CHAPTER – II

REVIEW OF RELATED LITERATURE

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CHAPTER – II

REVIEW OF RELATED LITERATURE

Any scientific investigation starts with a review of the literature. The main objective of a review of the literature is to have an understanding of the trends of research in the field and about the gaps in research if any. Therefore, this chapter devoted to achieve the aforesaid objective by highlighting the related studies conducted in India and abroad; its general conclusion and present study.

2.1 STUDIES CONDUCTED ABROAD:

Binet (1857-1911): In the beginning of the present century, a very important step in the development of the Individual Intelligence Tests was taken by Alfred Binet who established in France the first psychological laboratory in 1889. Working with Simon a physician, Binet developed an intelligence test for diagnosing slow learners and mentally retarded children in Paris Schools. The test is known as Binet - Simon scale, first published in 1905. The test consisted of 30 items which were arranged in ascending order of difficulty. The difficulty level was determined empirically by administering the test to 50 normal children aged 3 to 11 years and to some retarded children and adults. The test was designed to cover a wide variety of functions, with special emphasis on judgement, comprehension and reasoning, which Binet regarded as essential components of intelligence. In 1908 Binet
and Simon revised the scale, and it was the first Age-scale which had created interests among the psychologists. Binet and Simon further revised the scale in 1911 in which the age-range was extended from three years to adult level. The first important revision of the Binet-Simon was done by Terman and his associates at Stanford University in 1916 and was known as Stanford-Binet scale. The test included 90 items with many changes and modifications and was restandardized on an American sample of 1400 in which 1000 were children and 400 were adults. The most important aspect of this revision was the concept of I.Q., which for the first time introduced in a psychological test. In 1937 Terman along with Merrill did the second revision of the 1916 Stanford-Binet scale and commonly known as 1937 Binet. This revision comprised of two equivalent forms-L and M. The third revision of the Stanford-Binet scale was done again in 1960; and is known as L-M form, incorporating the best items from the 1937 revision. The items were grouped into different age levels of 3 to 8 years, average adults and superior adults. In the year 1972 the scale has been restandardized on a sample of 2,100 cases. Norms were derived from three new samples. This edition retained most of the advantages of the earlier editions which reflects intervening developments in both theoretical conceptualizations of intellectual functions and methodology of test construction. This edition is designed for use from the age two to the adult level. The fourth edition, sometimes referred to as Stanford Binet Fourth Edition was released in 1986. The test population consisted of over 5,000 people between the ages of 2 years to 23 years 11 months. It differs from the earlier versions of the test because it gives sub test scores in the four areas as well as a single composite IQ score.¹

¹ http://www.answers.com/topics/intelligence/personality-research.org/
Wechsler Scales (1939)²: Wechsler developed a scale known as Wechsler-Bellevue scale for children above 10 and adults. The scale consists of ten subtests of which five were verbal and five were non-verbal tests or performance test. In 1955 the Wechsler Bellevue scale was revised and renamed as the Wechsler Adult Intelligence Scale or WAIS, which consisted of eleven subtests- six were verbal and five were non-verbal or performance scales. The scale was standardized on the sample of 1700 individuals; age levels 16 to 64. Raw scores on each subtest are transformed into a normalized standard score with a mean of 10 and SD of 3 and thus, each subtest score becomes directly comparable. The test yields a separate IQ for the verbal test by adding these scale or standard scores on all the six subtests and a separate IQ for the performance tests by adding scores on all the five subtests. A Full score scale is obtained by adding the scaled score on all the 11 subtests and on the basis of the Full scale score, the Full scale IQ is computed. Subsequently, these standard scores are expressed in the form of the Deviation IQ with a mean of 100 and SD of 15. The purpose of expressing the scores in the form of DIQ is to know the extent to which the scaled or standard scores deviate from the mean of the examinee’s own age group. The manual (73)³Freeman reports split-half reliability coefficients and standard error of measurement based upon results obtained with three groups 18-19, 25-34 and 45-54. There are only slight differences between coefficients found for each group. The reliability coefficients for the three types of IQ are highly satisfactory. Their standard errors of measurement, furthermore, indicate high “absolute” reliability.

³ Ibid. p. 251.
In 1949, Wechsler developed a test known as the Wechsler intelligence scale for children aged 5-15 or WISC. The WISC is very similar to the WAIS except that the items have been remodelled to suit the children's interest. It comprises of 12 subtests, of which two are used as alternative or supplementary tests provided time permits. Like the WAIS the subtests are grouped into 6 verbal scales and 6 performance scale. The WISC is scored as the WAIS. The raw score for each subtest is determined and subsequently, each is transformed into a normalized standard score with a mean of 10 and SD of 3. After that, standard scores for the verbal subtests and performance subtests are added separately and for both the verbal and performance subtests separately. Then three sets of standard scores are converted into the Deviation IQ with a mean of 100 and SD of 15 to yield verbal IQ, Performance IQ and Full Scale IQ.

In 1967 Wechsler has also developed a scale known as the Wechsler Preschool and Primary scale of intelligence, WPPSI to measure the intelligence of the children aged 4-6 1/2 years. The WPPSI items are similar to WISC. The scale has 11 subtests of which 6 are verbal scales and 5 are performance scales. The method of computing IQ is similar to WISC. Raw scores on each subtest are first converted into standard scores with a mean of 10 and SD of 3. The sum of the standard scores for verbal, performance and full scale is calculated and then transformed into the Deviation IQ with a mean of 100 and SD of 15.

In 1974 the revised edition WISC-R was published designed for 6-16 years old. The current versions published under the name of Wechsler after his death are- the Wechsler Adult Intelligence Scale-Revised 1981 age span 16-74, the Wechsler Intelligence Scale for Children-third edition 1991 age groups 6-16 years and 11 months, and the Wechsler Preschool and Primary Scale of Intelligence-Revised 1989 age group 3-7 years and 3 months. The fourth
edition of the WAIS-IV was released in 2008 by Pearson\(^4\). It composed of 10 core subtests and five supplemental subtests, with the 10 core subtests comprising the Full Scale IQ. It was standardized on a sample of 2,200 people in the U.S. ranging in age from 16-90. An extension of the standardization has been conducted with 688 Canadians in the same age range. The median of Full Scale IQ is centered at 100, with a SD of 15. In a normal distribution, the IQ range of one SD above and below the mean (i.e between 85 and 115) is where approximately 68% of all adults would fall.

*Cattell (1930)\(^5\)* constructed and standardized the group and individual intelligence test for children of the age 2 months -30 months. The objective of the test was to measure individual intelligence in a manner designed to reduce, as much as possible, the influence of verbal fluency, cultural climate and educational level. The reliability of the test was calculated by odd-even number method and corrected by Spearman Brown formula. Coefficient ranged from a low of 0.56± 0.05 at the age of three months, to a high of 0.90± 0.01 at 18 months. The median coefficient was 0.86 ± .02.

In 1960, Cattell devised the test in format of scale 1, 2 & 3 designed in form A & B. The scale is meant for children of 4-8 years and scale 2 & 3 are for adults. The reliability of the test in full form (A & B) and in short form (A) for scale 2 was estimated by applying three methods of consistency over items, consistency over parts and consistency over tomes on different on different samples. The reliability coefficient of correlation of scales 2 in full form (A & B) was found to be 0.87, 0.80 and 0.84 and in short form (A) was found to be 0.76, 0.67 and 0.73 respectively. The reliability coefficients of correlation of scales 3 in full

\(^4\) http://en.wikipedia.org/

form (A & B) were found to be 0.85, 0.82 and 0.82 and in short forms (A) were 0.74, 0.70 and 0.69 respectively. The validity of the test was studied by the methods of concept validity and concrete validity. The validity coefficient of correlations of scale 2 in full form (A & B) was found to be 0.85 and 0.77 and in short forms (A) were 0.81 and 0.70 respectively. The validity coefficients of correlations of scale 3 in full form (A & B) were found to be 0.92 and 0.69 and in short forms (A) were 0.85 and 0.66 respectively.

*Raven (1936)* developed a Standardized Progressive Matrices Scale. It is a non-verbal test and was devised to measure ‘immediate capacities for observation and clear thinking’ with the help of figures. The scale has been revised many times. There are 60 problems grouped under 5 sets, arranged in progressive order of difficulties. The scale measures the whole range of intellectual development from early childhood to adulthood. The scale can be applied to any age group and individually as well to groups. The scale was standardized on a sample of 6 to 65 years of age. The test-retest reliability varies from 0.83 to 0.93. It correlates 0.86 with Terman-Merrill Scale. It has a ‘g’ saturation of 0.82.

*Thurstone (1938)* developed the Primary Mental Abilities (PMA) tests and published by American Council of Education. The tests were designed in two forms-Chicago long (two hours) and short form (45 minutes). The test were constructed for use primarily at the high school level. The battery of tests consists of 11 tests, selected from the 60 tests tried out experimentally on 1154 pupils after using factor analysis. A second experimental battery of 21 tests was tried out on 437 subjects and factorially analyzed. These 11 tests measure six primary mental abilities — (i) Verbal reasoning, (ii) Special

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abilities, (iii) Number ability, (iv) Memory ability, (v) Reasoning and (vi) Word fluency. These have been arranged in booklets which can be administered in school periods. The validity coefficient of the test was estimated by correlating with university examination grades. Traxler (1941)\textsuperscript{8} ascertained that the reliabilities of the original PMA tests were high, estimating by both split-half and test-re-test techniques. The inter-correlation of the tests was reported 0.20 to 0.90, the mean being 0.49

*Goodenough-Harris Drawing Test (1963)*\textsuperscript{9} made a revision of the good enough Draw-a Man Test, together with a similar Draw-a Woman and an experimental Self-Drawing scale. The man and woman figures that the examinee is instructed to draw are scored for bodily and clothing details, proportionality among the various body parts (e.g. head to trunk), and other characteristics, rather than according to artistic merit. The test is untimed but usually takes from 10 to 15 minutes to complete. Norms for children from age 3 to 15 years are reported as standard scores and percentile ranks, separately for boys and girls.

*Kuhlman and Anderson (1963)*\textsuperscript{10} developed an intelligence test for children age group KG to grade 12 levels. The test is in verbal and non-verbal form. Each level takes 50 to 70 minutes to administer. Different norms of cognitive skills quotient, standard scores, percentile and Stanine scale from different grade and age were established on the verbal and non-verbal.

\textsuperscript{8} Ibid., pp. 432-435.
\textsuperscript{10} Ibid., p. 172.
Otis and Lennur (1967)\textsuperscript{11} developed the Mental Ability Tests on review of certain tests in the Otis Services, the Otis Self Administer Tests of Mental Ability and the Otis Quick Scoring Mental ability Test. The test was therefore, known as Otis-Lennon Mental Ability. The tests composed of a variety of items to measure the general mental ability. The six levels of the tests extend from Primary I (last half of kindergarten) through advanced grades (10-12). Testing time varies from 30 to 45 minutes, depending on the level. The norms, which are based on a national, sample 200,000 pupils, are expressed as mental ages, deviation IQs, percentile ranks and Stanine by age and grade.

Bayley (1969)\textsuperscript{12} published a well constructed test for the earliest age levels, known as the Bayley Scales of Infant Development and now available in its second edition (Bayley-II – Bayley, 1993)\textsuperscript{13}. The Bayley-II Scales provide three complimentary tools for assessing the developmental status of children between the ages of 1 month and 3\(\frac{1}{2}\) years: the Mental Scale, the Motor Scale and the Behaviour Rating Scale. The Mental Scale samples such functions as sensory and perceptual acuities, memory, learning, problem-solving, and vocalization, the beginning of verbal communication and rudimentary abstract thinking. The Motor Scales provide measures of gross motor abilities such as sitting, standing, walking and stair climbing, as well as manipulatory skills of hands and figures; items that assess sensory and perceptual-motor integration are also included. The Behaviour Rating Scale is designed to assess various aspects of personality development such as emotional and social behaviour, attention span and arousal, persistence and goal directedness. It has a 5 point scoring system for each item and descriptors specific to the behaviour being rated. The

\textsuperscript{11} Ibid., p. 172.
\textsuperscript{13} Ibid., p. 237.
Behaviour Rating Scale, which is completed by the examiner after the other two parts have been administered, is based on information obtained from the child's caregiver as well on the examiner's own impression. Norms were established on 1,700 children, including 50 females and 50 males in each of 17 age groups between the ages of 1 and 42 months only normal children were considered for the sample. The Mental and Motor Scales yield separate developmental indices, expressed as normalized standard scores with a mean of 100 and SD of 15. These indices are found within the child's own age-group, classified in 1 month intervals up to 36 months and in 3 months interval thereafter. The Behaviour Rating Scale yields percentile rank scores that are, in turn, categorized as 'Non-Optimal', 'Questionable' or 'Within Normal Limits'.

_Mc Carthy (1972)_14 developed a scale of children abilities known as the Mc Carthy Scales of Children Abilities (MSCA) suitable for children between the ages of 2½ and 8½ years. It consists of 18 tests, giving the examiner multiple opportunities to observe the child's approach to a variety of problems and stimuli. The tests are grouped into six overlapping scales: Verbal, Perceptual-Performance, Quantitative, General Cognitive, Memory and Motor. The General Cognitive score, based on 15 of the 18 tests in the battery, comes closest to the traditional global measure of intellectual development. This General Cognitive Index (GCI) is a normalized standard score, reported in the same units as traditional IQs (with a mean of 100 and SD of 16) and found within each 3-months age group. In the development of the MSCA the term IQ was deliberately avoided because of its many misleading connotations. The GCI is described as an index of the child's functioning

14 Ibid., pp. 239-240.
at the time testing, with no implications of immutability. Scores on the 5 additional scales are based on the same age groups and have a mean of 50 and SD of 10.

_Henmon-Nelson (1973)_\(^{15}\) the Henmon-Nelson Tests of Mental Ability was devised by Henmon and Nelson. The tests cover four grade-levels: grades 3 through 6, 6 through 9 and 9 through 12 (Form I) and Kindergarten through grade 2 (Primary Battery). A college-level edition of the tests is also available. Each of the three levels of Form I consists of 90 items arranged in spiral-omnibus format, including items on scrambled words, verbal analogies, verbal classification, verbal inference, number series, arithmetic reasoning, figure analogies and following directions. Testing time for Form I is 30 minutes. The norms, which are based on a random sample of 35,000 pupils tested in 1972, are expressed as deviation IQs, Stanine and percentile ranks by grade level. The Primary Battery test is untimed but usually takes 25 to 30 minutes. It is composed of three subtests: a listening test of thirty general information items, a picture vocabulary test of thirty-five items and number test of twenty-three items. The Primary battery was standardized on 5,000 pupils. Scores are expressed as deviation IQs, Stanine and percentile ranks by grade level.

_Mc Crow (1981)_\(^{16}\) developed a California Test of Cognitive Skills (TCS), a successor to the well known California Short Form Test of Mental Maturity and the Short Form Test of academic Aptitude. The test composed of four subtests: Sequences, Analogies, Memory and Verbal Reasoning- at five grade levels (2-3,3-5,5-7,7-9,9-12). In addition to age or grade percentile rank, Stanine and standard score norms for each subtest, the combined scores on all four subtests may be converted to a Cognitive Skills Index (CSI).


\(^{16}\)Ibid., p. 173.
Scores on the test may also be used in combination with scores on the Comprehensive Tests of Basic Skills (CTBS-U and V) or the California Achievement Tests (CAT & D) to determine anticipated achievement at successive elementary and high school levels.

*Thorndike & Hagen (1982)*\(^{17}\) devised a Cognitive Abilities Test (CAT) for primary levels. The test consists of a Primary Battery for kindergarten through grade 3 and a Multilevel Edition (A-H) for grades 3 through 12. The Primary Battery was designed to assess cognitive development on primary school by use of pictorial materials and oral directions. There are two levels, Primary I (kindergarten to grade 2) and Primary II (grades 2-3), with two forms at each level. The four subtests at each level - oral vocabulary, relational concepts, multi-mental (one that does not belong to the others), and quantitative concepts - take 12 to 16 minutes each and are administered in four separate sessions. New national norms (deviation IQs, percentile ranks, Stanine scores) were obtained.

*Kaufman & Kaufman (1983)*\(^{18}\) developed the Kaufman Assessment Battery for Children (K-ABC) designed primarily to access the abilities of children. The K-ABC was standardized on a national sample of 2,000 children aged \(2^{1/2}\) to \(12^{1/2}\). Additional groups of Black and White children were tested to develop socio-cultural norms for race and parental education that may be used as a supplementary interpretive aid. The design and organization of the K-ABC was also intended to accommodate the testing needs of special groups and to aid in the diagnosis of learning disabilities. The battery yields four global scores: Sequential Processing, Simultaneous Processing, Mental Processing Composite (combining the two) and Achievement. Each of these is a standard score with a mean of 100 and an SD of 15.

In 1990\textsuperscript{19} the Kaufman Brief Intelligence Test (K-BIT) was developed by Kaufman & Kaufman. It was designed as a quick screening instrument to estimate the level of intellectual functioning. The K-BIT covers the age range of 4 to 90 years. The scale was standardized on a sample of 2,000 cases. The test consists of one verbal subtest of 45 Expressive Vocabulary items and 37 Definitions and one non-verbal subtest of 48 Matrices. The three scores (verbal, nonverbal and composite) yielded are expressed in terms of deviation IQ units, as are those of other Kaufman scales. Reliability of the test with other tests was estimated. Norms were also established.

In 1993\textsuperscript{20} the Kaufman Adolescent and Adult Intelligence Test (KAIT) was devised by Kaufman & Kaufman. The KAIT was designed as a measure of intelligence for ages 11 to 85 years or older. It represents an attempt to integrate the theory of fluid and crystallized intelligence articulated by Horn and Cattell with notions about adult intelligence proposed by other theorists. The battery is composed of a Crystallized Scale, which measures concepts acquired from schooling and acculturation, and a Fluid Scale, which taps the ability to solve new problems. The core battery consists of three subtests from each scale. An expanded Battery, intended for use with individual suspected of neurological damage, can also be employed by adding any of four specified subtests. The KAIT also includes a brief Mental Status test to assess attention and orientation in examinees that are too cognitively to take the full battery.

\textsuperscript{19} \textit{Ibid.}, p. 225.
\textsuperscript{20} \textit{Ibid.}, p. 225.
Hashmi (2000)\textsuperscript{21} constructed and standardized an Intelligence Test in Urdu for the middle level students of classes VI –VII of the age group 11+ to 12+. The test was administered on a sample of 12,120 students taken from the schools of Bahawalpur, D.G. Khan, Multan and Sargodha divisions. The test contained 10 sub-tests. To find the reliability of the test K-R formula, K-R 20 and K-R 21 for class VI & VII were used. Coefficient of correlation was computed for internal reliability of the test. Thurstone Model of Multiple Factor Theory of Intelligence was used.

Hussain (2001)\textsuperscript{22} constructed and standardization a verbal group test of intelligence in Urdu for adolescent’s age group 17 – 20 years. The test comprised of 128 multiple choice items was standardized on 1080 candidates of PMA Long Course centre, Rawalpindi. The reliability of the test was determined by Kuder Richardson Method, Split-half and test-re test method. The result suggests high reliability of the test. The validity of test was established and evidenced of high validity of the test.

Khan (2006)\textsuperscript{23} constructed and standardized Verbal Group Test of Intelligence for the students of age group 14 to 16 years. The final test consists of 60 items of 4 subtests: analogies, series (number & alphabetical), classification and word building. The test was administered on a sample of 10,000 children of the Province of Punjab and Islamabad. The reliability of test was explored by using split-half and K-R methods. The values of


\textsuperscript{23} Mahammud Khan: “Construction and Standardization of a Verbal Group Test of Intelligence for the Age Group 14 to 16 Years”. Ph.D Thesis, University of Arid Agriculture, Rawalpandi; 2006.
correlations of all parts were 0.44, 0.39, 0.43 and 0.48 respectively. The different parts of the values were from 0.68 to 0.96. The mean and SD of the whole test were worked out.

2.2 STUDIES CONDUCTED IN INDIA:

There has been a marked trend in the number of studies in test construction in India during the past twenty-five years, and the first Indian doctorate in this area was awarded to Desai (1954). In the present study the abstracts of related studies have been categorized in four categories, such: (a) Verbal group tests of intelligence, (b) Non-verbal group tests of intelligence, (c) Performance tests of intelligence, and (d) Adaptation of foreign tests.

(a) Verbal Group Tests of Intelligence:

Jalota (1952)\(^{24}\) standardized a Verbal Group Test of Intelligence in Hindi. The test has been standardized on high school students of Allahabad in U.P. It consists of 100 items which covers such areas as vocabulary, information, number sequence, analogy, classification, best answer, coding etc. The test has been used in many studies covering children from Hindi speaking states.

Desai (1954)\(^{25}\) constructed and standardized a Battery or Group Test of Intelligence in Gujarati for the students of 12 to 18 years studying in standard VII to XI of secondary schools. The test was standardized on a sample of 4755 boys and 4770 girls from various classes of Gujarati medium schools. The test re-test reliability coefficient of the test was .77 and split-half was .94. Age-wise and grade-wise distribution was worked out. The

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correlation coefficient of IQs with examination marks was .42, with teacher’s estimate .53 and with Shukla’s adaptation of the Stanford-Binet Intelligence scale was .82.

Pillai (1955)\(^{26}\) constructed a General Mental Ability Test in Malayalam for school children. The test was standardized on a sample of 2000 students of the upper, middle and lower social strata representing Malayalam speaking children. The test consists of seven subtests yielding separate scores.

Mehta (1958)\(^{27}\) revised his own test of intelligence in Hindi and standardized it with Rajasthani School going children age range 12 to 14 years. Its split-half reliability coefficient was .93 and that by K-R formula was .91. The correlation coefficient of test scores with school marks was .44

The Central Institute of Education (CIE) Delhi (1959)\(^{28}\) developed and published a Verbal Group Test of Intelligence in Hindi. The test is intended to measure verbal intelligence of 13 years old school children of Delhi coming from Class VIII and above. The final version of the test consists of 85 items grouped under 12 subtests and was standardized on 1214 sample including 633 boys and 581 girls. The validity of the test was assessed on a sample of 174 in two ways: correlation of test score with teacher’s estimate of children’s intelligence (r = .60), and with the score on a Hindi-translated version of a Non-verbal test of intelligence (r = .71). The reliability is established in two ways: split-half reliability (r = .94) based on odd-even items and test re-test reliability (r = .87).

\(26\) Ibid., p. 214.  
\(27\) Ibid., p. 214.  
Kapat (1960)\textsuperscript{29} constructed a Group test of intelligence in Bengali for children of grade V- VII. The test consists of 75 items: 40 non-verbal and 35 verbal. The test included five subtests yielding separate scores. The split-half reliability coefficient for different subtests ranged between .76 to .80 and that of the entire battery was found to be .90. The validity coefficient of the test ranged from 0.32 to 0.70. Separate grade and percentile norms were established.

Pandey (1961)\textsuperscript{30} constructed and standardized a Group test of intelligence in Nepali for children of class VIII to X. The test was standardized on 2694 students of Nepali speaking children representing different social strata of Nepal. The reliability coefficient of the test with K-R formula 21 was ranging between 0.83 and 0.89 for different classes. The ‘g’ factor loading on various elements of the test ranged between 0.54 to 0.74.

Pathak (1961)\textsuperscript{31} constructed a Group test of intelligence in Marathi for the age group 9 to 13 years. The test was standardized on a sample of 10738 students of Bombay, Puna, Ratnagiry, Thane and Surat schools. The reliability of the test with test re-test was 0.89 and the validity of the test against Kamat’s test was 0.74.

Joshi (1961)\textsuperscript{32} developed a Group test of intelligence in Hindi for school and college going students. His test format was verbal omnibus spiral group point scale. The test was standardized on students of grades VIII to XII. The reliability coefficients ranged from .81 to .86 for different class levels and all the seven sub-tests were found to be highly saturated with ‘g’.

\textsuperscript{29} M.B. Buch: First Survey of Research in Education, Centre of Advanced Study in Education, M.S. University, Baroda, 1974, p. 214.
\textsuperscript{30} Ibid., p. 214.
\textsuperscript{31} Ibid., p. 214.
\textsuperscript{32} Ibid., p. 214.
Bhatt (1962)\textsuperscript{33} designed his scale for Gujarati children of standard V to VII belonging to urban, semi-urban and rural cultures. The test was partly verbal and partly non-verbal and was standardized on a sample of 5173 boys and 4649 girls drawn from 58 schools representing urban, semi-urban and rural schools in Gujarat. The reliability coefficient of the test was computed by K-R formula, split-half method, Gauttman’s formula and Rulon’s formula and it ranged from .91 to .98. The correlation of this test with Desai’s Group Test of Intelligence was .88 and with Shukla’s adaptation of the Stanford Binet Intelligence scale was .82 and with Joshi’s Group Test of General Mental Ability was .68.

Hundal and Singh (1963)\textsuperscript{34} devised their scale for Punjabi speaking children. The scale was administered on a random sample of 1882 student of age group 13 to 17 years selected from the schools in the Punjabi speaking areas of Panjab. The tests re-test reliability coefficients for different grades ranged from .87 to .90 and the validity coefficient against academic achievement was .83. Singh’s group test of general mental ability was mainly on adaptation of the Jalota’s General Mental Ability Test in Hindi. Out of seven subtests, five were taken from Jalota’s scale and only few were developed fresh. The test was standardized on a sample of 2985 school going students of classes VIII to X of schools in Punjab. The split-half reliability coefficient was .93 and correlation coefficient with school marks varied from .41 to .50 for different subjects.

Agnihotri (1965)\textsuperscript{35} constructed and standardized a Verbal group test of intelligence in Hindi for the age group 11+ in Madhya Pradesh. The test consists of 100 items in nine subtests and was standardized on 2000 students of 57 schools. The reliability coefficients

\textsuperscript{33} Ibid., p. 213.
\textsuperscript{34} Ibid., p. 214.
worked out by using K-R formula was .94. The validity was established by correlating the
test scores with the class teacher’s rating on a five point scale; the validity coefficient was
0.63. Norms were prepared on the basis of Age allowances method. The time required for
administration of the test was 45 minutes.

Patel (1966)\textsuperscript{36} constructed an intelligence test contained Verbal and as well as
Figural items covering reasoning, perceptual memory, numerical and spatial relations
aspects of intelligence. The test was standardized on a sample of students in the age range 13
to 16 studying in grades VIII to XI of schools in Gujarat. The reliability coefficient of the
test by test re-test was .87 and by split-half was .99. The validity coefficients with other test
of intelligence in Gujarati and examination marks ranged between .68 to .80.

Kaul (1966)\textsuperscript{37} developed a Group test of intelligence in Urdu for the age group of 12
+ to 16 + in Kashmir. The test was standardized on a sample of 5872 pupils of 31 schools of
three districts in Kashmir. The split-half reliability coefficient of the test was .94 and by test
re-test method .90 The correlation coefficient of the test score with teacher’s estimate was
.52 and that with the Raven’s Progressive Matrices .77.

Ahuja (1966) & Ahuja (1969)\textsuperscript{38} constructed a Group test of intelligence in English
for Bombay children in age group of 13 to 17 and 9 to 13 years respectively. The Ahuja
(1966) test was standardized on 10132 children drawn from 53 schools on the stratified
random basis. Age and grade norms were worked out and deviation IQs were computed. The
test re-test and split-half reliability coefficients were .84 and .97 respectively. Correlation

\textsuperscript{36} M.B. Buch: \textit{First Survey of Research in Education}, Centre of Advanced Study in Education, M.S.
University, Baroda, 1974, p. 213.
\textsuperscript{37} Ibid., p. 214.
\textsuperscript{38} Ibid., p. 214.
coefficient of the test with the school marks was .53, with teacher’s judgement .61 and with other intelligence tests; it varied from .55 to .80. The Ahuja (1969) scale was administered to 10373 students, randomly selected from 53 English medium schools of Greater Bombay. Age norms and grade norms were worked out separately for boys and girls. The reliability coefficient by test re-test and split-half techniques were found to be .85 and .94 respectively. 

The validity coefficients against examination marks and teacher’s judgement were .49 each, with Nafde’s non-verbal Test was .56 and against the Ahuja’s Group Test of intelligence (1966) was .73

Oak (1967)\textsuperscript{39} constructed and standardized an Omnibus self administering battery of group test of intelligence. The final form of a test consists of 95 items arranged in an omnibus spiral form. The test was administered to 4350 boys and 3596 girls of classes VII to XI age group 11+ selected randomly from 18 schools of Bombay city. The stability and internal consistency coefficients were found to vary from 0.84 to 0.93 and 0.88 to 0.94 respectively. Validity coefficient against teacher’s judgement and annual examination marks for each school separately (predictive Validity) were found sufficiently high. The test scores were also correlated with the Otis Advanced Examination (r=0.65), the Army Alpha Test (r=0.82), the Desai’s Intelligence Test in Gujrati (r=0.82) and the Nafde’s Non-verbal Test of Intelligence (r=0.51).

Bora (1969)\textsuperscript{40} developed an Omnibus type verbal group test of intelligence in Assamese for pupils of classes VII to X of schools in Assam. The test items were based on foreign tests like the Otis Group Test of intelligence, the Pressey Group Point, the Army

\textsuperscript{39} Ibid., p. 244. 
\textsuperscript{40} Ibid., p. 213.
Alpha Test, the Terman Group Test of intelligence and the Thorndike Intelligence Examination. The test was administered on 1193 girls and 2028 boys of Greater Guahati areas. The test re-test reliability coefficient was 0.94 and by K-R formula 20 was 0.89. The split-half reliability coefficient varied from 0.91 to 0.96 for different classes. The coefficient correlation of scores on the test with Hermon-Nelson Tests of Mental Ability, Grade 9-12, Form A, 1957' was 0.73.

*Patel (1970)*[^41] constructed and standardized Verbal group test in Gujarati for children of 14 + to 16 + years of age. The test consists of only verbal items related to series, analogy, synthesis and classification functions. The test was standardized on a sample of 4471 students. The test re-test, split-half, K-R and various other methods were applied to estimate the reliability of the test which varied between 0.82 and 0.97. The validity of the test with school marks was 0.54.

*Shah (1975)*[^42] constructed and standardized an Omnibus test of intelligence for Gujarati speaking children of Greater Bombay between the age group 13 + to 16+. The final form of the test was administered to 4640 students of standard VIII and IX. The reliability coefficient obtained ranged from .77 to .88 for different groups. The validity of the test was established against Desai’s group Test of Intelligence, a Scholastic Aptitude Test and a Non-verbal Test of intelligence.

*Pillai (1978)*[^43] constructed and standardized a Verbal test of Intelligence in Tamil for the age group 10+ to 15+. The test was standardized on a sample of 5,000 pupils selected from thirty-four schools; using stratified proportionate sampling. The test included seven

[^41]: Ibid., p. 248.
[^43]: Ibid., p. 500.
subtests: synonym, antonym, analogy, classification, mixed words, reasoning (verbal) and reasoning (numerical). On the whole there were 110 test items. The test re-test reliability was found to be 0.84 and the split-half reliability was 0.88. The content validity was considered on the basis of various types of behaviour assessed by the subtests. Norms were determined in respect of the total sample, grades and age groups.

Thakur (1979)\textsuperscript{44} constructed and standardized a Verbal Group Test of Intelligence in Assamese for students reading in classes V to VIII on Assamese medium of high and higher secondary schools of Upper Assam. The test consists of seven subtests- logical selection, analogies, number series, synonyms-antonyms, proverbs, classifications and best answers. The final version of the test was administered to 3,039 boys and 2,243 girls adopted a stratified sampling technique. The reliability coefficients obtained by test re-test, split-half and rational equivalence methods for the entire sample and for the different classes of boys and girls separately were found to range from 0.89 to 0.97. The validity coefficients ranged between 0.87 to 0.97. The ‘g’ saturation obtained for all the seven subtests ranged from 0.39 to 0.90

Patel (1981)\textsuperscript{45} constructed and standardized a General ability test for standards XI and XII for Gujarati speaking students of higher secondary schools of Gujarat state. The test consists of two parts. Part One tested the student’s familiarity with the world around him through his experience in home, school and community. There were test questions in various fields of Indian culture, science, social science, community affairs and arts. Part Two avoided any culture content. It presented geometry drawings designed to test the student’s

\textsuperscript{44} Ibid., p. 508.
\textsuperscript{45} Ibid., p. 498.
power of abstract reasoning. This part of the test presented an equal challenge to all students regardless of their cultural background. The standardization sample consisted of 5,725 students studying in the higher secondary schools of Gujarat state. The coefficient of reliability ranged between 0.71 and 0.87 by different methods. The validity coefficients of the test with other tests of intelligence were 0.68 and 0.79. Factor loadings revealed that the test was heavily loaded with ‘g’ factor. Age norms and grade norms were established and deviation IQs and percentiles for the test were computed.

Bhatt (1981)\(^{46}\) constructed and standardized a Verbal Reasoning test for the students studying in grades VIII to IX of secondary schools in Saurashtra, Gujarat. The test was standardized on the sample of 5,449 students selected from sixty-six schools of sixty-six different places of Saurashtra region by the stratified random sampling technique. The items were constructed on the lines of the DAT. The final form of the test consists of sixty items. Descriptive statistics like central tendencies, SD and skewness were worked out. Percentile scores, standard scores, T-scores and Stanine were developed. Reliability was established by test re-test, split half and Kuder Richardson formulas 20 and 21. The reliability coefficients were 0.82, 0.93, 0.91, and 0.82 respectively, validity of the test was established by correlation with intelligence tests, aptitude tests like abstract reasoning, numerical ability and verbal reasoning.

Shah (1981)\(^{47}\) constructed and standardized a Verbal Reasoning test for the students of standard VI and VII in Saurashtra. The final test was administered to 9,382 students of 200 schools. The reliability of the test was established by test re-test, Rulon formula, K-R

\(^{46}\) Ibid., p. 477.
\(^{47}\) Ibid., p. 502.
and Flanagan formula. The reliability coefficients of correlations were found to be 0.88, 0.89, 0.86, 0.92 and 0.84. The three types of validity established were construct validity (0.72 and 0.52), concurrent validity (0.88 and 0.80) and predictive validity range from (0.22 to 0.36).

Rathor (1983)\(^{48}\) constructed and standardized a Group Test of Intelligence (verbal & non-verbal) in Oriya for the children of age group 8+ to 12+. The verbal form of the test contained seven parts namely, general information, arithmetic problems, logical reasoning, verbal comprehension numerical series, verbal relations and vocabulary. The non-verbal form included seven components like similarities, figure analogies, seeing the opposites, classification, progressive series, story sequences and matrices. For standardization of a sample of 2500 students studying in classes IV to VIII of Orissa state were taken. The split-half reliability of the test varied from 0.84 to 0.94 in the verbal test and 0.78 to 0.83 in the non-verbal test for different age groups. The K-R 21 reliability coefficient ranged from 0.80 to 0.91 for the verbal test and from 0.79 to 0.88 for different age group students. The validity coefficients against Cattell’s CFIS-2 Form A, ranged from 0.50 to 0.75 and 0.63 to 0.76 for the verbal and non-verbal respectively. With Raven’s Coloured Progressive Matrices, the validity coefficients varied from 0.64 to 0.71 and 0.61 to 0.70 for verbal and non-verbal respectively.

Nair (1984)\(^{49}\) constructed and standardized a Battery of tests for measuring Intelligence of Indian children between the age group 2 months and 6 years in big cities like Bombay and were fluent in English. The study was conducted on 1084 children from sixteen


\(^{49}\) Ibid., p. 555.
schools in the city of Bombay. The test consists of problems involved thinking and reasoning, viz., classification, mixed sentences, sentences completion etc. The age norms, grade norms and validity of the tests were established. Percentile ranks, Stanine scores, sigma scores, standard scores, T-score, SD, Mean correlation coefficient and standard error were computed. The reliability of the test was calculated by the split-half method using the Spearman-Brown Prophecy formula, Rulon’s formula and K-R formula. The coefficient of reliability as calculated by the above formula ranged from 0.75 to 0.89

*Mishra (1985)*\(^{50}\) constructed and standardized a Verbal Group Test of Intelligence in Oriya for the age group 12+ to 15+. The items of the test were verbal analogy, verbal reasoning, vocabulary, general information and numerical relations. The final test was standardized on the sample of 2000 boys and girls chosen on a stratified random basis. Split-half, test re-test and other reliability coefficients were calculated. Age norms, percentile norms and other norms were calculated. The reliability indices were split-half: 0.89 and 0.90, test re-test 0.79,0.81, 0.80 and K-R reliability Form A:0.84 to 0.84. Form B: 0.82 to 0.86 and whole 0.90 to 0.92 The Current validity with Cattell’s Culture-Fair Test Form Scale II was 0.63, 0.58 and 0.58 for form A,B, and whole test respectively.

*Veerabhadraiah (1985)*\(^{51}\) constructed and standardized a Verbal and Non-Verbal Group Test of Intelligence for Kannada pupils of standards V to VII in the age group 10+ to 13+ with special reference to Karnataka state. The final test consisted of four verbal and four non-verbal subtests was administered to 3250 boys and equal number of girls drawn from 50 government and private schools as well as urban areas of 11 districts of Karnataka.


The reliability of the test was measured by test re-test, $r=0.88$; split-half $r=0.97$. The test was validated against total marks obtained in the preceding annual examination $r=0.64$; teacher’s estimate of intelligence $r=0.59$ and M.G. Premalatha’s Non-verbal Test $r=0.58$. Correlation between verbal and non-verbal subtests was found to be 0.71 and internal consistency of tests was found out by canonical correlation method using Hotelling’s Principal Component method. The test was analyzed factorially and eight factors were extracted. The relation between the occupation of parents and the intelligence of children was found out $r=0.41$ and relation between caste and intelligence was studied $r=0.24$.

Banmalidas (1987)\textsuperscript{52} constructed and standardized a Scientific Aptitude Test in Oriya for the 10\textsuperscript{th} class students of Orissa. The test consists of four components namely: general intelligence, reasoning ability, operational ability and scientific knowledge. The final form of the test battery had 215 items in total. The reliability coefficients for all the four components were 0.81, 0.91, 0.92 and 0.80 respectively. The validity of the test battery for making predictions was computed on the achievement scores of science and mathematics. The four subtests correlated significantly with science and mathematics achievement scores and the correlation coefficient ranged from 0.29 to 0.81. The norms were established on the basis of standard scores with a mean of 50 and SD of 10.

Usha (1989)\textsuperscript{53} constructed a battery of tests based on Guilford’s SOI model for standards VIII, IX and X. The author selected this model on the ground that it gives wider concept of intelligence and specifying the nature of tests for minute intellectual functions. In final study 4,322 subjects were considered for the normative study. Effective sample size for

\textsuperscript{52} Ibid., p. 550.
\textsuperscript{53} Ibid., p. 550.
each test ranged from 148 to 151 in item analysis study and 248 to 512 for the development of final versions. The statistical techniques used included point bi-serial correlation, pass percentages, G index agreement ‘d’ score ANOVA and ‘t’ test. The statistical techniques for internal consistency included split-half and rational equivalence. Further, the factor analyses by principal component method and Varimax rotation were also used on 196 students of grade IX. The indices of internal consistency and homogeneity were mostly satisfactory. The independence of factor was evidenced in the product wise analyses. The content wise and operation-wise analyses yielded some higher order factors common to products in the same content category.

*Tarni (1994)*[^54] constructed and standardized a Verbal and Non-verbal Group Test of Intelligence for pupils of classes IX and X. The test was administered to 4500 students, 2700 males and 1800 females. The test consists of four subtests: words, classification, word analogy, best answer and test reasoning. Tests re-test, split half and rational equivalence reliability coefficients were 0.78, 0.85 and 0.91 respectively. The external validity coefficients against SEM as 0, 50, against VRT as 0.84 and against VNART as 0.87. The internal validity of test with split-half reliability coefficient was 0.92. Norms were established on the basis of Z-score for male and female separately.

*Lalhmingliana (2005)*[^55] constructed and standardized a Verbal Group Test of Intelligence in Mizo language for the age group 13 to 16+ years of Mizoram state. The test consists of 100 items was administered on a sample of 3600 students. For estimation of


[^55]: Lalhmingliana: “Construction and Standardization of Verbal Group Test of Intelligence in Mizo Language”, Mizoram University, Aizawl, 2005.
reliability of the test, split-half and K-R reliability were computed. The coefficient correlation was found to be 0.73. Using Spearman-brown formula, the split-half reliability of the test as a whole was 0.84. The K-R 21 reliability coefficient was found to be .82. The test was validated against the expert’s opinions on rating scale. The validity of the test was also studied by correlating the test score with two external criterion tests Viz. Ahuja’s Group Test and Cattell’s Culture Fairs Test of Intelligence.

(a) Non-Verbal Test:

In the area of Non-verbal tests of intelligence, Phatak (1955)⁵⁶ made a pioneering study of Good Enough’s Draw-a-Man Test and developed a new scoring method in her standardization of the test for Gujarati children. Validity of the new scoring plan was established by correlating the scores with Kamal’s Intelligence Test and correlation was found to be 0.50. The reliability of scoring system by re-test method was 0.81. Norms were developed on 722 drawing of children in the age group 6+ to 8+. Validity of the major scoring points was tested by simple criterion of increase of the scores at successive ages.

Nafde (1961)⁵⁷ prepared a Non-verbal test on a model of NIIP 70/23 and test of Abstract Reasoning (DAT). The test was administered to 10,000 boys and girls mainly from the high schools of Bombay city. The sample included college students of science and arts as well of engineering and medicines and some post graduate students The split-half reliability was found 0.88 and by re-test 0.91 The validity of the test were 0.47, 0.54 and 0.35 respectively. Age norms, class norms and IQ distribution were worked out.

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⁵⁷ Ibid., p. 238.
Premelatha (1962)\(^{58}\) designed a battery of Non-verbal test of intelligence for children of 7 to 13 years of age. The test was standardized on a sample of 7841 boys and girls drawn from rural and urban areas of Mysore state. The split-half reliability of the test was 0.97 and the K-R 0.99. The test was correlated with school marks (0.37, teacher’s estimate (0.35) and a standardized verbal test of intelligence in Kannada (0.69).

Shah (1964)\(^{59}\) developed a Non-verbal measure of intelligence and standardized it on Gujarati children of the age group 7 to 13 years. The reliability was found to be 0.96 by the method of rational equivalence, 0.94 by the re-test method and 0.70 against a verbal test 0.55, against examination marks and 0.53 against teacher’s estimate.

Jain (1965)\(^{60}\) developed a Non-verbal test which was based on Spearman’s two factor theory. The test with a parallel form was administered to 1000 cases which included students of Delhi region who had appeared for the higher secondary examination, and applicants for commission in the officer cadre of the Defence Services. The correlation between the scores on the two forms of the test was 0.80. Factorial study demonstrated that the two forms of the test had high ‘g’ saturation.

Bhavsar (1967)\(^{61}\) prepared a Non-verbal test for high school students of grades IX to XI corresponding to 13 – 18 years of age. A sample of 3184 boys and 2718 girls drawn from 44 schools of Gujrat was used for standardization. Age norms, grade norms and sex norms were worked out. The reliability of the test was found to be 0.91 and split-half was 0.93. The

\(^{58}\) Ibid., p. 238.  
\(^{59}\) Ibid., p. 238.  
\(^{60}\) Ibid., p. 238.  
\(^{61}\) Ibid., p. 240.
test correlated 0.61 with the Desai’s Group Test of Intelligence, 0.79 with Desai Bhatt’s and 0.77 with Nafde’s Non-verbal Test.

Nair (1970) developed a Non-verbal of intelligence and standardized it on a sample of 5252 students of class VIII to X selected from twelve educational districts of Kerala. Reliability by test re-test with an interval of three months, one month and one week was 0.76 (N=246), 0.75 (N=124) and 0.80 was (N=121) respectively. By rational equivalence method the reliability of the test was found to be 0.86 (N=100). The test was validated against the Raven’s Progressive Matrices, the Kerala University Verbal Group Test of Intelligence, teacher’s rating and school marks and the correlation varied from 0.21 to 0.78 for a sample of 256 students. Deviation IQ norms and sex norms were worked out.

Trivedi (1972) constructed a Non-verbal group test of general ability for students of grades VII to IX in Haryana of the age group 12+ to 14+. The test was standardized on a sample of 2483 students. The re-test and split-half reliability of the test were found to be 0.94 and 0.97.

Patel (1974) constructed a Non-verbal test with items in pictorial form designed to measure individual differences in intelligence for children studying in grade V to VII. The author reported that intelligence of the children increases with age, reliability of the test decreased with increase in time interval and pupils who scored well were good at arithmetic.

Nepal (1977) constructed and standardized a non-verbal group Test of Intelligence for Nepalese adolescents, using a random sampling technique of 1,650 boys and girls in the

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62 Ibid., p. 240.
63 Ibid., p. 240.
64 Ibid., p. 240.
age range of 13 to 17 years. The final form of the test consists of eighty items. Age-wise and grade-wise, percentile and Stanine norms were computed. Test reliability was computed in terms of test re-test, split-half reliability and rational equivalence. It ranged from 0.759 to 0.933. Content validity was estimated in terms of phi-coefficient of each item against criterion of total scores which ranged from 0.58 to 0.83. Intrinsic validity of the test was 0.966. Concurrent validity was estimate against the criteria of Koh’s Block Design Test (0.635), Alexander’s Pass-along Test (0.62 and examination marks (0.635).

Shah (1981)\textsuperscript{66} constructed and standardized a Spiral Omnibus Type Group Non-verbal Test of Intelligence for grades VIII to XII, age group 13 to 17 years. The test consists of six types of nonverbal tests namely: similarities, classification, analogies, series, conditions and matrices. A sample of 3,612 pupils of Gujarat was selected by the method of random sampling. The reliability of the test was estimated by test re-test method for different age groups ranged from 0.80 to 0.95. The tests re-test reliability for separate tests ranged from 0.60 to 0.80. The split-half reliability fro different age ranged between 0.80 to 0.87. The validity of the test was obtained by correlating the test with Bhasvar Non-verbal Test, Desai-Bhatt verbal Test., school examination marks and teacher’s opinion, which were 0.88, 0.90 0.57 and 0.78 respectively.

Bureau of Psychology (1982)\textsuperscript{67} constructed and standardized a Non-verbal group Test of Figural Ability for 12 + students. The test consists of four subtests. The test was standardized on a sample of 1.130 students of class VIII in Allahabad. The test –retest reliability coefficient ranged from 0.6 to 0.7. The concurrent validity was established by

\textsuperscript{66}Ibid., p. 502.
\textsuperscript{67}Ibid., p. 478.
using Form Relation Test developed by NIIP, London. The concurrent validity coefficients were fairly high. Thus, the reliability and validity data revealed that the test was highly reliable and valid.

Chatterji & Mukerji (1982) constructed and developed a Non-language test of intelligence for children reading in class VIII in ten boys' and seven girls' schools in Calcutta. The test was administered on 1,305 children. The test consists of sixty two items: analogy, classification, opposites and picture arrangement of the revised version. The reliability, validity and norms were determined. The reliability coefficients computed by K-R formula were found to vary from 0.51 to 0.83 for different parts of the test. Inter-correlation among the part scores were found to range between 0.30 and 0.56. Correlation between different parts of the test and the marks obtained in the annual examination in different school subjects were positive and significant at one percent level. Concurrent validity study results proved that the test measured verbal ability though the medium used was non-verbal. The factor analysis study indicated two different factors viz. verbal reasoning factor and verbal relation factor. Percentages of total communality for verbal reasoning and verbal relation factors were 66.4 and 33.6 respectively.

Ao (1993) constructed and standardized a Non-verbal group test of intelligence for the age group 13 to 17+ students in Nagaland. The final form of the test consists of nine subtests and was administered on a sample of 2396 students of Nagaland. The reliability of the test was estimated with sample of 599 by the method of K-R formula. The reliability coefficient by split-half was found to be 0.90, 0.92, 0.33 and 0.94. The validity of the test

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68 Ibid., p. 479.
was estimated with Jalota’s Group Test of General Mental Ability for construct validity by Pearson’s Product Moment formula was found to be +0.88. Norms of percentile, Stanine and DIQ were estimated.

(b) Performance Tests:

Bhatia and Tandon (1964)\textsuperscript{70} developed two forms: Form A for the age group three to five and Form B for the age group six to thirteen. The scale was standardized on a stratified sample of 1100 children in the age range from 3 to 13 of Moradabad town. The reliability of the test by split-half and K-R 20 for Form A ranged from 0.87 to 0.95 and for Form B it varied between 0.91 and 0.93. The test was validated against parents and teacher’s estimate of child ability.

Bhattacharya (1964)\textsuperscript{71} devised a battery of four performance tests of intelligence for the age group 8 to 22 years. The test included the Dearbon’s Form Board Test, The Alexander Passalong Test, the Goddard’s cube Construction Test and the Koh’s Bloch Design Test. The battery was validated against verbal intelligence scale prepared by Calcutta University.

Patel (1973)\textsuperscript{72} constructed a Performance scale of intelligence for the age group 6+ to 15+ in Gujarati. The test was standardized on 400 students. The test was validated factorially following the principal axes method. The three curves of mental growth for boys, girls and the mixed group were found to be regular.

\textsuperscript{71} Ibid., p. 240.
\textsuperscript{72} Ibid., p. 240.
Chakraborty (1979)\textsuperscript{73} constructed and standardized a Performance Test Battery of General Mental Ability for the children of age group six to ten years studying in classes I to V. A battery consists of six tests: Stringing Bead Pattern, Picture Sequence, Picture Assembly, Object Profile, Block Design and Symbol Substitution were standardized on a sample of 1000 children selected from 84\% of the total subdivisions of Manipur. The reliability coefficients of the battery and its tests (except Symbol Substitution) were estimated by K-R formula. For the symbol substitution test reliability coefficient was calculated by re-test method. The reliability coefficients were found to range from 0.66 to 0.91. The standard errors of estimate were found to vary from 0.017 to 0.056.

Patel (1979)\textsuperscript{74} constructed and standardized a Group Performance Test of intelligence for the students studying in classes VIII to X of rural and urban secondary schools in the eight districts of Vidarbha region. The final test consists of forty problems to be solved in 45 minutes and the test was standardized on a sample of 1920 boys and girls. Factorial analysis indicated that the test was a uni-factor one. Grade-wise, percentile norms, T-score norms and Stanine norms were fixed. Test re-test reliability was found to be 0.73, 0.77, 0.76 and 0.71. Reliability coefficients by K-R formula in respect of five samples ranged from 0.80 to 0.90 with an average of 0.85. Validity coefficients with other standardized tests of intelligence and with school marks ranged between 0.36 and 0.61.

\textsuperscript{74} Ibid., p. 499.
(c) Adaptation of Foreign Tests:

Attempts have been made to adapt some foreign tests for use in India. These are WISC, WAIS, Stanford - Binet test, Good-enough's Draw-A-Man test, Otis-administering Test of Mental Ability, Maslow's security - Insecurity and Culture Free Intelligence Test-Scale.

Malin (1964)\(^{75}\) worked out the first Indian adaptation of WISC for the students of age-group 6-15. Only verbal subtests were modified to suit Indian conditions and the performance part was retained as it was in the original WISC. The test was standardized on 656 children. The test re-tests reliability for the verbal part was 0.92, for performance scales 0.93 and for the full scale 0.91. The scale was validated against teacher's rating's 0.61, Draw-A-Man Test 0.71 and the California Test of Mental Maturity 0.63.

Pathak (1966)\(^{76}\) adapted Draw-A-Man Test for Indian children. The test was standardized on 7536 students of the age group 6 to 10 for Gujarati children. The validity of the test has been established against developmental trends, scoring points and some external criteria. The reliability of the test re-tests method ranged from 0.57 to 0.92.

Ramalingaswami (1969)\(^{77}\) adapted the Performance scale of WAIS. The test was standardized on a sample of 605 literate adults of both sexes in the age group 15 to 45 years representing Delhi's population. Reliability coefficients for subtests: picture completion, block design, picture arrangement and object assembly were worked out by using the formula Coefficient Alpha, suggested by Cronbach. The test re-test method was employed to

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determine the reliability of digit symbol. Total test reliability was determined by Monsier’s formula. The reliability coefficients of individual subtests ranged from .63 to .94. Apart from determining the construct and factorial validities, the test was also validated by comparing the results with those obtained by Wechsler. The results indicated that the test could be considered as a valid measure for assessing the intelligence of an Indian adult.

Yadav (1970) adapted the verbal part of WISC in Hindi. The test was standardized on 700 school going children in the age group of 8 to 12 selected from schools in Delhi. Using Monsier’s formula the reliability coefficients of the total scale was found to be 0.96. The validity coefficients of the total scale against a non-verbal test and other measures ranged from 0.51 to 0.66.

Bhatt (1970) adapted a WISC for Gujarati population. All the twelve subtests were adapted in Gujarati. The scale was standardized on a sample of 440 children of Ahmedabad city in the age group of 5+ to 15+. The test re-test reliability coefficient for the verbal scale was 0.98 and the split-half reliability coefficient was 0.90. For performance scale the test re-tests reliability coefficient was 0.97 and for full scale was 0.99. Validity was established against school marks and other intelligence in Gujarati.

Shah (1971) adapted the 1960’s revision of the Stanford-Binet Intelligence Scale for Gujarati children of the age group of 2+ to 18+. The test was standardized on a sample of 400 children. The reliability coefficient of the test by test re-test method was 0.95 and that by the average difference method was 0.96. Validity coefficients against eight different tests of intelligence ranged from 0.48 to 0.79.

78 Ibid., p. 215.
79 Ibid., p. 215.
80 Ibid., p. 215.
Sheth (1979) adapted Wechsler Adult Intelligence Scale in Gujarati by making changes in the items of WAIS, wherever necessary and standardized on the population of Ahmedabad city. Six subtests were verbal and five subtests were performance tests. The various subtests were general information, general comprehension, arithmetical reasoning, similarities, digit span, vocabulary, digit symbol, picture completion, block design, picture arrangement and object assembly. The sample comprised of 400 adults including women. The raw scores of each test were converted into scaled scores using $M=10$ and $SD=3$. Verbal, performance and full scale IQs were calculated by superimposing a normal probability curve of $M=100$ and $SD=15$ over the distribution of total scaled scores of group of subtests. Reliability of the test was checked by test re-test and split-half method and was found to be very high. Validity of the test was determined by comparing its IQs with IQs on Desai-Bhatt, Cattell Culture-Fair Tests and Raven’s Standard Progressive Matrices and the correlations ranged from 0.37 to 0.90. The correlations of the subtests were factor analyzed by Hotteling’s principal axis method and centroid method and eight factors were extracted, the first of them being G.

Joshi (1982) adapted a Wechsler Preschool and Primary Scale of Intelligence for the children of Ahmedabad in Gujarati. In the adaptation, some changes were made to suit the Gujarati children. The sample for the final norms consisted of 360 children (sixty from each six-month age group) from nine Kindergarten schools of Ahmedabad city. Their performance and total scale IQs were calculated for which deviation the IQ method as used in the original scale was used after converting the raw scores into scaled scores. The

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reliability of the scale was determined by split-half technique for all different age groups and also for individual tests which ranged from 0.28 to 0.94. By the test re-test method, the reliability ranged from 0.63 to 0.93. The validity of the scale was determined by correlating the WPPSI IQs with the Stanford=Binet IQs, Draw-A-Man Test IQs, school marks and teacher’s ratings which ranged from 0.26 to 0.92.

2.3 GENERAL CONCLUSION OF THE PAST RESEARCHES:

Historically, in India, construction of psychological testing was started by the Christian Missionaries up to the year 1921. The first Indian who took the initiative in the construction of Intelligence test was Rice in 1922, who about the year 1929 published his “Hindustani Binet Performance-Point Scale”. The test was an adaptation of the Binet test along with some additional performance tests. The first Indian doctorate in test construction was awarded to Desai (1954) for developing a group test of intelligence in Gujarati. In the area of non-verbal intelligence test, Pathak (1955) made a pioneering study of Goodenough’s Draw-a-man Test and developed a new scoring method in her standardization of the test for Gujarati children. In the area of Performance test, Mehta (1961) developed a pioneering study in a group test of intelligence for students of the age group 11 and 17 years. In the field of adaptation of foreign tests Malin (1964) worked out the first Indian adaptation of WISC for the students of age-group 6-15. From time to time attempts have been made in the development of intelligence test, but their contributions were mostly of the adaptation of foreign tests only. Even today very little original work is done in this area. It was also found that most of the studies are concentrating on general mental abilities. Few studies were found to develop tests based on Spearman’s two-factor theory, Thurstone’s Theory of
primary mental abilities, and Theories on cognitive abilities. Most studies are concentrated on group tests, with the target-group 12-18 years, and classes V to XII. So far very little attentions were given to the infants and adults. Though we have many intelligence tests in the country today, the studies revealed that not all states of the country have attempted to develop tests of their own and most of the tests constructed are in Hindi, Gujarati and in other regional languages. The major reasons for such a situation are: we do not have any common language for all states, the largeness of the country and its huge population and high rate of illiteracy of the general masses.

In comparing with the West, though test development in India started almost contemporaneously with a similar movement in the West, the outcomes have been very different. The reasons are:

(i) Indian tests construction literature is filled with instances of ‘psychometric borrowings’ from the West that are irrelevant and meaningless in our cultural setting. Tests and measurement based on western concepts and their adaptation and use in a different cultural setting can raise innumerable questions e.g. the so called adaptation of foreign tests like the Binet-Simon or Terman-Merrill were no more than imperfect translations of some western tests.

(ii) Heavy dependence on the West in the field of psychological testing has resulted in almost a total lack of concern for specifying in clear terms the construct underlying the test and the theoretical framework of the test developed.

(ii) Psychological testing in the country is not having a healthy progress relates to its origin, as it was in the West, where it originated and grew out of social necessity. In contrast, as Kulkarni and Puhan have rightly observed, Indian research work has
been tool-oriented rather than problem-oriented, having very little to do with problems of human beings for whom the tools were supposedly developed.  

(iii) Another common defect of Indian work on test development has been inadequacies in sampling and incomplete description of sample characteristics. The samples on which tests are developed, standardized or adapted and data collected are frequently small, unrepresentative and incidental.

The following observations could be made from the above reviews:

(1) In most of the studies, the samples on which tests were developed and data collected are frequently concentrated on the urban representatives only. Moreover, the sample is not large enough.

(2) Most of the constructed and standardized intelligence tests revealed to have a limited coverage of mental abilities.

(3) Though we have many standardized intelligence tests in the country today, most of those tests are found to have developed for a specific regional languages and cultures.

2.4 THE PRESENT STUDY:

Intelligence testing remained for long the most popular pursuit in all over the World. Though many researches have been conducted in India and abroad, but no full fledged study

could be traced out with respect to the intelligence testing for the Khasis children in Meghalaya. Therefore, the present study has been undertaken on the following grounds:

1. Till today the state does not have any intelligence test constructed in the Khasi language and with respect to Khasi culture.

2. To have a wide coverage of the representatives from both the urban and rural areas, the present study has taken a sample of 3000 students covering all the Khasi speaking districts of Meghalaya.

3. To measure the general mental abilities of the children, the investigator has taken extra efforts to make the present test comprehensive by including different set of intellectual abilities which consists of ten different subtests. The test has included two new kind of intellectual tasks like Akin/Imitative Words and Evaluation of Relationship which could not be traced in any of the previous studies.