CHAPTER VI

FINAL FORM: STANDARDIZATION

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I. MEANING OF STANDARDIZATION

Though standardization procedure followed by test constructors is uniform, its description differs with different authors. Thorndike and Hegan[1] define standardized test as a test that has been published for general standard use.

> The most distinctive feature of a standardized test is a set of norms based on some general reference population, but other usual features include the selection of the items on the basis of preliminary tryout and analysis, standard directions for administration and a manual providing various types of statistical evidence about the test.

They explain the term 'standardized' (p. 257) thus: The word 'standardized' in a test means only that all students answer the same questions and a large number

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1 Robert L. Thorndike and Elizabeth P. Hegan, <u>Measurement and Evaluation in Psychology and Education</u>, New Delhi: Willey Eastern Private Ltd., p. 654.

of questions under uniform directions and uniform time
limits, and that there is a uniform or standard reference
group to the performance of which a students' performance
can be compared. From the point of view of Thorndike and
Hegan standardization procedure implies:

1. Preliminary tryout for selection of items.

2. Uniformity in various aspects such as:
   (i) instruction, (ii) questions, (iii) time
   limit and (iv) standard comparison group.

3. Provision of various kinds of norms.

4. A manual showing standard procedure for
   administration of the tests as well as
   statistical evidence for its reliability,
   validity and norms.

Greene and others (58, p. 92) describe the
standardization process as the process of deriving compara-
tive norms and think that the programme of standardization
demand, "a more careful formulation of exercise material,
a more exacting refinement of techniques evaluating test
items, more critical standards of equality of items of test
forms, and more rigid statistical analysis, than are usual
for the informal objective test." Here, two aspects,
viz., (i) critical analysis of subject matter and (ii) care-
ful formulation of procedures are also emphasised.

Menzel[1] emphasizes three aspects. A fully standardized test according to him is standardized in three respects,viz., (1) in form and construction, (2) in the way it is administered and evaluated, and (3) in providing the facility of comparing the score of an individual with the general similar population.

According to Ross[2], a standardized test differs from the informal tests in four essential aspects:

1. The content has been standardized.

2. The method of administration is standardized.

3. The method of scoring has been standardized.

4. The process of interpretation has been standardized.

Finally, Lindquist (85, p. 125) comparing standardized test with teacher-made tests notes, "they are provided with norms, and that they are more reliable, more objective, more easily scored, and more highly refined technically."

It will be seen from the foregoing discussion that

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1 E.W.Menzel, Suggestions for the Usee of New Type Tests in India, Oxford University Press, 1952, p. 40.

2 C.C. Ross, Measurement in Today's Schools, New York: Prentice Hall, Inc., 1956, pp. 274-275.

not all aspects are emphasized by all authors. Yet common procedure can be developed, including all important steps mentioned above. The following seven steps relating to construction and standardization of the test may be listed:

Construction

1. The selection of content after critical analysis has to be done.

2. Careful formulation of items and their try-outs in the class.

3. Standardization of instruction.

4. Refinements of items by technical statistical procedures (item-analysis).

Standardization

5. Adoption of standardized administrative procedure and more objective, easily scoring techniques.

6. Fixing norms as needed.

7. Adopting rigid statistical analysis of the data to make it reliable and valid (studying reliability and validity).

As far as the present test is concerned steps

from I to IV concerning construction of the test have already been described in earlier chapters. The remaining three steps concerning standardization are:

A. Standardizing procedure for administration and scoring of the test.

B. Computing reliability and validity.

C. Fixing norms.

They are described below.

Sampling of the Test

Before we go to the process of administration and other procedures, the sampling procedure is described below.

As it has been already pointed elsewhere that the sample should be such that it represents the population for which the test is meant. For that the sample should be representative of the whole population. To be representative it should be 'randomly' selected. But in educational field such 'random' sampling is difficult to achieve. The present test is meant for both boys and girls from rural and urban areas, covering five main areas of culture in Gujarat. Hence, incidental stratified sampling method has been adopted. The schools in each district within this areas in five cultures were selected randomly and at the same time keeping in view

it may not be I random

the convenience of the school. The sample has been drawn for the urban as well as rural areas. The areas having one lakh of population and above are considered to be an urban area, like Bhavnagar, Anand, Surat, Ahmedabad and Baroda. The areas having population of less than a lakh are considered to be a rural area. However, the sample has been drawn from the places having population of about 10,000 to 50,000, viz., Padra, Dahod, Mahuva, Talaja, Pij, Bardoli and even less than that, viz., Asalali, Astan, Rakhial and Dholaka. However, a few considerations were also kept in mind while selecting the school. They are:

1. It should be so selected as to give sufficient number of boys and girls in each district.

2. It should be so selected as to give sufficient number of boys and girls from rural as well as urban area of each district/culture.

3. It should be so selected as to include boys' schools, girls' schools and mixed schools.

4. It should be so selected as to have a big room for sitting arrangement and have electricity.

5. It should be so selected that it consists of pupils whose mother tongue is Gujarati.

The Table No. 5 will show the names of the schools, types of the schools, location of schools available for the study.

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│                     │
│   TABLE  No.  5     │
│                     │
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The sample consisted of approximately 2,000 students for each form. The Table No. 6 shows the description of the sample according to area and sex.

TABLE 6

Description of the Sample of the
Final Forms

Form A

	Urban		Rural		Total
	Boys	Girls	Boys	Girls	
C1	95	92	84	63	334
C2	108	105	100	109	422
C3	98	100	34	104	336
C4	113	106	108	115	442
C5	103	100	75	93	371
Total	517	503	401	484	1905
Grand total	1020		885		1905

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Form   B

	Urban		Rural		Total
	Boys	Girls	Boys	Girls	
C1	105	103	98	60	366
C2	105	100	109	105	419
C3	106	111	62	113	392
C4	94	103	112	112	421
C5	91	91	71	92	345
Total	501	508	452	482	1943
Grand Total	1009		934		1943

The standardization procedure will be described in next section.

II. A STANDARDIZING PROCEDURES FOR ADMINISTRATION AND SCORING OF THE TEST

(a) Administration of the Final Test

As Freeman[1] observes: "Standardization of a test aims to eliminate or reduce to a minimum its inherent defects. The conditions for testing and retesting should be as nearly optimal and consistent as possible: for, reliability is in part a consequence of testing conditions, including

1 F. S. Freeman, Theory and Practice of Psychological Testing, New Delhi: Oxford & IBH Publishing Co., p. 68.

TABLE   5

Formwise Names of the Schools

Form   A

Sr. No.	District	Area	Sex	Name of the School
1	Ahmedabad	Urban	Boys	Best High School, (Ahmedabad)
2	Ahmedabad	Urban	Boys	Serda Mandir, (Ahmedabad)
3	Ahmedabad	Urban	Girls	J. N. Balika Vidyalaya, (Ahmedabad)
4	Ahmedabad	Urban	Girls	Sharda Mandir, (Ahmedabad)
5	Ahmedabad	Rural	Boys	Prakash Vidyalaya, (Rakhial)
6	Ahmedabad	Rural	Girls	B.P.M. Girls' High School, (Dholka)
7	Baroda	Urban	Boys	Sayaji Boys' High School, (Baroda)
8	Baroda	Urban	Girls	Jeyashree Kanya Vidyalaya, (Baroda)
9	Baroda	Urban	Girls	Sayaji Girls' High School, (Baroda)
10	Baroda	Rural	Boys	Padra High School, (Padra)
11	Baroda	Rural	Girls	Choksi K. K. High School, (Padra)
12	Bhavnagar	Urban	Boys	Nutan Vidyalaya (Bhavnagar)
13	Bhavnagar	Urban	Boys	Sanatan Dharma High School (Bhavnagar)
14	Bhavnagar	Urban	Girls	Majiraj Girls' High School (")
15	Bhavnagar	Rural	Boys	M. J. Doshi High School, (Talaja)
16	Bhavnagar	Rural	Girls	Navakar Mantra High School, (Talaja)
17	Bhavnagar	Rural	Girls	Shrimati J. J. Mehta Girls' High School, (Sihor)
18	Kheda	Urban	Boys	D. N. High School (Anand)
19	Kheda	Urban	Girls	Kasturba Kanya Vidyalaya (Anand)
20	Kheda	Rural	Boys & Girls	Mahatma Gandhi Vinay Mandir, (Pij)
21	Kheda	Rural	Boys & Girls	Sardar Patel Vinay Mandir (Ode)
22	Kheda	Rural	Girls	Mahatma Gandhi Vinay Mandir (Pij)
23	Surat	Urban	Boys	T and T V Sarvajanik High School (Surat)
24	Surat	Urban	Girls	Ambama Haripura High School (Surat)

Sr. No.	District	Area	Sex	Name of the Schools
25	Surat	Rural	Boys	B. A. B. S.High School
26	Surat	Rural	Girls	Astan Kanya Vidyalaya

Form B

Sr. No.	District	Area	Sex	Name of the Schools
27	Ahmedabad	Urban	Boys	Saraswati Vidyalaya (Ahmedabad)
28	Ahmedabad	Urban	Boys	Unnati Vidyalaya (")
29	Ahmedabad	Urban	Girls	G. M. Prakash High School (Ahmedabad)
30	Ahmedabad	Rural	Boys	Municipal High School, (Dehgam)
31	Ahmedabad	Rural	Boys	Shree Umedbhai Lallubhai Patel High School (Asalali)
32	Ahmedabad	Rural	Girls	Municipal Girls' High School, (Dehgam)
33	Ahmedabad	Rural	Girls	Shree Umedbhai Lallubhai Patel High School, (Asalali)
34	Baroda	Urban	Boys	H. V. Shroff Memorial High School, (Baroda)
35	Baroda	Urban	Boys	Jeevan Sadhana, (Baroda)
36	Baroda	Urban	Girls	New Era Girls' High School, (Baroda)
37	Baroda	Rural	Boys	M. H. Dayaram Sharda Mandir, (Dabhoi)
38	Baroda	Rural	Girls	Vibhag High School,(Dabhoi)
39	Baroda	Rural	Girls	Shree Vibhag High School, (Dabhoi)
40	Baroda	Rural	Girls	Shree N. K. Modi Girls' High School, (Dabhoi)
41	Bhavnagar	Urban	Boys	Alfred High School, (Bhavnagar)
42	Bhavnagar	Urban	Boys	Sanatan Dharma High School, (Bhavnagar)
43	Bhavnagar	Urban	Girls	Mahila Vidyalaya, (Bhavnagar)
44	Bhavnagar	Rural	Boys	Muni High School, (Sihor)
45	Bhavnagar	Rural	Girls	Shrimati J. J. Mehta Girls' High School,(Sihor)
46	Bhavnagar	Rural	Girls	K. G. Mehta Girls' High School, (Mahuva)

Sr. No.	District	Area	Sex	Name of the School
47	Kheda	Urban	Boys	D. N. High School, (Anand)
48	Kheda	Urban	Girls	Kasturba Girls' High School, (Anand)
49	Kheda	Rural	Boys	Mahatma Gandhi Vidyalaya, (Pij)
50	Kheda	Rural	Boys	Sardar Patel Vinay Mandir, (Ode)
51	Kheda	Rural	Girls	Mahatma Gandhi Vinay Mandir, (Pij)
52	Kheda	Rural	Girls	Sardar Patel Vinay Mandir, (Ode)
53	Surat	Urban	Boys	T. K. T. V. High School, (Surat)
54	Surat	Urban	Girls	Ambama Haripura English Girls' School, (Surat)
55	Surat	Rural	Girls	Astan Kanya Vidyalaya, (Bardoli)
56	Surat	Rural	Boys	B.A.B.S. High School, (Bardoli)
57	Surat	Rural	Girls	B.A.B.S. High School, (Bardoli)

strict adherence to prescribed instructions for administering, utilization of practice exercises (when included), accurate timing, elimination of noise and general provisions for adoption of individuals to the testing situation.

Thus, the administration of the test is the process to be taken with utmost care. The whole process for the present test is described below:

1. Though, students were well informed before hand by school authorities about the type of work and time to be taken for testing, a short talk on aims and the usefulness of the test was given to students just to establish rapport.

2. The answer sheets were then distributed to the students and they were asked to note down their background information regarding name, sex, age, school, district, birth-date, name of the place on the front page of the answer sheet.

3. It was felt necessary to make them familiar with the order of the tests and the answer sheet as a whole. The necessary information was given in Gujarati. The English translation of the information is given below.*

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* Original Text in Gujarati is given in Appendix 8.

(i) Page numbers of the answer sheets before you
are printed below.

(ii) Open your first page and see that test-1,
test-2 and so on are printed one by one.
Note that a thick line is printed at the end
of each test.

(iii) The number of answers to be given or attempt-
ed are not equal in each test. You will be
required to answer four or eight answers in
each test.

Again see the printing of the answers sheets.
Let us take test-1, See that there are two
columns having two answers in each. The
column on left side consists of two answers
No.1 and 2. The column on right side
consists two answers No. 3 and 4.

Let us take the example of a test having
eight questions. See test-2. It has two
columns, having four questions on each side.
The column on left side has four questions,
from 1 to 4 and column on right side has
four questions, from 5 to 8. Do you follow?
Any difficulty.

(iv)   There are in all 34 small tests to be
        attempted. They are not printed in order.
        For example, after test number seven, test
        number twelve is printed. See page No.five
        of your answer sheets. You all will attempt
        the test in its printing order.

 (v)   When the actual testing will begin the
        number of the test to be attempted will be
        spoken on tape each time. Be sure that you
        are marking your answers under the respective
        test. To avoid marking of answers in a
        wrong place, listen to the test number
        carefully.

(vi)   Any difficulty? Now close your answer
        sheets and listen to the tape-recorder. Are
        you ready? Listen.

4.   Before starting the tape-recorder students
were instructed to follow carefully, whatever instructions
were given to them on the tape, as there is no provision
for repeating the instructions.

5.   Volume of the tape-recorder was kept such so
as to satisfy almost all students.

6.   Instructions regarding marking correct

responses by either encircling or cross or writing were also given.

7. Finally, any doubts or questions regarding instructions were clarified.

8. Once the work was started, it was a non-stop work till the investigator asked them to stop on hearing recess bell.

9. All care was taken to avoid copying by strict vigilence.

Special type of sitting arrangement was done to avoid copying or cheating. It was also seen that the arrangements were comfortable and free from disturbances of any kind.

Following type of sitting arrangements were made:

(a) Only one student was allowed to sit on a bench; may be called two seater benches.

(b) Two students were allowed to sit on a bench; may be called three or more seaters benches.

(c) Whenever, it was not possible to make an arrangement, as mentioned in (a) and (b), bigger rooms like: drawing class, laboratory or prayer rooms were used for administration

of the test. Care was taken to choose compa-
ratively as a quiet place.

(d) When enough benches-desks were not available
    tastees were asked to sit on the floor,
    covered with a carpet, in a zig-zag fashion.

10. In order to have uniformity in presentation
of the whole test battery each of the testing sessions
(three in all) were conducted by the researcher herself.
The use of the tape-recorder ensured that there was no
variation in:

(i)   rate of presentations of all tests.

(ii) pauses, tone and accents.

(iii) instructions - which were also recorded
      on the tape-recorder.

(iv) time to be taken up for each test and each
      test items, which was also built up in
      tape-recorder.

(v)   each and every task to be done.

Thus, standard and uniformity in administration
were maintained.

Programme of the Administration of the Test

It was decided to administer the test in a day only because it was physically and economically impossible to administer the test on different days. The programme of testing can be seen from Table No. 7

The whole test battery of test was administered in three sessions intercepted by two recesses of ten minutes and 30 minutes for rest respectively, covering almost three and a half hours or say five school periods.

(b) Scoring Procedure

There were two types of fixed responses to be given by students:

(a) Fixed responses to be given by marking circle, or a cross or tick, etc.

(b) Fixed responses to be given by writing a word or a sentence.

The actual scoring was done for (a) type responses by superimposing the answer keys on the answer papers and for (b) type responses by referring to it.

Again in scoring (a) type of responses others help was sought; for (b) type of responses only two persons' help was sought. All correct answers were scored

as one.

For (b) type of questions for each form besides
the exact reproduction of the correct answers a few
modifications were accepted as correct for each form. A
key of all such accepted answers is given in Appendices
9 and 10. The scoring keys for both the forms are provided
in Appendices No. 4 & 5 in the answer sheet with red ink.

Thus, all answer sheets of 1905 subjects in form
A and 1943 in form B were available and these were scored
as per procedure mentioned. These data were subjected to
statistical analysis for the purpose of fixing norms.

(c) Fixing Norms

Norms are the criteria fixed up by standardiza-
tion procedure. It is the average or a typical score on a
particular test made by specific population. They are
empirically established by determining what a representative
group of persons actually do on the test. Norms enable one
to rank an individual pupil's own performance in comparison to
that of others in same age or grade groups on which the test
is standardized. Raw scores do not give any meaning. So, the
raw scores are usually converted into relative measures
called norms. It is desirable to have norms for different
cultures or sub-cultures, areas, ages, grades, sexes, etc.
rather than to have one norm for whole population, combining
all these different dimensions. The reason being, there is

no uniform level of instruction and each group may be
performing differently, characteristic to the level of the
group. Norms may be of following types:

    (i)   Age-norms (in terms of mean score)

    (ii) Grade -norms (in terms of mean score)

    (iii) Percentile norms

    (iv) Standard scores

        (a) Z-Scores

        (b) T-Scores

In the present study, these norms have been
arrived at as described below.

(i) Age-norms

An age norm is a unit of measurement derived from
the performance scores of individuals of specific ages on
some trait or ability. The norm for any age is the average
value of the said trait for the persons of that specific
age. A test is administered to a wide range of individuals
of different ages and an average value for each age group
is computed. This average value is called the age norm.
An individual's performance can be judged as above or
below the norm given. The age norms so calculated for both
the forms of the present test are given in Table 8.

TABLE 8

Age Norms for Both the Forms A & B

Sr. No.	Age		Form A		Form B	
			N	Mean Per-formance	N	Mean Per-formance
	From Y-M	Y-M				
1	10.1 to	12.0*	36	92.16	23	94.194
2	12.1 to	12.6	144	92.17	144	92.38
3	12.7 to	13.0	269	89.48	265	92.97
4	13.1 to	13.6	486	89.68	451	87.27
5	13.7 to	14.0	256	83.04	288	83.90
6	14.1 to	14.6	293	78.33	245	77.95
7	14.7 to	15.0	176	78.01	177	77.53
8	15.1 to	15.6	161	73.70	135	67.50
9	15.7 to	16.0	71	74.51	91	70.01
10	16.1 to	16.6	78	68.71	64	67.22
11	16.7 to	17.0	40	73.25 16.7		
				to	72	65.04
12	17.1 to	23.6*	48	69.45 23.6		

* Owing to small number of frequencies age range 10.1 to 12.0 and 17.1 to 23.6 - they are combined.

A glance through mean performance scores on both the forms A and B shows a tendency to decreasing scores upto the age of 14. For the age group of 14 to 17 the mean scores are fluctuating. However, they have been at no time more than the lowest score of the age group 10 to 14. It is

obvious that age norms cannot be reliably established with the decreasing averages. It may be pointed out here that the sample that was used for standardizing the present test was from one single school grade. It is understandable that the age range within the school grade might not represent the age especially the higher age by educationally normal pupils. Another factor that might have affected appropriateness of the same for age norms is the combination of pupils from urban and rural areas. It was observed while administering the test/most of the students from rural were older in comparison with students from the urban area from the same grade. It has been also noted that average performance of the two groups has been significantly differ in favour of urban students (See Chapter VIII, Table 16).Perhaps, it might have happened that older the students less attentive they might have been to the oral presentation. They might have been more comfortable with reading.

Besides, the study of age norms the table indicates a very interesting phenomenon that has been observed by Vernon, Brown, Nichols and Irvin (in Chap.I, p.6). The best group for listening comprehension on both the forms of the present test have their averages around 50 per cent of the highest score possible.

(ii) Grade-norms

As the test is standardized on the only one grade

student all the norms are applicable to the VIIIth grade
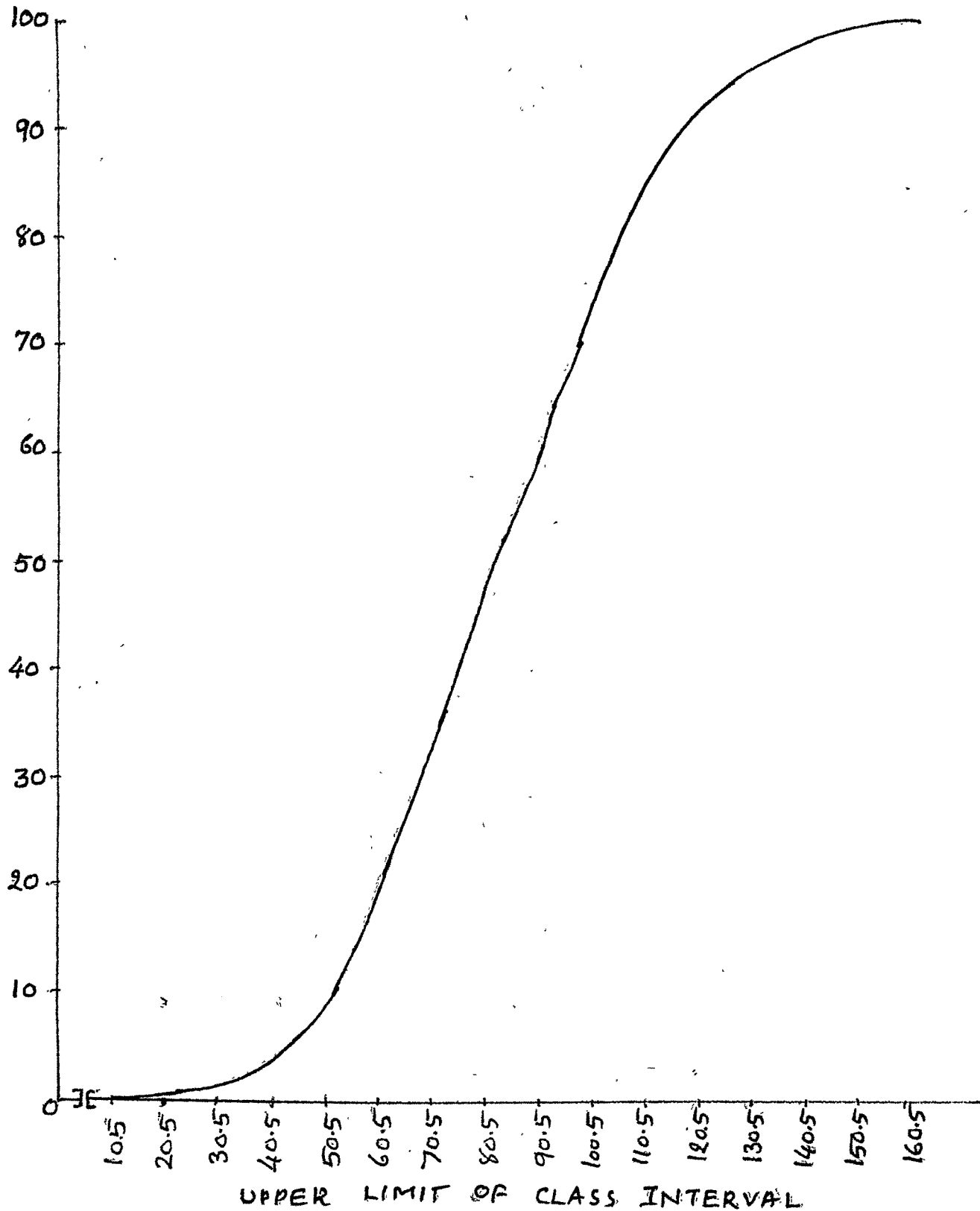only.

(iii) Percentile Norms

    Age norms and grade norms give meaning to an
individual's score by determining the age or grade group in
which he would be just average. However, it will often make
more sense to compare him to his own age or grade group, to
find his own position in a group which he belongs to.
Percentile scores make this type of comparison. When we say
that a student X, falls at 50th percentile, on the form A
of the present test, it means that 50 per cent students out
of the total No. of 1905 students score below him, i.e. less
than 81.09. Thus, percentiles give relative position of an
individual within the group. Tables No.11 (a) & (b) and
Tables No. 12 (a) & (b) show the percentiles calculated
from frequency distribution using the formula (20) given by
Garrett (51, p.65). Graphs No. 1 and 2 on pages 298 and 299
gives Ogives for forms A and B respectively.

(iv) Standard Scores

    Because the units of a score system based on per-
centile are so clearly not equal, we look for some other
unit that does not have the same meaning throughout the whole
range of values. Scores in terms of standard deviation
units have been developed to serve this purpose. These are
Z-scores, standard scores, T-scores or stanines. Z-scores
and T-scores are calculated by using formula given by
Garrett (51, p.312) and are given in Appendices No.13 & 14.

T-scores are normalized standard scores. A table of T-scores
calculated using the formula given by Garrett (51, p.316)
are given in Appendices No. 15 and 16.

GRAPH 1 298

OGIVE GRAPH (FORM A)
SCALE 1 C.M = 10 SCORES (X-AXIS)
1 C.M = 5 PER CENT (Y-AXIS)

UPPER LIMIT OF CLASS INTERVAL

GRAPH   2

OGIVE GRAPH (FORM B)
SCALE   1 C.M. = 10 SCORES (X-AXIS)
        1 C.M = 5 PER CENT (Y-AXIS)

UPPER LIMIT OF CLASS INTERVAL