



328en15



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## UNDERSTANDING INDIVIDUAL DIFFERENCES: THE CASE OF INTELLIGENCE

**T**hink about any characteristic of people around you and you will immediately notice that they differ from each other. They differ not only in bodily features like height, skin colour, weight, vision and hearing ability etc. but also in the psychological attributes. In our everyday experience we find that people differ in their motivation, approach to problems, interest and ability to learn. The study of these individual differences forms an important field of psychology. Assessing intelligence, personality, interest, creativity and other attributes with the help of psychological tests has become an established practice. In selecting people for jobs, diagnosing of mental handicap and monitoring psychological development have provided impetus to develop a variety of tests to suit different groups of people (e.g. children, adults, educated, illiterate). The term IQ has now become a common word and people often want to know their IQ and personality. This lesson will help you to learn about the basic features of psychological assessment and understand the nature and assessment of intellectual ability.



### OBJECTIVES

After studying this lesson, you will be able to:

- understand the meaning of psychological assessment;
- describe basic features of psychological tests used in assessment;
- explain the concept of intelligence;
- describe some of the tests of intelligence; and
- suggest various uses of psychological tests.



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## 15.1 NATURE OF PSYCHOLOGICAL ASSESSMENT

Psychological assessment refers to the use of specific procedures employed in evaluating the personal qualities, behaviours and abilities of individuals. These procedures describe people by specifying how they are different from or similar to other individuals. Such assessments are frequently done by most of us when we make judgments such as 'nice' 'good' 'bad' 'attractive', 'ugly', 'genius' and 'idiot'. Needless to say that such judgments are quite often found erroneous on many occasions. Scientific psychology tries to systematize these procedures so that assessment can be made with a minimum error and maximum accuracy. Psychologists often call these procedures as 'tests'. **A psychological test is a structured technique used to generate a carefully selected sample of behaviour.**

In order to be useful for the purpose of drawing inferences about the person being tested or examined it is necessary that the test should be **reliable, valid and standardized**. Let us understand the meaning of these terms. **A test is reliable if it measures something consistently.** For instance if you assess something the scores obtained on separate occasions should be same. If a scale tells two different values while assessing the same object on two occasions, it will be called unreliable. A test of intelligence can be called reliable only when a person scores high on both the occasions.

**The validity of a test is the degree to which it measures what it intends to measure.** A valid test of personality gives a measure of a person's personality and predicts behaviour in situations where that aspect of personality is found important.

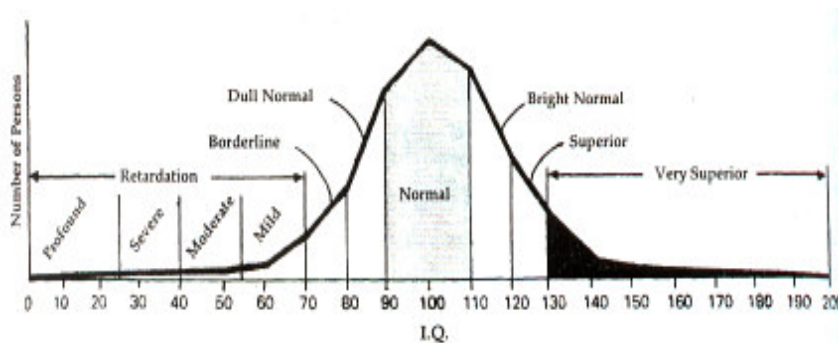
In order to be useful an assessment tool should be standardized. **Standardization involves establishing the procedure of administration of a test to all persons in the same way under the same condition.** It also involves establishing norms so that an individual's score can be interpreted. **Norms involve comparison of a score of a person with those of others in a defined group.** Standardization ensures uniformity and objectivity in the process and conditions of administration. It makes the results of a test interpretable.

Psychologists have developed a variety of tests to measure different human characteristics. In schools we use *achievement tests* which measure what pupils have learned. Psychologists frequently use *tests of ability* and *personality*. The tests of ability to tell what an individual can do when they are at his/her best. These tests measure capacity as potential rather than achievement. Tests of intelligence and aptitude come under this category. Aptitude refers to the ability of a person to learn a particular kind of skill required in a specific situation. Admission tests of

IIT or PMT is an aptitude test. Personality tests measure the characteristic ways of thinking, feeling and behaving.

## 15.2 THE CONCEPT OF INTELLIGENCE

There are very few things which are so obvious and illusive as 'intelligence.' The differences in intellectual achievement are expressed in performance. For instance if we take the marks in school examination of 10<sup>th</sup> grade students it will yield a distribution in which most people show moderate level of performance and very few are on the extremes showing extremely high (excellent) or extremely low (very poor) level of performance. The same is true about intelligence. Fig. 15.1 presents such a distribution. We can see that the Intelligence Quotient (IQ), which has been used as an index of intelligence varies in degrees and very few people have extraordinary level of intelligence. Similarly, very few people come in the categories of profound and severe retardation.



**Fig. 15.1:** Distribution of IQ scores as expected in a large sample

However, when we try to define and measure intelligence it proves to be a knotty problem. Intelligence is abstract in nature. Therefore our access to it is guided by our own theoretical view point. We can not approach and have access to it independent of our theoretical or conceptual models. At present psychologists have many such models which provide diverse views of intelligence. The diversity in defining intelligence is so perplexing that many psychologists have come to define it in terms of "what an intelligence test measures". This complexity is partly due to the fact that many of the intelligence tests were developed before defining of what is being tested. In this connection one may recall the story of the first published intelligence test. Binet and Simon in 1905 were asked by the French Minister of Public Instruction to help in teaching mentally retarded children. These psychologists considered it necessary to measure intelligence for identifying these mentally retarded children. They tested children with the help of a test and compared their scores with the average score obtained by normal children at each age level. Children who were two mental-age years behind their chronological age were considered as "retarded."



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Subsequent to the publication of Binet's first test of intelligence voluminous research on intelligence has been undertaken across the globe. This has resulted in several theoretical views. Before we proceed towards presenting some of these view points it may be mentioned that most researchers relate intelligence to the following broad classes of abilities:

- (a) adapting to new situations and changing task demands,
- (b) learning or profiting optimally from experience or training, and
- (c) thinking abstractly using symbols and concepts.

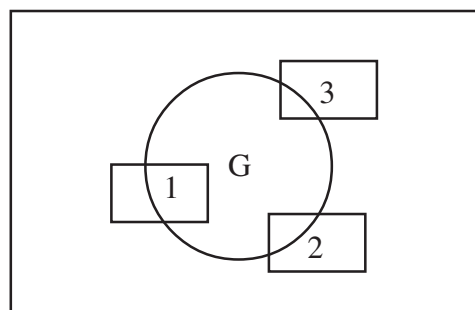
Here it should be made clear that the term 'ability' refers to the currently available power to perform something. The various view points about intelligence may be put into two broad categories namely psychometric or factor theories and process oriented views. Factor theories try to identify the factor(s) constituting intelligence, and process theories describe intelligence in terms of the specific tasks, processes or operations involved in intellectual functioning. Let us examine some of the major view points on intelligence.

### 15.3 FACTORIAL VIEW POINT ON INTELLIGENCE

The composition of intelligence whether it is unitary or multi componential has been a matter of curiosity. Using a correlational technique named factor analysis several researchers have tried to uncover the structure of intelligence.

#### Intelligence as a General (G) Factor

**Spearman** proposed that we possess one general intelligence factor (g) and many specific factors (s) which are specific to particular abilities. The g factor runs across all types of abilities. It is expressed in the ability to understand abstract relations. This view is depicted in Fig. 15.2.



**Fig. 15.2:** *Spearman's model of intelligence*



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### Multiple Factors of Intelligence

**Thurstone** proposed that intelligence consists of 7 factors namely, *verbal comprehension, word fluency, number, space, associative memory, perceptual speed* and *induction* (or general reasoning). He developed a test of perceptual speed and induction (or general reasoning). He developed a test of Primary Mental Abilities (PMA) to measure these factors.

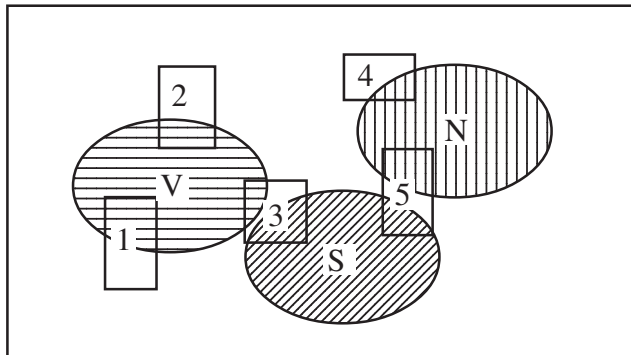


Fig. 15.3: Thurstone's model of intelligence

## 15.4 THE STRUCTURE OF INTELLECT

With a view to provide a comprehensive measure of intelligence Guilford has proposed another view point. He terms it as the structure-of-intellect (SI) model. This model classifies intellectual traits along main three dimensions.

**Operations:** What a person does? Operations include *cognition, memory, divergent production* (creativity), *convergent production*, and *evaluation*.

**Contents:** This refers to the nature of the materials or information on which operations are performed. These include visual, *auditory, symbolic* (e.g., letters, numbers), *semantic* (e.g., words) and *behavioural* and *Figural* (information about person's behaviour, attitudes, needs etc.)

**Products:** This refers to the form in which information is processed by a person. Products are classified into *units, classes, relations, system transformations* and *implications*.

Thus it is clear that the factorial viewpoint presents a view of intelligence in terms of *trait organisation*. The variety of traits thus identified is perplexing. Here, the readers should remember that the traits identified through the technique of factor



analysis are simply an expression of the degree of relationship among behavioural measures. They are descriptive categories. The trait organisation is influenced by the experiential background of the people who are performing the task. The differences found across groups, socio-economic levels and types of school curricula in trait organisation lend support to this view. Looking at the plethora of research using factor analysis Anastasi has rightly concluded that human intelligence consists of *“that combination of cognitive skills and knowledge demanded, fostered, and rewarded by the experiential context within which the individual functions.”*

### 15.5 INTELLIGENCE AS A PROCESS

This view point is related to cognitive science tradition. In particular the information processing model is very relevant to it. It traces the processes of acquisition, representation and use of information in undertaking intellectual activities. Let us learn about some of the models emphasising the process view of intelligence.

#### Triarchic Theory

After rejecting the factorial or psychometric approach **Robert Sternberg** analysed intelligence in three aspects i.e. componential, experiential and contextual. The componential aspect includes those processes which are employed by a person taking a test in responding to the items of standardised intelligence tests. Its constituents include meta component or higher order control processes, performance component, acquisition component and transfer component. The second aspect namely experiential one refers to the way people's mental world and the outer or external world are related to each other. It adds creativity to the notion of intelligence. In reality a person's intelligence shapes his or her experiences. Also, the experience which one has influences intelligence. The third aspect of intelligence is contextual. It refers to the way individuals share their environments, adapt to them and try to get maximum from the available resources. It is also called practical intelligence.

#### Theory of Multiple Intelligences

**Haward Gardner** has argued that there are multiple intelligences. He says that intelligence is not a single entity, rather there are multiple intelligences each distinct from others. He has so far identified eight types of intelligence: linguistic, logical, mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal and natural. The value of these is determined by their relevance to culture in which people live. Different cultures assign different degrees of importance to each of these intelligences.



### INTEXT QUESTIONS 15.1

Choose the correct alternative:

- (i) Scores of a large group of persons on intelligence test will show distribution in which majority will get:
  - a) low scores
  - b) moderate scores
  - c) high scores
  - d) extremely high scores
- (ii) The first test of intelligence is associated with:
  - a) Binet
  - b) Spearman
  - c) Terman
  - d) Raven
- (iii) Who has stated that intelligence consists of multiple factors?
  - a) Thurstone
  - b) Guilford
  - c) Vernon
  - d) Sternberg
- (iv) The view which conceptualizes intelligence in terms of operations, contents and products is known as:
  - a) systems model
  - b) structure of intellect
  - c) hierarchical model
  - d) G factor model



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### 15.6 INTELLIGENCE IN THE NON-COGNITIVE DOMAINS

As can be seen from the preceding analysis the major concern of studying intelligence has been with the rational and cognitive domain. In recent years many





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other aspects have been explored. It would be interesting to briefly refer to some of them. One such concept is of **wisdom**. It comprises a unique blend of cognitive, interpersonal, social and personality attributes. It is achieved as a result of successfully negotiating the conflict between integrity and despair or as a result of transcendence of preoccupation with one's self. It is knowledge that effectively integrates emotional and cognitive components. Another related concept is that of prudence of "practical wisdom". It emphasizes on the practical achievement of personal goals, plans and intentions. It is characterized by a flexible and applied concern for the practical contingencies, specially in the face of uncertainty.

**Social intelligence** has also received attention by the researchers. It represents the efforts of an individual to solve the problems of daily life and work toward the desired goals. Finally, the most recent notion is that of **emotional intelligence**. It is defined as the ability to monitor one's own and other's feelings and emotions, to discriminate among them and to use this information to guide one's thinking and action. People high on emotional intelligence show greater degree of emotional self awareness, manage emotions well, harness emotions productively, have empathy and handle relationships effectively. It has been observed that success in jobs and in the different walks of life depends more on emotional intelligence than IQ. While childhood is a critical time for its development, emotional intelligence is not something fixed at birth. It can be nurtured and enhanced throughout adulthood.

## 15.7 INTELLIGENCE TESTS

Let us familiarise with some intelligence tests. These tests may be classified into verbal and non-verbal (performance) and individual and group tests. The performance tests are used for the assessment in case of illiterates and people with certain types of physical handicap. Individual tests are those which can be administered on one person at a time and group tests can be administered simultaneously on several persons. Some information about certain important intelligence tests is presented below.

### 1. Stanford-Binet Intelligence Scale

The test developed by Binet and Simon for the children in French schools was adopted and revised by Terman and his associates at Stanford University and was published in 1916. Since then this individual test has been revised several times. Now we have the fourth edition of Stanford-Binet (S-B IV) scale. It has 15 tests selected to represent four major cognitive areas: verbal reasoning, abstract/visual reasoning, quantitative reasoning, and short-term memory. The tests are administered in a mixed sequence. The age range covered is 2 Years to 18+. Its administration involves two stages. In the first stage the examiner gives the vocabulary test which helps in determining entry level for all the remaining tests. In



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the second stage the examiner establishes a basal level and a ceiling level for each test in terms of actual performance. The basal level is reached when four items on two consecutive levels are passed. If this does not occur at the entry level, testing continues downward until a basal level is reached. The ceiling level is reached when three out of four or all four items on two consecutive levels, are failed. This is where testing with that particular test is discontinued for the individual.

In earlier edition of this test the scores were interpreted in terms of intelligence Quotient (IQ) as per the following formula:

$$IQ = \frac{MA}{CA} \times 100$$

Here MA stands for mental age and CA stands for chronological age. The concept of IQ has been very popular as an index of intelligence. But in recent years it is being criticised. Now there is a move to develop and use other indices of intelligence.

In the recent version of the test Standard Age Scores (SAS) are given for all the 15 tests. The record booklet of the test provides a chart for plotting a profile of the test taker's SAS performance on each test administered. The use of the term IQ has now been completely abandoned. The test allows examiners to assess separate abilities appropriate for specific testing purposes.

## **2. The Wechsler Scales**

These scales developed originally by David Wechsler deal with the groups of adults, school-age children and pre-schoolers. They are used as measures of general intelligence as well as a possible aid in psychiatric diagnosis. The current version of the test includes Wechsler Adult Intelligence Scale Revised (WAIS-R), which covers the age span of 16 to 74 years; the Wechsler intelligence Scale for children-Third Edition (WISC-III) intended for children aged 6 years to 16 years and 11 months, and the Wechsler Pre-school and Primary Scale of Intelligence-Revised (WPPSI) which covers the range of 3 years to 7 years and 3 months. Out of the 17 different kinds of sub tests 8 are common to all three scales (5 verbal and 3 performance sub tests). The information sub test is the first verbal sub test to be administered in all three scales. The performance subtests of these scales typically require manipulation of various objects, such as puzzles and blocks, or the visual scanning of printed materials like pictures or symbols. Some researchers have proposed short forms of these scales, the raw scores on each of the subtests are transformed into standard scores with means of 10 and an SD of 3. All the subset scores are thus expressed in comparable units. An examinee's performance is evaluated in terms of the appropriate age norms.



### 3. Raven's Progressive Matrices (RPM)

This is a performance test designed to measure g factor or general intelligence. The items consist of a set of matrices, or arrangement of design elements into rows and columns from each of which a part has been removed. The task is to choose the missing insert from given alternatives.

The easier items require accuracy of discrimination; the more difficult items involve analogies, permutations and alternations of patterns, and other logical relations. It is available in three forms differing in the level of difficulty:

- (i) The Standard Progressive Matrices (SPM) is suitable for the ages of 6 and 80 years
- (ii) The Coloured Progressive Matrices (CPM) is for younger children and for special groups.
- (iii) The Advanced Progressive Matrices (APM) is for adolescents and adults,

### 4. Draw-A-Man Test

Developed initially by *Goodenough*, this nonverbal test requires the the test taker to draw or make a picture of a man. Credit is given for the inclusion of individual body parts, clothing details, proportion, perspective, and similar features, Moderate reliability and validity have been reported for this test. In India Pramila Phatak has developed norms for this test.

## 15.8 USES OF INTELLIGENCE TESTS

Since tests are used as a tool in vital decision making about jobs, promotions, school or college admissions there emerge many problems of ethical and procedural kind which require that the use of tests should be controlled. It is recommended that the test is given or administered by a qualified examiner. Also, the scores should be properly used. The general familiarity with the test content should be prevented. This may invalidate the test results. The examiners are required to make advance preparations to maintain uniformity in the procedure. Testing conditions should be proper. The examiners are required to arouse the test takers' interest in the test, elicit their co-operation, and encourage them to respond in an appropriate manner.

At present, intelligence tests are used in many settings to help in a number of activities like selection of people for various jobs, diagnosis of mental handicap, guidance and counselling, and research in the area of intellectual development. A brief description of these uses is as follows.

**Notes****Personnel Selection**

It's a matter of common experience that people differ in the degree of competencies, abilities and interests. Success in a job depends on the fact whether the person applying for a job possesses the qualities required in undertaking a particular job. In this way the process of selection becomes one of matching the characteristics of the applicants with job requirements. Intelligence is considered as something basic to success in all kinds of jobs. As a result in most of the procedures of personnel selection assessment of intelligence constitutes an important component. With the help of intelligence tests applicants' intelligence level is assessed and the results are used by the employer in the process of decision making about the applicants.

**Diagnosis of mental Handicap**

People differ in their intellectual abilities, Those who have a very low level of intelligence are known as mentally handicapped. Such persons experience difficulty in adjusting with the demands of their external environment. They need special care and training. Infact many of them can not communicate or express their needs and have difficulty even in taking care of themselves. Intelligence test along with certain other indicators is commonly used to estimate the degree of mental handicap.

**Guidance and Counseling**

Career of vocational guidance is assuming an important role in the context of education. With the expansion and diversification in our country's educational scenario, selection of a course and career is becoming a tough task for the students, teachers and parents. In this context, psychologists use intelligence tests to assess the capability of the people and use this information in deciding about the choice of career options.

**15.9 EXPLAINING DIFFERENCES IN HUMAN**

While differences in intelligence are obvious the reasons of there differences are till matters of debate. In particular researchers have tried to examine the contributions of genetic or hereditary and environmental factors toward variation in IQ. Studies indicate that the scores of more closely related people are quite similar. In particular the evidence from the studies of adopted children and of identical twins separated early in life and raised in different homes show this trend. The studies of environmental deprivation and enrichment have indicated the effects of environmental factors on IQ. Interestingly females are found to score higher

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than males with respect to verbal abilities while males tend to score higher in visual-spatial abilities. Such differences may reflect the evolutionary history of human species.

Another important issue about the group differences relates to the cultural bias of intelligence tests. It has been argued that many of the tests have been developed in western cultural context. As a result children familiar with western cultural context score higher than those who are not familiar with it.

This is why some efforts have been made to develop culture fair test like Cattell's Culture Fair Test of Intelligence.



Choose the correct alternative:

- (i) Which one of the following does not deal with non-cognitive aspect of intelligence:
  - a) practical intelligence
  - b) social intelligence
  - c) emotional intelligence
  - d) process model of intelligence
- (ii) Intelligence Quotient (IQ) is derived using the following formula:
  - a)  $MA/CA + 100$
  - b)  $MA/CA \times 100$
  - c)  $CA/MA \times 100$
  - d)  $CA/MA + 100$
- (iii) Wechsler test provides a measure of:
  - a) specific abilities
  - b) verbal ability
  - c) processes of intelligence
  - d) general ability
- (iv) An intelligence test must have the following
  - a) norms

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- b) validity
- c) reliability
- d) all of the above

(v) Intelligence tests do not help in:

- a) guidance
- b) personal selection
- c) measurement of learning
- d) measurement of problem solving ability.



- Psychological characteristics are normally distributed in the population. Thus majority of the people are found moderately intelligent and a limited number is found to have very low or very high level of intelligence.
- The study of individual differences is practically important. Intelligence is viewed in many ways depending on the theoretical view point adopted. Some psychologists view it as a trait while others view it as a process.
- The trait approach has also yielded different views. Thus we have single (general) factor, multiple factors, and hierarchical views. On the whole, intelligence appears to be a combination of cognitive skills and knowledge.
- The process view of intelligence considers it in terms of various cognitive processes. Also, there is realization that intelligence is of multiple kinds. The notion of social and emotional intelligence have opened new areas of research.
- Intelligence is assessed with the help of psychological tests which are reliable and valid measures of a sample of behaviour. The first test of intelligence was developed by Binet which was subsequently standardized at Stanford University. The tests may be verbal or performance and can be administered individually or on a group.
- Special tests have been developed for children and the handicapped people. These tests are often used in personnel selection, guidance, diagnosis of mental retardation and research.
- The Indian psychologists have adapted several tests are often used in personnel selection, guidance, diagnosis of mental retardation and research. The Indian psychologists have adapted several tests but much is still desired.
- Psychologists have also developed tests to assess achievement, aptitude and



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1. Show your acquaintance with the different ways in which the concept of intelligence is used by psychologists.



2. Describe the properties of a psychological test used in assessing intelligence.

its possible uses.

### 15.1

- i) B      ii) A      iii) A      iv) B

### 15.2

- i) D      ii) B      iii) D      iv) D  
v) C

## HINTS TO TERMINAL EXERCISE

1. Refer section 15.3
2. Refer section 15.4
3. Refer section 15.4 and 15.5