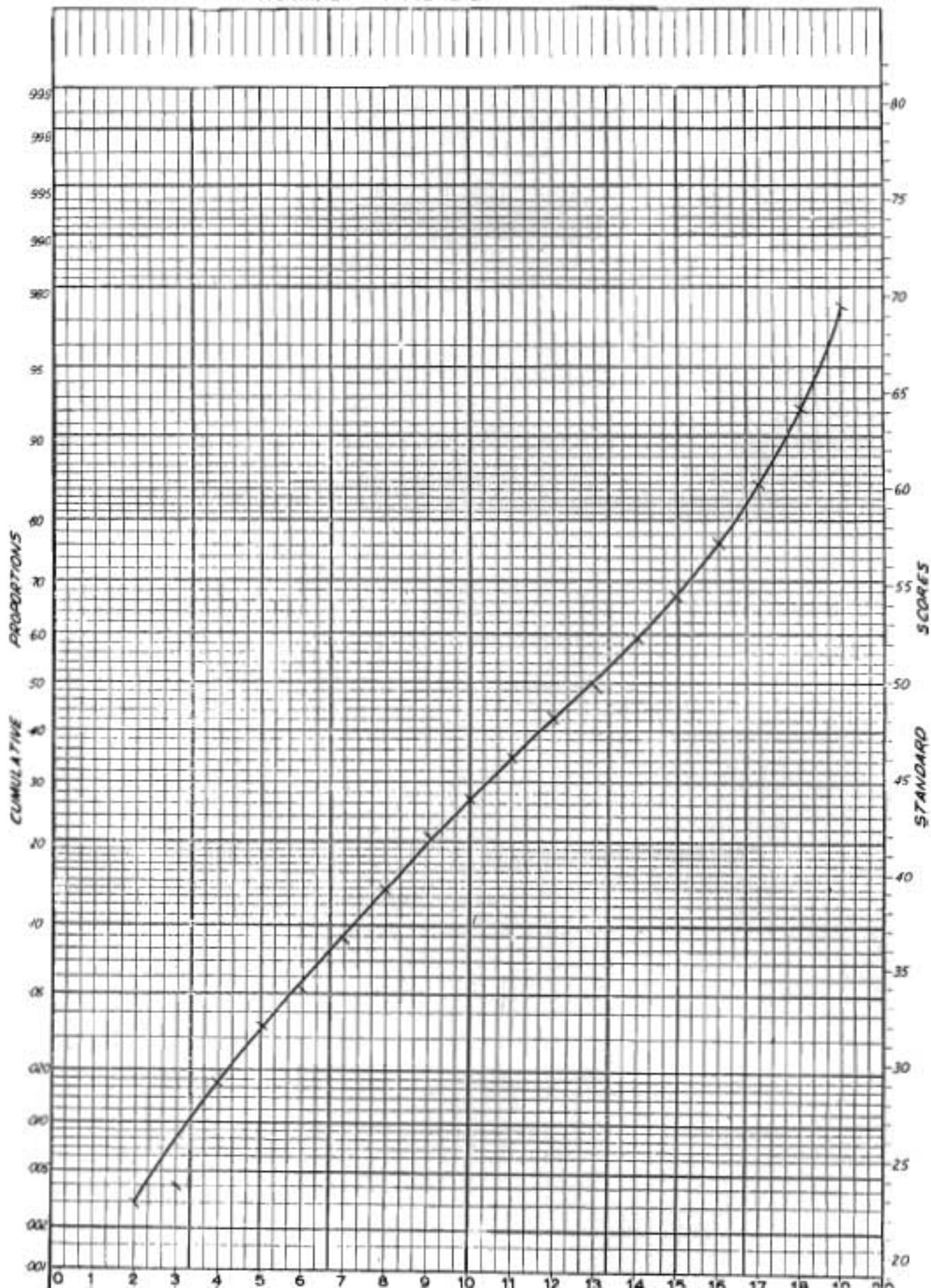


FIG. 15.

SCHOOL TEST — SPELLING

NORMAL PROBABILITY PAPER

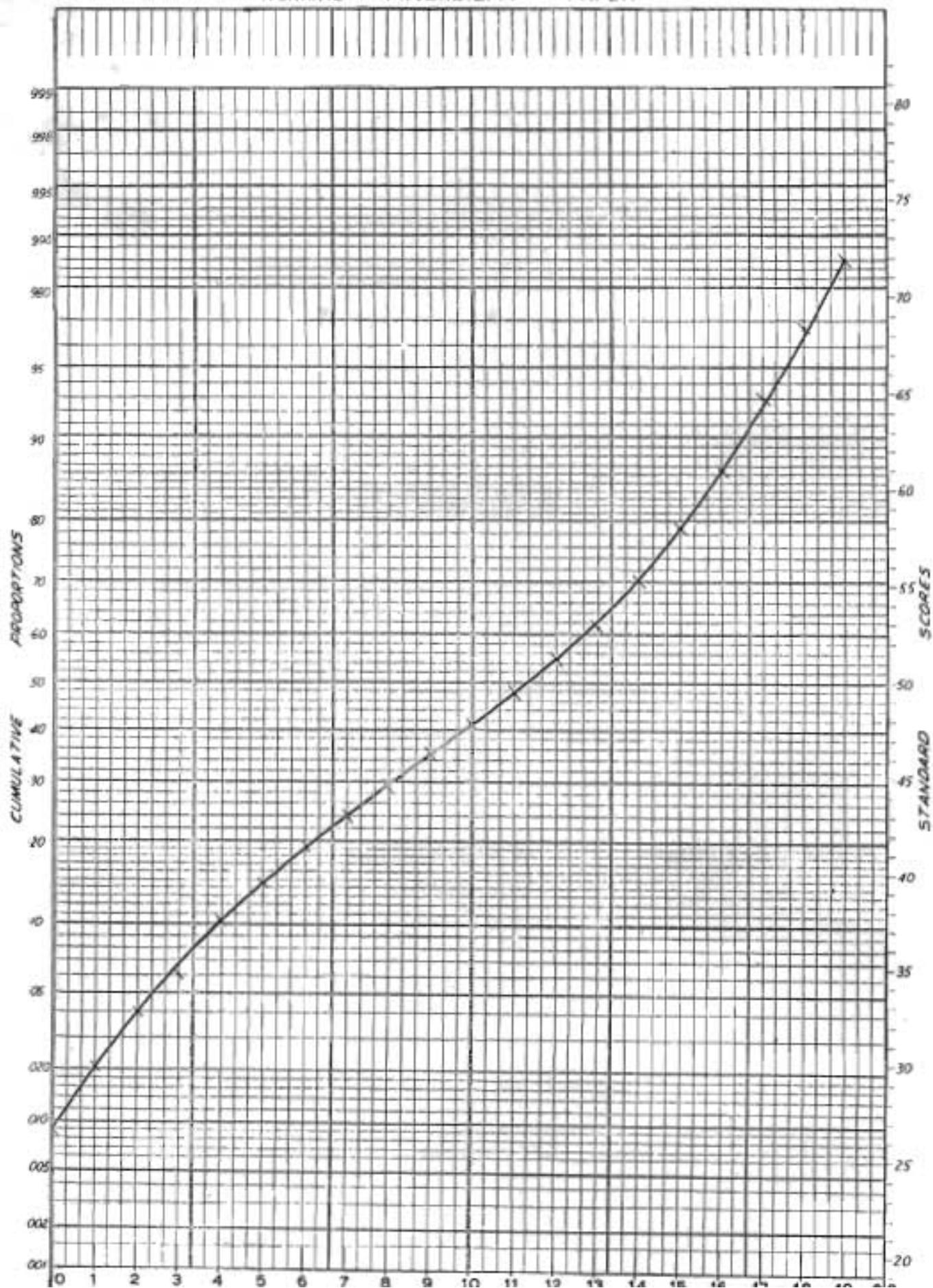
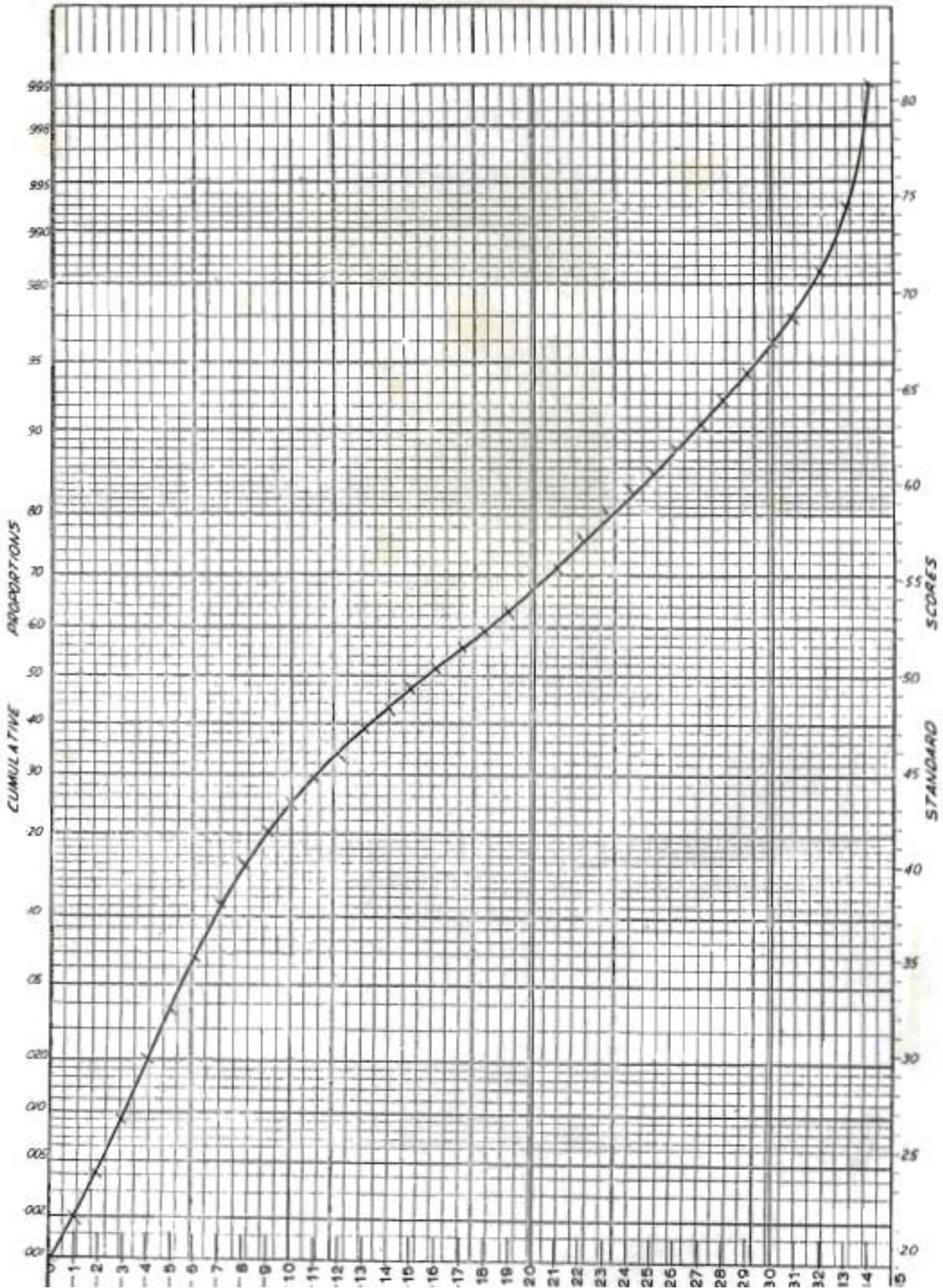


FIG. 16.

S-G TEST — SPELLING

NORMAL PROBABILITY PAPER



The graphs numbered 9 to 16 show the raw scores which were obtained in the school tests and in the S-G tests (my tests) plotted on normal probability paper. The results of 1044 pupils, i.e. 495 boys and 549 girls, were used.

These graphs have been used to convert raw scores of the S-G tests to standard scores, e.g. a raw score of 20 in the school's Arithmetic gives a standard score of approximately 38.75 as indicated on the graph in Figure 9.

TABLE 27

Standard Scores for the S-G Tests

Arithmetic		Language and Vocabulary		Reading Study		Spelling	
Raw Score	Standard Score	Raw Score	Standard Score	Raw Score	Standard Score	Raw Score	Standard Score
0	21.25	0	0	0	0	0	19.00
1	26.75	1	4.00	1	19.10	1	21.25
2	31.75	2	8.00	2	22.60	2	23.50
3	35.90	3	12.00	3	25.90	3	26.50
4	39.90	4	19.10	4	28.90	4	29.80
5	43.25	5	22.20	5	31.75	5	32.20
6	46.25	6	24.50	6	34.20	6	35.00
7	49.25	7	27.20	7	36.80	7	37.25
8	52.25	8	29.00	8	39.20	8	39.90
9	55.00	9	31.20	9	41.60	9	41.50
10	58.00	10	33.00	10	44.00	10	43.40
11	60.75	11	34.50	11	46.20	11	44.50
12	64.00	12	36.20	12	48.20	12	46.00
13	68.75	13	37.75	13	50.20	13	47.20
14	75.75	14	39.25	14	52.20	14	48.20
15	78.80	15	40.60	15	54.50	15	49.40
		16	42.00	16	57.20	16	50.20
		17	43.40	17	60.20	17	51.40
		18	44.50	18	64.20	18	52.20
		19	46.20	19	69.50	19	53.30
		20	47.50	20	78.00	20	54.60
		21	48.80			21	55.50
		22	50.25			22	56.60
		23	51.60			23	58.00
		24	52.80			24	59.20
		25	54.50			25	60.50
		26	55.60			26	61.50
		27	57.50			27	63.00
		28	59.00			28	64.50
		29	61.25			29	66.00
		30	63.00			30	67.40
		31	66.00			31	69.00
		32	68.75			32	71.20
		33	74.40			33	74.30
		34	81.00			34	80.50
		35	99.90			35	99.90