CHAPTER 2

DEVELOPMENTAL HISTORY OF INTELLIGENCE TESTING

The Practical Forces
- The Feebleminded

The Theoretical Forces
The Binet - Scale and Its Adaptations
The Wechsler Scales

Intelligence Testing in India
Although the intelligence test, as we find it to-day is the product of the twentieth century, it is interesting to trace its early history and to find some of the factors that led to its development. Like so many other modern sciences intelligence testing also has appeared as the fulfilment of the need in the society.

THE PRACTICAL FORCES

The defectives and the delinquents were the first to arouse the interest of the psychologists because of their peculiarities in mental make-up. The application of the first scales for measuring intelligence was largely restricted to them.

We have no information about the treatment of the feebleminded in Ancient India. Intellectuals were respected and favourably rewarded in the early Vedic Period. The later Hindu and Muslim Emperors followed the same track and patronized the learned. In the early Christian era university of Nalanda and Takshashila were opened for only the few intellectuals. The admission tests were compulsory and only those who showed the necessary intellectual level and special abilities were admitted for specialized courses. Thus the minimum intellectual standard was the necessary pre-condition for such higher studies. But there is no reference any where to the attitude of Indian society...
towards the mentally retarded.

We have little information as to the treatment of feebleminded in ancient Greece and Rome. In general the physically defective were exposed and to the extent that mental retardation accompanies physical defects, they were eliminated. Thus the great mass of mentally retarded, sound in body must have escaped annihilation.

Christianity emphasised charity and mercy which resulted in a decided change in the attitude of society towards the physically and mentally defective. This attitude was marked by sympathy and pity, but was absolutely lacking in scientific understanding. The insane and feebleminded were tolerated but were not given the helpful service.

During the Renaissance Protestantism emphasised the individual and his responsibility for his deeds and misdeeds. This resulted in the sudden change in the attitude of society towards the insane and feebleminded; and there came "the era of whips and chains."

The industrial revolution of the eighteenth century asked for a great demand for child labour. An interesting reference to the feebleminded appears in the customs prevalent in England, where, in order to get rid of imbeciles the authorities often bargained that the mill-owners take
A scientific interest in the insane and feebleminded and a deeper sense of social justice to all classes resulted in the modern attitude. A movement for the better treatment of the insane was prosecuted vigorously during the nineteenth century. The physicians and the psychologists paid their attention to this class and studied insanity and feeblemindedness.

Out of the children who are not entirely normal, deaf children were the first to attract the attention and the special interest, as the calamity of deafness is more striking than that of blindness and feeblemindedness. In the sixteenth century, Ponce de León, in the seventeenth century Juan Pablo Bonet, in the eighteenth century Pereire and in the nineteenth century Abbe de L'Epee and T. H. Gallaudet tried their best to educate deaf children by signs, oral speech, manual-alphabet, lip-reading and speech.

This naturally resulted in the interest of the educators in the blind. Haily in France began definite constructive work in 1798 and Howe in Boston was the first superintendent of the Perkins Institute for the Blind founded in 1833.

Interest being thus directed towards abnormal children, it could not be long before the mentally
defective child, as contrasted with physically defective-ness, would claim attention. It is a fairly safe conjecture to suppose that in the actual work with the deaf and the blind the problem of mental retardation would arise and idiots and imbeciles would have been admitted to deaf and blind asylums. But actually however it was the mere dramatic accident that turned the attention of scientists to the problem of feeblemindedness.

The Feebleminded:

In 1707, a so-called wild boy was found by some hunters in the woods of Gaune, in the Department of Aveyron in France, and was brought to Paris, where he aroused considerable interest. We can consider him the first feebleminded child whose education was scientifically attempted. Though Pinel suspected him imbecile his view was neither shared nor admitted by many other scientific men. The boy, however, aroused the interest of the sensualist philosophers who took it as an admirable opportunity to study the effect of sensations upon ideas in the gradual transition from savagery to civilization.

Itard, the philosophically minded physician of the Institute for Deaf-Mutes undertook the responsibility of educating him. He worked hard and accomplished much but was unable to restore the child to complete normality;
He was much disappointed when he came to know that the boy was imbecile or idiot. He shared the common medical belief that idiocy was incurable and that idiots were "human brutes", and therefore, once sure of a diagnosis of idiocy there was nothing to do but to send the boy as a custodial case unworthy of training. Unfortunately, Itard failed to see that, although the boy was an idiot or imbecile, his course of training had been of great good to him and had made him less of a burden to society then he had been before.

Itard's blunder was corrected by his pupil named Seguin. He carried out the work from the point where Itard abandoned it. In 1837 he commenced the training of a few feebleminded children. In 1842 he was successful in convincing the authorities of the desirability of educating the idiots and imbeciles at the Bicêtre and he was put in charge of the school there. This marked the beginning of state schools for the feebleminded. From this time on the state recognized its responsibility of training these individuals in addition to merely housing and feeding them.

Seguin is also the author of the first standard book on the education and treatment of the feebleminded which was published in 1846. Though presently we do not agree with all the things in it; we must accept that it is the marvalous book showing deep insight into many
aspects. Though we do not agree with the sharp distinction that he has drawn between idiocy and imbecility and between these two and backwardness, his plea for regulating marriage in order to restrict the propagation of feeblemindedness naturally proves his appreciation of the importance of heredity in intelligence. He considered medical profession responsible for its conservative attitude which resulted in the ignorance of such a great problem. He devoted his whole life to work with the feebleminded and by coming to America in 1848 he stimulated directly the work in the United States. In the United States he published in 1864 his English book "Idiocy; Its Diagnosis and Treatment by the Physiological Method."

Other countries like England, Germany and Switzerland followed the example of France and United States and directed their efforts towards the problem. The first state institution for the feebleminded in America was opened in Massachusetts in 1849. New York followed in 1851 and up to the present time there is a record of opening more and more such institutions. Presently most of the countries fully recognize the duty of making some kind of provision for the mentally defectives.

Commencing a little later than the establishment of institutions, was the movement for the separation of the backward and dull children into special class.
started in Halle, Germany, in 1859, with the idea of stimulating the child in order to put him into the regular class later on. This idea was abandoned afterwards because the feebleminded children were not able to keep pace with the normal children. In the United States, the first special class for the mentally retarded seems to have been taken place in Cleveland in 1893. Though the beginning was somewhat earlier it was the first decade of the twentieth century that saw the special classes as the common feature of the ordinary public school system.

The growing interest of the nineteenth century educators and social reformers is visible in the care of the feebleminded and it is towards the end of the century that the first definite interest of the psychologists resulted in the opening of the psychological clinic in the University of Pennsylvania in 1896 under Lightner Witmer. It is for the first time that the necessity of a careful psychological diagnosis of the mental deficiency and its amenability to treatment were emphasised.

THE THEORITICAL FORCES

The opening of Wundt’s psychological laboratory in Leipzig in 1879, made the growth of experimental psychology very rapid. The apparatus and the methods of physical sciences were pressed into the service of the new science.
In the beginning attempts were made to find out the general laws of the normal human mind. During this exploration they were surprised to find the individual differences which were to some extent disturbing factors while arriving at the general laws. After few years only, these individual differences themselves became the subject of interest and study for some psychologists.

Secondly this experimental psychology gave birth and impetus to the growth of clinical psychology in Germany. The German psychiatrists like Kraepelin, Sommer and Ziehen were much influenced by the methods and apparatus of the psychological laboratory, which they applied to the study of insanity.

In the last decade of the nineteenth century a great many studies in individual differences appeared. In the United States Cattell championed the work and while finding out the range of individual differences, he fixed for ever the word "test", for a simple task to be carried out by subjects during the psychological investigation. As early as 1890, while writing on "Mental Tests and Measurements", he pleaded for standardized methods and procedures, and urged upon the necessity for established norms. The tests described by Cattell are mainly that of sensory and sensory-motor type namely tests of vital capacity, strength of grip, vision, reaction time, pain,
memory, imagery etc.; very few of them being tests of general intelligence, they give us the insight into the tests which led later on to intelligence testing.

Bolton and Jastrow helped this movement of mental testing by their memory tests for digits, and tests of sensory, sensory-motor, memory and reaction time. In 1893 Gilbert administered a battery of eight tests and gave age norms showing how the scores increased up to puberty. Bourdon, it seems, used for the first time a cancellation test which has since been widely used. Johnson compared the performances of feebleminded and normal children on the tests. The year 1897 gave us the now famous Ebbinghaus Completion test. The tests that he devised were: (1) rapid calculation; (2) memory for digits and (3) completion of sentences. In 1900 Kirkpatrick tested 500 school children with tests of counting aloud, making vertical marks, sorting cards, interpreting ink spots and so on; and he compared the results with the grades given to the children in school work. In 1901 the report from Wissler who worked under the direction of Cattell at Columbia University came to light wherein the Pearson correlation technique seems to have been used for the first time in comparing test with test, and tests with college grades. In 1903 prior to the Binet Scales, appeared one of the most interesting articles by Kelly on "Psycho-Physical Tests of Normal and Abnormal children."
Therein he clearly states his purpose of finding a simple method of differentiating between normal and abnormal children. His tests are largely physical and he finds in general an increase in motor coordination as intelligence increases; also the lower the intelligence, the more prominent the element of fatigue. Before the appearance of Binet Scales Norsworthy's tests of feeble-minded children are the most significant as, at that early period she gave, what are, in essence, group tests of intelligence and expressed the standing of the child in terms of the variability of the group.

Francis Galton, one of the most versatile of British scientists of the latter half of the nineteenth century, pioneered the Eugenics Movement and provided another great incentive to the study and measurement of individual differences. The very first sentence of his famous book "Hereditary Genius" published in 1869 showed his faith in the inheritance of man's mental abilities wherein he has stated that the mental abilities of human beings are derived hereditarily in the same fashion as the form and other physical features of the body are derived. In this very book he constructed on imaginary scale based upon his theory of a normal distribution of abilities ranging from the highest genius to the lowest idiot. Herein one finds the valuable quantitative concept which broke down the commonly accepted idea of the
existence of specific types such as idiots and geniuses. His concept made it clear for ever that people differ from each other in mental abilities by measurable amounts and cannot be grouped into several distinct specific types. Though he has not devised any specific tests, throughout his work we can see his interest in the measurement of ability.

In order to carry out different types of measurements, in 1884 Galton founded his Anthropometric Laboratory wherein while handling the mathematical data, he expanded the idea of percentile rank and in 1886 he introduced and applied the coefficient of correlation in a simple form. About 1901 Karl Pearson founded the Biometric Laboratory in University College, London and in 1905 Galton founded the Eugenics Laboratory. These foundations firmly established the concept of mental measurement contributing greatly to the mathematical handling of data and the theory of correlation.

The above mentioned practical and theoretical forces culminated in the work of Binet in the first decade of the twentieth century.

The topic of the present thesis being the individual test of intelligence, the present writer thinks it fair to give the brief history of the two well-known individual scales of intelligence - the Binet Scales and the Wechsler Scales.
Alfred Binet was a psychologist whose main purpose was to distinguish between the various groups of children as per their mental abilities. This purpose compelled him to choose complex tests, tests which are much closer to worksamples of life performance than to the psychological measures of Wundt. Around 1890 he was interested in the study of judgement, attention, reasoning and other complex mental processes. Having little idea of the means of mental measurement in the beginning he tried all sorts of the available measures - recall of digits, suggestibility, size of cranium, moral judgement, tactile discrimination, mental addition, graphology and even palmistry. He understood general intelligence as "the tendency to take and maintain a definite direction; the capacity to make adaptations for the purpose of attaining a desired end; and the power of auto-criticism" (Terman, 1916, p. 45). According to him it is in the higher mental processes that individual differences are most marked. These processes distinguish individuals most significantly and characteristically in everyday activities; whereas people show least differences in the simpler sensory and motor processes. Consequently he and his collaborators decided to measure those higher mental processes which can help them in making fine discriminations and distinctions.
among the various individuals. Thus they decided to study and measure the mental functions like memory, the nature of mental images, imagination, attention, comprehension, suggestibility, aesthetic feeling or appreciation, moral sentiments, muscular strength and strength of will, motor skill and visual judgement. According to them the state and performance of an individual on these mental processes would distinguish one individual from another. This was the beginning of tests which later on proved very useful and established firm tradition for the later tests. The fact that ability tests have remained about the same since 1920 proves Binet's worth and insight into mental functions and their measurement. Cronbach has rightly pointed out: "The practical tests of today differ from the tests of 1920 as today's automobiles differ from those of the same period: more efficient and more elegant, but operating on the same principles" (Cronbach, 1964, p. 159).

In 1904 a practical situation in France gave an opportunity to Binet to put his principles into practice. The French Minister of Public Instruction appointed a commission to find out the special ways and means of educating the subnormal children of ordinary schools who were unable to learn through regular instructions. The officials could not entrust the work of segregating the non-learners and feebleminded to teachers and therefore...
asked Binet to assist them in producing a method for
distinguishing the genuinely dull. In order to meet this
demand, the first intelligence scale was constructed by
Binet in collaboration with Simon in 1905.

The scale reflects of course crudely the fundamental
concept underlying all tests devised to measure children's
mental abilities. The differences in mentality and in
brightness and dullness can be identified with differen­
ces in levels of development represented by the average
abilities of various ages. Thus in order to know whether
the mental development of the child is accelerated,
retarded or normal, we must know the levels of intelle­
ctual performance of typical or normal children at each
age. Though the thirty items of the 1905 scale are not
arranged according to age groups, Binet did indicate
several differentiating levels. Children of the primary
schools, of grades just right for their ages were taken
as normal and the norms were based upon the records of
ten cases in each of the 3, 5, 7, 9 and 11 years age
groups. The scale rather crude and tentative enabled the
authors to classify idiots, imbeciles and morons in a
more scientific manner than ever before. The other
significant thing is that Binet was concerned with the
quality of the judgement and reasoning displayed by the
subject during the test situation, a practice widespread
amongst the present-day clinical psychologists.
Recognizing the defects of the 1905 scale Binet and Simon developed a new scale based on their own subsequent investigations and those of the other psychologists. This scale known as the 1908 scale, provided more valid norms based upon a larger and more representative sample at each age group. In this scale there are specific groups of items for each age covering the age range of 3 to 13 and testing greater variety of mental processes. The two significant contributions of the scale are: (1) the grouping of the test items per age was done after wide experimentation and a special statistical method was followed (2) the concept of mental age was presented for the first time.

A number of valuable suggestions and evaluation of 1908 scale by the psychologists of Belgium, Germany, England, Italy, Switzerland and the United States resulted in a new revision of 1911. Most of the changes, in this scale were pertaining to the age placement of the items. The method of scoring was modified and fractions of a year were now used in determining the mental age. A child scoring MA equal to his CA was considered as "regular", scoring MA higher than his CA was considered as "advanced" and scoring MA lower than his CA was considered as "retarded." The 1911 scale is Binet's final contribution to the field of mental testing as he expired in the same year.
Binet's Scale provided high incentive to the American psychologists who freely used his principles, made new innovations and adapted his scale for the American children. H. H. Goddard presented his revisions of the 1905 and 1908 Binet - Scales, in 1908 and 1911 respectively. Yerkes published his point scale revisions in 1915 and 1923. Herring's revision appeared in 1922 and Kuhlmann's three revisions in 1912, 1922 and 1939.

The worldwide known revisions are The Stanford Revisions of Binet - Scales - 1916, 1937 and 1960. Terman and Merrill prepared these revisions in order to provide an adequately standardized instrument for the use in the United States. The sample for the 1916 revision consisted of 2300 children, though the scale below 14 - year level was actually based on the results obtained from 1000 native-born children in California. There are 90 items in the scale covering the age range of 3 to 14; Group of items are added at the "Average adult" and "Superior adult" levels. Item selection was based on the study of the comments and notes of the examiners together with the verbatim responses of the subjects. The validation process included the selection of items on the percentage of subjects passing each test at each age level. It is not necessary to describe the other validation criteria used by Terman.
Though Terman has not included any new concepts or principles, he did extend, refine and adapt the Binet scales so that it can be a better standardized and more valid and reliable instrument for mental measurement. At each age level he included alternate tests which are to be used by the examiner in case he finds any other item or its administration inappropriate. They made new innovations in the scoring system of the scale too. Test item at each age level from 3 through 10 carry credit of two months each. There are no separate tests for 11-year level and 13-year level as the authors were unable to devise one that would indicate a one-year difference at these stages of mental development. Thus eight items at 12-year level and six items at 14-year level cover the credit of two years. The possible highest mental age on this scale is 19.5 and the persons having mental ages above 17 are considered as "Superior adults." Terman designed IQ tables, calculated the IQs for each examined subject, analyzed the distribution of IQs and gave a classification of IQs for groups like genius, very superior, superior, normal, dull, borderline deficiencies and feebleminded.

So far as the basic assumptions, conceptions, methods and principles of age scale are concerned, the 1937 revision does not differ either from 1916 scale or Binet-Scales. The scale consists of two equivalent forms.
(L and M) each of which contains 129 test items covering the age range of 2 to 3 levels of "superior adults." As the rate of mental growth is very rapid during the earlier years of life, the test items for 2 to 5 year levels are grouped at half yearly intervals. Scoring standards and instructions for administering the tests are improved. Though it maintains its verbal character mainly, it does provide non-verbal and performance tests at the earlier age levels; thus devising the test items more carefully below the age level. The authors designed the appropriate tests for ages 11 and 13. The statistical procedures adopted for the purpose of validation are more refined. The discrepancy regarding the Adult IQ of 1916 scale is overcome by fixing up the maximum possible attainable mental age of 22 years and 10 months. The maximum CA in denominator is 15, thus the highest possible IQ on the 1937 revision comes to 152. On the basis of the analysis of the available IQs, the authors gave the revised classification of composite L - M IQs.

The third and the last revision of Stanford-Binet by Terman and Merrill was published in 1960 incorporating both the L - M Forms in a single form. The scale retains all the main features and concepts of the previous scales, the only innovation being the inclusion of the deviation IQs.
The scales measure intelligence regarded as general mental adaptability. The mental functions required in the successful prosecution of the test items are: Visual perception and analysis plus motor development, immediate recall, language development and concept formation, reasoning with abstractions and number concept formation.

THE WECHSLER SCALES

The value and worth of Wechsler Scales lie in their possible aid to psychiatric diagnosis. Wechsler, a clinical psychologist, observed that brain damage, psychotic deterioration and emotional difficulties affect some intellectual functions variously. The best way to observe these specific psychiatric disorders, is to see an individual's relative performance on different subtests. It is an individually administered test which offers some opportunity to observe the nature of the subject's errors, habits of performance and emotional reactions. Performance tests are best instruments for clinical observations. Moreover their little dependence on language and schooling makes them suitable for the evaluation of young children, adults with limited schooling and persons unfamiliar with tester's language. The Stanford-Binet Scales include some performance tests but they are very few in number, and since they are concentrated at the earlier age levels and
therefore do not require complex reasoning. Though they are in agreement with Terman's concept of intelligence, clinical psychologists need more performance tests. Thus David Wechsler sought such items which may fall within the area of general ability at the same time must have sufficiently specific characteristics to outline different types of thinking and performance. The Wechsler Scales differ from that of Binet in many respects. Both the scales - WAIS and WISC - are point scales. The items of a given type are grouped into subtests and are arranged in an increasing order of difficulty within each sub-group of tests. The WAIS (Wechsler Adult Intelligence Scale) contains eleven subtests while the WISC (Wechsler Intelligence Scale for Children) includes twelve subtests. The other characteristic feature of the scales is their grouping of the subtests into verbal and performance types. Thus by combining verbal as well as non-verbal material the scales facilitate the comparisons and contrasts between the two.

Wechsler published his first scale known as the Wechsler - Bellevue Scale - Form I - in the year 1939. It was intended for the use with persons 10 to 60 years old and enables the examiner to get Verbal, Performance and Full IQs. The underlying principle of intelligence is that intelligence does not involve only the ability to deal with symbols, abstractions and concepts but also
the effective use of concrete material and successful
manipulation of objects. He avoids use of mental ages,
thereby avoiding the difficulty of using them with above
average adults. He believed in the general factor theory
of intelligence and that is reflected in his tests and
therefore he expects significant intertest correlations.
The principal criticism leveled against Form - I is in-
adequate and non-representative character of its sample.
The studies of reliability and validity are megre.

A second form of Wechsler - Bellevue Scale, published
in 1946, was also not adequately standardized. The scale
is now replaced by Wechsler Adult Intelligence Scale
The WAIS covers the age range of 16 and above while the
WISC covers that of 5 to 15. So far as the content,
principles of standardization and validation processes
are concerned, both the scales differ only in degree and
not in kind. Both the tests are standardized in a better
way than the original 1939 and 1946 scales and are also
validated adequately. The principal changes incorporated
in WAIS lie in its improved content, more representative
sample and better directions for test administration and
scoring. The sample consisting of 1700 persons - equally
distributed among both the sexes - was selected from the
four widely separated geographic areas. It ranged from
16 years old to 64 years old. The age range was divided
into seven groups and, so far as the geographic areas, race, occupation, urban-rural distribution and schooling were concerned, the number of persons selected in each group was in proportion to the percentages given in the 1950 census of the United States.

The scale consists of eleven subtests, six verbal and five non-verbal. The six verbal tests are: Information, Comprehension, Digit Span, Similarities, Arithmetic and Vocabulary. The five performance tests are: Picture Arrangement, Picture Completion, Block Designs, Object Assembly and Digit Symbol. The Information test includes items like: "What is the population of the United States?" and "How many weeks are there in a year?" Comprehension test includes questions as: "Why do we keep away from bad company?" and "What does this saying mean? Shallow brooks are noisy." The Digit span test presents the digits which the subject has to repeat in forward and backward manner. The Similarities test consists of twelve sets of paired words. The subject is required to say how they are alike. e.g. air and water, poem and statue. The Arithmetic test uses simple verbal problems such as, "How many oranges can you buy for 36 cents, if one orange costs 4 cents?" The subject is required to carry out the items mentally within a reasonably specified time. The Vocabulary test asks the testee to define or explain the words like "fabric", "conceal" and "tirade." In all these verbal
tests the subject is expected to give generalized fairly direct answers.

In the Picture Arrangement test a set of three or more picture in random order, is presented to the subject and is asked to arrange them so as to tell a logical story. Picture Completion test asks the testee to point out an important missing part of an object presented through a picture; e.g. steamship without funnels. In the Block Designs the testee observes the complex whole design presented through a picture, breaks its pattern into elements and arranges the blocks so as to reproduce the same design. The four items - profile, manikin, hand and elephant - included into the Object Assembly test, require almost the opposite mental task. Here the testee observes the parts, thinks in terms of a complex whole and tries to put them together. The Digit Symbol test being the test of speed and accuracy asks the testee to fill in the proper code symbol under each number - quickly but accurately. All the items in performance tests have been imposed with time limit; and the testee finishing the item successfully before time is allotted bonus scores.

The WISC series is a downward extension of WAIS using easier items but having the same subtests with one new maze test added to it.

The administration of the Wechsler Scales is compa-
 relatively easy as the similar items are grouped together and placed as subtests. The skill of the examiner lies in his correct judgment of the verbal answers since sometimes elaboration and explanation of the meaning on the part of the subject is required. Scoring borderline answers requires a good background of psychology on the part of the examiner.

The mental functions involved in the various subtests can be enlisted as immediate recall, long-range retention, association and organization of experience and knowledge, reasoning with abstractions, concept formation in general and verbal concept formation in particular, language development, auditory imagery and visual imagery. The mental processes required by the performance tests can be identified as visual perception its analysis together with synthesis, insight of relationship, synthesis of non-verbal material, visual-motor integration, perception of forms and immediate rote memory.

Factor analysis carried out by eminent persons through various statistical techniques have given factors ranging in number from 6 to 10 but most of them have agreed on four factors namely: (1) a general or 'g' factor known as "eductive" or general reasoning (2) a verbal factor or verbal comprehension (3) "non-verbal" or a non-verbal organization factor and (4) a general, non-specialized memory factor. The most important among this is the general
factor which accounts for about fifty per cent of the total factor loading when all the subtests are taken into consideration.

The Wechsler Scales being point scales, all of their items are scored in points. The items of the Information test are scored as either 1 or 0. The items of some other subtests (Similarities, Comprehension) are scored 2, 1 or 0, depending upon the quality of answers. The scores of tests like Picture Completion, Object Assembly and Picture Arrangement depend not only upon the correct responses but also upon the time taken to solve the problems successfully. Thus the speed of performance is credited with accuracy, quality and objectivity of the answers.

The raw score for each subtest is then obtained and this raw score is converted to scaled score or standard score with a mean of 10 and SD of 3. The weighted scores for the six verbal tests are added in order to obtain verbal score. The weighted scores for five performance tests are added in order to get performance score. The weighted verbal and performance scores are added to obtain full scaled score. The Scaled Verbal, Performance and Full scores are used to get Verbal, Performance and Full IQs respectively. Thus Wechsler completely eliminated the mental age conversion. The conversion of the raw scores into standard scores lies in the possible maximum variation of the raw scores in the several subtests of the
scale. The principle underlying this conversion of raw scores to scaled scores is that all the mental functions tested are equally important. The scaled scores for each subtest is based on a reference group of 500 subjects of the ages 20 to 34. Wechsler introduced deviation IQs with a mean of 100 and standard deviation of 15; a practice which was later on followed by Terman and Merrill who however fixed the mean at 100 but SD at 16. The other well-known feature of WAIS is its "deterioration quotient." Wechsler's belief that certain types of tested mental functions decline. In order to facilitate clinical analysis of the subject's performance on various subtests, Wechsler emphasised "Scatter Analysis." According to his views such an analysis can lead to diagnostic inferences about the personality characteristics, behavioural disorders, psychoneurosis, psychosis etc.

A short scale where some of the tests are omitted and the scores are prorated for the purpose of obtaining an IQ comparable with the full scale, is suggested by some psychologists. An abbreviated version can be used as a time saver for rough screening.

The Split-half reliability and standard errors of measurement are based upon the results obtained with three age groups: 18-19, 25-34 and 45-54. No data about the test-retest reliability is reported by WAIS manual.
Intercorrelations of subtests are computed for the purpose of achieving construct validity. Correlations with Binet Scales, schooling and quality of educational achievement were sought as other criteria of validity. The WAIS distribution of IQs ranges from 45 to 155, which is wide enough to include almost all cases. While discussing the criteria of validation Wechsler states that it has satisfied ratings by selected judges, conformation with the normal mental growth curve and comparisons with overall socioeconomic achievement.

By combining both types of measures - verbal and performance - and covering the long age range of 5 to 64; Wechsler Scales have almost entirely replaced the earlier tests. As the measures and predictors of general mental abilities, Stanford - Binet and Wechsler Scales are almost without any serious competitors. Yet the present writer thinks it fair to mention some other important and well-known individual tests.

1. Columbia Mental Maturity Scale published in 1953, covers the age range of 3 to 12. Each item of the scale consists of three or more drawings printed on a large card and the child is required to point out the one drawing not belonging to others.

2. Goodenough's Draw-A-Man Test is standardized for the age group of 1 to 10. The child is asked to draw the
3. Leiter International Performance Scale (1948) includes tests of perceptual matching, analogies, memory etc. The test is administered with simple directions and the items by themselves require no language. It has many excellent features, suited especially to handicapped children.

4. Merrill - Palmer Scale covers the ages 2 to 5. It uses interesting games, puzzles, pictures etc. for measurement. Some tests involve verbal comprehension and dexterity. Speed is also heavily emphasized.

5. Minnesota Preschool Scale covers the ages of 1½ to 6. Verbal scale includes verbal comprehension, memory tests etc. Non-verbal scale includes form recognition, tracing, picture completion, block building, and simple puzzles. This test is found accurate for ages 3 to 5.

6. Pintner - Paterson Scale of Performance Tests published by Psychological Corporation in 1927, covers the ages 4 to 16. It was the first substantial performance battery. By including the performance tests like object assembly, formboards and Healy Picture completion.
test, it played a major part in research and clinical work prior to the development of the Wechsler Scales.

The other individual tests are not tests of intelligence in the sense discussed till now. They are, rather, scales developed to see the normal development during infancy. An infant does not do things on demand. A one year child cannot be tested on abstract thinking or complex reasoning - because he has not developed adequate and sustained attention and understanding of directions to attempt such types of problems. Therefore the tests for infants are developed primarily to observe the child's response to stimulation. Some of the well known tests developed on this line are the following:

(1) California First - Year Mental Scale, 1933; was developed for ages 1 to 18 months. The items were chosen from other scales and a longitudinal study was carried out by testing 50 infants repeatedly.

(2) Cattell Infant Intelligence Scale published by Psychological Corporation in 1947 was developed for the ages 2 to 30 months. It is a downward extension of Stanford-Binet.

(3) Gesell Developmental Schedules published by Psychological Corporation in 1925 and 1949 were directed by Arnold Gesell for the ages 4 weeks to 6 years.
Infant's behaviour is divided in four areas: motor, adaptive, language and personal-social and the items are framed to see development in each area. Thus, for example, the child is stimulated by placing a block in front of him, and his reactions are observed as representing motor and adaptive development. NCERT, New Delhi has adapted the scale for Indian children through seven centres among which A. G. Teachers College, Ahmedabad was one.

INTELLIGENCE TESTING IN INDIA

Intelligence testing in the present form was not known in Ancient India. Occasionally some kings respected great scholars and gave them prominent places in their courts. Problems of reasoning were put to these scholars and they were required to answer them immediately. Sometimes, time limit of six months or a year was also given for solving the problem, failing which the person was either driven away from the kingdom or was given corporal punishment. But this was done merely for fun. Kalidasa, a famous scholar in the court of king Bhoja, was well-known for his problem solving ability. Very often he was presented with a verse which was to be completed by adding the last line. Stories of the great Moghul Emperor Akbar and Birbal, a witty minister of his court, are well-known examples of intelligence test items of those days.
Gujarati poet Shamaldas has also presented many problems in his poems which require intelligence. But all these were neither scientific nor systematic approaches towards intelligence testing.

The first systematic and scientific work in India was done by C. H. Rice of Lahore who presented his Hindu–Vernacular Binet Performance Point Scale in 1922. In 1934 V. V. Kamat published his Marathi and Kannad revision of the 1916 Stanford–Binet Scale.

So far as the development of intelligence tests in Gujarat is concerned, N. N. Shukla translated in Gujarati V. V. Kamat's adaptation of the 1916 Stanford–Binet Scale and published it in 1949. The scale was standardized on 1247 children of Bombay and Kutch. Presently J. H. Shah is adapting the 1960 revision of Stanford–Binet on Ahmedabad children and the work will be ready within a few months.

The first original group tests of intelligence in Gujarati was constructed by K. G. Desai. He standardized his tests on 10,000 pupils of Std. VII to XI of the age group 12 to 18 of Gujarat and Bombay. His are perhaps the most widely used tests, since more than 1,50,000 school pupils have been tested on his tests. Since Desai Group Tests have been old now, a new omnibus verbal group tests of intelligence is recently published by
K. G. Desai in collaboration with Champa L. Bhatt. The test covers the age range 12 to 18 and is standardized on the pupils of Std. VIII to XI.

Champa L. Bhatt prepared her group tests of intelligence in 1962 and standardized them on 10,000 pupils of Std. V to VIII covering the age range 9 to 14.

G. B. Shah of the Faculty of Education and Psychology, Baroda standardized his non-verbal group tests of intelligence in 1965, on the sample of 6000 Gujarati children of age group 8 to 14. A similar work has also been done by D. M. Bhavsar for children of age group 14 to 18.

In 1957, Premila Pathak, now in the Faculty of Home Science, Baroda adapted Goodenough's Draw-a-Man test for the children of 4 to 10 years. The sample consisted of 561 children. Recently she revised her test on a large sample wherein she has adopted the new method of evaluation.