CHAPTER III
REVIEW OFRELATED LITERATURE

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3.1 INTRODUCTION

Researches done in any field—may be in natural sciences or social sciences or humanities—are not conducted in a vacuum. Research is a vast ocean and there is a continuous flow of researches like rivers meeting the ocean of knowledge. One who sits on a shoulder of somebody can look far ahead. In the same fashion, the future researchers can investigate more effectively and on a wide spectrum than the present and past ones.

"The study of related literature is a valuable guide to defining the problem, recognizing its significance, suggesting promising data gathering devices, appropriate study design, and sources of data". 1

A review of the past literature is essential for the investigator, since

* it provides guidelines for the study.

* it helps the investigator to locate the problem in the whole area of investigation.

* it enables the investigator to foresee the limitations and scope of the study.

* it helps in selecting proper tools, sample and treatment of the data.

* it helps to precise the conclusions of the investigation and avoid ambiguities in it.

* it helps to find out related problems for further study.

As an investigator has to come in the link of researches in the particular field, he/she has to dig out the test material in the related field and know what has been done so far and what are the methods and contents. The investigator consequently has made an attempt to review the related literature akin to the present study.
3.2 MEASUREMENT OF INTELLIGENCE IN INDIA

In India, the development of tests started during the second decade of the twentieth century. The earlier attempts were in the form of adaptation of Binet type individual tests at Madras, Dacca, Calcutta and Lahore centres. C. Herbert Rice of Lahore published "A Hindustani Binet-Performance Point Scale" in 1929. He tested 929 school boys of 5 to 16 years age, all attending schools. He tried out 67 items out of which 9 non-verbal and 26 verbal items were retained. The first ten of 35 items constituted a brief scale. This point scale won the reputation of being the best scientific attempt in India. After Rice, V. V. Kamat adapted the 1916 Stanford revision of the Binet tests in two Indian languages, Marathi and Kannada and published them in 1935. He tested 1,074 boys and girls of ages two to adult age of Dharwar town. N.N. Shukla translated Kamat's version into Gujarati and standardized on 1,247 Gujarati children in the Bombay area in 1949. A Hindi version of the Stanford - Binet Intelligence Scale Form L- of 1937 revision was obtained at Allahabad. The L and M forms were also adapted in Bengali. Uday Shanker developed a Hindi version by testing 1,250 school children of Delhi and obtained norms for ages 3 to 11 years.

It is remarkable that whereas Terman revised this first Stanford adaptation of Binet-Simon tests of intelligence in 1937 and again in 1960, we do not have even a good first version of the adaptation of these tests, except in Marathi, Kannada and Gujarati.

The first group test of intelligence had been developed by G. C. Chatterjee at Lahore. But no scientific aspects of that study was published. Detailed statistical reports are available on a group test of intelligence in Bengali developed by Mahalanobis. He tried out his tests on larger samples in about 1934, a little earlier than Kamat. L. S. Jha prepared a Hindi adaptation of Simplex Mental Test by C. A. Richardson. At Allahabad, Sohan Lal tested 1,419 students of different school classes from a representative sample of students of Utter pradesh and published norms for intelligence tests in Hindi. Jalota at Lahore and Mohsin at Patna have given their notable contributions by standardizing intelligence tests in Hindi.
Bhatia's contribution in testing of intelligence is worth noting here as he standardised a battery of individual performance tests for school age for the first time. It was standardised on 642 literates and 512 illiterates and he obtained norms for ages above eleven.

In Gujarat, Desai's unique contribution was his battery of group tests of intelligence which he originally constructed and standardised on a representative sample of 4,735 boys and 4,770 girls of ages 12 to 18 years corresponding to standards VII to XI in secondary schools of Gujarat. It was the first group intelligence scale in Gujarati published in 1954. The need for the group intelligence scale in Gujarati was fulfilled. The need for the group intelligence test for pupils of standards V to VII was satisfied by Bhatt who constructed and standardised such a test on sound lines. She utilised verbal as well as non-verbal media for testing and obtained norms on the sample of 5,184 boys and 4,604 girls of ages 9 to 13 years. G. B. Shah developed non-verbal tests of intelligence on the sample of 6,037 children of ages 8 to 14 years, studying in primary schools from standards III to VII. Bhavsar, too, constructed a non-verbal intelligence test and standardised it on a sample of 3,189 boys and 2,718 girls of ages 12 to 18 studying in standards from VIII to XI. He had recently developed another non-verbal intelligence tests for pupils of V to VII standards, thus completing battery of non-verbal tests of intelligence for school children.

Phatak published her Draw-a-man scale in 1956 and after a decade, she presented norms on large samples in a more useful manner than in the first version.

Desai in collaboration with Bhatt developed group tests of intelligence of omnibus type which were, then, known as Desai-Bhatt Group Test of Intelligence. They were restandardised on sound lines and were available in the market. The norms were obtained on 3,001 boys and 2,653 girls of ages 11 to 17 years studying in standards from VIII to XI.
3.3 WORLD FAMOUS TESTS OF INTELLIGENCE

3.3.1 Binet – Simon Scales and its Adaptations

A scientific study of the general mental ability began in the 20th century, and Alfred Binet was a pinnacle among mental testers all over the world. The great French psychologist Alfred Binet and his collaborator Theodore Simon, contrived ways to gauge the intelligence level of children so that children of different age levels could be compared.

In 1904 Binet and his colleague, Simon were asked to devise procedures for identifying children who needed special classes — children who were intellectually unable to profit from ordinary instruction, by a French Education Commission.

Binet and Simon, in accepting this assignment, were eager to insure that children would not be placed in special classes simply on the basis of teachers' opinions or the views of other adults. Such judgements they stated, might be biased or simply inaccurate. Fairness and accuracy were especially important here, they argued, because,

To be a member of a special class can never be a mark of distinction, and such as do not merit it, must be spared the record...... We are convinced...... that the precision and exactness of science should be introduced into our practice whenever possible, and in the great majority of the cases it is possible.\(^3\)

Thus, a concern for fairness and accuracy in the education of children was a major factor in the development of the first viable intelligence test.

They collected and developed a variety of paper-pencil test items which they administered to children varying in age. The test was the result of two basic assumptions which Binet and Simon made, the first assumption referred to the fact that intelligence is made up of various abilities. This assumption necessitated inclusion of a large number of test items which were of different kinds. In contrast to the attempts of other psychologists who utilized tests of sensory reactions, Binet
experimented with tests of more complex mental functions including judgement, reasoning, memory and arithmetic reasoning etc. The second assumption referred to the nature of intelligence, which according to Binet and Simon, changes with age. The assumption necessitated gradation of the items according to the age group for which they were made. They decided upon a novel way of arranging or grouping their test items which was of great practical importance. In giving their tests to children of different ages, they were able to categorize the test items in terms of the age-level where they seemed most appropriate.

Binet knew, that some children had better school opportunities than others and that some learnt more at home than others. Even in his early tests, he tried to select items which were fair to all children. He struggled, though not completely successfully, to get at intrinsic intelligence not by "ruling out the environment" but by presenting tasks for which every child's environment would have prepared him if he had wit enough to take full advantage of the opportunity.

Binet's first tests were very crude, and it was not at all certain that they were really "differentiating" in the sense that bright children would consistently do better than dull ones.

Binet came to the conclusion that the intelligence of a normal child develops without school education and prepared a test of 30 items arranged in order of increasing difficulty.

The test items were framed from the most common experiences of children.

The sample items of 1905 scale are given below:

(1) Recognition of food
(2) Naming of objects designed in a picture
(3) Definition of familiar objects
(4) Suggestibility etc.
1908 Binet-Simon Scale

Binet went on experimenting, adding new tests, arranging items and working with more children. The defects of the first scale were identified and removed. The items were grouped for appropriate age levels.

Test items of age 3 are given below:

Age 3 years:

(1) Points to nose, eye and mouth.
(2) Repeats two digits, 3, 5.
(3) Repeats sentences of six syllables.
(4) Enumerates objects in a picture.
(5) Gives family name.

The new scale was helpful in classifying the individuals according to their ability. The concept of "Mental Age" was employed for the first time. "Mental Age" meant only the ability of a particular child to solve questions meant for a particular age group.

The controversy of whether intelligence could be measured at all, was still not over, and when the second Binet-Simon scale appeared in 1908, the authors were ready to answer the criticisms they had to face for their pioneering work.

Some psychologists affirm that intelligence can be measured, others declare that it is impossible to measure intelligence. But there are still others, better informed, who ignore these theoretical discussions and apply themselves to the actual solving of the problem. We have some times been accused of being opposed with blind infatuation to all theory and to the prior method. What we strongly reject are theoretical discussions which are intended to take the place of an exploration of facts. This scale endeavoured to standardize the tests for different ages by assigning to each year level the tests passed by 75 percent of the children of that
age. They also endeavoured to measure the intelligence of normal and sub-normal children.

The 1911 Revision of the Binet Scale

The 1908 revision created interest among psychologists of the U.S.A., England and Switzerland. They gave valuable suggestions for the improvement of the scale. Binet incorporated the suggestions in the revised scale of 1911. Binet went on with testing and in 1911, published a still better scale profiting by his earlier mistakes. The 1911 scale did not differ very materially from that of 1908. A few tests were dropped, while a few others were transferred to suitable age groups. The method of scoring was modified and the number of tests in each age-group was fixed at five except that of age 4 for which only four tests were laid down. Some sample items of 1911 scale are as follows:

Age 4 years:
1. Says whether the testee is a boy or a girl.
2. Names keys, knives, coins, etc. on seeing them.
3. Repeats 3 numbers on hearing them.
4. Compares the length of two straight lines.

Age 6 years:
1. Distinguishes between morning and afternoon.
2. Defines names of familiar objects in terms of use.
3. Copies a diamond.
5. Distinguishes between pictures of ugly and pretty faces.

Contribution of Binet

Although successive revisions differed from one another and from the original Binet-Simon scale, there is a body of features that characterize all versions.
of the scales of Binet-Simon. Following are the important features:

1. They are scales. This means that the items and tasks are grouped on the basis of their difficulty beginning with easy items. A child's score chiefly depends on how far up this ladder he can go rather than how fast or fluent he is.

2. They yield general global measure of intelligence rather than an analysis of separate special abilities.

3. The tests are grouped by age levels and measure mental growth of the subject.

4. They are individual tests given individually by a skilled examiner. High standard of proficiency is required on the part of the examiner.

5. The system of scoring in all Binet's tests is tied to the age norms. A child's mental age indicates the age group for which his performance would be typical.

The following contributions are to the credit of Alfred Binet:

1. He devised different tests for the measurement of intelligence for various groups and age levels.

2. He standardized the tests.

3. He distinguished between chronological age and mental age.

4. He made available a systematic method for appraising the development of mental abilities.

Binet died in the year 1911, but the work of revising the Binet Scale went on.

The scale was tried out by investigators in various countries. As a result, several modifications were suggested. The chief revisions of the tests were those of Goddard, Kuhlman, Terman and Burt and the point scale of Yerkes, Bridges and Hardwick.
3.3.2 Stanford-Binet Scales

L.M. Terman of Stanford University revised and refined original Binet-Simon scale in America, according to the needs of American culture in 1916. The concept of intelligence quotient developed by the German psychologist William Stern was employed for this test. The 1916 scale had 90 items ranging from 3 years to 14 years of age. Of these 90 items, 54 were adapted from 1911 Binet Scale, 5 from earlier Binet Scale, 4 from other American tests and 27 new items were added. This revision introduced so many changes and additions as to represent virtually a new test. The entire scale was restandardized on a sample of approximately 1,000 children and 400 adults. Detailed instructions for administering and scoring were provided.

The second Stanford revision, appearing in 1937, consisted of two equivalent forms L and M. In this revision, the scale was greatly expanded and completely restandardized on a new sample of 3,184 of the U.S. population.

This scale differs from that of 1916 in many details, but it does not differ in its essential and basic conceptions. Both forms contain 129 test items each, as compared with the 90 items in the first Stanford-Binet. The scale extends downward to the level of age 2, and upward through three levels of "superior adult", thus increasing its usefulness.

The third revision was published in 1960, providing a single form (L-M) incorporating the best items from the 1937 L and M forms. Without introducing any new content, it was thus possible to eliminate obsolescent items and to relocate items whose difficulty level had altered during the intervening years owing to cultural changes. The same test was standardized in 1972. The content remained unchanged. But the norms were derived from a new sample of approximately 2,100 cases.
3.3.3 The Wechsler Scales

The only intelligence tests that have rivaled the Stanford-Binet in popularity and in recent years, have become the preferred tests of clinical and school psychologists are the battery authored by David Wechsler, formerly chief psychologist at Bellevue Psychiatric Hospital in New York City. Wechsler felt that intelligence was an aggregate of abilities and not a single general ability. Accordingly, he developed a test to measure several specific mental abilities.

His first test became known as the Wechsler-Bellevue (1938). It was the first successful individual test of adult intelligence. Although the Standford-Binet ranged from age 2 to adult level, the adult part of the scale consisted of only twenty of the ninety items making up the entire test. Clinicians felt that they needed a more extensive and varied set of tests for assessing the intelligence level of the adults. The wechsler-Bellevue test fulfilled this need. Though this original Wechsler test filled a definite need and was widely used, it was described by one authority (Anastasi, 1958) as a "crude though promising instrument". It was extensively revised and restandardised on a national sample in 1955 and became the Wechsler Adult Intelligence Scale (WAIS). In 1949 Wechsler published the Wechsler Intelligence Scale for Children (WISC), which was revised and renormed in 1974 as the WISC (R). In 1963 there appeared the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). The WPPSI is normed for ages 4 years to 6 1/2 years, the WISC (R) for ages 6 years to 16 years and 11 months and the WAIS for ages 16 to 75 years and over. WAIS was revised and published as WAIS (R) in 1981. WPPSI has also been revised.

3.4 WELL KNOWN INTELLIGENCE TESTS STANDARDIZED IN INDIA

The early testing of intelligence remained Binet-type in all the countries of the world including India. According to available information, S. Pal (1925) was the pioneer Indian worker to have adapted Stanford-Binet Scale in Bengali. He was soon followed by Malti (1926), Chatterjee (1927) and Miss Gupta (1936).
Some work also went on in Patna Training College of Hindustani Revision of Stanford and of Tamilnad Telugu Revisions of Stanford at Lady Willingdon Training College, Madras. (Menzel, 1956)

A more thorough attempt was made by Rice (1929) at Lahore. This work began in 1922. Herbart Rice experimented on with several other items and final scale was different from Stanford-Binet Scale. In all, 57 items were tried out, out of which 32 were eliminated as unsuitable to Indian conditions. The languages used were Urdu and Punjabi. Another, early attempt of considerable importance was that of V.V. Kamat. He prepared a Binet Scale in Marathi and Kannada in 1935. N.N. Shukla adapted Kamat's tests in Gujarati and published in 1950. G. A. Muktar did a similar work in Urdu for use in Jammu and Kashmir.

These Binet revisions could not be of much use in school and colleges of India, due to lack of trained examiners for administration. Moreover individual tests of intelligence proved to be very time consuming. Therefore, Indians started constructing group tests. The first verbal group test of intelligence adapted to Indian conditions is that of J. Manry of Ewing Christian College, published in 1927 in Urdu, Hindi and English. In 1933, Pandit Lajja Shanker Jha published, in the Teachers Training College Annual of Banaras Hindu University, a report of the examination of over 1,000 pupils on a Hindi adaptation of the Simplex Mental Test by C. A. Richardson. "These early attempts at adaptation and translation were soon abandoned in favour of more carefully worked out and better supported tests."5

An attempt of more thorough nature was made by S. Jalota of The D.A.V. College, Lahore. He prepared a group verbal test for use among college students.

The first Indian doctorate in test construction was awarded to K.G. Desai (1954) for developing a battery of group tests of intelligence in Gujarati for the students of twelve to eighteen years studying in standards VII to XI of secondary schools.
After 1950 and till 1973, a number of group verbal tests have been constructed and standardized. A review of "The first Mental Measurement Handbook For India", published in 1966 gives the information of 326 tests prepared and adapted in India. Of these 100 were classified under intelligence. The 100 tests have been classified under two tables giving classifications firstly according to the types of tests and secondly according to languages used.

### TABLE 3.1

**CLASSIFICATION OF INDIAN TESTS OF INTELLIGENCE ACCORDING TO TEST MATERIALS USED**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Types of Tests</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Verbal-Individual</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Verbal-Group</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>Non-Verbal-Individual</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Non-Verbal-Group</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Both Verbal &amp; Non-Verbal-Individual</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Both Verbal &amp; Non-verbal-Group</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Non-Verbal-Group or Individual</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
### TABLE 3.2

**CLASSIFICATION OF INDIAN INTELLIGENCE TESTS ACCORDING TO LANGUAGE USED**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Language Used</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hindi</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>English</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Gujarati</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Bengali</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Kannada</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Marathi</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>Telugu</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Oriya</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Punjabi</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Without Language</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

A perusal of these tables indicates that majority of Indian tests are in verbal group form and in Hindi.

### 3.5 TESTS OF INTELLIGENCE IN GUJARAT

(In writing this section, the four volumes on Survey of Research in Education published by M. B. Buch as a Chief Editor, have been referred to.)


K.G. Desai constructed and standardized an original test battery. His objectives were as follows:

1. to construct an original verbal group test of intelligence,
2. to standardize the test on Gujarati students of the age 12 + to 18,
3. to establish age, grade and sex norms,
4. to check its reliability and validity,
He prepared a verbal test battery in the discrete pattern. He included the following sub tests in the battery:

(1) Following directions, (6) Number sequence,
(2) Opposites, (7) Analogies,
(3) Disarranged sentences, (8) Similarities,
(4) Proverbs, (9) Story completion, and
(5) Logical inferences, (10) Memory

He administered the final form to a sample of Gujarati speaking 4,735 boys and 4,770 girls of secondary schools in the Bombay state. He used the random sampling technique for selection of sample. He standardized the test and established grade norms and age norms for boys and girls separately. Slight sex difference was observed in grade norms and age norms.

The correlation of IQs with teachers' estimates of intelligence was .53 and validity coefficient against Shukla's Binet Scale was .82. The correlation of IQs with annual examination marks was .42. All these values are fairly high. The reliability of the test by the test-retest method was .77, while that by split-half method was .88. He employed Thurstone's centroid method on a sample of 100 cases for factorial validity and Spearman's method for detecting "g' saturation.

Champaben Bhatt aimed at constructing and standardizing group test of intelligence, for pupils of urban, semi-urban and rural cultures. The test consisted of 139 items-including matching legs of tables (nonverbal), matching profession and things (verbal), analogies (verbal), classification (non-verbal), pictorial absurdities (nonverbal). The test was administered to 5173 boys and 4649 girls. Separate norms for boys and girls were computed.
The reliability coefficients of the test by K.R. Formula 20, Split-half method, Guttman's formula and Rulon's formula were 0.93, 0.91, 0.97 and 0.98 respectively.

Congruent validity was estimated by correlating the IQs on the test with the IQs obtained on other intelligence tests - Shukla's Adaptation of Stanford-Binet, Desai's Group test of Intelligence and Joshi's Group test of General Mental Ability. The congruent validity coefficients with these tests were 0.82, 0.88 and 0.68 respectively. The concurrent validity coefficients were 0.45, 0.57, 0.29, 0.21, and 0.16 with teachers' estimates of intelligence, marks in academic subjects, marks in drawing, marks in crafts and marks in physical education respectively.

Champaben applied Thurstone's centroid method for factor analysis and only one common factor was revealed. She observed significant differences among the average IQs for urban, semi-urban and rural school pupils.


G. B. Shah constructed and standardised a non-verbal group test of intelligence for the age range 7 to 13 as a work of Ph.D. degree in 1964 from M.S. University.

The test was administered to 1,150 pupils for the second try-out. After item analysis 162 items were retained for the final form. The test consisted of 6 sub tests. The sub-tests were Similarity, Classification, Analogy, Absurdity, Progressive Series and Substitution Code. The test was standardized on a sample of 3,129 boys and 2,903 girls studying in grades III to VIII, drawn from seventeen schools in eleven districts of Gujarat.

The reliability of the test was calculated by test-retest method, split-half method and method of rational equivalence. The validity of the test was determined against the verbal test of intelligence, prepared by the Faculty of
Education and Psychology, M.S. University of Baroda, the total examination scores in four subjects and teachers' estimates of intelligence. Both Thurstone's centroid method and Spearman's method were used to calculate "g" saturation. The coefficients of reliability by test-retest method, split-half method and method of Rational Equivalence were 0.94, 0.96 and 0.92 respectively. The validity coefficients were 0.70, 0.55 and 0.53 against the verbal intelligence test, examination scores and teachers' estimates respectively. Boys and girls were found to be almost at par in intelligence till the age of eleven.

The performance of girls was comparatively higher at the age of twelve and thirteen, while that of boys was higher at the age of fourteen.

The differences between the means of rural and urban pupils were not significant at any age, except at the age of ten. Intelligence was found to be slightly dependent upon the occupations of the fathers.


Late D.M. Bhavsar aimed at preparing a non-verbal group test of intelligence for high school students of grades IX, X and XI in the age range of 13+ to 18+ of Gujarat.

The test consists of six sub tests of non-verbal items:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Sub test</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Similar Figure test</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Classification test</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Analogy test</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Mirror reflection test</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Series test</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>Completion test</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
Two items in each test are provided for practice, making 112 items totally. The time-limit of 32 minutes was fixed for the test battery. The item analysis was done by using Thorndike's procedure and the difficulty and discriminating indices were calculated using the Psychometric Research and Service Chart showing the Davis' difficulty and discriminating indices for item analysis. Final form of the test was administered to a sample consisting of 3,184 boys and 2,718 girls from classes VIII to XI, from fortyfour schools of 16 districts of Gujarat.

Age norms and grade norms for boys and girls were established separately. The reliability of the test by test-retest method was 0.91 and by split-half method it was 0.93 in two schools and 0.94 in one school. His test gave a correlation coefficient of 0.613 with Desai Group Test of Intelligence, 0.79 with Desai-Bhatt Group Test of Intelligence, and 0.77 with Nafde's Non-verbal Test. The test battery was validated against achievement of pupils in various school subjects like Hindi 0.455, Gujarati 0.51, Social studies 0.325, English 0.37, Science 0.659, Mathematics 0.59, and total marks of all subjects 0.49. The coefficient of correlation of each sub-test with the whole battery except in the case of similar figure was found to be above 0.50.


This study was undertaken by Champa L. Bhatt. The purpose was to revise the Desai Group Test of Intelligence for Grades VIII to XI, originally standardised by K.G. Desai in 1954. 160 items, some from the original test, but most of them newly coined, were arranged for pre-tryout. The battery included ten sub tests, viz., following directions, opposites, disarranged sentences, classification, meanings of proverbs, number sequence, differentiation, arithmetical reasoning and verbal reasoning. The test was administered to a group of 550 students of grades VIII to XI of schools in Ahmedabad and some semi-urban areas of Gujarat. Responses of 370 students were used for item analysis. Extreme groups method
was used for this purpose. Items with poor discrimination power were discarded. Ten best items for each of the ten tests were selected. The final version of the test comprised of 100 items of which fortyfive items were retained and modified from the original Desai Group Test of Intelligence and the remaining fiftyfive were altogether new. The final form of the test was administered to a sample of 1,106 boys and 867 girls from the schools of Gujarat, selected by stratified sampling method. The time-limit for the test was fixed at forty minutes.

Age norms for boys and girls were established. Reliability by split-half method was found to be .86 and by test-retest method 0.84. The concurrent validity of the test was estimated by correlating the IQs on two tests, namely, Desai Group Test of Intelligence, and Bhavsar's Non-Verbal Group Test of Intelligence which was 0.77 and 0.65 respectively.


Mahendrikaben aimed at adapting WISC as an individual test of intelligence for Gujarati population for the age groups from 5+ to 15+.

She standardised the scale on a sample of 220 girls and 220 boys. The WISC contained twelve subtests, namely, information, comprehension, arithmetic, similarities, vocabulary, digit span, picture completion, picture arrangement, block design, object assembly, coding A and B and mazes.

There was no method of uniform weightage wherein all sub tests were given equal weightage irrespective of the number of items they had. The scaled scores were derived to provide at each age of the separate sub tests, a mean scaled score of 10 with an SD of 3.

The reliability coefficient by test-retest method for verbal score was 0.98, for performance score was 0.97 and for full score was 0.99. The reliability coefficients against the Stanford-Binet Intelligence Scale, the Desai Group Test of
Intelligence, Bhatt Group Test of Intelligence, Desai-Bhatt Group Test of Intelligence, Shah Nonverbal Group Test of Intelligence, Draw-a-Man Test and Bhavsar Non-vebal Group Test of intelligence were 0.653, 0.729, 0.701, 0.679, 0.499, 0.484 and 0.546 respectively.


J.H. Shah aimed at providing an up-to-date adaptation of the third revision of the Stanford-Binet Scale (Form L.M.) for Gujarati population. After translating the test into Gujarati, four different tryouts were undertaken. For final tryout, a stratified sample was drawn. Ten boys and ten girls in each age group ranging from two plus to eighteen plus having half year intervals from two through five year age levels were selected.

The reliability coefficients of the test by test-retest method and average difference method were found to be 0.95 and 0.96 respectively. The reliability estimated by analysis of variance method at different IQ levels varied from 0.76 to 0.98. Congruent validity coefficients against eight different intelligence tests in Gujarati ranged from 0.48 to 0.79. Shah also made a few additional studies as those of sex differences, occupational differences, sibling resemblance and twin resemblance.

8 Shah, Bhanu : Construction and Standardization of a Group Intelligence Test (Ph.D., 1973).

Bhanu Shah constructed a group test of Intelligence for the pupils studying in Gujarati medium schools of the age 13 to 16 years. The test contains 60 items of 13 different types. The items are arranged in omnibus spiral form. Each item has five multiple choice answers. The time taken for the test is 35 minutes. It is a verbal test. It was standardised on a sample of 4,382 boys and 4,478 girls.

The reliability examined by the test-retest method, split-half method and Kuder-Richardson Formula 20. is 0.77, 0.88 and 0.89 respectively.
The validity was checked against teachers' opinion (0.73, 0.59, 0.51), school subjects (0.60 against Gujarati, 0.54 with Sanskrit, 0.72 with Hindi), Scholastic Aptitude Test (0.77), Desai Test Battery (0.72), and Nafde's Nonverbal Test of Intelligence (0.63).


Leela K. Patel constructed and standardised a performance scale for school going population in the age range 6+ to 15+ in Gujarat. The investigator coined different types of performance tests. The third try-out was carried out with eleven students of each age group. The final form of the test was given to 400 students, forty in each age group.

Intelligence quotients on the present test were correlated with the intelligence quotients on Desai-Bhatt Group Test, Bhatt Group Test, Bhavsar Non-Verbal Group Test, Shah's Non-Verbal Group Test and adaptation of Wechsler Intelligence Scale for Gujarati Children.

The Factorial validity of the test was established by Hotelling's principal axis method. The three curves of mental growth for the boys, girls and mixed groups were found to be regular inspite of the small sample size. The test is applicable to lower age group. It can be used whenever measurement of general intelligence was needed for guidance and selection purpose.


The objectives of the study were:

- to construct a non-verbal test of pupils for grades VIII to XII
- to establish grade and age norms separately for girls and boys
The investigator constructed 150 items for the first tryout and administered them to 30 pupils. She gave place to 140 items in the second tryout and administered to 400 pupils. Item analysis was computed from the results of 370 answersheets. 90 items selected were rearranged in the spiral omnibus pattern. A practice test was added to the final test.

A sample of 3,262 boys and 2,322 girls of 60 schools of Gujarat State was taken by stratified random sampling method. The test was administered to the total sample. Sexwise and agewise means and standard deviations of scores were calculated. The level of significance of the difference between the mean scores of boys and girls for each age group was found to be insignificant, so the means and standard deviations of the combined groups of boys and girls for all the ages were calculated. IQs and PRs were also calculated.

The reliability coefficients by test-retest method for each sub test were found as follows:

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Tests</th>
<th>Product moment r</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Similarities</td>
<td>.811</td>
</tr>
<tr>
<td>2</td>
<td>Classification</td>
<td>.789</td>
</tr>
<tr>
<td>3</td>
<td>Analogies</td>
<td>.606</td>
</tr>
<tr>
<td>4</td>
<td>Series</td>
<td>.710</td>
</tr>
<tr>
<td>5</td>
<td>Conditions</td>
<td>.876</td>
</tr>
<tr>
<td>6</td>
<td>Matrices</td>
<td>.709</td>
</tr>
</tbody>
</table>

The reliability by the split-half method for the whole test was .847, .800, .875, .857, .843 and .865 for 13+, 14+, 15+, 16+ and 17+ age groups respectively. Congruent validity was found out against Bhavsar Non-Verbal Group Test of Intelligence and Desai-Bhatt group Test of Intelligence which were .879 and .904 respectively. Concurrent validity against school marks was .569 and .783 against teachers' ratings. Hotelling's Principal Axis Iterative Procedure was used for factor analysis.
M. L. Joshi's test is an adaptation of Wechsler's scale - WPPSI. He administered the test to a sample of 360 children (180 boys and 180 girls) of the age range 4+ to 6½+.


The test-retest reliability ranges from 0.62 to 0.898. The validity against Gujarati Adaptation of S. B. Scale (1960) was 0.886, against Draw-a-Man test 0.538, with school marks 0.712 and with Teachers' rating 0.628.

### 3.6 HOW THE PRESENT STUDY DIFFERS FROM OTHER STUDIES

Sachchidananda observed, "The first contribution to the study of the educational problems of scheduled tribals in India was made as early as 1944 by professor Furer – Haimendorf (Indian Journal of Social Work, 5, 2, September, 1944). . . . . . This was the first time it was pointed out that an educational programme for tribals has to be in consonance with their habitat, economy and culture."

After five decades, the recommendation has not been partially fulfilled. Many researches on the tribal children had been undertaken, thenceforth. The acceleration in such tribal studies has been quite obvious after the Kothari Commission report (1966). These studies were pertaining to socio-cultural deprivation, some psychological variables, comparative studies of tribals and non-tribals, educational development, Ashram Schools, wastage and stagnation, tribal educational programmes, etc.
So far as the little knowledge of related literature the present investigator has gained during her study, it has been for the first time in Gujarat and very probably, in India, an intelligence test solely on school-going tribal children of grades V to VII is being constructed and standardised.

In selecting sample, the present investigator had tried her best to cover all the eight tribal districts in the eastern region of Gujarat – from Banaskantha in north to Dang in South. In all, two sub-tests - verbal and non-verbal - having five sub-tests in each and all the sub-tests containing ten test items were prepared. All these tests were administered to the tribal children of stds. V to VII in almost all the tribal districts of Gujarat. The total sample of 2000 pupils was drawn from 25 different schools of tribal districts of Gujarat State. The present investigator herself visited all the schools and administered these tests in two different sessions procuring help of the proctors (school-teachers) and her colleague who has been doctorate in education.

3.7 SALIENT FEATURES OF THIS STUDY

Salient features of this study are:

i first of its kind on Gujarati tribal children

ii moderately large number of children from all the tribal areas of Gujarat covered (N = 2000).

iii development of two types (verbal and non-verbal) of intelligence test

iv development of 10 intelligence sub-tests for grades V to VII

v Only verbal sub-tests (five in number) would have to be translated into different regional languages in India for the use of this standardised test thus having national utility in future, for tribal children of grades V to VII.

vi The most significant factor found (by varimax rotation) is a general factor "g", thus the investigator being a Spearmanite confirmed.
REFERENCES


5 M. B. Buch (a) *Survey of Research in Education* (Centre of Advanced Study in Education, Baroda, 1974.)

(b) *Second Survey of Research in Education* (1972-1978) (Society for Educational Research and Development, Baroda, 1979.)
