1. Details of Module and its structure

Module Detail	
Subject Name	Psychology
Course Name	Psychology 03 (Class XII, Semester - 1)
Module Name/Title	Variations in Psychological Attributes - Part 2
Module Id	lepy_10102
Pre-requisites	Understanding of psychological attributes on which people differ
Objectives	After going through this lesson, the learners will be able to understand the following: • To have clarity on different theories of intelligence and explain what constitutes intelligent behaviour
Keywords	Unifactor, Two Factor, Primary Mental Abilities, Hierarchical Model, Structure of Intellect Model, Multiple intelligenec, PASS model

2. Development Team

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Intelligence

Francis Galton, influenced by his half-cousin Charles Darwin, was the first to propose a theory of intelligence. Galton believed intelligence was a real faculty with a biological basis that could be studied by measuring reaction times to certain cognitive tasks. Galton measured the head sizes of British scientists and ordinary citizens, but found no relationship between head size and his definition of intelligence.

Intelligence is a key construct employed to know how individuals differ from one another. It also provides an understanding of how people adapt their behaviour according to the environment they live in.

Psychological notion of Intelligence is quite different from the common sensical notion of Intelligence. While watching an intelligent person, we are likely to see attributes like given below in the picture-

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Intelligence can be defined as-

According to, **Oxford dictionary** intelligence is the power of perceiving, learning, understanding and knowing.

According to **Alfred Binet** intelligence, it is defined as the ability to judge well, understand well and reason well. Alfred Binet began administering intelligence tests to school-age children in France. His goal was to develop a measure that would help determine differences between normal and subnormal children.

According to, **Wechsler** whose intelligence tests are most widely used, intelligence is understood in terms of its *functionality*, i.e. its value for adaptation to environment. He defined it as the global and aggregate capacity of an individual to think rationally, act purposefully, and to deal effectively with his/her environment.

Other psychologists like Gardner and Strenberg have suggested that an intelligent individual not only adapts to the environment, but also actively modifies or shapes it.

Other psychologists who have defined intelligence are- **Thorndike** understands intelligence as "one's capacity to deal effectively with situations". **Jean Piaget**, defines intelligence as- 'intelligence is the ability to adapt to one's surroundings'.

Different psychologists have discussed different aspects of intelligence in their definitions. More recently, psychologists have acknowledged that **Adaptation** to the environment is crucial to understanding both what intelligence is and what it does. Such adaptation may arise in a range of situations and settings: a student in college does research and learns the material she needs to know in order to do well in her course; a doctor treating a patient with unknown symptoms discovers about the underlying disease; or a painter modifies a painting to convey a more comprehensible effect. For the most part, adaptation concerns making a change in oneself in order to cope more productively with the environment, but it can also mean changing the environment or finding an absolutely new one.

THEORIES OF INTELLIGENCE

Psychologists have proposed several theories of intelligence. Theories can be broadly classified into two categories:

- Psychometric/structural approach
- Information-processing approach

PSYCHOMETRIC APPROACH	**INFORMATION-PROCESSING APPROACH**
Considers Intelligence as an aggregate of	Describes the processes people use in

abilities.	intellectual reasoning and problem solving
It expresses the individual's performance in terms of a single index of cognitive abilities.	The major focus of this approach is on how an intelligent person acts.
• Focuses on the structure of intelligence	• This approach emphasises studying cognitive functions underlying intelligent behaviour.
• Example of theories that fall under this approach are- • One factor theory (Alfred Binet) • Two factor theory (Charles Spearman) etc.	• Example of theories that fall under this approach are- • Triarchic theory of intelligence(Robert Sternberg) • PASS model of intelligence

Psychometric Approach

Psychometric theories have desired to understand the structure of intelligence: What form does it take, and what are its components, if any? Such theories have generally been based on and established by data obtained from tests of mental abilities. Psychometric theories are based on a model that accounts intelligence as a composite of abilities measured by mental tests.

The different theories under this approach are:

Alfred Binet's One/Uni factor theory:

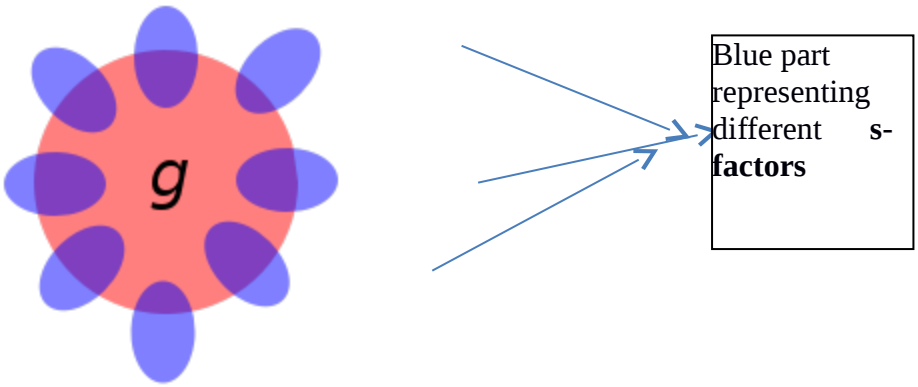
i. He was the first psychologist to formalise the concept of intelligence in terms of mental operations.
ii. This theory arose from his interest in differentiating more intelligent from less intelligent individuals.
iii. He conceptualised intelligence as consisting of one similar set of abilities which can be used for solving any problem in an individual's environment.
iv. Thus his theory is called Uni or One factor of Intelligence.
v. This theory came to be disputed when psychologists started analysing data of individuals, which was collected using Binet's test.

ALFRED BINET

Source: https://upload.wikimedia.org/wikipedia/commons/4/4f/Alfred_Binet.jpg

Charles Spearman's two factor theory (1927)

i. Spearman proposed a two factor theory of intelligence employing a statistical method called factor analysis.
ii. He showed that intelligence consisted of a general factor (**g-factor**) and some specific factors (**s-factors**).
iii. The g-factor includes mental operations which are primary and common to all performances.
iv. In addition to g-factor, he said that there are also many specific abilities. These are contained in what he called the s factor. Excellent singers, architects, scientists, and athletes may be high on g-factor but in addition to this, they have specific abilities which allow them to excel in their respective domains.



Two factor theory

Source: https://upload.wikimedia.org/wikipedia/commons/f/fc/SpearmanFactors.png

Charles Spearman

Source:

https://en.wikipedia.org/wiki/Charles_Spearman#/media/File:Exposition_universelle_de_1900_-_portraits_des_commissaires_g%C3%A9n%C3%A9raux-Charles_Spearman.jpg

Louis Thurstone's theory of Primary Mental abilities

i. Louis Thurstone proposed the theory of primary mental abilities.
ii. It states that intelligence consists of seven primary mental abilities, each of which is relatively independent of the other.
iii. The primary mental abilities are as follows-
    i. Verbal Comprehension (grasping meaning of words, concepts, and ideas)
    ii. Numerical Abilities (speed and accuracy in numerical and computational skills)
    iii. Spatial Relations (visualising patterns and forms)
    iv. Perceptual Speed (speed in perceiving details)
    v. Word Fluency (using words fluently and flexibly)
    vi. Memory (accuracy in recalling information)
    vii. Inductive Reasoning (deriving general rules from presented facts)

Arthur Jensen's Hierarchical model of intelligence

Arthur Jenson

Source:https://en.wikipedia.org/wiki/Arthur_Jensen#/media/File:Arthur_Jensen_Vanderbilt_2002.jpg

- He proposed the hierarchical model of intelligence consisting of abilities operating at two levels, called **level I** and **level II.**
- Level I is the associative learning in which the output is more or less similar to the input. Example- rote learning and memory
- Level II , called cognitive competence , involves high-order skills as the transform the input to produce an effective output.

J. P Guilford's structure of intellect model

- J.P. Guilford proposed the structure- of-intellect model which classifies intellectual traits among three dimensions: operations, contents, and products.
- Operations are what the respondent does. These include cognition, memory recording, memory retention, divergent production, convergent production, and evaluation.
- Contents refer to the nature of materials or information on which intellectual operations are performed. These include visual, auditory, symbolic (e.g., letters, numbers), semantic (e.g., words) and behavioural (e.g., information about people's behaviour, attitudes, needs, etc.).
- Products refer to the form in which information is processed by the respondent. Products are classified into units, classes, relations, systems, transformations, and implications.
- Since this classification (Guilford, 1988) includes 6ˆ5ˆ6categories, therefore, the model has 180 cells.
- Each cell is expected to have at least one factor or ability; some cells may have more than one factor. Each factor is described in terms of all three dimensions.

Information–Processing Approach

The information- processing theorists are involved in examining how individuals mentally manipulate what they know and learn about the world. They way in which various information-

processing theorist study intelligence differ mainly in the terms of complexity of the processes being studied.

Sternberg's Triarchic Theory of Intelligence:

Robert Sternberg (1985) proposed the Triarchic theory of intelligence. He defined intelligence as "the ability to adapt, to shape and to select environment to accomplish one's goals and those of one's society and culture". According to his theory there are three types of intelligence:

- Componential intelligence
- Experiential intelligence
- Contextual intelligence

Componential / Analytical Intelligence	**Experiential / Creative Intelligence**	**Contextual / Practical Intelligence**
It is the analysis of information to solve problems. Persons high on this think analytically and critically and succeed in schools. This intelligence has three components: a) Knowledge acquisition component- which is responsible for learning and acquisition of the ways of doing things. b) Meta components/ higher order component – which involves planning concerning what to do and how to do. (c) Performance component- which involves actually doing things.	Experiential or creative intelligence is involved in using past experiences creatively to solve novel problems. It is reflected in creative performance. Persons high on this aspect integrate different experiences in an original way to make new discoveries and inventions. They quickly find out which information is crucial in a given situation.	Contextual or practical intelligence involves the ability to deal with environmental demands encountered on a daily basis. It may be called 'street smartness' or 'business sense'. Persons high on this aspect easily adapt to their present environment or select a more favourable environment than the existing one, or modify the environment to fit their needs. Therefore, they turn out to be successful in life.

Sternberg's triarchic theory of intelligence represents the information- processing approach to understand intelligence.

Planning, Attention-arousal and simultaneous-successive (PASS) Model of Intelligence:

This model has been developed by J.P Das, Jack Naglieri, and Kirby (1994). According to this model intellectual activity involves the three independent functioning of neurological systems, called the functional units of the brain. These units are responsible for:-

i. Arousal/attention
ii. Simultaneous and Successive
iii. Planning

Arousal/attention: State of arousal is basic to any behaviour as it helps us in attending to stimuli. Arousal and attention enable a person to process information. An optimal level of arousal focuses our attention to the relevant aspects of a problem. Too much or too little arousal would interfere with attention. For instance, when you are told by your teacher about a test that s/he plans to hold, it would arouse you to attend to the specific chapters. Arousal forces you to focus your attention on reading, learning and revising the contents of the chapter.

Simultaneous and Successive Processing: You can integrate the information into your knowledge system either simultaneously or successively. Simultaneous processing takes place when you perceive the relations among various concepts and integrate them into a meaningful pattern for comprehension. For example, in Raven's Progressive Matrices (RPM) Test, a design is presented from which a part has been removed. You are required to choose one of the six options that best completes the design. Simultaneous processing helps you in grasping the meaning and relationship between the given abstract figures.
Successive processing takes place when you remember all the information serially so that the recall of one leads to the recall of another. Learning of digits, alphabets, multiplication tables, etc. are examples of successive processing.

Planning : This is an essential feature of intelligence. After the information is attended to and processed, planning is activated. It allows us to think of the possible courses of action, implement them to reach a target, and evaluate their effectiveness. If a plan does not work, it is modified to suit the requirements of the task or situation. For example, to take the test scheduled by your teacher, you would have to set goals, plan a time schedule of study, get clarifications in case of problems and if you are not able to tackle the chapters assigned for the

test, you may have to think of other ways (e.g., give more time, study with a friend, etc.) to meet your goals.

These PASS processes operate on a knowledge base developed either formally (by reading, writing, and experimenting) or informally from the environment. These processes are interactive and dynamic in nature; yet each has its own distinctive functions.

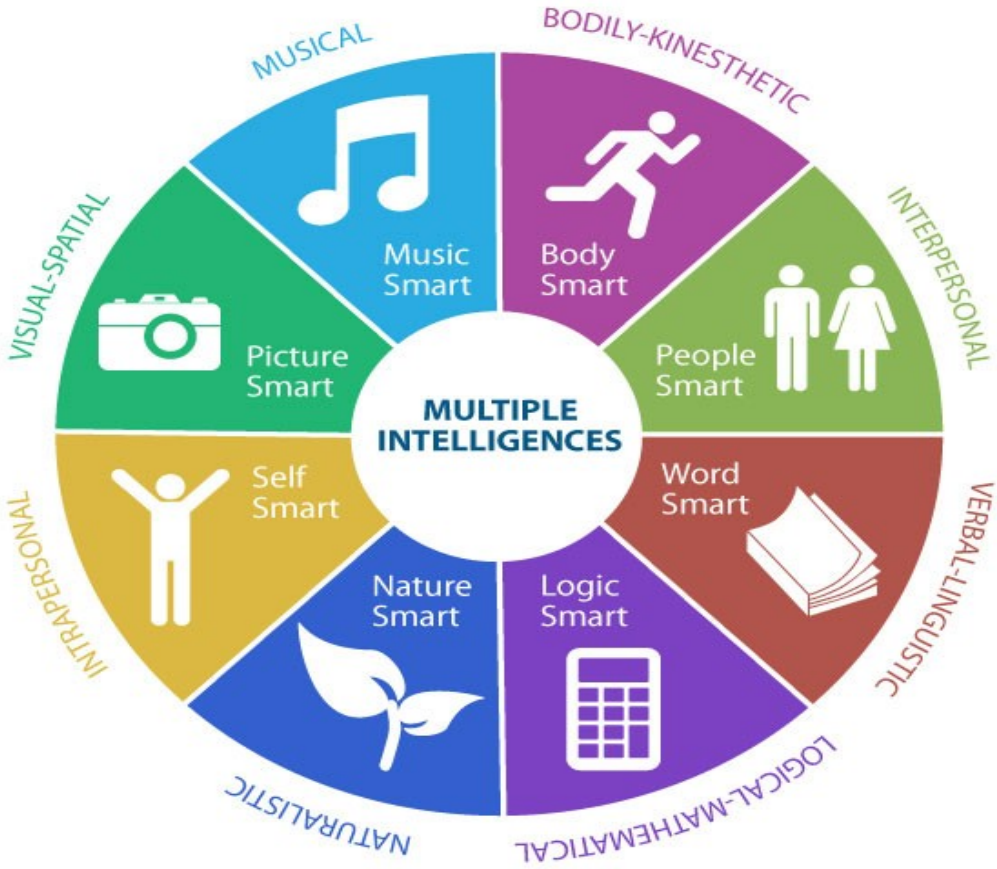
Das and Naglieri have also developed a battery of tests, known as the Cognitive Assessment System (CAS). It consists of verbal as well as non-verbal tasks that measure basic cognitive functions presumed to be independent of schooling. The battery of tests is meant for individuals between 5 and 18 years of age.
The results of assessment can be used to remedy cognitive deficits of children with learning problems.
This model represents the information- processing approach to intelligence.

THEORY OF MULTIPLE INTELLIGENCES

Howard Gardner proposed the theory of multiple intelligences. According to him, intelligence is not a single entity; rather distinct types of intelligences exist. Each of these intelligences are independent of each other. This means that, if a person exhibits one type of intelligence, it does not necessarily indicate being high or low on other types of intelligences. Gardner also put forth that different types of intelligences interact and work together to find a solution to a problem. Gardner studied extremely talented persons, who had shown exceptional abilities in their respective areas, and described eight types of intelligence. These are as follows:

1. Linguistic (skills involved in the production and use of language): It is the capacity to use language fluently and flexibly to express one's thinking and understand others. Persons high on this intelligence are 'wordsmart', i.e. they are sensitive to different shades of word meanings, are articulate, and can create linguistic images in their mind. Poets and writers are very strong in this component of intelligence.
2. Logical-Mathematical (skills in scientific thinking and problem solving): Persons high on this type of intelligence can think logically and critically. They engage in abstract reasoning, and can manipulate symbols to solve mathematical problems. Scientists and Nobel Prize winners are likely to be strong in this component.

3. Spatial (skills in forming visual images and patterns): It refers to the abilities involved in forming, using, and transforming mental images. The person high on this intelligence can easily represent the spatial world in the mind. Pilots, sailors, sculptors, painters, architects, interior decorators, and surgeons are likely to have highly developed spatial intelligence
4. Musical (sensitivity to musical rhythms and patterns): It is the capacity to produce, create and manipulate musical patterns. Persons high on this intelligence are very sensitive to sounds and vibrations, and in creating new patterns of sound.
5. Bodily kinaesthetic (using whole or portions of body flexibly and creatively): this consists of the use of the whole body or portions of it for display or construction of products and problem solving. Athletes, dancers, actors, sportspersons, gymnasts, and surgeons.
6. Interpersonal (sensitivity to subtle aspects of others' behaviours): This is the skill of understanding the motives, feelings and behaviours of other people so as to bond into a comfortable relationship with others. Psychologists, counsellors, politicians, social workers, and religious leaders are likely to possess high interpersonal intelligence.
7. Intrapersonal (awareness of one's own feelings, motives, and desires): This refers to the knowledge of one's internal strengths and limitations and using that knowledge to effectively relate to others. Persons high on this ability have finer sensibilities regarding their identity, human existence, and meaning of life. Philosophers and spiritual leaders present examples of this type of intelligence.
8. Naturalistic (sensitivity to the features of the natural world): This involves complete awareness of our relationship with the natural world. It is useful in recognising the beauty of different species of flora and fauna, and making subtle discriminations in the natural world. Hunters, farmers, tourists, botanists, zoologists, and bird watchers possess more of naturalistic intelligence.



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