o **Pleasantness-unpleasantness:** Facial muscles evolve to communicate specific information to onlookers. For example, happy face expresses the feeling of smile and laughter; whereas, sad face represents the expression of unpleasant feeling.

o **Attention-rejection:** Attention in the facial expression is shown through the muscles as they expand, like the eyes and the mouth opens up. Contraction of eyes, lips, and nostril are the best example of rejection.

o **Sleep-tension:** Level of relaxation depicts through sleep condition where as angry and excitement represents tension.

- **Startle response:** Alarm reaction or startle reflex, is the body's and mind's response to an unexpected and sudden stimulus, like a loud noise (acoustic startle reflex), a flash of light, a sudden movement near the face, etc. Our reactions include physically moving away from the stimulus. These reactions could be contraction of the arm and leg muscles and often blinking. It also includes breathing changes and blood pressure respiration. This is an inborn response.

- **Vocal expressions:** Emotion also expressed with the help of voice, trembling and breaking of voice can be noticed when we are sad or upset. We groan when we are in pain and become loud and high-pitched when we are angry.

- **Gestures and postures:** The postures and gestures that we display show joy and sorrow and they are different in both the cases.. In sorrow the face slum down while in happiness we hold the head high and have an upright posture. When we are angry, we show an aggressive behaviour and in fear we are either rooted to the spot or run from it.

4.5.2 Dimensions of Emotion

Robert Plutchik (1980) believes emotions have four dimensions, which are as follows:

(i) They are positive or negative.

(ii) They are primary or mixed.

(iii) Many are polar opposites.

(iv) They vary in intensity.

Let us take an example. Let us think about the ecstasy when we get an unexpected 'A' on a test or our enthusiasm about a football game the next weekend—these are positive emotions. In contrast, we feel negative emotion, like grief, when someone close to us dies or anger when someone verbally attacks us. Positive emotions enhance our self-esteem; negative emotions lower our self-esteem. Positive emotions improve our relationships with others; negative emotions depress the quality of those relationships.

Plutchik believes that emotions are like colours. Every colour of the spectrum can be produced by mixing the primary colours. Happiness, disgust, surprise, sadness, anger, and fear are candidates for primary emotions. Combining sadness and surprise produces disappointment. Jealousy is composed of love and anger. Plutchik developed the emotion wheel to show how primary emotions adjacent to each other produce other emotions. It must be noted that some emotions are opposites—love and remorse, optimism and disappointment. Theorists, such as Plutchik, view emotions as innate reactions that require little cognitive interpretation—an evolutionary perspective.

4.5.3 Emotions as Adaptive and Disruptive

Emotions can be classified into two broad dimensions—adaptive/positive and disruptive/negative. Positive affectivity (PA) refers to positive emotions, such as joy, happiness, love, and, interest. Negative affectivity (NA) refers to negative emotions, such as anxiety, anger, guilt, and sadness. Positive emotions facilitate approach behaviour (Davidson, 1993; Watson, 2001; Watson and others, 1999). In other words, positive affect increases the likelihood that individuals will interact with their environment and engage in activities that are adaptive for the individual, its species, or both. Positive emotions can broaden people's horizons and build their personal resource. For example, joy increases by creating the urge to play, push limits, and be creative, interest broadens by creating the motivation to explore, absorb new information and experiences, and expand the self (Csikszentmihalyi, 1990; Ryan and Deci, 2000). There is increasing interest in the role that positive affectivity might play in wellbeing (Frederickson, 2001); for example, positive emotions appear to improve coping. In one study, individuals who experienced more positive emotions than others developed broader-based coping strategies, such as thinking about different ways to deal with a problem and step back from the situation and being more objective (Frederickson and Joiner, 2002). In some cases, positive emotions—such as joy, happiness, love, and interest—may override, or undo the lingering effects of negative emotions—such as sadness, anger, and despair (Diener, 1999; Fredrickson, 2001). For example, mild joy and contentment have been found to undo the lingering cardiovascular effects of negative emotions, such as sadness (Frederickson and Levenson, 1998). To sum it all, positive emotions are likely to serve important functions in an individual's adaptation, growth and social connection. By building personal and social resources, positive emotions improve people's wellbeing.

One aspect of positive emotion that is increasingly being studied is happiness. Psychologists' interest in happiness aims at the positive ways in which we experience life, including cognitive judgments of our well-being (Diener, Lucas, and Oishi, 2001; Locke, 2002). In other words, psychologists

are trying to find out what makes us happy and how we perceive our happiness. Recent research reviews indicate that the following factors are linked with happiness (Diener and Seligman, 2002; Diener and others, 1999):

- Psychological and personality characteristics, like high levels of self-esteem, optimism, extraversion, and personal control.
- A supportive network of close relationships.
- A culture that offers positive interpretations of most daily events.
- Being engaged by work and leisure.
- A faith that embodies social support, purpose, hope, and religious attendance.

The importance of close relationships in happiness was documented in a recent study of what makes college students happy (Diener and Seligman, 2002). College students were divided into three groups, viz., very happy, average, and very unhappy. The very happy college students were highly social, were more extraverted, and had stronger romantic and social relationships than the less happy college students.

Negative emotions, such as fear, facilitate withdrawal behaviour and thus carry direct and immediate adaptive benefits in situations that threaten survival. Positive emotions tend to broaden a person's attention; negative emotions, such as anxiety and depression often narrow attention even in no threatening situations (Basso and others, 1996).

CHECK YOUR PROGRESS

6. What is the goal of drive reduction?
7. What is the Yerkes-Dodson Law?
8. What are the two dimensions of emotion?

4.6 THEORIES OF EMOTIONS

There are various theories of emotions. The most well-known among those are discussed in the following sections.

4.6.1 James-Lange Theory

James-Lange theory of emotion was developed after the name of the psychologist William James and the physiologist G.G. Lange (1884–1894). According to this theory, the perception of an object is followed by the disturbed bodily activities and the bodily activities are followed by the confused sensation. A person becomes aware this sensation as a state of fear and anger. James has pointed out that we do not run because we are afraid, we are afraid because we run; for example, the fear of snakes is not

immediately followed by the fear of a snake. The perception would first produce the activity of jumping or running, together with some other activities inside the body like rapid blood circulation, quick breathing, etc. These activities stimulate the receptors that lie inside the body—the kinesthetic receptors and the organic receptors. Influences from these receptors reach the brain and produce mass kinesthetic and organic sensation. This mass sensation constitutes our experience of fear. Thus, the state of fear, anger, or other emotions that a person experience, according to this theory, is a confused mass sensation produced by the disturbed activities of the organism.

What about people who have spinal cord injuries that prevent the sympathetic nervous system from functioning? Although James-Lange would predict that these people should show decreased emotion. However, the arousal studies of people with spinal cord injuries report that these people are capable of experiencing the same emotions after their injury as before, sometimes even more intensely (Bermond et al., 1991; Chwalisz et al., 1988).

4.6.2 Cannon-Bard Theory of Emotion

Physiologists Walter Cannon (1927) and Philip Bard (1934) theorized that the emotion and the physiological arousal occur more or less at the same time. Cannon, an expert in sympathetic arousal mechanisms, did not feel that the physical changes caused by different emotions were distinct enough to allow them to be perceived as different emotions. Bard expanded on this idea by stating that the sensory information that comes into the brain is sent simultaneously (by the thalamus) to both cortex and organ of sympathetic nervous system. The fear and the bodily reactions are, therefore, experienced at the same time—not one after the other; for example, a person is afraid and running and aroused.

This theory, known as the Cannon-Bard theory of emotion, also had its critics. K.S. Lashley (1938) stated that the thalamus would have to be pretty sophisticated to make sense of all the possible human emotions and relay them to the proper areas of the cortex and body. It would seem that other areas of the brain must be involved in processing emotional reactions. The studies of people with spinal cord injuries, that seemed to suggest that emotions can be experienced without feedback from the sympathetic organs to the cortex and cited as a criticism of the James-Lange theory, seemed at first to support the Cannon-Bard version of emotions. People do not need feedback from those organs to experience emotion. However, there is an alternate pathway that carries information from these organs to the cortex; this is the vagus nerve—one of the cranial nerves (LeDoux, 1994). This makes the case for Cannon-Bard a little less convincing.

4.6.3 Two-Factor Theory of Emotion

According to the Two-Factor Theory of Emotion developed by Stanley Schachter and Jerome Singer (1962), emotion is determined by physiological

arousal and cognitive labelling. They argued that we look at the external world to find an explanation as to why we are aroused; for instance, if we feel good at someone's pleasant comment, we may call the emotion 'happy'. If we feel bad after doing something wrong, we may call the feeling 'guilty'. To test their theory, epinephrine was injected into the volunteer participants by Singer and Schachter (1962). Epinephrine is a drug that produces high arousal. Then the volunteers were made to observe others behave in either an angry way (stomping out of the room) or a euphoric way (shooting papers at a wastebasket). As predicted, the volunteers' cognitive interpretation of their own arousal was influenced by the angry and euphoric behaviours. They said that they were happy when they were with a happy person, and angry when they were with an angry person. However, this effect only occurred when the volunteers were not aware of the injection's true effects. When they were informed that the drug would make them jittery and increase their heart rate, they said that the other person's behaviour was the reason for their own arousal. Psychologists have faced difficulty replicating Schachter and Singer's experiment, but in general, research supports the belief that misinterpreted arousal intensifies emotional experiences (Leventhal and Tomarken, 1986).

4.7 MANAGING NEGATIVE EMOTIONS

There are few general strategies for managing negative emotions. They are as follows:

- **Keep away from the negativity:** Negative emotions may comprise jealousy, anger, resentment, fear, etc. These may be caused by a bad experience leaving us feel negatively towards someone or something. It is important to find out the exact reason that causes such negative emotions to understand where they are coming from and help to keep from taking them out on others around.

- **Doing something positive:** Positive emotions consist of interacting more with others, enjoying making things better and thinking positively. Positive emotions are fuelled by an underlying desire for enjoyment and unity; foe example, interest, enthusiasm, boredom, laughter, empathy, action, curiosity, etc.

- **Happiness: When people smile, it releases chemical which make them feel better.** It is a state of mind or feeling characterized by love, contentment, satisfaction, joy, or pleasure. Many biological psychological, religious, and philosophical approaches have striven to define happiness and identify its sources. Research has identified many attributes that correlate with, viz., relationship, happiness, extraversion, social interaction, health, marital status, employment, optimism, democratic freedom, religious involvement and physical exercise.

- **Yoga:** The term yoga is originated from Sanskrit. It is a combination of mind, body and soul. (Seaward, 1995). Yoga emphasizes on uniting the mind, body and spirit through action, emotion and intelligence (Seaward 1994). It involves combining the art of breathing conscious stretching, and mind balancing in a rigorous discipline for effectiveness. Central to yoga are a series of 'asanas' or stretching position that are done smoothly, slowly and gracefully with focus and spiritual depth. There is not much scientific evidence on the effect of yoga, though occasional study do show positive psychological benefits (Birkel.1991).

- **Managing anger:** Negative anger is harmful and it should be avoided, on the other hand positive anger is constructive and creates positive experiences. Negative anger usually arises in response to a perceive threat, frustration or injustice. The greater the threat the greater the potential anger. A key to dealing with negative anger is to cover up the causes of that threat and what can be done in order to manage that.

- **Managing ego:** Ego and emotion are the obverse and the reverse of the same coin. On one hand, ego is self binding and the other hand, it is self transcending. High ego becomes problematic and cause major obstacle in the way of success and decreases wellbeing and happiness.

- **Identify the feeling first:** Approach the positive feeling, make a list of the feeling of positive behaviour, chose the most approachable way and work on it.

- **Ask what would help you to feel better:** Find out the answer of self question, move to the easiest way to control the negative emotion, solve the problem and implement the positive one.

- **Change to overcome challenges:** Emotions that we want to challenge or change is not always compromising.

- **Need to believe in ourselves:** How we think matters the most. Interpretation emerges from beliefs and beliefs emerge from sense of meaning, value and purpose. This entire realm is the realm of thinking or cognition.

4.7.1 Post Traumatic Stress Disorder

Post-Traumatic Stress Disorder, or PTSD, is an anxiety disorder that can develop after exposure to a terrifying event or ordeal in which grave physical harm occurred or was threatened. Traumatic events that may trigger PTSD include human-caused or natural disasters, violent personal assaults, military combat, or accidents. Traumatic event will have shocking reactions that may include anger, nervousness, fear, and even guilt. These reactions are common for every one and these feelings continue and even increase. This feeling becomes so strong that it becomes difficult for a person to lead a normal life.

Each person is unique in his or her ability to manage fear and stress, and to cope with the threat posed by a traumatic event or situation. For that reason, not everyone who experiences or witnesses a trauma will develop PTSD. Further, the type of help and support a person receives from friends, family members and professionals following the trauma may influence the development of PTSD or the severity of symptoms.

Treatment for PTSD

Treatment for PTSD help victim to restore the sense of control and to deal with trauma. The following are the ways of treating PTSD:

- **Trauma focussed cognitive-behavioural therapy (CBT):** CBT can help the victim to change the extreme ways of thinking. Carefully and gradually exposing to thoughts, feeling and traumatic situations help them to feel better and to behave differently. This therapy identifies distorted and irrational thoughts about the traumatic events and replaces them with more balanced one.

- **Family therapy:** Family therapy is a type of counselling that involves the entire family. A therapist helps the entire family to communicate and maintain good relationships, and cope with tough emotions. In family therapy, each person can express his or her fears and concerns. It is important to be honest about the feelings and to listen to others. Every one can talk about their PTSD symptoms and what triggers them. By doing this, family will be better prepared to help each other.

- **Medication:** Medications help in regulating the chemical imbalances that occur in the brain, thus reducing emotional and physical over-reactivity. According to the International Psychopharmacology Algorithm for PTSD (2005), the first-line medication is usually a serotonin-and-nor epinephrine reuptake inhibitor (SNRI) or a serotonin-selective reuptake inhibitor (SSRI). The reuptake inhibitors block the re-absorption of serotonin or norepinephrine by nerve cells, making the chemicals more available for transmitting signals in the brain. Considerate symptom reduction usually takes place four to twelve weeks after starting the medication.

Eye movement desensitization and reprocessing (EMDR)

The rapid eye movement in EMDR creates similar brain activity to REM (rapid eye movement) that individual experience during sleep. This REM assists victims in processing ideas and resolves conflicts. They are able to work through things and they still retain the memory, but without the emotional pain and the feelings of smell, taste, etc. of the event.

4.8 MANAGEMENT OF EXAMINATION ANXIETY

A normal level of tension motivates us to perform at our level best. Everyone feel nervous before the examination, but too much anxiety can block thoughts,

create a negative frame of mind, and lead to panic and potentially poor exam performance. There are number of strategies which can help in managing examination anxiety, they are as follows:

- **Prepare well:** We must prepare well for the examination and prepare well in advance. Spend enough time on studying, revising and analysing your strengths and weaknesses. We must familiarize ourselves with the pattern of question papers and frequently asked questions. This will give us a sense of control and predictability in the exam.

- **Revision:** Plan a revision timetable. Prepare condensed notes and space out your revision periods.

- **Rehearsal:** We should go through a mock examination or ask our friends/family members to test our knowledge. We may also rehearse mentally in our mind. We need to visualize ourselves taking an exam with complete confidence and relaxation and accomplishing it.

- **Positive thinking:** The power of positive thinking is increasingly realized today. We need o be an optimist and have faith in our abilities, link the thoughts that worry us and deal with them rationally one by one. We should focus on our strengths and be positive and enthusiastic.

- **Seek support:** We must discuss difficulties with relatives, friends, teachers or seniors. We should not hesitate to seek help. Talking about stressful situation makes us feel light and gain insight.

- **Relaxation and exercise:** We need to learn to relax and do some sort of light exercise. Also, monitoring of thinking patterns and positive self-talk can be helpful.

4.9 ENHANCING POSITIVE EMOTIONS

Positive moods promote positive behaviour. The evidence suggests six categories of behaviour that result from happiness which enhance positive emotions.

Positive perception of self and others

A positive mind anticipates happiness, joy, health and a successful outcome of every situation and action. The mind finds whatever it expects. Happy people tend to like other people more; also, being satisfied with the life brings happiness. Following are the six broad categories of behaviour that result from happiness which enhance positive emotions:

(i) **Social support:** It refers to the relationship that brings positive benefits to the individual. Different functions of social supports like attachment, social integration, opportunity for nurturance reassurance of one's worth, a sense of reliable alliance and obtaining guidance are essential for wellbeing.

(ii) Humour: The ability to use humour in everyday life is invaluable for health and happiness. Laughter, funniness and joking in a playful spirit can enhance mental and physical wellbeing and sometimes it can even heal a person.

(iii) Sociability and activity: Being social leads to happiness and self-satisfaction. Happier people seem to be more interested in acquiring new learning and knowledge. They tend to be more outgoing, energetic and active.

(iv) Likeability and cooperation: Expressing cooperative feeling make a real difference in the quality of self and other's life. People with positive mood can be more approachable and inviting to others.

(v) Prosocial behaviour: We can promote positive emotion by helping others. It makes people more likeable, strengthens social bonds and networks and adopt the principles of reciprocity.

(vi) Wellbeing and coping: Subjective wellbeing can be simply defined as the individual's current evaluation of his or her happiness. Such an evaluation is often expressed in affective terms; when asked about subjective wellbeing, we will often say, 'I feel good' (Schwartz and Strack, 1999). It represents how satisfied people feel with their life generally, as contrasted with positive affect (happiness), which represents how they feel at a single point in time. Constantly changing cognitive and behavioural efforts manage specific internal and external demands that are appraised as taxing or exceeding the resources of the person (Lazarus and Folkman, 1984).

CHECK YOUR PROGRESS

9. Name the receptors that lie inside the body.
10. What does the Cannon-Bard Theory suggest?
11. What does the Two-Factor Theory of Emotion suggest?

4.10 SUMMARY

- When a motive is aroused and an organism is driven towards a goal, it produces tension within the individual.

- Motives are internal source of man's behaviour. Man's thinking, feeling, and actions are determined not only by the environment in which man lives.

- Motivation has been broadly classified as physiological and psychological. The physiological motives are also called biological or biogenic motives, whereas the psychological motives are called social or socio-psychogenic motives.

- The basic biological or physiological motives are hunger, thirst, sex and air.
- There are various theories of motivation, like the need reduction theory, Maslow's hierarchy of needs theory, cognitive approach, optimum arousal theory, and evolutionary approach.

- Emotion can be defined as a feeling, an aspect of consciousness characterized by a certain physical arousal, a certain behaviour that reveals the feeling to both the outer and the inner world.
- There are various theories of emotions. some of them are James-Lange Theory, Cannon-Bard Theory of Emotion and Two-Factor Theory of Emotion.
- It is important to manage negative emotions and there are various ways of doing it, like staying away from negativity, happiness, yoga, managing anger and ego, etc.
- Post-Traumatic Stress Disorder, PTSD, is an anxiety disorder that can develop after exposure to a terrifying event or ordeal in which grave physical harm occurred or was threatened.
- Normal level of tension motivates us to perform at our level best. Everyone feel nervous before the examination, but too much anxiety can block thoughts, create a negative frame of mind, and lead to panic and potentially poor exam performance.
- A positive mind anticipates happiness, joy, health and a successful outcome of every situation and action.

4.11 KEY TERMS

- **Intrinsic motivation:** Refers to tasks that are rewarding in and of themselves, such as the pleasure of solving a puzzle, learning, or playing a game
- **Emotion:** A feeling, an aspect of consciousness characterized by a certain physical arousal, a certain behaviour that reveals the feeling to both the outer and the inner world
- **PA:** Stands for positive affectivity and refers to positive emotions, such as joy, happiness, love, and, interest
- **NA:** Stands for negative affectivity and refers to negative emotions, such as anxiety, anger, guilt, and sadness

4.12 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Need is that condition which is essential for survival. Need leads to physical and psychological tension within us that motivates us to act in order to fulfil the need and reduce the tension.
2. Insulin injections cause profound hunger because they lower blood sugar drastically.

3. The two areas of hypothalamus that affect hunger are the lateral hypothalamus and the ventromedial hypothalamus.

4. The two main classes of sex hormones are estrogens, found in females and androgens, found in males.

5. The condition produced by the deficiency or loss of oxygen is called asphyxia.

6. The goal of drive reduction is homeostasis, the body's tendency to maintain an equilibrium, or steady state.

7. The relationship between task performance and arousal is called the Yerkes-Dodson Law.

8. Emotions can be classified into two broad dimensions—adaptive/positive and disruptive/negative.

9. The receptors that lie inside the body are the kinesthetic receptors and the organic receptors.

10. Physiologists Walter Cannon (1927) and Philip Bard (1934) theorized that the emotion and the physiological arousal occur more or less at the same time.

11. According to the Two-Factor Theory of Emotion developed by Stanley Schachter and Jerome Singer (1962), emotion is determined by physiological arousal and cognitive labelling.

4.13 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is motivation? Briefly describe the concept of motivation.
2. What do you understand by the evolutionary approach?
3. List the factors linked with happiness.
4. Briefly describe the various ways of managing negative emotions.
5. What is PTSD?

Long-Answer Questions

1. Explain the physiological basis of motivation.
2. Explain the cognitive and evolutionary approach.
3. What are the aspects to emotions? Describe the various emotional expressions.
4. Discuss the James-Lange Theory and Cannon-Bard Theory of motion.
5. Discuss the ways of managing examination anxiety.
6. What is the drive reduction theory and Maslow's hierarchy of needs theory?

7. How is aggression motivated? State the two factors that motivate aggression.

8. What are adaptive and disruptive emotions?

9. What are the ways of enhancing positive emotions?

10. How can PTSD be treated?

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UNIT 5   INTELLIGENCE

Structure

5.0 INTRODUCTION

In this unit you will be familiarized with the concept of thinking and reasoning and the concept of formation. You will learn about intelligence, theories of intelligence, the process of measuring intelligence and its kinds. You will be introduced to ability, the process of measuring ability, formation of aptitude and ability, types of aptitude tests and creativity tests. The the unit will also discuss personality in detail, its theories and assessment of personality as well as personality and different approaches.

5.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Explain the different theories of intelligence
- Describe the different methods of measuring intelligence
- Examine the different types of intelligence tests

- Discuss the nature of aptitude tests
- Explain the concept of creativity and its tests
- Describe the basic concept of personality
- Highlight the assessment methods of personality

5.2 INDIVIDUAL DIFFERENCES

Individual difference psychology examines how people are similar and how they differ in their thinking, feeling and behaviour. For example, people can be classified according to intelligence and personality characteristics. People are complex, however, and there are multiple theories and evidence as to what are the prevailing aspects of psychological differences.

Individual difference is a cornerstone subject area in modern psychology. In many ways, it is the 'classic' psychology that the general public refers to—it refers the psychology of the person—the psychological differences between people and their similarities. Plato stated the following more than 2000 years ago:

> No two persons are born exactly alike; but each differs from the other in natural endowments, one being suited for one occupation and the other for another.

Individual difference psychology examines how people are similar and how they differ in their thinking, feeling and behaviour. No two people are alike, yet no two people are unlike. So, in the study of individual differences we strive to understand ways in which people are psychologically similar and particularly what psychological characteristics vary between people.

In the Western psychology approach to individual differences, the following are generally assumed:

- People vary on a range of psychological attributes.
- It is possible to measure and study these individual differences.
- Individual differences are useful for explaining and predicting behaviour and performance.

We can classify people psychologically, according to their intelligence and personality characteristics; for example, with moderate success, however people are complex and much is still left unexplained. There are multiple and often conflicting theories and evidence about individual difference psychology.

Human beings have been aware of individual differences throughout history, consider the following as examples:

- Gender differences: Hunters = men; gatherers = women.
- Intelligence differences: Caste, class, education, etc.
- Personality differences: Job specialisations.

Early study of individual differences

We have come a long way since Franz Gall invented phrenology in the early 1800s. Phrenology is the study of an individual's bumps on the skull, which supposedly reveal character traits and mental abilities.

Phrenology had such vogue that by 1832 there were twenty-nine phrenological societies in Britain and many journals in both the UK and US devoted to the study of phrenology. It was seriously proposed to select Members of Parliament from their 'bumps'. Some phrenologists even moulded children's heads to accentuate good qualities and minimize bad ones.

Despite the theory being incorrect, one of its assumptions holds true, the idea that various brain regions have particular functions.

Darwin suggested that nature selects successful traits through the 'survival of the fittest'. His cousin, Sir Francis Galton (1822–1911) concluded that he could apply the principle scientifically. Why not measure human traits and then selectively breed superior people? He assumed human traits, everything from height and beauty to intelligence and ability, to personality traits, such as even-temperedness, were inherited.

Modern psychology has formalized the study of individual differences over the last 100 years. Individual differences psychology is still a young science and a relatively recent development in modern psychology. There are still many debates and issues. Current knowledge will change and evolve. Since there are multiple and controversial viewpoints, it is necessary to move beyond reliance on personally preferred viewpoints to also embrace alternative perspectives, particularly those which are utilized in psychological practice and which have solid research support.

5.2.1 Thinking, Reasoning and Concept Formation

The psychology of reasoning is the study of how people think and reason. It is often broadly defined as the process of drawing conclusions to inform how people solve problems and make decisions. It is at the intersection of psychology, philosophy, linguistics, cognitive science, artificial intelligence, logic, and probability theory.

Psychological experiments on how humans and other animals reason, have been carried out for over 100 years. An enduring question is whether or not people have the capacity to be rational. What does it mean to be rational? Current research in this area addresses various questions about reasoning, rationality, intelligence, relationships between emotion and reasoning, and development.

Everyday reasoning

How do people reason about sentences in natural language? Most experimentation on deduction has been carried out on hypothetical thought, in particular, examining how people reason about conditionals, e.g., if A then B.

Concept formation

Concept formation is the process of classifying information into meaningful categories (Ashby and Maddox, 2005). At its most basic, concept formation is based on experience with positive and negative instances. Concept formation is not as simple as it might seem. It can be and usually is confusing.

Types of concepts

There are three types of concepts, conjunctive concepts or 'and concepts', relational concepts and disjunctive concepts.

(i) **Conjunctive concepts:** It can be defined as the presence of two or more features (Reed, 2007). In other words, an item must have 'this feature and this feature and this feature'. For example, a motorcycle must have two wheels and an engine and handlebars.

(ii) **Relational concepts:** They are based on how an object relates to something else, or how its features relate one another. All of the following are relational concepts: larger, above, left, north and upside down. Another example is a brother, who is defined as 'a male considered in his relation to another person having the same parents.'

(iii) **Disjunctive concepts:** They have at least one of several possible features. These are 'either/or' concepts. to belong to the category, the item must have 'this feature, or that feature or another feature'. This 'either/or' quality of disjunctive concepts makes it hard to learn.

5.3 INTELLIGENCE

Different psychologists attempted to define intelligence in different manner. It is a broader concept that consists of several cognitive functioning like discrete abilities, capacities for abstract thought, understanding, communication, reasoning, learning, learning from past experiences, planning, and problem solving. However intelligence can be understood as a general set of mental abilities. We have already learnt that individuals differ from one another in their ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles. Intellectual performance of a person will be different on different occasions , in different domains, as judged by different criteria. Hence, these individual differences can be substantial, they are never consistent.

5.3.1 Theories of Intelligence

While intelligence is one of the most talked about subjects within psychology, there is no standard definition of what exactly constitutes 'intelligence'. Some researchers have suggested that intelligence is a single, general ability; while

other believe that intelligence encompasses a range of aptitudes, skills and talents. There are various theories of intelligence; some of them are discussed in detail.

Intelligence as a general intellectual capacity

Some psychologists have defined intelligence as a general intellectual capacity, which is made up of several discrete abilities. Binet (1916) has defined intelligence from this angle. According to him, intelligence is a general intellectual capacity which consists of the following abilities:

(i) To reason well with abstract materials

(ii) To comprehend well

(iii) To have a clear direction of thought

(iv) To relate thinking with the attainment of a desirable end

(v) To be self-critical.

Synthesizing the same it can be said that he has defined intelligence as inventiveness that is dependent upon comprehension and marked by purposefulness and self-corrective judgment (Stanley and Hopkins, 1978). Binet conceptualized intelligence as a single, but a complex mental process which can be measured by various kinds of materials designed to measure the integrated mental processes.

Two-factor theory of intelligence

According to Spearman (1927), intelligence is a general intellectual capacity. He postulated the existence of a general factor 'g' and a specific factor 's' underlying intelligence. All mental activities are mainly dependent upon and are an expression of this 'g' factor. He defined the 'g' factor as a mental energy that is required in all mental tasks and that is processed by all individuals in varying degrees (because people differ in their mental activity). A positive correlation between two or more than two functions indicates the presence of the 'g' factor. Another factor called the 's' factor is a specific factor underlying a particular type of mental activity. Such a factor is unique to the activity itself. A low correlation between two or more than two functions indicates the presence of the 's' factor. Of the two, the 'g' factor is more important because it is an important measure of intelligence. Spearman's view is known as the two-factor theory of intelligence, which states that all mental activities have some general component (called the 'g' factor) in common indicating general intellectual capacity, and more important one. Spearman proposed that the aim of any intelligence test should be to measure the amount of 'g' factor of each person because it provides the most important basis of predicting a person's behaviour in different situations.

It is relatively of little use to measure the 's' factor because it is unique to a specific activity. Tests which measure abstract relations such as the Raven

Progressive Matrices and the Cattell Culture Fair Intelligence Test are also good measures of the g factor.

Groups factor theory

Intelligence has also been understood on the basis of the combination of groups of traits or factors. Thurstone (1938), Thurstone and Thurstone (1943) were the first persons to define intelligence on this basis and their theory is popularly known as the 'group--factor theory' or 'multiple factor theory of intelligence'. They are of the opinion that intelligence is not an expression of the general factor, as postulated by Spearman; rather it is an expression of the combination of groups of traits or factors. Such factors are intermediate factors, not so universal and common as the 'g' factor nor so truly specific as the 's' factor. According to the group-factor theory, some common mental activities have a primary factor on the basis of which they are distinguished from other mental activities. This primary factor gives the common mental abilities (or factors) a functional cohesiveness, and then they are said to constitute a group. Another group of common mental activities is said to have another primary factor and so on. In this way, there are a number of groups of mental abilities (or factors), each of which has its own primary factors. On the basis of extensive factor-analytic research, Thurstone and Thurstone (1943) postulated seven group factors which they designed as the primary mental abilities or PMA. (These primary mental abilities do not incorporate the entire range of human abilities. They are especially from those found in abstract intelligence and in academic learning.) These abilities are space, verbal comprehension, word fluency, number facility, induction, perceptual speed, deduction, rote memory, and arithmetic reasoning. They are further discussed as follows:

- **Space PMA:** It represents the ability to recognize that two shapes are the same when one has been rotated.
- **Verbal comprehension:** It involves recognizing synonyms and antonyms.
- **Induction:** It requires establishing a rule or pattern within a given set.
- **Word fluency:** It involved articulateness and gracefulness of words.
- **Number factor:** It includes effective numerical calculation
- **Rote memory:** It depicts ability to quick memorization.
- **Perceptual speed (P):** It is the ability to note visual detail rapidly.

It is obvious, therefore, that the factor-analytic research of Thurstone and Thurstone has revealed that intelligence comprises a number of aptitudes or factors or mental abilities. Originally, each of these primary mental abilities was thought to be an independent one, but later the positive and significant correlations were demonstrated among these factors. The range of correlation was from 0.13 to 0.59. This meant that the primary factors or abilities were not the only factors in the operation of those mental activities which are assessed by various tests. They postulated that there must be some factors

other than the primary factors or abilities to account for the positive correlations between those psychological tests which measure the above seven factors. They named these factors the second-order general factors. To this extent they supported Spearman's viewpoint regarding some generality in the concept of intelligence. Thus, it may be concluded that intelligence is, to some extent, the expression of the combination of different factors (Thurstone) and, to some extent, the expression of some general factors (Spearman).

Structure model of Guilford

J.P. Guilford (1967) proposed a three-dimensional box-like model which he called the structure of intellect model or SI model. The model tried to simply explain the picture of intellectual trait relationships by organizing the traits along three dimensions, viz., contents, operations and products. Each of these aspects of intelligence was analysed and separated into subcategories: six for products (units, relations, classes, systems, implications and transformations), five kinds of operations (memory, cognition, convergent production, divergent production and evaluation), and five kinds of contents (auditory, visual, semantic, symbolic, behavioural). Since each of these dimensions is independent, there are theoretically a cube of $6 \times 5 \times 5 = 150$ different components of intelligence (refer Figure 5.1).
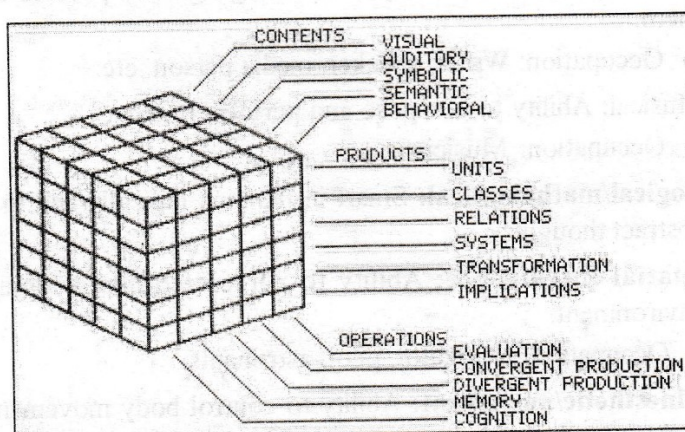

Fig. 5.1 Components of Intelligence

SI theory is intended to be a general theory of human intelligence. Its major application (besides educational research) has been in personnel selection and placement. Meeker (1969) examines its application to education.

Intelligence as a global capacity

Intelligence has been defined as a global capacity or a composite of several intellectual skills. Wechsler (1944) and Stoddard (1943) have defined intelligence as such. According to Wechsler, intelligence is 'the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment'. One of the salient features of this definition is that intelligence is displayed by the behaviour of the individual as a whole and that intelligent behaviour is goal-directed and helps in making

effective adjustment in the given environment. Thus, Wechsler has included the concept of 'drive' and 'incentive' which are implied in his statements 'to act purposefully' and 'to deal effectively'. However, his viewpoint has been criticized by many experts who are of the view that drive and incentives are non-intellectual traits of personality and if they are included in a test of mental ability, it will create more confusion.

Gardner's eight intelligences

Imagine someone who has great musical skills, but does not do well in math or English—someone like the famous musical composer Ludwing van Beethoven. Would you call Beethoven 'unintelligent'? Howard Gardner (1983, 1993, 2001, and 2002) believes there are eight types of intelligence, thus accounting for genius in music and in several other domains that have not traditionally been categorized as intelligence. Gardner's eight intelligences are described in a list, along with examples of the occupations in which they are considered strengths (Campbell, Campbell, and Dickinson, 2004). In the beginning he listed seven different kinds of intelligence then added eight and then nine (Gardener, 1999). The list is as follows:

- **Verbal/Linguistic:** Ability to use language and provide meaning to them:
  - o Occupation: Writer, speaker, media person, etc.
- **Musical:** Ability to compose and perform music.
  - o Occupation: Musician.
- **Logical/mathematical:** Smart in thinking logically and to engage in abstract thought.
- **Spatial Intelligence:** Ability to perceive different objects in the environment.
  - o Occupation: Navigator, pilot, astronauts.
- **Kinesthetic/movement:** Ability to control body movement to solve problem and manipulate external objects.
- **Interpersonal intelligence:** Ability to understand one's own feeling, emotion, belief, and intentions.
  - o Occupation: People oriented career.
- **Intrapersonal Intelligence:** Ability to understand other's motivation, feeling, belief, etc.
  - o Occupation: Psychologist.
- **Naturalistic:** Ability to understand natural phenomenon.
  - o Occupation: biologist, botanists, etc.
- **Existentialist:** Ability to search about the human existence.
  - o Occupation: Philosophical thinker.

Gardner believed that each intelligence involved unique cognitive skill, and can be destroyed by brain damage. The idea of multiple intelligence has great appeal, especially for educators, in spite of the fact that there is little scientific evidence that such intelligence are anything more than different abilities and that those abilities are not necessarily the same thing as what is typically meant by intelligence (Hunt, 2001). Spearman two-factor theory of intelligence is still accepted by many psychologist and many of them believe that Gardner theory of multiple intelligence has taken concept of 's' (special factor) too far.

Sternberg's triarchic intelligence

Gardner does not have a category for creativity in his intelligence theory, but Robert J. Sternberg does (2002, 2003b). He proposes that intelligence is triarchic, meaning that it has three main components that are as follows:

(i) **Analytical intelligence:** It consists of several basic units of information processing ability. This type of intelligence is very useful in problem-solving. This can be measured by intelligence test and academic achievement tests.

(ii) **Creative intelligence:** It is required to come up with new ways of problem-solving and to deal with new concept. In other words we can call it divergent thinking.

(iii) **Practical intelligence:** It is best described as 'street smarts' or the ability to use information to get alone in life.

Sternberg (1997) found that practical intelligence predicts success in life but has low relationship to academic (analytical) intelligence. Sternberg (2003b) believes that few tasks are purely analytical, creative or practical and most task requires some combination of these skills.

Psychologist criticizes the unempirical nature of triarchic theory and argues that it is absurd to assert that traditional intelligence tests do not measure practical intelligence when they show a moderate correlation with income, especially at middle age when individuals have had a chance to reach their maximum career potential, an even higher correlation with occupational prestige. Gottfredson claims that what Sternberg calls practical intelligence is not a broad aspect of cognition at all, but simply a specific skill set people learn to cope with a specific environment (task specific knowledge).

5.4 MEASURING INTELLIGENCE

1. Individually administered test

Binet tests

Binet and Simon developed the first intelligence test in 1904 as requested by the Government of France to diagnose slow learner and mentally retarded children. The test is known as Binet-Simon test published in 1905. The scale

was a crude method of intelligence for school going children that consisted of thirty items. Several adaptations of Binet-Simon scale were developed, the most important adaptation was done in Standford University and it gained prominence by Terman and associates in 1916. Binet-Simon scale was first revised in 1908 as age scale. In 1911, the scale was further revised and the age range was extended from three years to adult level. Binet reasoned that a mentally retarded child would perform like a normal child of a younger age. He developed norms of intelligence by testing fifty non-retarded children from the ages of 3–11. Children suspected of mental retardation were then given the test, and their performances were compared with those of the children of the same chronological age in the normal sample. Chronological age is the age measured in months and years from the birth. A comparison between mental age and chronological age told whether the child was just below, average or above average in intelligence. In 1916, revision of this scale took a new look. The most important aspect of this revision was the concept of Intelligence Quotient (IQ). The term Intelligence Quotient was developed by William Stern in 1912. The formula of IQ is as follows:

$$MA/CA X 100$$

Those people with IQ below 70 are regarded as mentally deficient, person with 100 IQ are treated as average, if IQ is more than 100, then those people will be treated as above average.

The Binet test has been revised many times to incorporate advances in the understanding of both intelligence and intelligence testing (Caruso, 2001., Kamphaus and Kronck, 2004). The most serious criticism of the Standford Binet scale is that it is more useful for children and not for adult. The scoring is too complicated. Still the Stanford-Binet continues to be one of the most widely used individual tests of intelligence.

Wechsler scales

Wechler, working at Bellevue Hospital in New York City, developed a scale for measuring adult intelligence in 1939. It is developed in two equivalent form—Form 1 and Form 2. Each form consists of ten subsets of which five were verbal or five were performance. In 1955, this scale was revised which consisted of six verbal and five performance scale. This scale is known as WAIS and is used for people between the age of 16 and above. Following are the subsets of WAIS:

- **Verbal scale:** Information, comprehension, arithmetic, similarity, digit span, vocabulary.

- **Performance scale:** Digit symbol, picture completion, block design, picture arrangement, object assembly, etc.

In 1949, he developed a test known as WISC. It comprised of twelve subsets, of which two were used as alternative and supplementary. The row scores of

each subset was determined and transformed into a normalized standard scores with a mean of 10 and SD of 3, then all the scores were added separately.

2. Group tests of intelligence

The Stanford-Binet and Wechsler tests are individually administered intelligence tests. On some occasions, though, it is more convenient and economical to administer group intelligence tests than individual tests. For example, when World War I began, the armed services thought it would be beneficial to know the intellectual abilities of its thousands or recruits. The Army Alpha Test came out in 1917 to measure the intelligence of this large number of individuals on a group basis. In the same year, the Army Beta Test, mainly a performance test given orally, was designed for individuals who could not read the Army Alpha Test.

In spite of different advantages of group test, like being economical, less time taking and convenient it has some disadvantages also, like rapport formation, determining the level of anxiety, etc. Detailed information is also not possible the group.

Scholastic assessment test (SAT)

SAT is a group test taken each year by more than 1 million high school seniors, and it measures some of the same abilities as intelligence tests.

In recent years, a debate has developed over whether private coaching can raise a student's SAT scores. Researchers have found that, on average, SAT preparation courses raise a student's scores only 15 points on the SAT's 200- to 800-point scale (Kulik, Bangert, Drowns, and Kulik, 1984). The reason may be that the student's verbal and mathematical abilities, which the SAT assesses, have been consolidated over years of experience and instruction. SAT is used to predict college success; it has usually been referred to as aptitude test. Aptitude tests predict how well an individual will be able to learn a skill or what an individual can accomplish with training.

3. On administration basis

Individual tests and group tests

From the point of view of their administration, they are divided into two categories, i.e., individual tests and group tests. An individual intelligence test, as its name implies, is one which can be administered to one person at a time. The first individual intelligence test was the Binet-Simon scale. A group intelligence test is one which can be administered to more than one person at a time, i.e., it can be administered to a group. The first group intelligence test was developed when the necessity for mass testing was realized during the World War I. As already mentioned, the Army Alpha test and the Army Beta test were the first group tests; the former being a verbal one and the later being a non- language one. Besides the above simplest comparison, the

individual test and the group test may be compared on the following points so that the two may be recognized as two distinct tests:

(i) The individual test requires a highly skilled and experienced test administrator. He must have a specialized knowledge of testing procedures and test administrations. The group test, on the other hand, being mostly self-explanatory in nature, does not require a very trained and skilled administrator. Persons having a moderate experience with testing procedures can do well in the case of administration of the group test.

(ii) Individual tests are mostly applied in clinical settings whereas the group tests are mostly applied in educational settings, industries, the civil services and military services. A person who is discouraged, withdrawn and has a strong sense of inferiority and guilt cannot be tested properly in a group. However, in an individual session with an experienced administrator he can be readily diagnosed with the help of the appropriate test.

(iii) Individual tests are most suitable for very young children whereas group tests are most suitable for adolescents and adults. With very young children, that is, children of pre-school ages, group test is not suitable. There are two reasons for this. First, the children of pre-school age are distracted very easily. If they are asked to sit in a group, they will be even more distracted. The only solution is to test them individually where the test administrator can have a better control over the distraction of a child. Second, such children cannot be motivated to do well in group tests. The administrator cannot encourage and motivate each child of a group to the extent he deserves. In an individual session, the same task becomes easier for him.

(iv) Individual tests are usually more difficult to construct than group tests. The construction of an individual test is a time-consuming process and an expensive job. Preparing test items for individual tests, standardizing those items on a suitable representative sample, and then finding the proper instructions, time limits, method of scoring, all this is definitely an arduous, non-economical and the time-consuming process. This is so especially because the entire process of test construction is to be carried out in an individual session.

(v) It is, therefore, advisable that individual test construction should not be undertaken unless the test constructor is ready to expend a considerable amount of money and time in test construction.

(vi) In group tests the administrator has a very little opportunity to establish rapport and motivate the examinees and this is especially true when the group is large. Not only this, in the group test the administrator cannot readily recognize those examinees who are being influenced