CHAPTER IV

STUDY OF GOODENOUGH'S SCORING SCALE - EVOLUTION OF A NEW METHOD OF SCORING

Criterion for Validity:

The critical study of any test in a new environment begins with testing its validity. Validity of a test is determined by the co-efficient of correlation between the scoringson the new test and the criterion test. Hence it is necessary to select a criterion for testing the validity before starting the study proper. The most common criteria accepted for such a type of study are (i) a standardised test of general intelligence, (ii) teachers' estimates of pupils' intelligence and (iii) examination marks.

When we are thinking of children of school going age as the sample for study the first criterion that appeals to

us is the examination marks. If the examinations could be free of all the defects they provide the best objective criterion for this type of study. There are volumes written on the drawbacks of the present system of examinations with special reference to the factor of subjectivity,[1] and therefore investigators have used them when they are reasonably reliable and regularly administered, bearing in mind also all their defects. For the present study it was necessary to select the children from the lower primary classes. There are no regular examinations in the lower classes of the primary schools and whatever estimate is made of pupils' abilities is done on the oral work and teachers' impressions. Primary education was free and compulsory in the Baroda State. The beginning of compulsion was at seven years of age. For some time after the merger of the State with the Bombay State the same conditions prevailed in the primary schools although the age of compulsion in the Bombay State was six years. Hence the majority of pupils were admitted at the age of seven to primary schools. Naturally it was not possible to get any estimate of the children at seven years of age by any type of examination which will be reasonably objective. As it was intended to begin the study with children of seven years it

---

1. (i) Examination of Examinations: Hartog Sir Philip and Rhodes E.C
   (ii) The Report of the University Education Commission: 1948-49; Vol.I, Chapter X.
   (iii) Measurement of Abilities: Vernon.

was obvious that examination marks as an objective criterion for studying the validity of an objective test of intelligence could not be used.

The second criterion one had to think of was the teachers' estimate of pupils' intelligence. The subjectivity of the estimate is in the very nature of the criterion and hence it can never be perfectly objective. Obviously even with the best caution this criterion cannot be absolutely reliable. The limitations of this criterion can easily be seen through the results of the investigations in which the teachers' estimate is used as a criterion for the validity of a new test. Many of such studies show low correlation between the teachers' estimate and the new test; it is often between .3 to .40. Even the co-efficient of correlation found by Goodenough between her scale and teachers' estimate was only[2] .444. Similar low correlations are reported in the studies done in Western countries like the U.K. and U.S.A.[3] Teachers in these countries are conversant with the measurement of intelligence because testing of intelligence has been a regular feature of schools during the last two decades. Teachers there have got used to giving estimates of pupils' intelligence as objectively as possible. In India intelligence

---

2. Measurement of Intelligence by Drawing: Goodenough, p.82.

3. The Abilities of Man: Spearman C., p. 188

testing as a feature of school work is a novelty even to a secondary school teacher. Many primary school teachers are ignorant about measurement of intelligence and intelligence tests. If such teachers are asked to give estimates of their pupils for testing the validity of a new test it is likely to be not properly understood, and there is every likelihood of the estimates being unreliable. Moreover, the environmental and service conditions in primary schools here are also not helpful in getting a reliable estimate from the teachers. Often a teacher is in charge of about sixty children and they sometimes belong to different grades. Under such circumstances a teacher is not likely to have enough personal knowledge of all pupils under his control. Dr.Kamat who has done some pioneering work in the field of intelligence testing in Bombay State did not also think it worthwhile to consider for his standardising an intelligence test the estimates given by primary school teachers.[4] For the purpose of this study also it was felt that no useful purpose would be served by collecting teacher's estimate of the pupils' intelligence for using it as an objective criterion for testing the validity of an intelligence test.

The only other criterion is a standardised test of general intelligence and it is the best objective criterion

---

4. Measuring Intelligence of Indian Children: Kamat, p.84.

for this type of study. The interest in mental testing is a recent development in India. Till about 1930 when Kamat took up the laborious work of translating and adapting the Stanford Revision of the Binet - Simon scale for children in Bombay and Karnatak there was only one standardised test of intelligence, viz., 'Hindustani Binet Performance Point Scale' by Prof. G.H. Rice of Lahore. Even after Dr. Kamat very few persons get interested in mental measurement and it must be admitted that the progress in the field has been very slow. During the last five years, however, interest in mental measurement, especially in intelligence testing, has been appreciable. In spite of this enthusism, there is no group test which has been at least tentatively standardised for Marathi speaking children of primary schools. Kamat's Tests for Measuring Intelligence of Indian children is the only standardised test available. For the present study therefore there was no question of choice; the Marathi version of Kamat's Tests for Measuring Intelligence of Indian children was used as the objective criterion for finding the validity of Goodenough's Draw-a-man Scale and its revision which was being attempted. Kamat's, it will be recalled here, is an individual verbal test of intelligence based on the concep of mental age.

It might be mentioned here that for testing validity Khos' Block Design Tests of Intelligence was also tried. It was felt that a performance test of the type of Kohs' Block Design Test could be used as a criterion even with foreign norms. However, as majority of children from the study group scored between 0 and 3 on this test it had to be discarded in the final analysis. Consequently the final study of the validity of Goodenough's scale and of the new scoring scale was done with one objective criterion only.

Study Group:

Before taking up the study proper there was another problem which required to be carefully decided. This concerned the selection of the study group.

In using drawings as a measure of intelligence we must take account of the growth and fluctuations of the impulse for drawing in children. Psychologists like Sully, Barnes, Lukens and others have given details of evolution in the drawings of the child. Lukens has recognised four periods which Chamberlain has summarised along with their chief characteristics. The characteristics of the third period restrict the upper limit of our study group to ten years of age. The characteristics of the third period, from about the tenth to about the fifteenth year, are as follows: "In the beginning of this period the environment

and the school have repressed the productive activity of the child in the endeavour to increase his intellectuality. The child now 'begins to see that his drawing is nothing more than a poor, weak imitation of nature', and the charm of creative art vanishes with the disappearance of the former naive faith. No wonder so many observers have noted a distinct deterioration both in the pleasure in and the quality of, the drawings of children, beginning with the tenth or twelfth year."[5] Another consideration which determined the study group was Goodenough's own work. Her study was made with only primary school children of ages six to ten years. Other investigators also support the view that drawing as a measure of intelligence can be conveniently applied upto the age of ten years.[6] The above considerations determined that the study group for the present study should consist of primary school children of six to ten years.

The absence of getting any ready made results in the schools in the form of mental ages or IQs presented another difficulty in fixing up the group. Although the Goodenough Draw-a-man Test could be administered quickly the administration of the criterion test had also to be thought of. Kamat's Intelligence Tests are individual tests and it takes a good

---

5. The Child: A Study in the Evolution of Man:Chamberlain, p.209.

6. (i) Oakley: British Journal of Psychology (General Section), July 1940.
   (ii) Lowenfeld: Creative and Mental Growth.

bit of time to administer them to each child. In view of this it was decided to start with one age group only.

The age group, seven plus was selected for the study to start with. It is the age when all normal children in the primary school complete at least one year of their schooling, while it is the mid-year of the children coming from educationally conscious families. Children from such families generally leave the primary school and join the secondary school at the age of nine plus. The selection of the age group of seven plus had thus a double advantage. It was possible to get children below this age in the primary school and also above. There was therefore scope for the extension of the scale below as well as above seven plus.

The third factor which was considered while selecting the group was 'sex differences'. In order to avoid the influence of sex differences it was decided to confine the study to one sex only. As Parents in general are more conscious and particular about sending their sons to school than their daughters the study was made with reference to boys only.

After fixing Marathi speaking boys of seven plus for the study a random sample of 60 children was taken from the whole group of Marathi speaking school going population of

of seven plus age in the Baroda city. The total population consisted of 250 children. The selected 60 children were from the following schools :

1) Govindrao Maharaj Madhyavarti School	15 boys
2) Gendigate Primary School	12 boys
3) Raopura Primary School	11 boys
4) Fatepura Primary School	9 boys
5) Wadi Mixed School	5 boys
6) Maharani Chimanabai Primary School	6 boys
7) Jayashree Vidya Mandir	2 boys
Total	60 boys

All these schools except the last two are government free schools situated in different localities of the city. The last two are private schools recognised by the Education Department and were started only six months before the tests were administered.

Procedure of Testing:

Before starting with the testing proper every attempt was made to establish a good rapport between the child and the examiner. The following information about the child was elicited from the child during a free talk and this also helped the child to be free with the examiner. Information collected

was about (i) residence, (ii) father's occupation, (iii) mother's activities, (iv) number of brothers and sisters - elder and younger and their activities.

Each child was given first individually Kohs' Block Design Test. Draw-a-man Test was given to a group of five children at each time who have already done Kohs' Block Design Test.

The children were provided with a pencil and a sheet of paper of half foolscap size folded to make a quarter size. The following instructions were given: "You are given a paper and a pencil. On these papers I want you to draw a picture of a man. I want to see how nicely you can draw it; so try to draw as best as you can. Do not turn the paper without my permission. Tell me when you finish the drawing". The instructions were given in Marathi.[7]

---

7. तुम्हाला एक कागद आणि पेन्सिल दिली आहे. या कागदावर तुम्हीं मला एक सर्वांग माणसाचे चित्र काढून दाखवा. तुम्हाला तें कसें काढतां येते हें मला पहावयाचे आहे; म्हणून जितके चांगले काढतां येईल तितके चांगले काढण्याचा प्रयत्न करा. चित्र काढून झाले म्हणजे मला सांगा. मला विचारल्याशिवाय कागद उलटूं नका.

A child was allowed to change one side of the paper if it was found that he has spoiled it and is keen upon starting on a fresh page. As our children are not used to any examination of this type, some of them required special encouragement in taking up the work and doing it with confidence and pleasure.

When the child reported that he had finished the drawing he was allowed to dray anything he pleased on the remaining side of the paper till he felt like going away.

The two tests - Kohs' Block Design Test and Goodenough's Draw-a-man Test - were administered on the same day. Kamat's Intelligence Tests were administered according to the convenience of the school and the examiner. In no case the interval between the first two tests and Kamat's tests exceeded a fortnight.

Analysis of the Data:

Drawings were scored by the examiner strictly following Goodenough's instructions. Some difficulties were experienced in scoring some of the points, but the scorer tried to see that Goodenough's instructions were very strictly adhered to. The difficulties were noted down. They will be discussed in detail later. Dr. Kamat's instructions, given in the text of the tests were followed in calculating the mental ages.

The validity of a new test is judged by the coefficient of correlation between a chosen criterion and the new test. To study validity of the Goodenough Draw-a-man Scale the Product - Moment coefficient of correlation between the mental age on Kamat's Tests and the scores on Draw-a-man Scale was calculated by using the following formula:[8]

$$r = \frac{\frac{\Sigma x'y'}{N} - C_x C_y}{\sigma_x \cdot \sigma_y}$$

The coefficient of correlation was found to be .45 ± .063* . The calculated 'r' of .45 ± .063 is significant at .01 level, still it is not as high as it is expected to be in comparing two tests of intelligence. Goodenough has found 'r' to be .716 ± .042 for the same age group (seven plus) with 63 children.[9] It is not possible to compare two 'r's; still it may be concluded that Goodenough's Draw-a-man Scale does not show the same high correlation with Kamat's Tests of Intelligence as it shows with Stanford - Binet with American children. Obviously therefore the problem needed further study.

---

8. Statistics in Psychology and Education: Garret, p.283, 287.

* Appendix II, Table I.

9. Measurement of Intelligence by Drawing: Goodenough, p.50.

It might be recalled here that some difficulties were felt while scoring the drawings according to Goodenough's scoring scale. It was felt that a few changes in the scoring scale might improve its agreement with Kamat's Tests. A further study was therefore made with a view to revising the scale so as to suit the Indian situation.

Revision of the Scale:

Goodenough has applied the criterion of regular rise in the percentage of successes at each level from 4 to 10 years. All the points in her scale show such increase with reference to the groups of normal children. She has produced 51 graphs showing the percentages of success in each point at successive ages.[10] This simple objective criterion of testing the validity of each point in the scale separately could not be applied to the present group because of its being homogeneous as far as age was concerned. So it was decided to revise Goodenough's scoring scale in the light of the difficulties felt while scoring the drawings and the Indian criticism of the scale which was referred to in the last chapter.

First, it was felt that the 'B' class drawings in Goodenough's scale should be divided into two categories:

---

10. Measurement of Intelligence by Drawing: Goodenough, pp. 26-34.

(i) dressed drawings, and (ii) undressed drawings. Much of the difficulties in scoring on Goodenough's scale arose because of mixing up the two categories mentioned above; e.g. drawings shown in figures 14 and 94 in Goodenough's book.[11] The drawings are reproduced below:

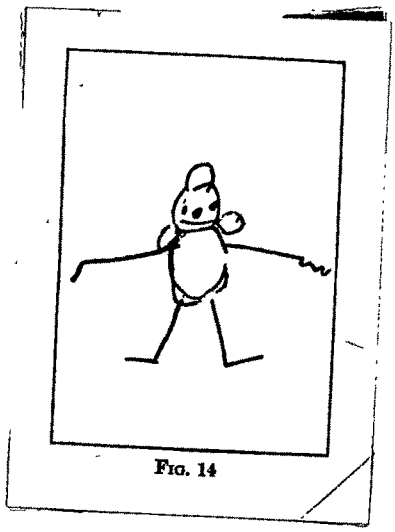


Fig. 14

M.A. 6-9 I.Q. 116

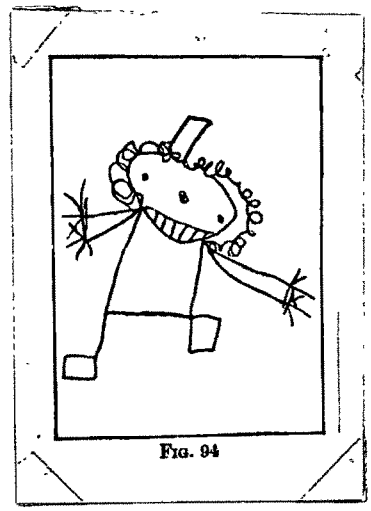


Fig. 94

M.A. 6-0 I.

According to her scoring drawing in figure 14 scores point '9a' which is 'clothing present' on the strength of the cap only, while drawing in figure 94 scores '8a' which is 'hair shown' and point '9a' for 'clothing present' on the strength of the cap which the boy has drawn transparent. Transparancy in drawing certainly indicates a lower stage of development and still according to the scale 'transparent hat' gets one point more than 'non-transparent hat'.

11. Measurement of Intelligence by Drawing: Goodenough,

Another change was also thought desirable because of the environmental differences. Indian environment is different especially in the points of clothing - their number and manner. A boy in a city like Baroda can hardly think of four articles of clothing as necessary or very common, and the homely dress of a man often consists of only one piece - dhoti - especially in poor homes. Shoes or sandles are not worn by all and this has also to be taken into account. A good number of pupils in the schools visited for this purpose came to school barefooted, and very few were particular about having caps on even in hot summer. Even in the public about 50 per cent of the people are seen without caps and a good number without footwear.

This difference in the number and manner of clothing has made the Goodenough Scale inappropriate to our situation in two ways. Firstly, her points for clothing cannot be effectively applied to the drawings by Indian children because of the difference in the manner in which dress is worn. Secondly, because of the constant association with the shoes or some footwear Goodenough has ignored the indication of toes and their further development observed in the children's drawings here. Naturally the drawings of Indian children loose all the marks for footwear according to Goodenough Scale and gain nothing for drawing the toes.

The six points which Goodenough assigns for motor co-ordination appeared to be an over weightage given to the minor muscle control which is essential for executing motor co-ordination. Her six points were therefore reduced to three points. Moreover these points in the scale are not free from the element of subjectivity; by reducing its total value the scale should become a shade more objective.

The factor of symmetry is also added to her points for proportion. Although art aims at perfection through symmetry and proportion it is more natural for children to be conscious of symmetry first. It is especially true of Indian children. Even in ancient Indian art we observe comparatively greater influence of symmetry than that of proportion. The picturesgiven in the Appendix IV will illustrate the point.

Goodenough's scale for 'A' class drawings were maintained without change. For 'B' class drawings separate points were listed for 'dressed' and 'undressed' drawings bearing in mind all the above-mentioned considerations. When these separate lists for dressed and undressed drawings were compared they revealed a number of points which were common to both the categories; e.g. all the points with

reference to head. While applying the lists to a few drawings it was found that there were drawings which were partly dressed and partly undressed and hence could not be classified as 'dressed' or 'undressed'. The scoring points in both the lists were therefore combined in such a way that it allowed scope to value dressed and undressed parts of the drawings differently whenever required. The final scale consists of fiftysix points. The following are the fiftysix points thus decided.

All the fiftysix points for 'B' class drawings were classified into three categories, viz: (i) points which are common to both the types of drawings, listed under 'B'; (ii) points applicable to undressed drawings, listed under 'BI'; and (iii) points applicable to dressed drawings, listed under 'BII'.

Revised Scoring Scale - (for 'B' class drawings)

'B' (Common Points)

1. Head present
2. Eyes present
3. Eye-brows or eye-lids shown
4. Pupils shown
5. Eyes proportionate - length more than breadth for full face

6. Nose present

7. Nose in two dimensions

8. Nostrils indicated

9. Mouth present

10. Mouth in two dimensions

11. Mouth non-transparent

12. Forehead shown

13. Chin indicated

14. Projection of the chin indicated

15. Ears present

16. Ears symmetrical - in profile drawings one ear at the right place

17. Ears in proportion

18. Hair or cap present

19. Hair present on more than the circumference of the head only

20. Neck present

21. Neck in two dimensions

22. Arms present

23. Fingers shown

24. Correct number of fingers

25. Fingers shown in two dimensions

26. Opposition of the thumb shown

27. Hands shown

28. Arms symmetrical - length and attachment

29. Arms attached to the trunk at the proper place

30. Lines indicating control in the major sections of the drawings

31. Lines firm - not mixing up or crossing at joints

32. The whole drawing indicating control over muscles

33. Face in profile without any error

34. Complete profile without any error

35. Human form drawn with some background - a situation or action.

'BI' (Undressed Drawings)

36. Trunk present

37. Length of the trunk more than the breadth

38. Shoulders shown

39. Length of the trunk more than the length of the head - not more than twice

40. Breadth of the trunk more than the breadth of the head - not more than twice

41. Legs present

42. Toes indicated

43. Correct number of toes

44. Feet shown

45. Feet in two dimensions

46. Length of the feet more than the height

47. Legs in two dimensions

48. Knee joint indicated

49. Hip joint indicated

50. Heel projection shown

51. Legs symmetrical

52. Legs longer than the trunk - not more than twice

53. Arms in two dimensions

54. Elbow-bent shown

55. Two indications of clothing - pockets and buttons, cap and design on the trunk, collar and design, design on trunk and arms etc. etc.

56. Two main pieces of clothings - shorts and shirt shown completely but transparent (sleeves of the shirt must be drawn)

'BII' (Dressed Drawings)

36. Shirt or frock non-transparent

37. Sleeves shown

38. Shoulders shown

39. Neckline or collar drawn

40. Folds or curves of the dress on the trunk shown

41. Short or any suitable clothing - non-transparent

42. Shoes indicated

43. Straps, buttons or lace of the footwear shown

44. Shoes non-transparent

45. Shoes in proportion

46. Shoes complete with buttons or lace

47. Folds and curves on the sleeves of the short shown - any dress drawn

48. Sleeves properly indicated

49. Hip joint shown

50. Heel projection or heels of the footwear shown

51. Legs symmetrical - length and breadth - sleeves

52. Legs longer than the trunk

53. Fold and curves on the hand sleeves shown

54. Elbow-bent or wrist cuff or wrist buttons drawn

55. Homely dress

56. Complete dress

The same sixty drawings were scored according to this scale. The drawings which were of mixed type were scored according to the points conveniently applicable to the various body-parts. The dressed body-part of the drawing was scored according to the relevant points from the 'BII' list while the remaining undressed parts of the same drawing were scored according to 'BI' list. Using the same method as used in the previous calculations the coefficient of correlation was calculated. It was found to be .43 .07.*

The coefficients of correlation between Goodenough's scoring scale and mental age on Kamat's Tests and between the Revised Scoring Scale and mental age on Kamat's Tests

---

* Appendix II, Table II.

do not show any significant difference. Hence the new scoring scale was abandoned as it did not indicate any superiority over Goodenough Scale when applied to the drawings of Indian children.

New Method:

The failure to get higher correlation with the revision of the scale on the lines attempted, suggested that the simple revision by addition and omission of certain points is not likely to give the desired results. At the same time it was felt beyond doubt that even with significant coefficient of correlation Goodenough Scoring Scale cannot be used as it is for Indian children. It was decided, therefore, to think of an altogether new method of scoring based on the principles underlying Goodenough's scale.

Burt's method of scoring age-wise samples of drawings given in the book 'Mental and Scholastic Tests' was another way of approach.[12] This meant the preparation of an age-wise scale for drawings. Study with reference to successive age groups is essential for this type of scale even at the preliminary stage of the work. Collecting drawings and scoring them is not a difficult job; but getting mental age on Kamat's Intelligence Tests of reasonably adequate number

---

12. ~~Mental and Scholastic Tests: Burt, pp.~~
A Guide to Mental Testing : Cattell : Figs. Opp. p. ~~104~~ 108

of children of different age groups required an impossible duration of time. Hence the idea was given up.

Sully's study suggested another idea. He has described the development in the representation of many of the body parts as observed in children's drawings.[13] The possibility of scoring each body part according to its stage of development was envisaged and an attempt was made to do so. An independent list of major sections of human form and major body parts which should form the basis of any scale of this type was made. Although there was no direct use of Goodenough's scoring scale while making this list still it cannot be denied that it did appreciably influence the procedure as Goodenough's work was always, though not quite consciously, at the back of the writer's mind.

Muscle control and motor co-ordination are important aspects of development which affect the total representation in the drawing . Hence these aspects were added to the list even at the risk of the scale becoming a little subjective.

Dress is another aspect which was also added to the list. Although clothing is scantier in India than in the

---

13. Studies in Childhood: Sully, pp. 355 fl.

Western countries which have cooler climate still it is a necessary concomitant of a human form.

Taking into account all the factors mentioned above, the following list of major scoring points was made :

1. Head
2. Eyes
3. Nose
4. Ears
5. Hair
6. Forehead
7. Chin
8. Mouth
9. Neck
10. Arms
11. Palm and fingers
12. Legs
13. Feet and toes
14. Trunk
15. Dress
16. Motor co-ordination

Each point in the list above was then studied in the age-wise samples of drawings given by Burt. It was observed

that each point can be weighted according to the development seen in the drawings of successive superiority. To verify the observation and fix up the weightage to be given to each point about 200 drawings of Marathi speaking children were collected. Irrespective of chronological age they were classified into seven categories according to the development observed in the drawing as a whole. Five drawings of each type were selected and the development of each point was carefully noted down e.g. Head : (i) no head line drawn, (ii) head line drawn, (iii) round or circular headline, (iv) oval headline or face. Regular weightage of one more point was given for each successive stage of development. Thus weightage was given to the point 'head' according to the type of its representation, as follows :

no headline drawn	0
headline drawn	1
round or circular headline	2
oval headline or face	3

So the highest score for the head was decided to be 3 based on the natural development observed in its representation. The lowest score for every point was decided to be zero and the highest score was fixed by the number of stages of development observed with reference to that particular point. One extra point was added to the weightage for stray but vital developments; e.g. indication of the opposition of the

thumb. Thus although the major points were only sixteen, the highest weighted score came up to sixtyfive. The new scale with weightage given to each point according to the development is given below:

THE NEW SCORING SCALE - (WEIGHTED)

Description of the point	Weighted score
1. Head	
head present	1
round head	2
oval head	3
oval head less than $\frac{1}{6}$ and more than $\frac{1}{6}$ of the remaining figure	4
oval head less than $\frac{1}{6}$ and more than $\frac{1}{6}$ of the remaining figure and breadth less than the breadth of the trunk	5
2. Eyes	
eyes present	1
eye-lids and pupils or eye-brows or eye-lashes present	2
eye-lids and pupils and eye-brows present	3
eye-lids with pupils symmetrical OR eye-brows symmetrical	4
eye-lids with pupils and eye-brows symmetrical	5
glance represented even without eye-brows and symmetry	6

Description of the point	Weighted score
3. Nose	
nose present	1
nose in two dimensions indicating length	2
two dimensional nose in the middle of the face	3
nostrils indicated	4
4. Mouth	
mouth present	1
mouth in two dimensions - transparent showing teeth	2
mouth in two dimensions - lip-line shown	3
5. Hair OR Hat	
hair or hat present	1
hair indicated as parted or combed OR hat properly attached to the head	2
hair present outside the hat	3
6. Ears	
ears present	1
ears symmetrical	2
length of the ear more than breadth OR ear-hole indicated	3
shape of the ear-lobe shown	4

Description of the point	Weighted score
7. Forehead	
forehead indicated by sufficient space between the headline and eye-brows or eyes and nose or by some chandla(mark of decoration)	1
8. Chin	
chin present - shape or space between the neck and mouth	1
chin projection shown	2
9. Neck	
neck present	1
neck in two dimensions	2
neck in continuation of the trunk-line or headline or neck line of the dress drawn	3
10. Trunk	
trunk present	1
square trunk	2
length of the trunk more than breadth OR shoulders indicated OR some indication of dress - buttons, pockets, etc.	3
length of the trunk more than breadth and shoulders OR design etc. and shoulders	4

Description of the point	Weighted score
length of the trunk more than the length of the head - approximately twice in undressed drawing OR in dressed drawings folds or curves of dress indicated along with button-strip or neckline or collar	5
11. Arms	
arms present	1
arms symmetrical and approximately equal OR attached to the trunk	2
arms attached to the trunk symmetrically or two dimensional arms	3
two dimensional arms attached to the trunk at the right place OR transparent sleeves	4
elbow joint, shoulders or wrist-joint shown - undressed drawings OR in dressed drawings wrist-cuff or curves or plates shown on the arms	5
arms in two dimensions, one of the joints indicated and proportional - length more than breadth and slightly more than twice the trunk or not reaching knee.	6
12. Fingers	
fingers present OR palm present	1
correct number of fingers	2

Description of the point	Weighted score
fingers in two dimensions OR palm and fingers shown	3
two dimensional fingers and palm shown	4
fingers, palm and opposition of the thumb shown	5
13. Legs	
legs present	1
legs attached to the trunk or symmetrical	2
legs in two dimensions OR transparent sleeves	3
knee-joint shown (undressed drawings) OR in dressed drawings curves or plates on the sleeves - may be transparent-shown	4
hip-joints shown	5
legs in proportion - length more than breadth, longer than arms and trunk - not more than twice approximately	6
14. Toes and Feet	
toes OR feet OR chappals (sandals) present	1
correct number of toes OR feet in proportion - length more than height	2

Description of the point	Weighted score
toes in two dimensions OR heel projection shown	3
toes and feet shown	4
toes in two dimensions and feet in proportion	5
toes in two dimensions, feet in proportion and heel projection	6
IN DRESSED DRAWINGS	
shoes indicated by lace or buttons etc.	1
shoes in proportion - length more than height	2
heel shown	3
lining at the ankle	4
heels and laces etc. or lining at the ankles	5
lace OR buttons, heels and lining at the ankle	6
15. Motor co-ordination (control)	
major parts of the drawings showing control - head, trunk etc.	1
minor parts indicating control - fingers, eyes, nose etc.	2
joints indicating control and freedom of movement	3

Description of the point	Weighted score
16. Dress	
two complete pieces of clothing transparent OR one complete piece non-transparent	1
two pieces of clothing non-transparent	2

The same sixty drawings of seven plus age group were scored according to this new method of scoring. Following the same procedure the coefficient of correlation between the mental ages on Kamat's Tests of Intelligence and the scores according to the new scoring scale was calculated. It was found to be .52± .053.*

Objectivity of New Method of Scoring:

Objectivity of the scoring is another of the essential qualities of any scale which is meant for quick classification of pupils on a large scale. The present test is expected to be of great help in classifying the pupils in the primary schools. Naturally the persons using the scale will be primary school teachers who are not expected to have much training in the use of such tests. It is extremely essential

* Appendix II, Table III.

therefore, that the scoring should be as objective as possible. A simple test of objectivity is to get the same material scored by different persons and find out how far they agree in their scorings of the same papers. In other words the coefficient of correlation between the scorings of different scorers is taken as the index of the objectivity of the scoring. Obsiously a high correlation, nearing at least to .8 is desirable to establish the objectivity of the scoring.

The same sixty drawings were scored by another scorer Mr. X. The coefficient of correlation between my scorings and his scorings was calculated and it was found to be .76 $\pm$ .032 *

Modification of the new Scoring Scale:

The coefficient of correlation between the new scoring scale and mental ages is slightly higher than the Goodenough's scoring scale and mental ages. Still it is not as high as it should be. The score for objectivity is also slightly less than what is desirable. Moreover, while scoring the drawings on this scale it was felt that some of the points for giving a particular weightage were rather confusing; e.g. glance represented even without eyebrows and symmetry. The points of proportion and symmetry

---

* Appendix II, Table VI.

with reference to major body-parts were also mixed up with the representation of the part and it made the scoring more difficult. It was felt that separating the points for proportion, symmetry and representation of the part would make the scale more definite and would give more clarity to the whole scale. Addition of one more point was also thought desirable. Just as dress shows an intelligent development of the concept of human form there is another factor which also shows a more intelligent concept of a human being. It is the environment in which he exists or some action that he performs. As the concept of a human being develops and enlarges it becomes more and more natural to conceive him in some situation or in some action. This factor is often observed in the more advanced drawings of older children.

With the above-mentioned considerations in view the new method of scoring was modified. The separation of some of the points and addition of a point increased the number of major scoring points by five. In the new scale the major points are twentyone and the highest weighted score is sixtyone. The following is the scale :

MODIFIED NEW SCORING SCALE

Description of the points	Weighted score
1. Head	
head present	1
round head	2
oval head (face)	3
2. Eyes	
eyes present	1
eye-lids and pupils or eye-brows or eye-lashes shown	2
eye-lids, eye-brows and pupils present	3
3. Nose	
nose present	1
nose in two dimensions	2
two dimensional nose in the middle of the face: OR nostrils indicated	3
two dimensional nose in the middle of the face and nostrils indicated	4
4. Ears	
ears present	1
ears symmetrical	2
length of the ears more than breadth OR ear-hole indicated	3
shape of the ear shown - lobe	4

Description of the points	Weighted score
5. Hair OR Hat	
hair OR hat present	1
hair presentation better than a scribble or vertical lines OR hat non-transparent	2
6. Forehead	
forehead indicated by sufficient space between the headline and eyes, eye-brows, nose or any mark of decoration	1
7. Chin	
chin indicated by space	1
well formed shape of the chin	2
8. Mouth	
mouth present	1
mouth in two dimensions transparent or showing teeth	2
mouth in two dimensions - lip-line indicated	3
9. Neck	
neck present	1
neck in two dimensions	2
neck-line in continuation of trunk-line or head-line or neck line of the dress drawn	3

Description of the points	Weighted score
10. Trunk	
trunk present	1
squarish trunk	2
length of the trunk more than breadth OR some indication of the dress - buttons, design, pockets or shape OR shoulders indicated	3
length more than breadth and shoulders indicated	4
length more than breadth and shoulders indicated and length of the trunk more than length of the head - approximately twice OR in dressed drawings folds or curves of the dress indicated along with button-strip, neck-line or collar (any two)	5
11. Arms	
arms present	1
arms attached to the trunk OR two dimensional arms	2
two dimensional arms attached to the trunk OR arms (single line) attached to the trunk at the right place	3
two dimensional arms attached to the trunk at the right place OR one of the joints indicated - elbow, shoulder or wrist	4

Description of the points	Weighted score
two dimensional arms attached to the trunk at the right place and one of the joints indicated (undressed drawings) OR in dressed drawings, curves or folds on the sleeves or wrist-cuff indicated	5
12. Fingers	
fingers or palm present	1
fingers and palm OR correct number of fingers OR fingers in two dimensions	2
palm with correct number of fingers OR palm with two dimensional fingers	3
palm with two dimensional correct number of fingers	4
indication of thumb (opposition)	additional 1
13. Legs	
legs present	1
legs attached to the trunk OR legs in two dimensions	2
two dimensional legs attached to the trunk	3
knee-joint indicated in undressed drawings OR in dressed drawings, folds on the sleeves indicated - may be transparent	4
Hip-joint indicated by legs being not parallel	additional 1

Description of the points	Weighted score
14. Toes OR Feet	
toes OR feet OR chaprnl present	1
correct number of toes OR toes in two dimensions	2
toes and feet shown	3
toes in two dimensions and feet in proportion - length more than height and length less than $\frac{1}{4}$ of the leg	4
IN DRESSED DRAWINGS	
shoes indicated by lace or buttons	1
heels OR ankle lining drawn	2
heels and ankle lining drawn	3
shape of the shoe properly shown with lace or buttons, heels and ankle lining	4
15. Motor co-ordination (control)	
major parts in the drawing indicating control over finger muscles - head, trunk, legs, and arms	1
minor parts in the drawing showing control - eyes, fingers, toes etc.	2

Description of the points	Weighted score
joints indicating control	3
whole drawing indicating control of hand and free movement	4
16. Dress	
two complete pieces of clothing - transparent OR one piece non-transparent	1
two pieces of clothing non-transparent	2
17. Proportion - Head	
head less than ½ of the remaining figure and more than 1/6 of it OR breadth of the head less than the trunk- not less than 1/3	1
both the above mentioned proportions present	2
18. Proportion - Arms	
arms slightly longer than the trunk - not reaching knee	1
19. Proportion - Legs	
legs longer than arms and trunk - not more than twice the trunk	1
20. Symmetry	
arms symmetrical - equal in length (approximately)	1
21. General	
action or situation indicated	1

The same sixty drawings of seven plus age group were scored according to the modified new scoring scale. Applying the same formula as before the coefficient of correlation between the scores on the modified scale and mental ages was calculated. It was found to be .50 ± .06.*

Mr. X was again requested to score the same drawings with the modified new scoring scale. Coefficient of correlation was calculated between my scorings and the scorings by Mr. X. It was found to be .959 ± .008.**

Thus it was found that although the correlation between the modified new scoring scale and mental ages is slightly less than the correlation between the original new scoring scale and mental ages, still the modification has showed positive improvement in the objectivity of the scale. Hence the modified new scoring scale was accepted for further study.

Although the scale is accepted for further study it was observed that in all the attempts of revising the Goodenough's Draw-a-man Scale the coefficient of correlation between the test scores and mental ages has not gone beyond .50. Although it is not so low as to discard the

---

* Appendix II, Table IV.

** Appendix II, Table VII.

Test as a measure of intelligence it is not as high as that found between Goodenough scale and Stanford-Binet Scale in the case of American children. In order to investigate the reasons for this consistent lower correlation it was thought worthwhile to go through the standardisation of Kamat's Tests of Intelligence.

While going through the tests the first thing that was observed was that the tests were overdue for revision. They were standardised as early as in 1935. While administering the tests some need for revision was felt but as that was not the main object of the study nothing can be said here about the nature of the revision required.

Secondly, the Tests were worked out and standardised in Dharwar which is a bilingual city where Marathi and Kanarese are spoken and where a child's knowledge of Marathi is influenced by Kanarese. Baroda is another bilingual city, at the other end of the Bombay State where a child's knowledge of Marathi is influenced by Gujarati, which is spoken by the majority.

Thirdly, fifteen years back there were no objective criteria available for studying the validity of the tests. So the validity of the tests was judged against the secondary school teachers' estimate of normal children on a five point scale.

The coefficient of correlation between teachers' estimate and Kamat's tests as reported by Dr.Kamat is[14] nearly 0.5.

Hence the coefficient of correlation of .5 .06 between the modified new scoring scale and Kamat's Tests may be considered as indicating the acceptable validity of the scoring scale.

Distribution of Scores:

The new scale was further studied from the point of view of the distribution of the scores. Henzel and Shrimali have found the scores of Indian children consistently lower with the Goodenough scale. The scores on the revised Goodenough scale and modified newly devised scale were compared to the scores on the Goodenough scoring scale. The following table gives the mean scores along with S.D.with the three scoring scales:

TABLE 14

Mean scores on three scales with S.D.

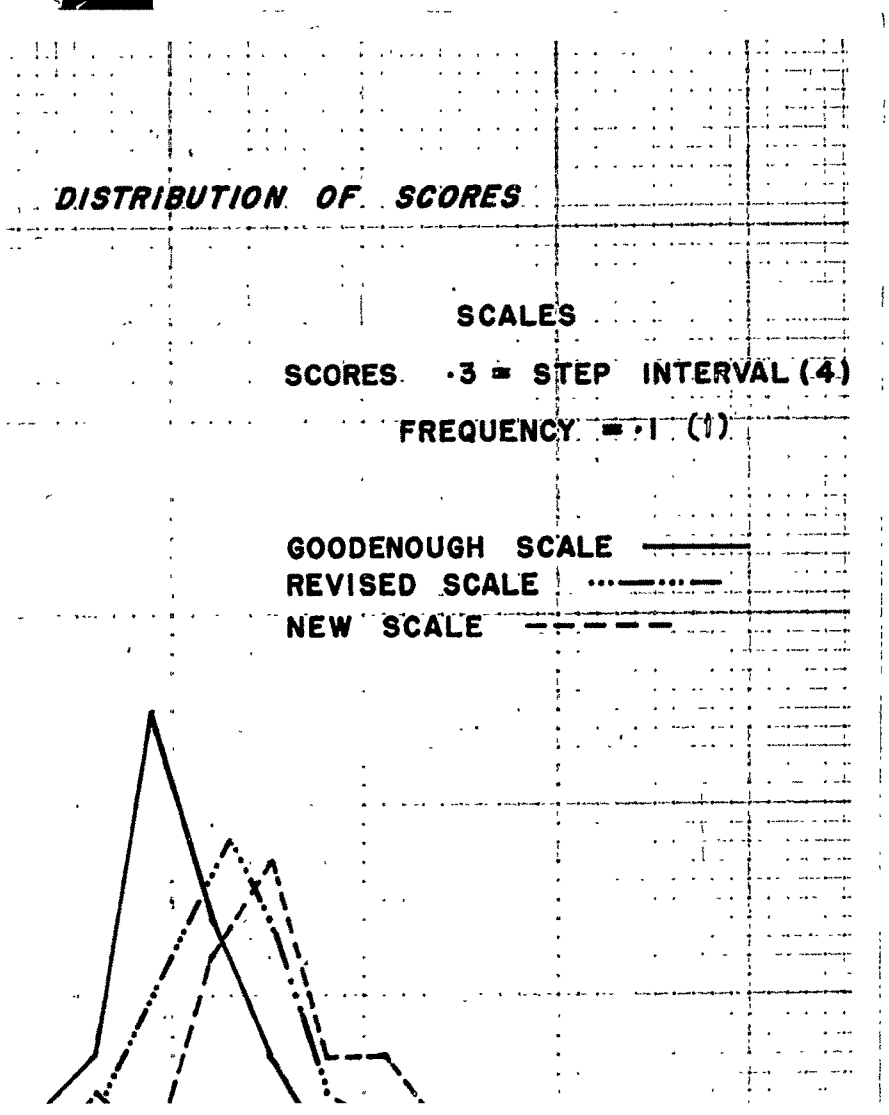
	Mean score	S.D.
Goodenough's Scale	11.18	± 5.4
Revised Scale	13.74	± 6.52
Final New Method	16.94	± 8.32

The improvement which is easily noticeable in the mean scores suggests that the norms for Indian children according to the ne scoring scale are likely to come to the same level as American norms on Goodenough Scale. The score of American norms for seven years age is 18.

---

14. Measuring Intelligence of Indian Children: Kamat, p. 84.

The new method scores also show a slight improvement in the general distribution of the scores. The following graphs representing the distribution of scores of sixty children of seven years according to the three scoring scales show the improvement in general distribution.



Verification of 'r':

In the first study the coefficient of correlation between the mental age on Kamat's Intelligence Tests and the scores on Draw-a-man Tests according to the new method of scoring is .50 ± .06. To verify the constancy of 'r' it was decided to study it with another group of boys of the same age. With all the difficulties already expressed it was not possible to take up a large sample. A small group of ten boys from normal environment was selected. The necessary data was collected and the coefficient of correlation between mental ages on the intelligence tests and scores on the drawing test was calculated. It was found to be .490 ± .11 .* As the group is a small one the following formula is used to calculate the coefficient of correlation without grouping the data.[15]

$$r = \frac{\Sigma xy}{\sqrt{\Sigma x^2 \times \Sigma y^2}}$$

The results with the second group support the agreement between the new scoring scale and the criterion test calculated in the first study.

Extension of the Scale to more age groups:

Any test of the type under study will be useful only if it can be applied to more than one age group. To justify

---

* Appendix II, Table V.

15. Statistics in Psychology and Education: Garrett, p.271

the utility of the New Scoring Method of the drawings it was essential to study its application to some more age groups. Two age groups - one below the age group studied and one above it e.g. six years and eight years - were selected. Mental ages and the drawing scores according to Kamat's Tests and the new scoring scale respectively were collected. Coefficients of correlation were calculated. The two groups were of twenty and twentyfive children respectively. As the groups were small 'r' is calculated without grouping the data. The calculated 'r's are .51± .11 and .54 ±.11* respectively.

To facilitate the comparison of the variability of the three groups another test was applied. To say whether one group is more variable than the other or not, we must have a measure which takes account of both, of the central tendency and of the variability of the group, and which is independent of the units in which the ability is expressed. 'V' or coefficients of variation is one of such measures which can be conveniently applied in a situation like this. So the coefficient of variation were calculated by using the formula[16]

$$V = \frac{100 \times \sigma}{M}$$

---

* Appendix II, Tables X, XI.

16. Statistics in Psychology and Education: Garrett, p.65.

The coefficient of variation in the three groups is 44, 44 and 40 respectively.* (The following table gives all the results of the significant calculations.)

TABLE 15

Comparative Study of 6, 7 and 8 years age groups

No.	Age	Kamat's Tests M.A. in Months Mean & S.D.	V	New Method Scores Mean & S.D. (Modified)	'r'
20	6	77.0 ± 11.77	44	16.3 ± 7.11	.51
60	7	83.4 ± 15.26	44	18.94 ± 8.32	.50
25	8	98.0 ± 15.52	40	24.1 ± 9.70	.53

The results quoted in the previous table indicate the constancy of 'r' and also the constancy of the variability when the new scoring scale is applied to three different age groups. Thus the index of agreement between the criterion tests and the new scoring scale is established at an acceptable level of .5 with reference to six, seven and eight years of age groups of school-going children in Baroda.

* Aprendix II, Table XII.

Further Study of Objectivity:

Scorer Mr X was conversant with the line on which the new method of scoring was developed and modified. It was, therefore, thought worthwhile to study the objectivity of the final scale further. Two persons were requested to score the same drawings of sixty boys of age seven plus. Scorer Mr. Y was familiar with the Goodenough's Draw-a-man Scale. Scorer Mr. Z was a primary school teacher, practically ignorant about the technique of mental testing. The coefficients of correlation were calculated between my scorings and each one of the other scorers. They were respectively .90 ± .011* and .884 ± .012**. The table below gives the comparative 'r's at a glance calculated in all the three studies :

TABLE 16

'r' between the Scoring of the Experimentor and other Scorers

Scorer	'r' with PEr
X	.959 ± .008
Y	.90 ± .011
Z	.884 ± .012

The 'r's are high enough to establish the objectivity of the new scoring method of Drew-a-man Test.

* Appendix II, Table VIII.

** Appendix II, Table IX.

Reliability of the New Method:

Objectivity of the scoring is one of the factors that influence the reliability of a test. The more objective the scoring the greater the reliability of the test. The high correlation with the three scorers suggests the reliability of the new method to be significant. Still however, the method of retest was tried. An attempt was made to collect the second drawings of all fiftyfive boys of six, seven and eight years of age who formed the group for the second study of verification and extension of the scale. In all thirtyfive drawings could be collected after a uniform interval of twentytwo days. The interval of about three weeks was fixed up because it was felt that the interval between the two performances for such studies should be such that it would allow the immediate effects of experience to be faint. At the same time, the interval was so large as to have no significant development in any innate ability of the child. The coefficient of correlation between the scores at the two trials is known as the coefficient of reliability. A significantly reliable test of intelligence should have at least .8 reliability coefficient. In the present study the reliability coefficient was found to be .817±.041* applying the usual formula for ungrouped data

* Appendix II, Table XIII.

Thus the studies for the reliability of the new scoring scale led to the conclusion that the new scoring scale for Draw-a-man Test is significantly reliable.

Tentative Norms:

After finding the validity, reliability and objectivity derivation of norms for practical use is the next important step in the standardisation of any objective test. The number of children tested per age group in the previous study was not enough to establish norms for general use. An attempt was made to establish general norms in respect of sufficiently large age groups. The collection of drawings for this study was started in the Baroda city. 247 drawings of Marathi speaking school-going children of ages six, seven and eight in the city of Baroda were collected. The drawings were scored according to the new method of scoring and classified according to the ages. Mean scores and S.D.s were calculated by preparing the frequency table and using the formula given below:[17]

$$\text{Mean} = \text{Assumed mean} \quad \text{correction} \quad (ci)$$

$$\text{S.D.} = \sqrt{\frac{fx^2}{N} - c^2} \times i \text{ (interval)}$$

The results of the calculations are given on the next page.

---

17. Statistics in Psychology and Education: Garrett, p.61.

TABLE 17

Tentative Norms for Baroda Marathi Speaking Children

Age	No. of Pupils	Mean Score	S.D.
6	68	16.32	± 7.44
7	103	19.54	± 6.36
8	76	24.18	± 8.12

A test was applied to find out how far the differences calculated between the three age groups are significant. The C.R. was calculated and it was thought essential to make the sample more representative for calculation of norms which will indicate significant differences in the scores at successive ages. It was necessary that the additional group should come from a normal area. As the Marathi speaking population of Baroda is limited it was decided to collect data from a Marathi speaking town. It was convenient to collect data from Poona school children and hence norms are calculated on the performances of children from Baroda and Poona. The drawings of about 500 children were collected from two primary schools at Poona. Out of these 500 drawings 475 could be used in making the sample sufficiently big.

Thus the group on which the final norms are established is of 722 children from Baroda and Poona. The drawings were classified according to the age groups and scored. Frequency tables were made and mean score and the S.D.s were calculated by using the same formula quoted before. The results of the calculations are given below:

TABLE 18*

Mean Scores for Marathi Speaking Children

Age	No. of pupils	Mean Score	S.D.
6	234	16.27	± 7.00
7	280	20.4	± 7.36
8	208	23.4	± 8.76

The test of C.R. was applied to these scores to find out whether the differences between the means of successive age groups are significant. The following formula was applied for calculating the Critical Ratio:[18]

$$\sigma_m = \frac{\sigma}{\sqrt{N}} \quad ; \quad \sigma_D = \sqrt{(\sigma_{m_1})^2 + (\sigma_{m_2})^2}$$

$$C.R. = \frac{D}{\sigma_D}$$

---

18. Statistics in Psychology and Education: Garrett, pp. 189, 198, 199.

* Appendix II, Tables XIV, XV and XVI.

C.R.s with reference to three age groups are 6.4 and 4.0*. The two tables below give the relevant results used in calculating C.R.

TABLE 19

Relevant figures used in calculation of C.R.

Age	No. of Ss.	Mean Score	S.D.	$\frac{\sigma m}{N}$ S.D.	$(\sigma m)^2$
6	234	16.27	7.00	.46	.2116
7	280	20.4	7.36	.44	.1936
8	208	23.4	8.76	.61	.3721

TABLE 20

Groups	C.R.	Remarks[19]
6 years & 7 years	6.4	Highly significant
7 years & 8 years	4.0	Highly significant

Thus the present study shows positive results for accepting the norms for use in the future. In the final group

---

* Appendix II, Table XVII.

19. Psychometric Methods: Gilford, p.61.

the means for the successive ages taken to their nearest whole number are as follows :

TABLE 21

Age	Score
6	16
7	20
8	23

Smoothing the curve and extrapolating at both the extremes give the following final norms.

TABLE 22

Age	Norms
5	12
6	16
7	20
8	24
9	28

Ages were taken to the last birthday; hence the above norms apply to the interval mid-way between birthdays, as 6½ years etc.

The comparison of the American norms on Goodenough Scale, Indian norms on Goodenough Scale and the present norms is quite interesting. The table below gives the respective norms.

TABLE 23

Norms - American and Indian-on Goodenough Scale and Norms - Indian - on the New Scale

Age	Goodenough Scale American	Goodenough Scale Indian (Menzel)	Goodenough Scale Indian (Shrimali)	Present Scale Indian
6.5	14	9	8	16
7.5	18	11	10	20
8.5	22	13	12	24
9.5	26	15	14	28

The new method of scoring has made the Indian norms slightly higher than American norms of Goodenough Scale. Of course, no comparison can be scientific unless it is between two equivalent groups. The results, however, suggest that the consistent low scoring as indicated in the two previous studies may be due to unsuitability of Goodenough's scoring scale in certain matters, and with a suitable scoring scale the performances of Indian children will be similar and comparable with the performances of American children.

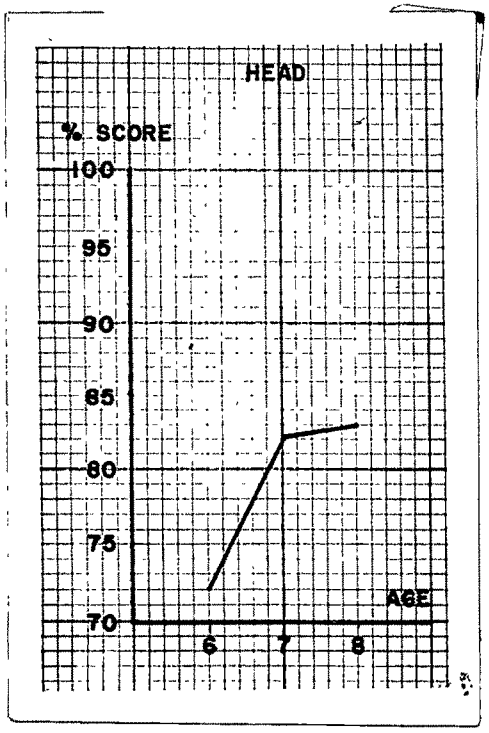
Validity of Scoring Points:

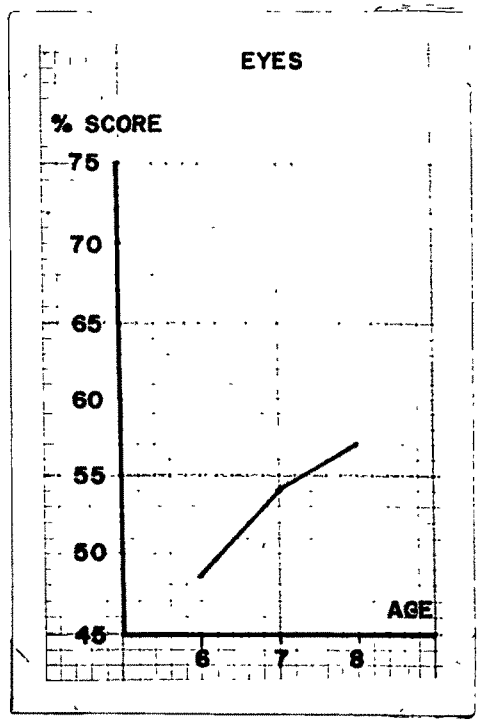
The validation of the individual points in the scale is tested by the simple test of increase in the percentage of total score for each of the major points at successive age groups. The following fourteen major groups were formed for this study : (the fourteen categories are given below) :

1. Head
2. Eyes
3. Nose
4. Ears
5. Hair OR Hat
6. Forehead
7. Chin and Mouth
8. Neck and Trunk
9. Arms and Hands
10. Legs and Feet
11. Motor Co-ordination
12. Dress
13. Proportion and Symmetry
14. Indication of environment or action.

Total scores gained per point in the scale were calculated. The necessary scores were added together, and then the percentage of the scores obtained was calculated against the highest possible score for the particular

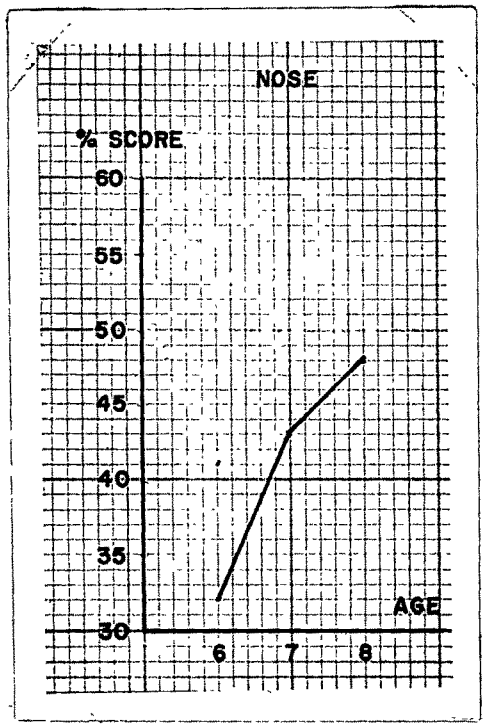
category of points. Three percentages were noted, according to the three age groups for each of the fourteen categories mentioned above.* The graphs are drawn to represent the percentages at each successive age group. The accompanying graphs clearly indicate the increase in the percentage of scores obtained at successive age groups. Thus the fourteen categories of scoring points may be considered as valid for measuring successive developments.

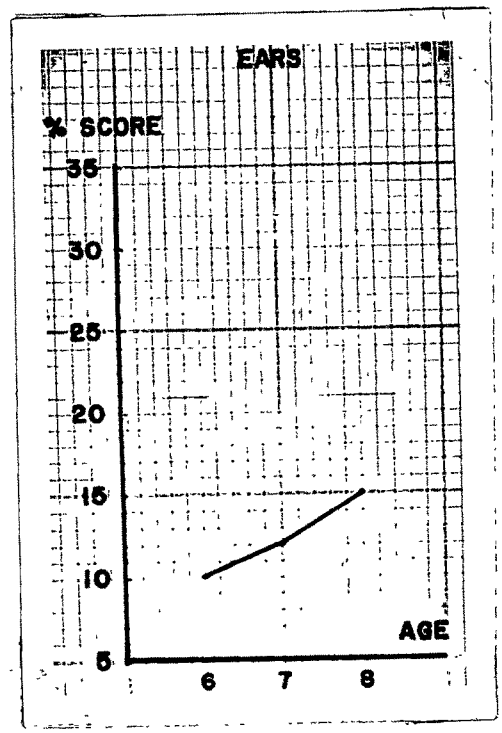


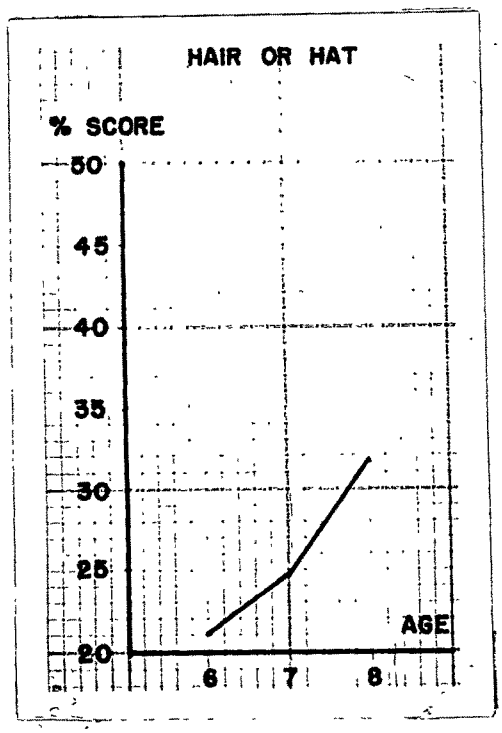


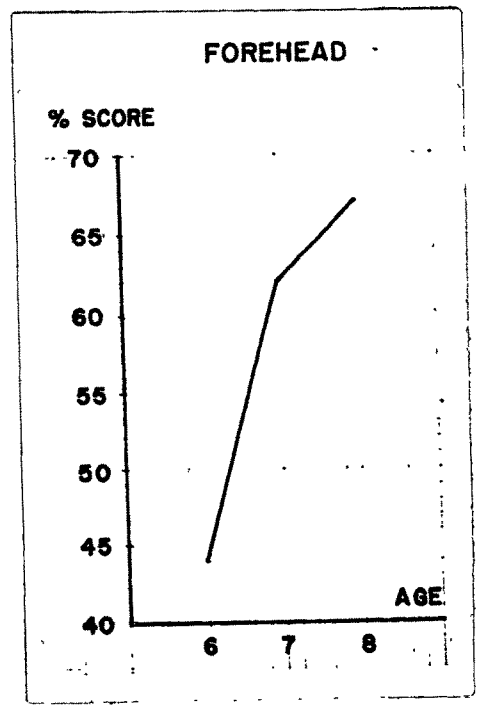
* Appendix II, Table XVIII.

166
/

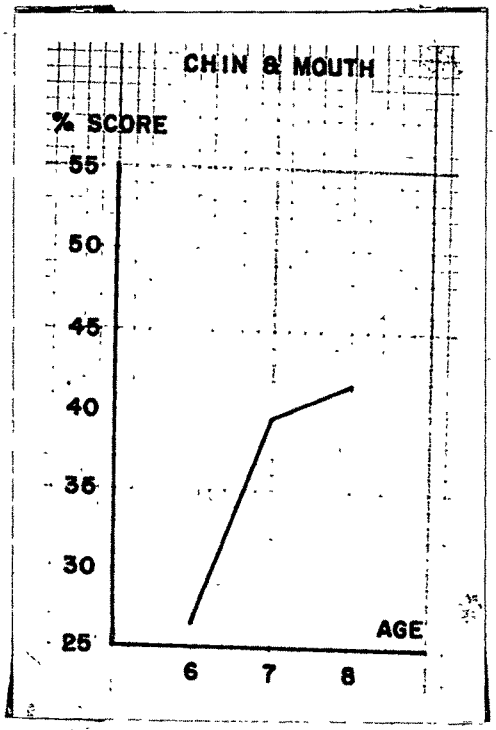

NOSE
% SCORE
60
55
50
45
40
35
30
AGE
6
7
8

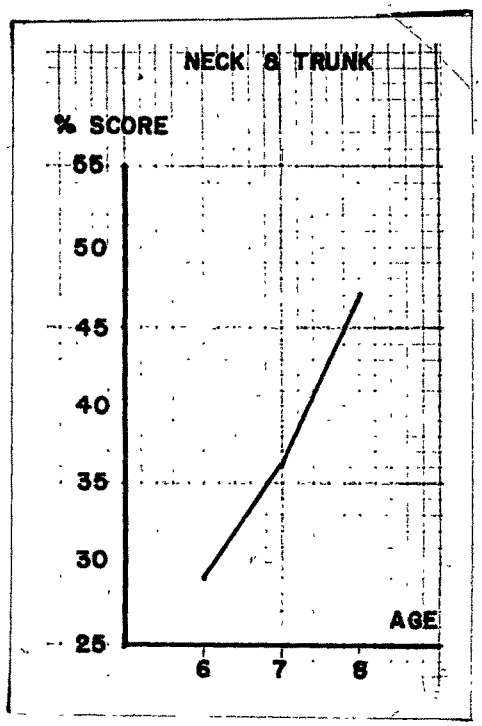

EARS
% SCORE
35
30
25
20
15
10
5
AGE
6
7
8

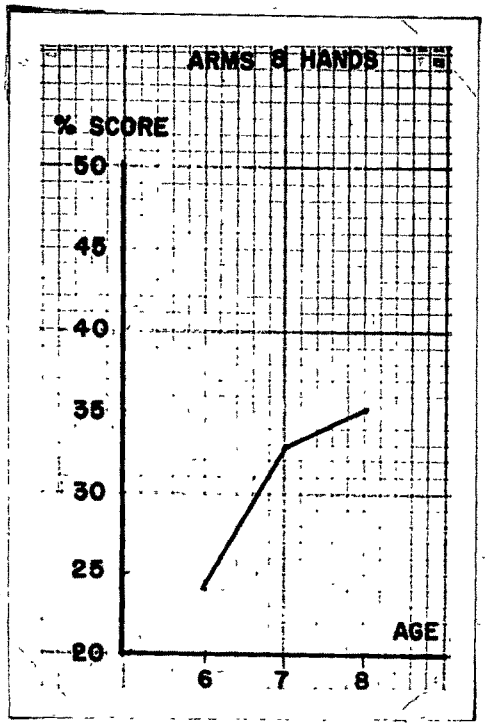

HAIR OR HAT
% SCORE
50
45
40
35
30
25
20
AGE
6
7
8

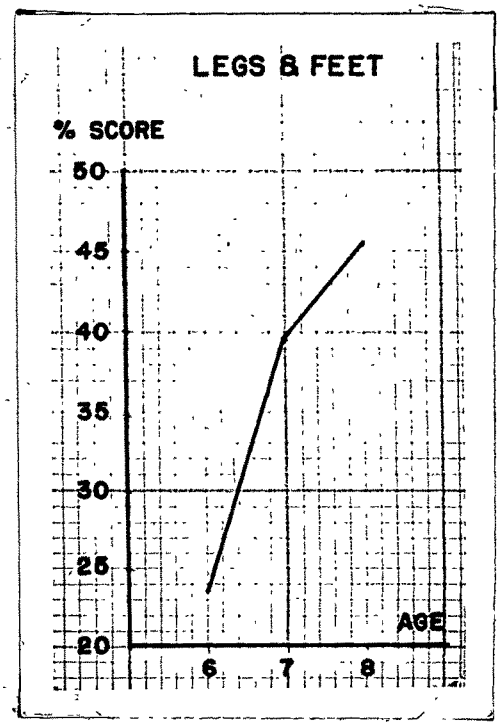

FOREHEAD
% SCORE
70
65
60
55
50
45
40
AGE
6
7
8

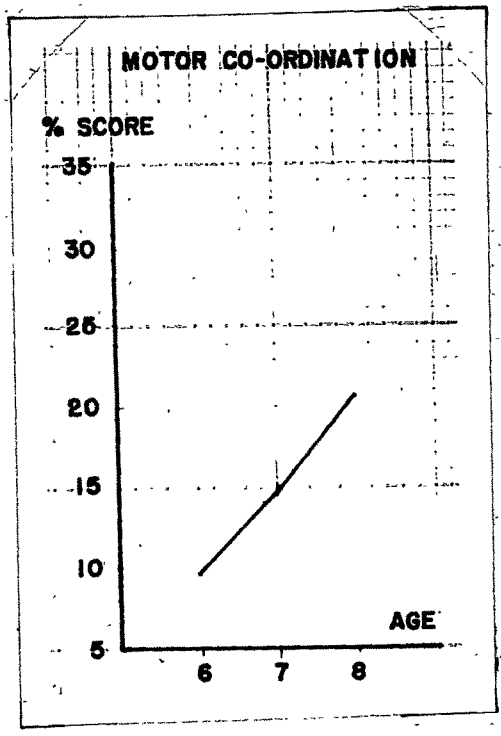
166
2

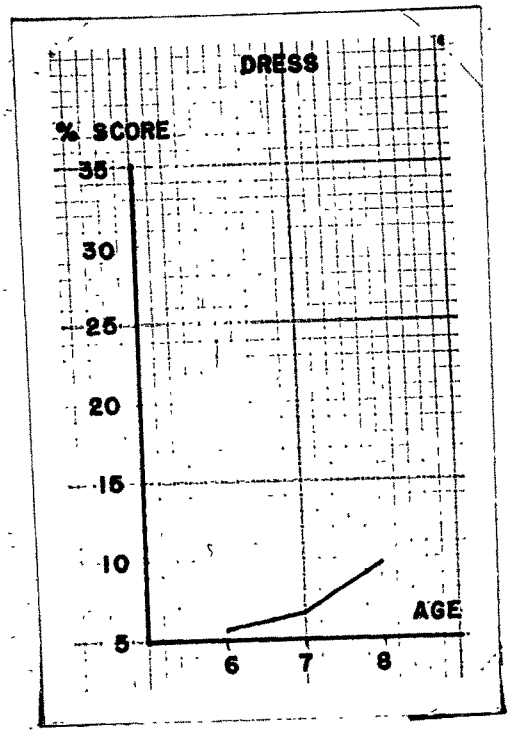

CHIN & MOUTH
% SCORE
55
50
45
40
35
30
25
AGE
6
7
8

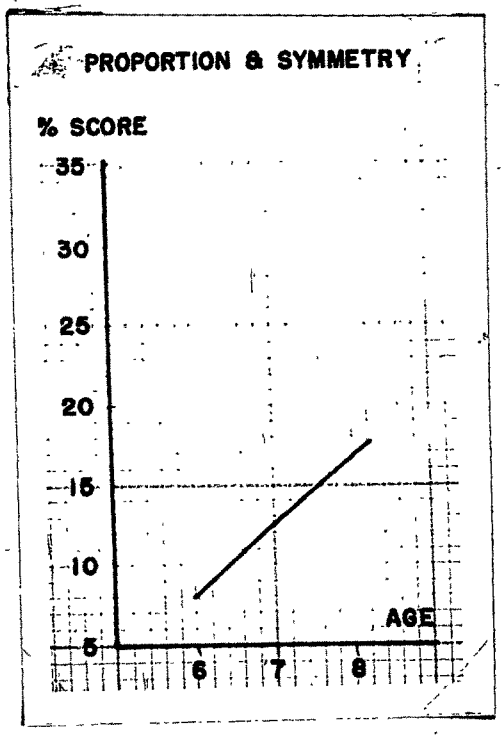

NECK & TRUNK
% SCORE
55
50
45
40
35
30
25
AGE
6
7
8

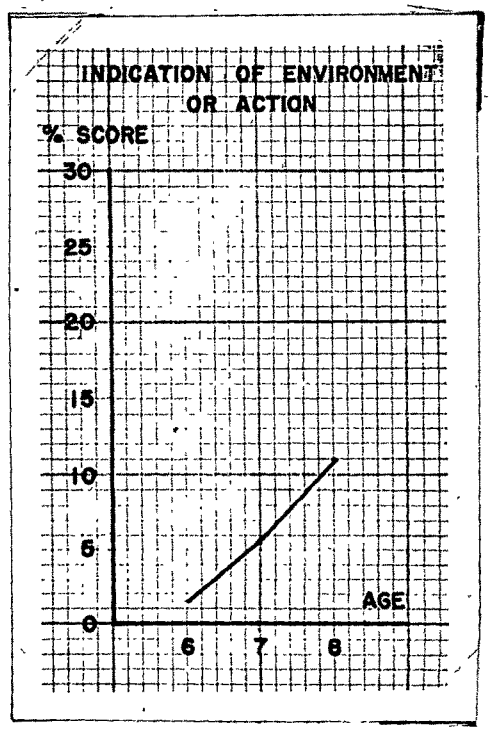

ARMS & HANDS
% SCORE
50
45
40
35
30
25
20
AGE
6
7
8


LEGS & FEET
% SCORE
50
45
40
35
30
25
20
AGE
6
7
8


MOTOR CO-ORDINATION
% SCORE
35
30
25
20
15
10
5
AGE
6
7
8


DRESS
% SCORE
35
30
25
20
15
10
5
AGE
6
7
8


PROPORTION & SYMMETRY
% SCORE
35
30
25
20
15
10
5
AGE
6
7
8


INDICATION OF ENVIRONMENT
OR ACTION
% SCORE
30
25
20
15
10
5
0
AGE
6
7
8

Grade Norms :

When the study was taken up with the children in Baroda, it was felt that the norms for ages and for grades will not be concurrent as the grade placement appeared to be absolutely unreliable. But when the data were collected from children in two schools at Poona it was felt that the grade placement may be reliable in those schools. Further information about the schools were sought for with a view to finding out how far the grade placement of the children can be relied upon for the present purpose. The information given by the headmasters of the schools lead to the confirmation that the grade placements of the children from these two schools may be taken as reliable. Some of the facts about the schools which attributed to the belief are enumerated below :

1. Both are paying schools of sufficiently long standing.
2. The majority of the parents belong to the middle-class society which is more conscious about the education of their children.
3. Attendance and promotions are fairly regular.
4. In one of the schools utmost care is taken not to have a large age range in the beginners' class. Although the school authorities are free to admit children at the age of five years

complete no child is admitted unless he is five and a half years old. To check the age range at the upper limit no child older than six and a half years is admitted in the beginners' class. In the other school where no such care is taken at the time of the admission the average age of the beginners' class is five and a half years.

To calculate the grade norms the drawings which were collected for age norms from the Poona schools were reclassified according to the grades. It was found that there were few drawings from Grade I as compared to the drawings from other grades. More drawings were taken from the children in Grade I, so as to make the group sufficiently large. Mean scores and S.D.s per grade were calculated by using the method and formula used in the previous studies.* Critical Ratios were also calculated so as to test the significance of the difference in the mean scores for the successive grades.** The two tables below give the relevant results of the calculations.

---

* Appendix II, Tables XIV, XX, XVI and XXII.

** Appendix II, Table XXIII.

TABLE 24

Gradewise calculations of Mean Scores S.D.s σ_m & $(\sigma_m)^2$

Grade	No. of Ss.	Mean Score	S.D.	σ_m	$(\sigma_m)^2$
I	154	13.5	6.39	.51	.2601
II	145	17.7	7.00	.58	.3364
III	127	21.6	6.88	.61	.3721
IV	135	24.2	8.68	.75	.5625

TABLE 25

C.R. between the Scores for Successive Grades

			Remarks
Grades I and II	C.R.	5.1	Significant at .01 level
Grades II and III	C.R.	5.0	
Grades III and IV	C.R.	2.7	

Taking the mean scores to the nearest whole number we get the following grade norms. These norms, however, cannot be considered to be final as no verification of the norms or any other observation is done. It may be possible to do it in course of time.

TABLE 26

Grade	Scores
I	13
II	17
III	21
IV	24

By smoothing the curve we may lay down the following tentative norms :

TABLE 27

Grade	Norms
I	13
II	17
III	21
IV	25

Summary :

Goodenough Scale for Draw-a-man Test was studied with reference to Indian children of seven years' age. The criterion test was Dr. Kamat's Tests for measuring intelli-

gence of Indian children. 'r' was calculated and finding it to be lower than what is given by Goodenough with Stanford-Binet attempts were made to evolve a new scoring scale so as to suit the measurement of intelligence of Indian children.

A new scoring scale based on the same principles as that of Goodenough was developed and the validity, objectivity and reliability of the new scale were tested. The test was applied to three age groups - six, seven, and eight. Validity of the scoring points was tested by the simple method of increase in the percentage of scores at successive age groups. The age norms and grade norms were further calculated. Thus the new scoring scale was tested in as many aspects as possible. As all the results are favourable it is suggested that the test with the new scoring scale may be accepted as a quick measure of intelligence for school children of five to nine years' age.

***
*