

MEASUREMENT OF INTELLIGENCE

Psychologists have devised tests to measure general intellectual abilities of people. These tests are called intelligence tests. The widely used tests are: (i) Binet and Simon Test, (ii) Stanford Binet Intelligence Scale, (iii) Wechsler Intelligence Scale, and (iv) Group Tests.

Before we describe the above modern tests of intelligence, we propose to explain the forerunner of modern IQ test. The first person to come out with the idea of measuring intelligence was Sir Francis Galton (1822-1911), an English scientist. For him, the best indication of a person's IQ is the size and shape of his or her head. According to him, intelligence was inherited. He hypothesised that head configuration was related to brain size, and hence related to intelligence.

Galton's approach to correlate size and shape of head to intelligence was not acceptable to psychologists. Size and shape of head were not related to intellectual performance. However, Galton's work did have one desirable effect. He was the first person to suggest that intelligence could be quantified and measured in an objective manner.

Binet and Simon Test. It was in 1904, when psychology was just emerging as an independent field, the French Government requested Alfred Binet to design a test to identify school children who were mentally retarded, so they could be removed from the regular classroom and given special education. Binet agreed and took the help of his colleague, Theodore Simon.

Binet and Simon felt that intelligence should be measured by tasks that required reasoning and problem-solving abilities, rather than perceptual-motor skills. Their test required the child to execute the following tasks:

- Follow simple commands or initiate simple gestures
- Name objects shown in pictures
- Repeat a sentence of fifteen words
- Tell how two common objects are different
- Complete sentences begun by the examiner.

The first version of Binet and Simon's test was published in 1905 and contained thirty items. The test proved to be successful in identifying children in need of special assistance. Encouraged by this success, Binet and Simon broadened the scope of their test to measure varied intelligence among children of normal intelligence. The revised version, published in 1908, grouped items by age, with six items at each level between three and thirteen years. Items were placed at a particular age level if about 75 per cent of children at that age could pass them correctly.³

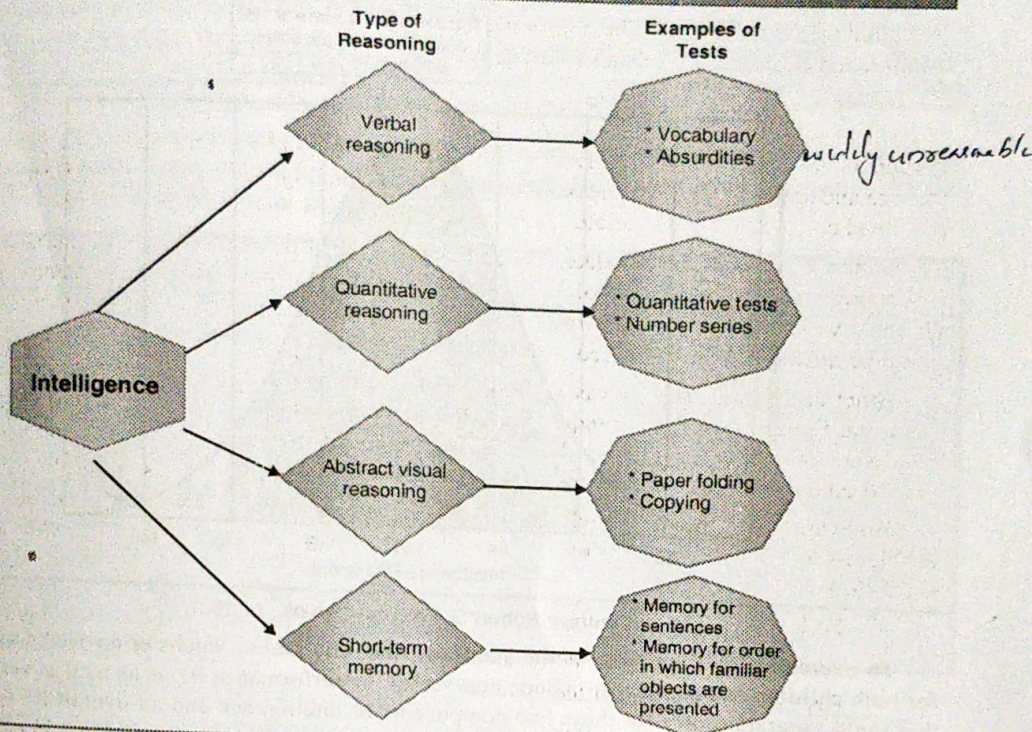
Stanford-Binet Scale: Binet and Simon's tests became widely accepted, revised and adopted for use in the US by Lewis Terman, a Psychologist at Stanford University. The Stanford-Binet test, as it came to be known, gained rapid popularity and was soon put to use in many settings. Over the years it has been revised several times and the latest version is shown in Fig. 6.1.

As shown in the figure, the test measures intelligence of an individual with a composite score made up of four scores for broad types of mental activity: verbal reasoning, quantitative reasoning, abstract visual reasoning, and short-term memory. Each of the scores is obtained through a series of sub-tests that measure specific mental abilities.

Key Term: Nature vs. Nurture Debate: Which is the deciding factor in determining intelligence of an individual? Nature (heredity) or nurture (environment)? The debate ends with an assertion that the heredity component is more significant than environment in determining the intelligence of any person. Narayana Murthy, Steve Jobs or Bill Gates hailed from humble beginnings but became icons in their respective areas. Obviously, heredity factor is more significant in determining one's intelligence.

FIGURE 6.1

THE STANFORD-BINET TEST



(Source: Robert A. Baron, *Psychology*, p.422)

The Stanford-Binet test became widely accepted because it yielded a single score assumed to reflect an individual's level of intelligence. The single score is popularly known as IQ.

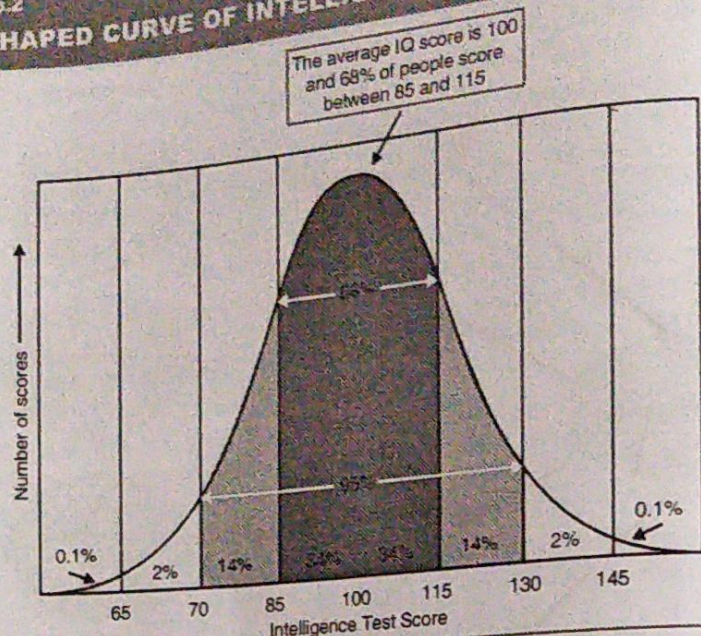
IQ stands for **intelligence quotient** as a 'quotient' is what such scores represent. IQ represents a numerical value that reflects the extent to which an individual's score on an intelligence test departs from the average for other people of the same age. To obtain an IQ, an examiner divides a student's mental age by his or her chronological age, then multiplies by 100. Mental age is based on the number of items a person passes correctly on the test. For each correct item, the individual is awarded two marks. If the individual's mental age and chronological age are equal, his or her IQ is 100.⁴

(An IQ between 90 and 110 is considered to be normal, but above 130 it is considered to be very superior. The person with an IQ below 70 is judged to be retarded. As with many differences between individuals, the distribution of IQs in the population approximates the bell-shaped normal distribution curve. Most cases would fall into the mid-value of the curve, with just a few cases at the left and the right extreme positions on the curve (See Fig. 6.2).

The Wechsler Scales. Though widely accepted, Stanford-Binet Scale had a few gaps, and the major one is the test's inability to include non-verbal activities. The test, by focusing on verbal content, failed to realise that intelligence can be assessed in non-verbal activities also. The other criticism against the Stanford-Binet test is that it did not cater to the needs of adults.

Key Term: Intelligence Quotient: Intelligence Quotient (IQ) represents a numerical value that reflects the extent to which an individual scores on an intelligence test departs from the average for other people of the same age.

FIGURE 6.2
BELL-SHAPED CURVE OF INTELLIGENCE



(Source: Robert S. Feldman, *op.cit.*, p. 263).

To overcome the limitations of the Stanford-Binet test, David Wechsler devised a set of tests for both children and adults that include non-verbal, or performance items as well as verbal ones that yield separate scores for these two components of intelligence and an overall IQ score. The test for adults is called the Wechsler Adult Intelligence Scale (WAIS) (See Table 6.2) and the one for children is called the Wechsler Intelligence Scale for Children (WISC).

TABLE 6.2

SUB-TESTS OF THE WECHSLER ADULT INTELLIGENCE SCALE

Test	Description
Verbal Tests	
Information	Examinees are asked to answer general information questions, increasing in difficulty.
Digit span	Examinees are asked to repeat series of digits read out loud by the examiner.
Vocabulary	Examinees are asked to define thirty-five words.
Arithmetic	Examinees are asked to solve arithmetic problems.
Comprehension	Examinees are asked to answer questions requiring detailed answers; answers indicate their comprehension of the questions.
Similarities	Examinees indicate in what way two items are alike.
Performance Tests	
Picture completion	Examinees indicate what part of each picture is missing.
Picture arrangement	Examinees arrange pictures to make a sensible story.
Block design	Examinees attempt to duplicate designs made with red and white blocks.
Object assembly	Examinees attempt to solve picture puzzles.
Digit symbol	Examinees fill in small boxes with coded symbols corresponding to a number above each box.

(Source: Robert A. Baron, *op.cit.*, p. 423).

Group Tests of Intelligence The tests described earlier are designed for use with one person at a time. There is a need for tests designed to administer to a large number of people at once. This need was felt in the US at the start of World War I, when the armed forces suddenly faced the task of screening several million recruits. In response to this challenge, psychologists such as Arthur Otis developed two tests: **Army Alpha** for persons who could read, and **Army Beta** for persons who could not read or who did not speak English. These early group tests proved highly useful. For example, they were used to select candidates for officers' training school.⁵

As days went by, several other group tests were designed. For example, there are **Otis Tests**, the **Herman-Nelson Tests**, and the **Cognitive Abilities Test**. All are available in versions that can be administered to large number of persons.

SUCCESSFUL MANAGER

EMOTIONAL INTELLIGENCE MATTERS

1. Intelligence shapes the behaviour of an individual while adapting to the environment. It is also a key aspect of how individuals differ from one another in the way they learn about and understand the world.
2. Individuals differ in their intelligence — some are more and others are less intelligent.
3. From success point of view, emotional intelligence is more important than being mere intelligent. Emotional intelligence is a person's ability to: (1) to be self-aware, (2) detect emotions in others, and (3) manage emotional cues and information. People who know their own emotions and are good at reading emotional cues tend to be more effective.

FACTORS INFLUENCING INTELLIGENCE

It is well understood that people differ in intellectual ability. The differences stem from two sources: heredity and environment.

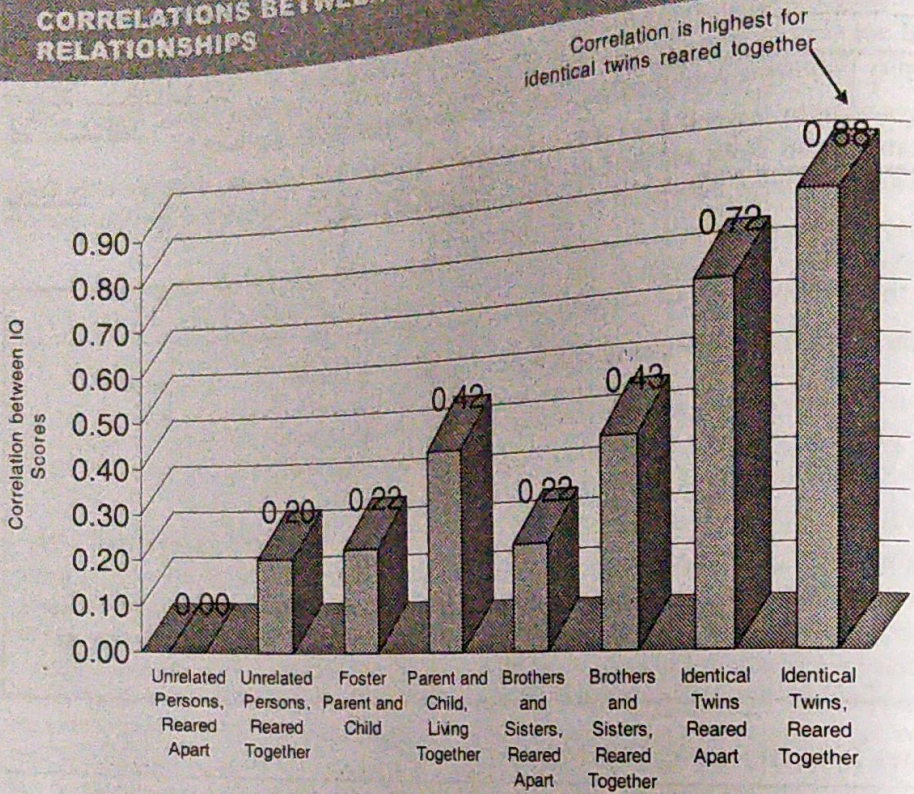
Environment: The environmental conditions likely to determine how an individual's intellectual potential will develop include nutrition, health, quality of stimulation, emotional climate at home, educational opportunities, and appropriate rewards for accomplishments. It has been proved that family environmental factors have significant effect upon childhood intelligence. Further, studies on **environmental deprivation** have proved that intelligence can be reduced by the absence of certain forms of environmental stimulation early in life. Another evidence in support of the impact of environment on IQ is provided by the type of kinship. For a given degree of kinship, or family relationship, individuals raised in the same environment have more similar IQs than persons raised apart, in different environments. Finally, correlation between IQ and birth order is a strong evidence to demonstrate the impact of environment on intelligence. Studies have proved that **first-borns** tend to have higher IQs than **second-borns**, who tend to have higher IQs than **third borns** and so on. This phenomenon occurs because of the **confluence theory**. According to the confluence theory, each individual's intellectual growth depends to an important degree on the intellectual environment in which he or she develops.⁶

While detailing the impact of environment on intelligence, one is reminded of the 'nature versus nurture' debate. In the final reckoning, it is said that the 'nature' (heredity) component appears to be much more important than the 'nurture' (environment) element in explaining IQ variance in the people in general.

Key Term: Confluence Theory: According to the confluence theory, each individual's intellectual growth depends on the intellectual environment in which he or she develops.

FIGURE 6.3

CORRELATIONS BETWEEN IQ SCORES OF PERSONS OF VARYING RELATIONSHIPS



(Source: Robert S. Feldman, *op.cit.*, p. 263).

Heredity: Several evidences have been identified to prove the impact of heredity on intelligence. It has been found that closer the biological relationship of two individuals, the more similar are their IQ scores (See Fig. 6.3). The IQs of identical twins reared together correlate almost +0.90, and those of brothers and sisters reared together about +0.50. It may be stated that higher correlations indicate stronger relationships between the variables.)

Other biological factors correlating with IQ include ratio of brain weight to body weight and the volume and location of gray matter tissue in the brain. Since intelligence appears to be partly dependent on brain structures and the genes shaping brain development, it has been proposed that genetic engineering could be used to enhance IQs, particularly among animals. Experiments on mice have demonstrated superior ability in learning and memory in various behavioural tasks.)

(Age is another biological factor having its impact on intelligence. A decline in performance over time can be attributable to a number of factors. There may be a general deterioration of health, or growing deficiencies of hearing and eyesight.

Besides, as people grow older they may become more cautious and fearful of making mistakes, and this may undermine their test performance. It is said that giving extra time to older people to do the test, or allowing them more time to familiarise themselves with the test procedures, tend to lead to higher scores. In the final analysis, it would be wise to distinguish between those with a defective mental capacity because of an age-related infirmity and those who are not disadvantaged in that way.)