

GENERAL PSYCHOLOGY II

Unit III

INTELLIGENCE AND SPECIAL APTITUDES

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DEFINITION OF INTELLIGENCE

Intelligence is general term referring to the overall capacity of a person for learning and problem solving.

THEORIES OF INTELLIGENCE

There are groups of intelligence theories. They are

1. Factor theories
2. Process oriented theories.

FACTOR THEORIES

The primary interest of factor theories is in identifying the factor or factors which constitute intelligence.

The question that whether intelligence is a single characteristic or intelligence is a collection of a specific, distinguishable abilities is a center piece of discussion among factor theories.

The following are the different concepts arised out of discussion-

1. There is a single ability underlying the various intelligent behaviors.
2. Intelligence consists of few major factors.
3. Even intellectual tasks involves a totally different ability.

In making decisions about intelligence, theorists used a statistical technique known as FACTOR ANALYSIS. This technique is a way of identifying groups of abilities that are related to one another.

Let us briefly explain the factor theories of intelligence

1) G-FACTOR THEORIES

Charles Spearman proposed that a broad general intelligence factor lay beneath the surface. Spearman said that a number of different cognitive tasks and intellectual measures tend to be correlated with one another and forms a single common factor G.

2) TWO-FACTOR THEORY

Later Charles Spearman proposed that each individual intellectual task is based on general intelligence factor G and specific factor S. For example, an arithmetic test might tap both broad general intelligence factor G and an S factor specific to mathematical ability.

3) THURSTONE'S PRIMARY MENTAL ABILITIES

Thurston concluded that intelligence has multiple components. Based on his test and factor analysis he identified 7 factors which he called PRIMARY MENTAL ABILITIES. They are-

- 1) Verbal comprehension
- 2) Word Fluency.
- 3) Perceptual speed.
- 4) Memory.
- 5) Numerical ability and
- 6) Spatial ability and
- 7) Reasoning.

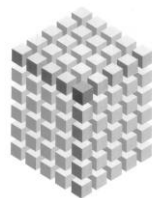
Thurston assailed a battery of tests called PRIMARY MENTAL ABILITY TEST (PMA) to measure these mental abilities.

4) GUILFORD'S STRUCTURE OF INTELLECT MODEL

This theory is proposed by J. P. GUILFORD. This 3 dimensional theory is based on the massive analysis of many tests.

This cubical model provides 120 factors of intelligence. Each factor is represented by a cell in the cube and is some combination of these three dimensions-

1. 5 kinds of operations.
2. 6 kinds of products and
3. 5 kinds of contents.



According to Guilford human intelligence includes 150 factors.

5) HIERARCHICAL THEORY OF INTELLIGENCE (VERNON)

Vernon proposed hierarchical theory of intelligence. In this theory intelligence is pictured as a sort of pyramid.

At the top of the pyramid is broad general intelligence factor G. Which shows up in all kinds of intellectual activity. Underneath it are several moderately specific abilities like Thurstones' primary mental abilities. At the bottom of the pyramid are the highly specific abilities similar to Spearman's factors. This hierarchical theory borrows from several factor theories to form a multilayered view of intelligence.

PROCESS ORIENTED THEORIES OF INTELLIGENCE

Process – oriented theorists focus on intellectual processes, ie, the pattern of thinking that people use when they reason and solve problems. They are more interested in how people go about solving problems and they focus on development of intellectual processes, ie, how the processes change as individuals mature.

The following are the processes oriented theories of intelligence.

1. PIAGET'S THEORY

In Piaget's view, intelligence is an adaptive process that involves an interplay of biological maturation and interaction with the environment.

He views intellectual development as an evaluation of cognitive processes such as understanding the laws of nature, principle of grammar and mathematical rules. His stage theory of cognitive development is as follows-

2. BRUNER'S THEORY

Jerome Bruner is a process theorist who sees intellectual development as growing reliance on internal representation.

Babies, according to Bruner have action – oriented form of intelligence. They know the object only to the extent. That they can act on it.

Older children and adolescents know things internally and symbolically. This means that they are able to form symbol and representations of objects and hold these mental images in mind.

Bruner is interested on how these growing abilities are influenced by the environment especially by the rewards and punishments people receive for using particular ways.

3. INFORMATION – PROCESSING THEORIES

These theories break intelligence down into various skills that people employ to take information in process it, and use it to reason and solve problems. These skills may be simple or complex.

In one approach componential analysis Robert Sternberg, distinguishes between components and meta- components. Components are step one go through to solve a problem. Meta components are kind of knowledge one has about how to solve a problem. We use meta-components to plan and regulate our behaviour.

Juan – Pascual – Leone described action schemes (specific – repeatable – intellectual sequences) and Executive schemes (similar to plan and strategies). Such schemes are referred to as intellectual software, as distinguished from intellectual hardware resources such as attention and memory. He suggests people's software grow more sophisticated as they mature.

Other information processing theories solve on the rules involved in intelligent.

Despite their difference all of the various approaches break intelligence into components/processes and explore how these processes change over the course of development.

ASSESSING INTELLIGENCE

Besides comprehensive analysis of intelligence it is most important to assess individuals overall capacity for learning and problem solving.

Several tests have been devised for the purpose of assessing intelligence. All the intelligence tests can be grouped into two main categories. They are

Individual tests Tests which are administered to an individual in a particular time.

Group tests Tests which are administered to a large number of people at a time

These individual and group tests are of four categories They are

VERBAL TESTS Tests which are based on usage of language ability. For example, Army general classification test.

NON- VERBAL TEST Tests which are not involving the usage of language Ability but requires individual to perform some activities.

PERFORMANCE TEST for example Draw-a-man-test.

CULTURE-FAIR INTELLIGENCE TEST Tests not concerned with place, language, education, society and culture; for example Army Alpha test.

Among the most important of the intelligence test are the STANFORD – BINET INTELLIGENCE SCALE and three tests developed by DAVID WECHSLER for different age groups.

A brief description of the above to follows-

STANFORD – BINET INTELLIGENCE SCALE

Binet and Simon developed a test to identify mentally retarded children in French schools.

Several English language versions were developed subsequently.

The most successful was brought out in 1916 by LEWIS TERMAN of Stanford university.

Terman's scale known as the STANDARD-BINET became the model for many intelligence tests and has itself been revised several times.

NATURE OF BINET'S TEST

Binet devised his test by age levels on the basis that mentally retarded students seemed to think non-retarded children at younger ages.

Within age scales, the tasks at each level are those which averages children of that age should find moderately difficult.

For testing purpose, the highest level at which all items are passed by a given child is that child's basal age.

Starting from that age, the tester adds additional credit for each item the child passes until the reaches a ceiling age—that is the lowest level at which all items within the level are failed.

Individual's score can be expressed as a mental age(MA). Mental age could be expressed in relation to CA (chronological age). The MA/CA ratio yields INTELLIGENCE QUOTIENT (IQ). This concept is proposed by psychologist WILLIAM STERN in 1912.

$$IQ = MA/CA \times 100$$

Where

MA= mental age

CA = Chronological age and

100 is used to eliminate decimals.

The following are some of the items from the Stanford – binet scale.

Age Type of item

1 3 hole form board,

Block building – tower.

2 Block building – Bridge.

Pure vocabulary.

3 Naming objects from memory.

Picture identification.

WECHSLER TESTS

David wechsler developed a family of tests for people at various age level. The tests include

WECHSLER ADULT INTELLIGENCE SCALE (WAIS)

WECHSLER INTELLIGENCE SCALE FOR CHILDREN (WISC)

WECHSLER PRESCHOOL AND PRIMARY SCALE OF INTELLIGENCE

(WPPSI)

These tests contain several subtests. The subtests can be grouped into two categories.

1. VERBAL SUBTESTS They are information memory span, arithmetic, comprehension, similarities, vocabulary.

2. PERFORMANCE SUBJECTS they are picture arrangement, picture completion, block design object assembly, digit symbol.

PROCESS- ORIENTED ASSESSMENT OF INTELLIGENCE DEVELOPMENT

INA UZGIRIS and J. McV . HUNT (1975) developed a set of six developmental scales to measure “progressive level of cognitive organization” in the first 2 years of life.

These scales are rooted in cognitive development theory, particularly PIAGET’S THEORY.

They are designed to indicate whether a particular baby is at a given point of time within a particular sequence of development stages.

INDIVIDUAL DIFFERENCES IN INTELLIGENCE

Differences in intelligence greatly affect people’s ability to cope with the demands of society. Low intelligence creates enormously difficult barriers to full participation in society and the attainment of a high standard of living.

MENTAL SUBNORMALITY

People are appropriately regarded as mentally retarded if

1. They attain IQs below 70 on an appropriate intelligence test
2. Their adaptive skills are inadequate to cope with ordinary daily tasks.

LEVELS OF MENTAL RETARDATION

American Association on Mental Deficiency has recommended a category of mental retardation

I Q	DESCRIPTION
130 and above	Very superior
120-129	Superior
110-119	Bright Normal
85-109	Average
70-84	Borderline
55-69	Mildly mentally retarded

40-54	Moderately mentally retarded
25-39	Severely Mentally retarded
Below 25	Profoundly mentally retarded

CAUSES OF MENTAL RETARDATION

There are two general causes of mental retardation

1. Cultural-familial, or sociocultural causes.
2. Genetic or a chromosomal defect. Down syndrome, for example, might be a genetic or a chromosomal defect.

Other physiological causes of retardation are environmental, pregnant women who contract rubella, scarlet fever, syphilis, or even mumps may give birth to infants who have suffered brain damage as a result. Also, insult or injury to the brain or nervous system before or after birth may result in retardation. Such damage may be done by x-rays, by inappropriate drugs, by severe pressure on the infant's head during birth, by oxygen shortages during or after birth, and even by severe maternal malnutrition.

INTELLECTUAL DEVELOPMENT AND BEHAVIOURAL CHARACTERISTICS OF THE MENTALLY RETARDED

Cultural-familial retarded persons are developing intellectually, they pass through the major stages of cognitive development as described by Piaget much the same way as the non-retarded population, the only major differences seem to be that retarded people pass through the stages at a slower pace and cease developing cognitively at a lower stage level than do most of us.

Retarded youngsters are often passive and dependent on others when they are asked to solve problems.

Retarded children have been described as outer-directed meaning that they are overly dependent on cues from other people.

EDUCATION AND TREATMENT FOR MENTAL RETARDATION

Once serious retardation has been identified, there is usually no way to undo it. However, special training can sometimes produce modest changes in IQ and adaptive behaviour.

Training can also enhance the retarded person's all-important social skills.

A friendly style and an endearing smile can be major assets for a Down-syndrome child.

Social and self-help skills can be taught for the mentally retarded.

THE MENTALLY GIFTED

Intellectually gifted is a which is not so clearly defined as the mentally retarded. IQ s of 120 and up to be sufficient evidence of exceptionality.

A child who is moderately bright is likely to be one of the class “stars”. But they may often be a misfit, misunderstood by peers and teachers and often regarded by both as impudent.

One problem seems to be that such extremely bright children are trapped in a world with few real peers, they are “out of synch” intellectually with children their own age. They are “out of synch” physically and socially with the older people who are their intellectual equals.

AGE CHANGES IN INTELLIGENCE

Process influencing intelligence develop with years. Mental ability for a bright child would grow more rapidly than for a dull one. So that some degree of consistency would be found for the ratio of MA to CA.

STABILITY OF IQ

The rate of intellectual growth is relatively stable for most people. In school age IQ does not seem to change. Knowing the IQ at age seven, have a very accurate predictor of IQ at age 18 in one study.

IQ is more stable for most people after about age seven. However if there are major changes in environmental conditions and in the opportunities for learning, there may be marked changes in intelligence. Individuals’ emotions and motives also produce changes in intelligence.

GROWTH OF INTELLIGENCE

Gain in intellectual ability is generally rapid in childhood and slows down in teens.

In one study, mental ability increased up to age 26, after which it leveled off and remained unchanged through age 36.

Some individuals may show an increase in IQ after age 26 and some a decrease.

There is a steady decrease in intellectual ability after age 40 with a precipitous drop after 60.

Whether ability declines or not depends both on the person and the type of ability.

Individuals who remain physically well and continue to engage in stimulating activities show little decrease in intellectual ability up to age 70.

Mental abilities that require speed and extensive use of short-term memory tend to reach their peak between age 30 and 40 and decline thereafter.

Tests that tap general knowledge show little decline with age.

The rate of decline of specific abilities is related to one's occupation. People in intellectually demanding occupations do not decline in mental ability as early as others.

However, with accumulated knowledge and experience, the older person may more than compensate for diminishing speed and efficiency of intellectual functioning. In some situations, older individuals may be more competent than a brighter younger person who lacks experience.

GENETIC AND ENVIRONMENTAL INFLUENCES ON INTELLIGENCE

GENETIC INFLUENCE IN INTELLIGENCE

Many studies have been conducted with fraternal twins and identical twins to know the IQ differences among them. The results show that identical twins are more similar in IQs. This supports the notion that is a considerable genetic influence on IQ.

Some researches conducted experiments with identical twins who had been separated in childhood and reared in different environment. The aim was to assess how similar the twin's IQs were despite their environmental difference. The result showed that IQ similarity exists among the twins. Hence it can be concluded that genetic similarity leads to similarity in intelligence.

Many other studies have been conducted in which the children's IQ scores were correlated with their biological parents and adoptive parents. Most of this research has shown that children's IQs correlate more strongly with those of their biological parents. This also suggests the genetic influence on intelligence.

ENVIRONMENTAL INFLUENCES ON INTELLIGENCE

In studies of identical twins, and pairs of sibling, it is generally found that the pairs reared together correspond more closely in IQ, than do the pairs reared apart.

Studies show that extremely poor rearing conditions are associated with low IQ's and that enriched rearing and educational conditions are associated with higher IQ's.

These research finding shows that environmental conditions influences intelligence.

GENETIC AND ENVIRONMENTAL INFLUENCES ON INTELLIGENCE

Virtually there is no evidence that nature alone or environmental alone completely determines the development of intelligence. Psychologists today agree that intelligence is shaped by the integration of the environment and heredity.

RUBBER- BAND – ANALOGY

Curt stern compared the genetic endowment to the amount of "stretch" that is possible in a rubber band. Some rubber bands have a great deal of potential stretch built into them. Others have relatively little. The amount of stretch a particular rubber band actually shows will

depend upon both its native endowment – stretchability – and the amount of pressure or pull exerted by the people in the environment. Similarly a person's intelligence depends upon genetic endowment and environment.

REACTION TIME

It is believed that our genes endow us with a reaction range. That is a range of possible intellectual levels that we may attain depending in part on the genetics and quality of environment into which we are born and within which we mature.

Our genetic endowment may set limits on what we can attain. Our environment may have a major influence on how much of our potential we actually realize.

TESTING FOR SPECIAL APTITUDES

Individuals differ widely in intelligence, knowledge and skill. Many tests have been devised to measure these individual differences. These include aptitude, interest, and achievement tests.

WHAT IS ACHIEVEMENT TEST?

Tests that tell what one can do now are achievement tests. These tests measure accomplished skills. Examinations given at the end of a course to see how much you have learned are achievement tests.

APTITUDE TEST- MEANING

Tests that predict what one can accomplish with training are called aptitude tests. They identify a capacity to learn.

SCHOLASTIC APTITUDES

One's capacity to succeed in academic activities is called scholastic aptitude.

The best known test of this type is the SCHOLASTIC APTITUDE TEST (SAT).

Similar tests are used for schools of medicine, dentistry, nursing, law and several other professions. Each is focused on specific abilities thought to be important to the profession.

The GRADUATE RECORD EXAMINATION (GRE) and MILLER ANALOGIES TEST (MAT) are some of the other scholastic aptitude tests.

VOCATIONAL APTITUDES AND INTERESTS

NON – COGNITIVE ABILITIES

In many occupations they requires skills – such as reading x rays, Judging the color of the throats, using surgical instruments- that have large perceptual – motor components. Such

physical and perceptual skills are known as non-cognitive abilities. Tests have been developed to measure these abilities.

MECHANICAL – ABILITY TESTS

Many tests are intended for specific jobs. For example, test for machines, machine operators and assembly line workers. These tests measure mechanical knowledge or ability to manipulate objects.

PSYCHOMOTOR TESTS

Psychomotor tests are a second general class of vocational aptitude tests. They involve such psychomotor tests as manual dexterity, steadiness, muscular strength, speed of response to a signal and coordination of many movements into a unified whole.

USES OF VOCATIONAL APTITUDE AND INTEREST TESTS

1. employers use these tests to select employees.
2. Vocational counsellors use these tests to help people assess their aptitude for different types of work.

EXAMPLES OF APTITUDE AND INTEREST TESTS

1. Differential Aptitude Tests (DAT) – It is test battery that is combinations of tests covering a wide spectrum of abilities.
2. The strong Campbell vocational interest inventory.
3. Kuder Occupational Interest Survey.

PERSONALITY ASSESSMENT

OBJECTIVES OF PERSONALITY TESTS

1. Personality test tries to understand what the person is usually like in thought, feelings and behaviour patterns.
2. Personality testing aims typically for a representative picture of individuals as they usually are.

PAPER AND PENCIL TESTS

Paper and Pencil Tests are in the form of a questionnaire or inventory. Such test can be given cheaply and quickly to large groups of people.

QUESTIONNAIRES

Questionnaires ask questions or give simple statements to be marked yes or no, true or false.

The questions are usually more reasonable and their purpose may not be self-evident.

This type of paper of paper-pencil tests were first used widely during world war-I to weed out emotionally unstable draftees. The items may predict future emotional break- downs.

Some of the personality Questionnaires are briefed below-

MINNESOTA MULTIPHASIC PERSONALITY INVENTORY (MMPI)

MMPI consists of 566 items for people to answer about themselves. The items can be answered as “true” “false” or “cannot say”. In MMPI there are 10 basic clinical scales. In addition, MMPI also has several validity scales designed to assess a test taker’s frankness and thoroughness in answering the items. The test results are plotted on a profile, which shows the nature of person’s problem.

THE 16 PERSONALITY FACTOR QUESTIONNAIRE(16 PF)

16 PF – has been devised by Raymond cattell and his associates. Cattell used factor analysis to identify these 16 factors. These factors reflect key characteristic or source traits of the human personality. A score sheet, which has 16 bipolar traits is used to show the 16 PF test profile.

A number of other objectives personality inventories are used. Some of them are

1. The California Psychological Inventory (CPI)
2. The Omnibus Personality Inventory (OPI)
3. The Comfrey Personality Scales (CPS)
4. The Jackson Personality Inventory (JPI)
5. The Guilford – Zimmerson TemperamentSurvey (GZTS)
6. The Myers – Briggs Type indicator (MBTI)
7. Eysenck Personality Inventory (EPI).

PROJECTIVE METHODS

Projective methods are based on the projective hypothesis, derived from Freud’s personality theory. The basic idea is the way people respond to a vague or ambiguous situation is often a projection of their underlying feelings and motives. A related assumption is that the test taker responds to the relatively unstructured test stimuli in ways that gives meaning to the stimuli. Much of that meaning comes from within the person responding. Thus projective methods are intended to provide access to unconscious impulses and other aspects of personality of which the test takers themselves may not be aware. Some of the most frequently used projective tests are

1. RORSCHACH INKBLOT TEST (Hermann Rorschach)

There is a set of 10 ink blots. The blots, some black and white some multi colored, appear on separate cards. Subjects are presented with the cards, one at a time and asked questions such as “what might this be”?or “what does this remind you of?”After writing the responses, the tester asks the subject’s response. The first phases of the test is called the free- association phase, the second phase is called the inquiry.

Several methods, most combine subjective and objective procedures, for scoring the Rorschach have been proposed. The content and style of responses is important in the subjective aspects of scoring.

2. THEMATIC APPERCEPTION TEST (TAT) (Morgan and Murray)

The TAT is based on Murray's theory of needs. TAT includes a 'standard set of 30 pictures. The tester selects pictures involving themes of special significance to the test taker. The tester presents a series of pictures and asks the subject to make up a story about "what is happening", what went before? What is going to happen? And what the people involved are thinking and feeling?

The stories are closely related to the personality of the story-teller. The tester usually looks for themes that surface several times in response to several different pictures and they make personality inference.

Other popularly used projective tests are

1. The sentence completion technique
2. Draw-a-person expressive technique
3. The Bender visual motor Gestalt test.

BEHAVIOURAL ASSESSMENT

Behavioral assessment methods have two main characteristics

1. They are designed to reveal the stimulus conditions associated with the specific target behaviors. For example what circumstances lead to outbursts of temper?
2. They involve direct scrutiny- observing. The person's behaviour as it unfolds or at least seeking a specific description of the behaviour and the situations in which it happens.

PROBLEM CHECKLISTS

Some checklists ask for specific details of a person's difficulties in one particular problem area. Behaviour therapists ask the patients to fill out checklists of this sort just prior to therapy in order to help the therapists decide which specific problem behaviors need to be treated on in which order.

Other checklists surveying problem behaviors of many different types one advantage of such broadly - cast measures is that they are likely to include more clinically significant problems than psychologists, clients, or the relatives of clients might ordinarily think to mention during an interview. Another advantage is that the problems can be listed in explicit, observable terms that make them well suited to behavioral therapies. Checklists may be structured to provide for members of clients, or from significant others such teachers or therapists.

e. g

Fear checklists

Child behaviour checklists

Assertion inventory by Gambrills and Richey

Friedman's Action Situation Inventory

Kohn Social Complete Scale.

Benter Sexual activities checklist.

BEHAVIOR SAMPLING TECHNIQUES

It is important to observe a person's naturally accruing behaviour in real - life settings psychologists sometimes arrange to observe behaviour in laboratory situation designed to be

experimental analogues of real life. Observation of a person's behaviour adds so much to the assessment process that is considered almost indispensable by many behaviorally oriented psychologists.