Centre for Distance and Online Education
Punjabi University, Patiala

Class : B.A. I (Psychology) **Semester : 1**

Paper : General Psychology **Unit : 2**

Medium : English

Lesson No.

2.1: Personality : Nature and Determinants

2.2: Theories of Personality

2.3: Assessment of Personality

2.4: Measures of Central Tendency

2.5: Measures of Variability

2.6: Graphical Representation of Data

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Last updated May, 2023

PERSONALITY: NATURE AND DETERMINANTS

Lesson Structure

2.1.0 Objectives

In the present chapter, we shall discuss :

* what is meant by the term "personality"
* approaches towards the study of personality
* factors affecting personality

2.1.1 Introduction

People often talk about personality as if it were a commodity. Generally, a common man's notion about personality is that it consists only of appealing, admirable traits : affection, charm, honesty, etc. But to a psychologist, personality is much more complex than the ordinary, use of the word implies, it includes both negative and positive qualities.

It is easy to talk about aspects or traits of personality without defining the term. We often say, "I don't trust that man. He is not honest" or "I love that girl. She is good-hearted." But a broad definition of personality is difficult, partly because personality is not one characteristic or ability but consists of a whole range of them.

A definition of personality proposed by Phrase is regarded as comprehensive definition. According to him, personality is the "pattern of characteristics, thoughts, feelings and behaviours that persists over time and situations and that distinguishes one person from another." Two important parts of this definition need special mention. First, personality refers to those aspects that distinguish a person from everybody else. Personality is thus, a person's psychological signature : the behaviours, attitudes, motives, tendencies, outlooks, and emotions with which he or she responds to the world. In this sense, personality is both characteristic and unique to a particular person. A second aspect of this definition is that personality persists over time and across situations. Whether we are reflecting on our own behaviour or interpreting the actions of others, we expect to find consistency. If a person is friendly one day, we would be surprised if he or she were unfriendly the next day. If a relative who is usually quiet and mannerly suddenly turns loud and disrespectful, we become concerned and seek explanations. We know that life is not as predictable as a television serial, but we do expect a degree of consistency, a pattern of behaviour that reflects each person's unique personality. And when we are faced with inconsistency, we suspect that something is wrong. Thus, the concept of personality lends a degree of predictability and stability to an individual.

2.1.1.1 Characteristics of Personality

New comb has discussed personality in the light of certain characteristics and traits. These characteristics and traits are as follows :

1. Personality is something which is unique in each individual :

Personality refers to internal as well as external qualities, some of which are quite general. But it is unique to each individual. It is not possible for

any other individual to reproduce or imitate the qualities of the personality of the individual.

2. Personality refers particularly to persistent qualities of an individual :

Every individual has certain feeling as well as other permanent traits and qualities. Personality is mainly composed of the persistent or permanent qualities that exhibit themselves in form of social behaviour and attempt to make adjustment with the environment.

3. Personality represents a dynamic orientation of organism to environment:

Personality represents the process of learning. It takes place in reference to the environment. We do not acquire all the traits of personality all atonce.

4. Personality is greatly influenced by social interactions :

Personality is not an individual quality. It is a result of social-interaction. In other words, it means that when we come in contact with other members of the society, we acquire certain qualities while we exhibit certain others. All these come to form personality.

5. Personality represents a unique organisation of persistent dynamic and social predisposition :

In personality various qualities are not put together. They are, in fact, integrated into one. This integration is nothing but a result of organisation which may be different from man to man. The behaviour of a person directed to one particular individual may differ from the behaviour of another person. That is why; we put the condition of suitable environment. This suitability is concerned with individual specificity.

2.1.1.2 Foundations of Personality

On the basis of various difinitions it can be said that personality is founded on certain structures. These are (i), Physiological structure of the organism, (ii) Psychic structure of the organism and (iii) Social and cultural structure. These structures contribute to the formation of personality.

Individual is born with certain physical and psychological traits or structures. The physiological and psychological traits react to the social and cultural atmosphere. Consequently, the personality is made up. Various structures that form the personality are discussed below.

1. Physiological structure :

Physiological structure of an individual influences the development of personality

to a large extent. The foundation of this structure is laid in the mother's womb. Thy physiological structure is deeply influenced by certain internal as well as external agencies. Heredity as well as social environment influence the development of the physiological structure.

Heredity contributes to intelligence and mental traits. These factors do influence the development of personality, because they have a place in the society.

Heredity imposes several limitations and restrictions on the personality of an individual. Culture is very much a gift of the heredity. Due to this culture, it is possible for an individual to adjust himself to different situations.

Besides biological inheritance, in social heredity there is a transmission of personality characteristics from one generation to another through pattern of relationship. The vehicle of transmission is not the germ plasm but a psychogenetic influence of parent on child. Heredity may prove the raw material, out of which experience moulds the personality.

2. Psychic Structure of the Personality :

The Psychic structure consists of (a) attitudes (b) traits, (c) sentiments

(d) feelings and emotions (e) values and ideals.

The attitudes influence the psychic structure and latter on, physiological structures.

Traits are inherent as well as the acquired qualities of an individual.

3. Social and Cultural Structure :

Every society has a culture of its own and in the atmosphere of that socio cultural background, the personality of individual develops in its own way. The attitudes of an individual are largely influenced by cultural order. We find difference in the behaviour of individuals due to sociocultural environment. That is why culture play an important role in the development of personality.

Besides the above structures, experience play in important role in the formation of personality. Man is the child of experience. The experience are of two types, one that the infant acquires in his group, for example family. The parents being very intimate to the child make a deep impact of him. The child is fashioned in his home after his parents. He picks up their patterns, manners and poise. The learning of social norms form parents and other agents of socialisation has significant formative influence on him.

2.1.2 Approaches to Study Personality

In order to understand the complexity of personality, theorists have adopted one of the two alternatives of conceptions. The first is a *description* view which emphasizes the *structure* of personality, either in terms of major behaviour

dimensions called *personality traits* or in terms of broader categories of *personality types.* The second is development orientation in which the task is to describe how personality develops and how individual adapt to their diverse environments.

2.1.2.1 Trait Theory

A trait is a stable and enduring attribute of a person that is revealed consistently in a variety of situations. Here a trait theorist studies all possible characteristics that can be used to describe individuals, the number of possibilities would be overwhelming. The most cited number in the psychology of personality may be 17,953 traits. This is the number of distinguishing adjectives that Gordon Allport and Henry Odbert were able to extract from the English language when they set to create a dictionary of trait names that could be used to distinguish one person's behaviour from another's. Thirty years later, Warren Norman developed a new pool of some 40,000 trait-descriptive terms, using experimental and statistical methods. However, Norman was able to reduce this number dramatically, and finally proposed three paired polar opposite adjectives in each of the five major trait dimensions; namely extroversion, agreeableness, conscientiousness, emotional stability, and openness. These were named as five "basic" traits.

Raymond Cattell proposed a more statistical and mathematical approach to the study of traits in order to reduce the vast number of traits to a more manageable and efficient list. He used a sophisticated statistical technique known as factor analysis, which makes it possible to analyse data for a large number of variables and to group together those variables that are associated with one another. Two or more characteristics that correlate highly as assumed to reflect the existence of one underlying trait. In this way, he eventually concluded that 16 traits were sufficient to convey the important underlying differences in personalities. Cattell called these 16 traits as the source traits, which were divided by him into different major dimensions, including **ability** source traits (e.g., intelligence), **temperament** traits (responsible for level of emotional stability), and **dynamic** traits (traits that motivate the individual, such as curiosity and sensuality). He believed that everyone possesses the same source traits, but to different degrees. Cattell also proposed that with the information obtained through these 16 traits, it would be possible to predict individual's behaviour in a particular situation.

Cattell contended that both heredity and environment determine personality. He considered some source traits to be genetically transmitted and others to be environmentally produced.

2.1.2.2 Type Theory

Types are broad inclusive patterns of traits of which some psychologists have

attempted to classify people. One of the first type theory was proposed by Hippocrates (400 BC) who grouped people in four types according to four different humors present in their bodies.

(i) Blood (Sanguine) : In this type a person has a lot of blood and he is cheerful, vigorous, confident and optimistic.

(ii) Black Bile (Melancholic) : Melancholic people are depressed, sad and brooding.

(iii) Yellow Bile (Choleric) : Choleric people are hot tempered and irritable.

(iv) Phlegmatic : Such people are calm, slow moving, sluggish and unexcitable.

Sheldon (1936, 1954) investigated the relationship between biologically determined characteristics and personality traits. Sheldon classified three general body types : **Mesomorphs** are muscular and strong, of medium weight, their temperaments are described as somatotonic (concerned with the body). They love adventure, they are assertive and bold and have lust for power.

Endomorphs : They are obese and have viscerotonic temperaments. They are fond of eating, sociable, tolerant, complacent, love comfort and have slow reactions.

Ectomorphs : They are frail and slender, and are described as cerebrotonic. They are hypersensitive to pain, they love privacy, secretive and unsocial by nature.

Perhaps the most famous of all typologies is that of **introversion-extroversion,** first described by **Carl Jung.** According to Jung, the **extrovert** is outgoing, exuberant, lively and inclined towards direct action. **The introvert** presents the opposite side of the behavioural coin, and is more prone to thoughtful reflection. This attractive typology unfortunately shares the two major shortcomings of all simple typologies. First, typologies put people into extreme categories that apply only to few individuals. As with most dimensions of human variation, the gradation from introversion is a continuous one on which people are normally distributed. Most people fall in the middle of the dimension and show both introversion and extroversion to a degree. Second, in their simplicity, typologies ignore one of the most important facts about personality, that it is multidimensional and consists of many attributes.

These shortcomings have been partially overcome in the work of a famous British psychologist, Hans J. Eysenck. Eysenck's major contribution was to suggest that the traits were not randomly distributed among individuals, but rather clustered in certain predictable patterns. Thus, people can be divided into basic personality types. These types are composed of sets of traits that are the basic habitual response patterns.

Eysenck identified two dimensions along which people could be sorted : *introversion-extroversion,* and *neuroticism.* He believed that an individual's position on these two dimensions defined his or her personality. Eysenck later added a third type *psychoticism.*

Eysenck emphasized the role of heredity in personality. He also proposed that differences in personality resulted from differences in the excitability of the brain and nervous system. Results of his research suggest that extroverts and introverts differ in their level of cortical arousal. Under similar conditions : extroverts tend to show much less psychological arousal than introverts. Eysenck has suggested that because of this, introverts tend to avoid arousing situations, while extroverts tend to seek them out. That is, extroverts in an attempt to avoid the boredom of a generally lower level of psychological arousal seek stimulation, whereas introverts, with a higher level of general arousal, desire less stimulating situations.

Eysencks Type - Trait Theory : Eysenck a British Psychologist believes in biological basis of personality. He described human personality in terms of extroversion, introversion, neuroticism and psychoticism. He suggested that low level of cortical arousals led to etrovert personality type. Low level of cortical arousal means the person needs more and more of stimulation to get aroused. On the other hand introverts has a high level of cortical arousal which means even little stimulation is enough to arouse that is why they prefer to avoid parties, social gatherings etc. to minimise stimulations.

Hierarchy of behaviour organisation.

Specific responses at lowest level. eg. Blushing, crying, smiling etc.

Habitual responses at second level eg. Habits of person.

Traits at third level eg. shy, active, outgoing etc.

The highest level is the organisation of traits into type :- eg. Introver, extrovert etc.

Types/Dimensions of Personality :

1. Introversion-Extroversion:

It refers to the degree to which people are socially outgoing or socially withdrawn. At one extreme are those who are active, thrill seeking and outgoing etc. At other extreme are people who are passive, quiet and reserved etc.

2. Neuroticism vs. emotional stability :

It refers to the degree of control people have over their feelings. At one extreme lies the people who are neurotic. They are moody, touchy and quickly lose

control. At the other extreme lie people who are calm, reliable and under control.

3. Psychoticism vs. sociability :

The third dimension of psychoticism indicates the traits of solitary, egocentric, hostility etc. These persons are opposed to accepted social norms while on the other extreme people with sociability are empathatic, less adventurous and bold.

Self Check Exercise

Note : Space is given below for you to write your answer.

Explain in 30 lines what is meant by the term "personality".

2.1.3 Factors Affecting Personality

An individual's personality is created by a unique combination of influences from biological and constitutional factors, socio-cultural factors, and psychological factors.

2.1.3.1 Biological Factors

The biological factors which are crucial in the development of personality are of three types :

(a) ductless glands, (b) physique, and (c) body chemistry.

2.1.3.1.1 Ductless glands

The ductless glands secrets their hormones directly into the blood. These secretions produce profound effects in personality development. Each gland secretes either one or more than one hormones. Endocrinologists are convinced that moderate over activity of the **pituitary gland** makes the individual muscular, aggressive and self controlled, while under-activity of this gland produces muscular weakness, sluggishness, easy discouragement, and a tendency to give up and cry.

Thyroid deficiency leads to sluggishness, but if the subject is constantly criticized for his sluggishness he may develop an irritable behaviour quite different from what one would expect from the thyroid deficiency alone. Lack of **gonadal** hormones naturally leads to lack of sex interest, but the subjects reaction as already stated, may lead him into some atypical form of sexual behaviour.

Its difficult to suggest that the variations in personality occur due to alterations in the endocrine glandular secretions. Within the normal range of glandular functions personality differences are probably due to other causes. Some of the other causes are biological and some social.

2.1.3.1.2 Physique

Sheldon proposed that people might have three types of body build, each associated with particular type of temperament.

Type	Physique	Temperament
Endomorphic	Soft, round	Comfort-loving, sentimental, pleasure-seeking, socializing.
Mesomorphic	Strong, Muscular, athletic	Active, energetic, more achievement-oriented, aggressive
Ectomorphic	Slender, fragile	Sensitive, delicate, intellectual, withdrawing

Kretschmer named these three types as *pyknic, athletic* and *asthenic* respectively.

2.1.3.1.3 Body Chemistry

Body chemistry has been known to be associated with personality make-up temperament. The relationship between body chemistry and temperament is spelled out as below :

Type	Body Chemistry	Temperament
Sanguine	Greater amount of blood and its proper circulation	Hopeful, energetic
Choleric	Greater amount of bile	Irritated, tense

Phlegmatic	Greater amount of phlegm	Serene, Calm
Melancholic	Greater amount of spleen	Sad, depressed

Neurotransmitters also play a vital role in the personality make up of an individual. Neurotransmitters or neurochemicals, such as serotonin, dopamine Acth is not maintained, the result can be behavioural problems. If the chemicals are released, less or more than required, it results into the disturbance of cognitive, conative and affective behaviour of an individual. The relation of hormonal disturbances to our personality and behaviour is a subject of discussion.

2.1.3.2 Psychological Factors :

2.1.3.2.1 Family patterns

As the infant progress into childhood, he must learn new competencies, develop usable and realistic assumptions about himself and his world, and exert increasing control over his behaviour.

During this period, the family unit remains the crucial guiding influence in the child's personality development. Sometimes, parents do too much, and at other times they do too little. Faulty parent-child and sibling relationships produce negative influence on the development of personality in the growing child.

2.1.3.2.2 Maternal deprivation

Maternal deprivation might be due to separation from the mother and placement in the institution or lack of adequate "mothering" in home. The emphasis here is on lack of warmth and stimulation on the part of persons responsible for the child's rearing.

2.1.3.2.3 Unrealistic demands

Sometimes, parents place excessively strong pressures on their children to excel in schools and other activities. Generally, it becomes difficult for the child to live up to parental expectations and demands.

2.1.3.2.4 Discipline

Discipline needs to be inculcated in the child judiciously. Inadequate discipline, harsh and overly severe discipline and inconsistent discipline may lead to many behavioural problems which are certainly not congenial to healthy personality development.

2.1.3.2.5 Undesirable Parental Models

Children observe and initiate the parents behaviour they see around them. Ordinarily, the child's key models are his parents, who serve as his guides and educators. If the parent's behaviours has not been ideal for the child, the child's behaviour and eventually, the personality make-up is likely to be affected adversely.

2.1.3.2.6 Pathogenic families

Pathogenic families such as families involved in antisocial, activities disrupted and disturbed families, broken homes produce permanent scares on the personality of the child.

Other psychological factors crucial for personality development are : rewards and frustrations, personal limitations, lack or abundance of resources, proper development of self, positive or negative outlook towards life, commitment or involvement, avoiding or facing reality, conformity or non-conformity, etc.

2.1.3.3 Socio-Cultural Factors

Home, school, peer groups and society exert great influence in the development of personality. An infant's biological entity gradually gets socialized with the expansion in his social milieu.

Similarly, cultural factors also exert sufficient influence on the development of personality. Culture exerts a great influence in shaping not only the personality make, up but also in cultivating various types of values, sentiments, cognitive and affective life-styles, faith in ritualistic and customary activities. People belonging to various tribes have peculiar types of beliefs, faiths and customs and accordingly their personality is shaped. Some tribes are very docile while others are aggressive. This variation is because of the cultural differences in the emphasis on life style in different tribes.

2.1.3.4 Summary

Personality is the "totality" of an individual that is physical, mental, and emotional aspects. Certain trait theorists like Allport and Cattell have explained personality in light of number of persistent traits. Personality is developed and affected in light of number of factors like biological, psychosocial and cultural.

2.1.4 Key Words

Pathogenic families

Pathogenic families such as families involved in antisocial, activities disrupted and disturbed families, broken homes produce permanent scares on the personality of the child.

Ductless glands

The ductless glands secrets their hormones directly into the blood. These secretions produce profound effects in personality development. Each gland secretes either one or more than one hormones.

Discipline

Discipline needs to be inculcated in the child judiciously. Inadequate discipline, harsh and overly severe discipline and inconsistent discipline may lead to many behavioural problems which are certainly not congenial to healthy personality development.

Ectomorphs

They are frail and slender, and are described as cerebrotonic. They are hypersensitive to pain, they love privacy, secretive and unsocial by nature.

Maternal deprivation

Maternal deprivation might be due to separation from the mother and placement in the institution or lack of adequate "mothering" in home. The emphasis here is on lack of warmth and stimulation on the part of persons responsible for the child's rearing.

2.1.6 Long questions

1. Analyze the various factors that affect personality development.
2. How do biological factors contribute in shaping an individual's personality?

2.1.7 Short questions

1. Persona
2. Temprament
3. Physique

2.1.8 Suggested Readings

Bhatia : General Psychology

Morgan : Introduction to Psychology

Rai : General Psychology.

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Last updated May, 2023

Theories of Personality

Lesson Structure

2.2.0 Objectives

In the present chapter, we shall discuss three theories of personality, viz.,

(i) Freud's theory;

(ii) Allport's theory; and

(iii) Cattell's theory.

2.2.1 Introduction

A theory of personality consists of a set of assumption relevant to human behaviour alongwith the necessary implied empirical considerations. The theory should also be comprehensive and adequate for making predictions concerning a wide range of human behaviour.

2.2.2 Freud's Theory

Freud's theory of personality involves three inter-related aspects :

(i) structural;

(ii) dynamic; and

(iii) developmental.

2.2.2.1 Structural Aspect of Personality

Personality is made up of three major systems; the id, the ego, and the superego. Each of these systems has its functions, properties, components, operating principles and mechanisms, but they interact so closely with one another that it is difficult to separate out their effects on human behaviour. Behaviour is nearly always the product of an interaction among these three systems.

Id

The *id* is the most basic and original component. It is the matrix within which the ego and the superego become differentiated. It is the reservoir of all psychic energy. It is entirely unconscious. It comprises the whole of the psyche at birth. The ego and the superego develops out of it; throughout life, they depend upon the id as the source of psychic energy for their activities.

The goal of the id is immediate tension reduction, i.e., gratification of impulses. Thus, when a person experiences a biological need, such as hunger, this is felt as an uncomfortable state of psychological tension. The id operates to reduce this tension, and the pleasure obtained by this tension is the id's sole motivation. Freud called this the **pleasure principle.** The id demands immediate gratification and has no concern about external reality.

Ego

In contrast to the id, the *ego* is concerned with, and aware of, objective reality. Ego tries to devise the realistic plans to satisfy the impulsive cravings of the id and is said to be governed by the **reality principle.** Ego wants to protect the organism (i.e., gratification of id impulses) while coping with the real world. If necessary, the ego will delay the organism's attempts at immediate gratification and pleasure, either because these attempts are likely to be unsuccessful or dangerous, or because greater gratification can be gained by waiting. The ego, therefore, is concerned with what is good and bad for the organism on the basis of reality concerns.

Super Ego

The *super ego* is referred to as the "**conscience**" and is concerned primarily with moral ideals. These ideals are originally conveyed to the child by the parents; later by other authority figures and the rewards and punishments imposed by the society shape the development of superego. The super ego deals in absolute rules. Unlike the ego, which seeks compromise, the super ego strives for perfection. It does not function merely to postpone id impulses, it seeks to

block them permanently.

Ideally, the id, ego and super ego work in harmony. The ego satisfies the demands of the id in a reasonable, moral manner approved by the super ego. Thus, ego serves two harsh masters, the id and the super ego, by working a harmonious balance between them.

2.2.2.2 Dynamic Aspect of Personality

The total energy at the disposal of the individual was named by Freud as the *psychic energy.* The source of this energy, of course, is the food consumed by the individual. This energy may be transformed from one state into another state but can never be lost from the total cosmic system.

Freud believed that the total id energy can be divided into two broad categories : **life instinct (eros)** and **death instinct (thanatos).** As drives, these are frequently expressed as sex and aggression. Freud believed that the human organism simultaneously wants to create and destroy, live and die. Freud called the energy that fuels the life instinct as *libido.* The life instinct serves the purpose of individual survival and racial propagation. Hunger, thirst and sex fall in this category. The death instinct performs its work much less conspicuously than the life instinct. For the reason, little is known about it, other than that it inevitably accomplishes its mission. Every person does eventually die, a fact that caused Freud to formulate the famous dictum "the goal of all life is death."

Sudden and unpredictable shifts of energy from one system to another (id, ego and superego) are quite common, especially during the first two decades of life. These shifts of energy keep the personality in a state of dynamic flux. Hence, the dynamics of personality denotes the interplay of the driving forces (id impulses) and the restraining forces (restrictions and blocks created by the ego and the superego). All the conflicts with the personality may be due to the opposition operating in these two sets of forces. Such conflicts, if not resolved, may eventually lead to anxiety. Freud recognized **three** types of anxiety : **reality** anxiety, **neurotic** anxiety, and **moral** anxiety.

The function of anxiety is to warn the person of impending danger. It is a signal to the ego that appropriate measures need to be taken otherwise if the danger persists it might be overthrown. Anxiety is a state of tension; it is a drive like hunger or sex. When anxiety is aroused, it motivates the person to do something. He or she may free from the threatening region, inhibit the dangerous impulses, or obey the voice of conscience. When the ego cannot cope with anxiety by rational methods, it has to fall back on unrealistic ones. These unrealistic methods adopted by the ego are known as *defense mechanisms* of the ego.

Under the pressure of anxiety, the ego is sometimes forced to take extreme

measures to relieve the pressure. These measures are called defense mechanisms. The principal defenses are repression, projection, reaction formation, fixation and regression. The purpose to these defense mechanisms is to resolve frustrations, conflicts and anxieties.

2.2.2.3 Development Aspect of Personality

Freud's model personality assumes that individuals develop in discrete, observable states. Successful progression from one stage to the next is an important determinant of adult mental health, Freud believed that the first few years of life are very important and decisive for the formation of personality.

Each stage of development during the first five years is defined in terms of the modes of reaction of a particular zone of the body. During the first stage, which lasts for about a year and half, the mouth is the principal region of dynamic activity. This is known as the **oral** stage which is followed by the development of driving and inhibiting forces around the eliminative functions, is called the **anal** stage that may last upto the next two years. This phase is succeeded by the **phallic** stage in which the sex organs become the leading erogenous zones. These stages, the oral, anal and the phallic, are called the pregenital stages. The child then goes into a prolonged **latency** period which may last until age 12 to 13 years. At puberty, we enter the last psycho sexual stage, which Freud called the **genital** stage. At this time our sexual impulses reawaken and are directed to the members of the opposite sex.

In Freud's development model of personality, greater emphasis has been placed upon infantile sexuality, i.e., satisfaction or frustration achieved from the erogenous zone during the infantile period. However, the final organization to personality represents contributions from all the five stages.

2.2.3 Allport's theory

Gordon Allport defined personality as "Personality is the dynamic organization within the individual of those psychophysical system that determine his unique adjustments to his environment." Certain aspects of this definition require special emphasis. The term "dynamic organization" emphasizes the fact that personality is constantly developing and changing, although at the same time there is an organization or system that binds together and relates the various components of personality. The term "psychophysical" indicates that personality is neither exclusively mental nor exclusively physical. The organization involves the operation of both body and mind, inextricably fused with each other. The word "determine"" refers to that personality is made up of determining tendencies that play an active role in the individual's behaviours.

Allport is well known for his attempts to describe personality in terms of traits.

According to Allport, no two persons are alike, no two individuals respond in the same way, even to identical stimuli. To study personality, Allport believed one must study the combination of traits that appear in each individual.

Allport divided traits into two types : common and personal. **Common traits** are those that can be used to characterize group of individual, such as "aggressive" to describe wrestlers and football players. **Personal traits** are specific to the individual and most often cannot be described in single word. Personal traits give individuality and uniqueness to personality.

Allport distinguished three levels of personal traits : **cardinal, central and secondary traits. Cardinal traits** are the most powerful and pervasive; they dominate a person's entire personality. For instance, if someone possesses the cardinal traits of "manipulativeness", then this person's action in a number of areas are habitually, characteristically and consitently manipulative. All individuals do not possess cardinal traits. **Central traits** influence much of our behaviour. They are thought of basically describing an individual - for instance, reliable, motivated, sociable, trustworthy. **Secondary traits** are highly specific and apply in certain situation. For example, an individual might be orderly and meticulous in the office but disorganized and messy at home.

In dividing traits into cardinal, central and secondary categories, Allport tried to arrange them hierarchically with respect to their influence on personality and behaviour. Thus, cardinal traits have the most pervasive influence over personality and behaviour, central traits are next, and secondary traits have the least influence.

Allport hypothesized that internal and external forces influence an individual's behaviour and personality, and he referred to these forces as genotypes and phenotypes. Genotypes are internal forces that relate to how a person retains information and uses to it interact with the world. Phenotypes are external forces that relate to the way an individual accepts his or her surroundings and how others influence his or her behaviour.

Allport aimed to describe *individual* personalities. He was interested in those traits that made an individual different from others. He argued that the traits that were most common among all individuals were those that were least common among all individuals (personal traits). However, most of Allport's research centered on investigations into common traits.

Self Check Exercise

Note : Space is given below for you to write your answer.

State in 50 lines the major views held by Allport regarding personality

2.2.4 Cattell's theory

Raymond Cattell proposed a more statistical and mathematical approach to the study of personality. His major concern was to reduce the vast number of traits to a more manageable list. He got out to identify a reasonable number of traits

that could be used to describe all individuals and predict their behaviour. To accomplish this end, he used a sophisticated statistical technique known as *factor analysis*. Cattell eventually proposed 16 dimensions or factors which he considered to be sufficient to convey the underlying differences in personalities.

Cattell believed that this approach to personality could permit a prediction of what a person would do in a given situation. Once he could position a person according to 16 dimensions, he would attempt to predict many of that person's behaviours. Cattell called the 16 first-order dimensions the *source traits,* which he divided into different types, including **ability** *source traits* (i.e., intelligence), **temperament** *traits* (responsible for the level of emotionality), and **dynamic** *traits* (traits that motivate the individual, such as curiosity). He believed that everyone possess the same source traits, but their degree differed from individual to individual.

Cattell also proposed that both heredity and environment determine personality. He considered some traits to be genetically transmitted and other to be environmentally produced.

Cattell's 16 source traits, which could be measured by his Sixteen Personality Factors (16 PF) test, along with the source traits index and the low/high score descriptions, are mentioned below :

Source trait Index	**Low-Score Description**	**High-Score Description**
A	SIZIA Reserved, Detached, critical, aloof, stiff	AFFECTIA Outgoing, warm-hearted, easy-going, participating
B	LOW INTELLIGENCE Dull	HIGH INTELLIGENCE Bright
C	LOW EGO STRENGTH Emotionally less stable, easily upset, changeable	HIGH EGO STRENGTH Emotionally stable, mature, faces reality, calm
D	SUBMISSIVENESS Humble, timid, docile, accommodating	DOMINANCE Assertive, aggressive, competitive, stubborn
F	DESURGENCY Sober, tacitum, serious	SURGENCY Happy-go-lucky, gay, enthusiastic

G	WEAK SUPEREGO STRENGTH Expedient, disregards rules	STRONG SUPEREGO STRENGTH Conscientious, persistent moralistic, staid
H	THRECTIA Shy, timid, threat-sensitive	PARMIA Venturesome, uninhibited, socially bold
I	HARRIA Tough-minded, self-reliant	PREMSIA Tender-minded, sensitive, clinging, overprotected
L	ALAXIA Trusting accepting conditions	PROTENSION Suspicious, hard to fool
M	PRAXERNIA Practical, "down-to-earth", concerned	AUTIA Imaginative, bohemian, absent-minded
N	ARTLESSNESS Forthright, unpretentious genuine socially clumsy	SHREWDNESS Astute, polished, socially aware
O	UNTROUBLES ADEQUACY Self-assured, placid, secure, complacent, serene	GUILT PRONENESS Apprehensive, self-reproaching insecure, worrying, troubled
Q_1	CONSERVATIMS OF TEMPERAMENT Conservative, respecting traditional ideas	RADICALISM OF TEMPERAMENT Experimenting liberal, free-thinking
Q_2	GROUP ADHERENCE Group-dependent, a "joiner" and sound follower	SELF-SUFFICIENCY Self-sufficient, resourceful, prefers own decisions
Q_3	LOW SELF-SENTIMENT INTEGRATION Undisciplined, self-conflict, follows on urges careless of social rules	HIGH STRENGTH OF SELF-SENTIMENT Controlled, exacting will power, socially precise, compulsive, following self-image

Q_4	LOW ERGIC TENSION Relaxed, tranquil torpid, unfrustrated, composed	HIGH ERGIC TENSION Tense, frustrated, driven, overwrought

Based on these 16 factors, he developed a personality assessment each dimension is scored over a continuum from high to low. For eg: your level of warmth describes how warm, caring and nice to others you are. If you score low on this index, you tend to be more distant and cold while a high score signifies you are supportive and comforting.

Eysebcks Type - Trait Theory : Eysenck a British Psychologist believes in biological basis of personality. He described human personality in terms of extroversion, introversion, neuroticism and psychoticism. He suggested that low level of cortical arousals led to etrovert personality type. Low level of cortical arousal means the person needs more and more of stimulation to get aroused. On the other hand introverts has a high level of cortical arousal which means even little stimulation is enough to arouse that is why they prefer to avoid parties, social gatherings etc. to minimise stimulations.

Hierarchy of behaviour organisation.

Specific responses at lowest level. eg. Blushing, crying, smiling etc.

Habitual responses at second level eg. Habits of person.

Traits at third level eg. shy, active, outgoing etc.

The highest level is the organisation of traits into type :- eg. Introver, extrovert etc.

Types/Dimensions of Personality :

1. Introversion-Extroversion

It refers to the degree to which people are socially outgoing or socially withdrawn. At one extreme are those who are active, thrill seeking and outgoing etc. At other extreme are people who are passive, quiet and reserved etc.

2. Neuroticism vs. emotional stability

It refers to the degree of control people have over their feelings. At one extreme lies the people who are neurotic. They are moody, touchy and quickly lose control. At the other extreme lie people who are calm, reliable and under control.

3. Psychoticism vs. sociability

The third dimension of psychoticism indicates the traits of solitary, egocentric, hostility etc. These persons are opposed to accepted social norms while on the other extreme people with sociability are empathatic, less adventurous and bold.

Self Check Exercise

Note : Space is given below for you to write your answer

Explain in 50 lines the categorization of traits as specified by Cattell

2.2.5 Key Words

Id

The *id* is the most basic and original component. It is the matrix within which the ego and the superego become differentiated. It is the reservoir of all psychic energy. It is entirely unconscious.

Ego

In contrast to the id, the *ego* is concerned with, and aware of, objective reality. Ego tries to devise the realistic plans to satisfy the impulsive cravings of the id and is said to be governed by the **reality principle.** Ego wants to protect the organism (i.e., gratification of id impulses) while coping with the real world.

Personal traits are specific to the individual and most often cannot be described in single word. Personal traits give individuality and uniqueness to personality.

Secondary traits are highly specific and apply in certain situation. For example, an individual might be orderly and meticulous in the office but disorganized and messy at home.

2.2.7 Long questions

1. Discuss the key concepts of Freud's theory of personality.
2. Explain the concept of source traits and how Cattell used factor analysis to identify these traits.

2.2.8 Short questions

1 Reality principle
2 EROS

2.2.9 Suggested Readings

Bhatia : General Psychology
Morgan : Introduction to Psychology

LESSON NO. 2.3 **AUTHOR : Dr. SANGEETA TRAMA**

Last updated May, 2023

Assessment of Personality

Lesson Structure :

2.3.0 OBJECTIVES

In this lesson the students will be Appraised of the methods of assessment of personality. After reading this lesson students will be able to differentiate and understand subjective methods, Objective Methods & Projective Techniques in assessing the personality.

2.3.1 Introduction

Today, measurement of personality or assessment of personality has become the important subject-matter of the study of psychology. It would be better to speak of assessing or judging personality rather than of measuring it because our main concern is to find out the progress an individual has made in personality development which is a very complex phenomenon. We evaluate personality because it helps us to know about the physical, emotional and social behaviour of the person. Another important aspect of personality measurement is to find out the extent of individual adjustment to environment, and to help and improve it as far as possible. Important methods that are employed in measuring and assessing the personality are as mentioned below :

1) Subjective Methods;
2) Objective Methods; and
3) Projective Methods.

2.3.2 Subjective Methods

In subjective methods, the subject is asked to evaluate himself and the individual looks at himself critically. Data is collected with the help of friends, associates and relatives. Some of the main subjective methods of measuring personality are given below :

2.3.2.1 Autobiography

Autobiography is the story of the subject written by himself. It is a reliable record of past and present. In this method, the subject writes according to his adventures, experiences, interests and activities of his life. It is very economical and very useful to explore the personality of the person.

But this method has some drawbacks too. The person generally conceals his drawbacks and exaggerates his qualities. So, autobiographies are generally full of lies. Autobiographies may be full of irrelevant or insignificant things. The subject writes from his memory and from memory, we can't recall the same experience that we have felt. So, due to these drawbacks, this method has not proved very useful.

2.3.2.2 Case History Method

In this method, the facts concerning the life of the subject are collected. Its aim is to get as much information as possible about the family history of the individual. The information about hereditary and environmental factors which influence personality development of the individual is collected. Through this method the person tries to study the social environment in which he has been brought up

and in which he now lives, his physical condition, constitutional make-up and health, his education and training, his habits attitudes and interests, his social and economic status his adjustment to things and people around him. With the help of this information, the history of the case is prepared and an attempt is made to find out the case of abnormalities in the personality.

This method, too, has some weaknesses. It is very difficult to collect data through case history. It is very laborious and time consuming task, Moreover, the successful use of case history needs for specialized training.

2.3.2.3 Interview Method

The interview method is the most common used method for testing personality. It is a face-to-face relationship between interviewer and interviewee. It is largely used by staff selection board and public service commissions. Interviewer asks some questions to get information. In the words of Prof. Woodworth, "Interview is a technique by which the information is obtained from a person through indirect type of question. The interviewer keeps observing as the aim how the person behaves, what hesitations he has and what his emotional responses are. The interview and the observation made reveal a lot about the person, e.g., his interest, attitudes, ambitions, aspirations, socialability etc.

But the method of interview is not scientific. It is subjective and needs very experienced examiners. Even the most experienced interviewers are not able to tell what makes the interview most successful. The results of the different interviewers cannot be compared. A successful interview depends on the intimate rapport between the interviewer and the interviewee, but this is not always easy to secure.

2.3.2.4 Questionnaire Method

Questionnaire have been used extensively in the investigation of personality. Personality is frequently measured by questionnaires or a series of questions devised to test a particular trait. R.S. Woodworth was the first to use it and devised a 'Personal Data Sheet' in 1918 to determine emotional instability or neurotic tendency among soldiers. In the questionnaire method, a list of questions is drawn and the candidate is required to answer them. 'Yes' and 'No' are written in front of these questions and the student rules out the wrong answers and indicates the correct ones. It is self-report type of instrument. By classifying answers, it is possible to find out the type of problem the subject is facing and what he is doing to face it.

There are some difficulties in this method. It is not very dependable method because often, the subjects conceal true facts and give wrong answers.

Sometimes, the framing of the questions is such that examiners and the subject take their meaning differently. Inspite of these difficulties, this method has proved to be of tremendous value.

Self Check Exercise

Q. Explain the role of subjective methods in assessing personality.

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2.3.3 Objective methods

In objective methods, the psychologist does not depend upon subject's own statement, but the assessment of his behaviour, is made by judging the subject's overt behaviour as revealed to others. Objective methods depend in the objective data they are said to be scientific. Some of the objective methods are :

2.3.3.1 Rating Method

(By this method, certain traits of personality are divided into several classes on the basis of varying degrees of a trait). By rating is meant the judgement of one person by another. The individuals are ranged into these classes by people who know them intimately. There are two types of scales that are employed :

(1) Relative rating scale

In this method, personality is judged in relation to other persons on the basis of their performance in particular field.

(2) Absolute rating scale

In this method, people are not judged in relation to others but they are judged on the basis of their purpose. Rating can be done by parents, friends, teachers, a board of interviewers, examiner and judges. There can be 3, 5, 7, 9, 11 point rating scales.

This method also has certain limitations. The competent and efficient staff is needed for successful results. This method has the element of subjectivity and the results has likelihood of being biased. Another difficulty is that upon observing a particular good or bad quality, we classify his personality as good or bad in other aspects of temperament too.

2.3.3.2 Situational Test

In this test, as the name suggests, certain artificial situations resembling real-life situation are created and the candidates are placed in such situations and circumstances, and are asked to behave and act. Their behaviour and personality can be assessed by judging the reaction to these situations. These tests are usually employed for children. Generally, rating tests and situational tests are used together. Situation involving cooperation, honesty and leadership can be created and the behaviour of the students can be judged and evaluated accordingly.

This method has limitation of artificiality. When artificial situations are created, the behaviour of the students also becomes artificial and we can not know how they will behave in natural conditions.

2.3.3.3 Performance Method

The performance test was conceived by May and Hartshorne. In this method, the subject is taken to a place where several things are placed. The subject's task is to perform a variety of specific jobs and the quality of his personality is examined. Performance tests are used for carpenters and other kinds of skilled workers. Prof. Murphy said, "The performance tests refer to the art and the workmanship of a person.

2.3.3.4 Sociometric Technique

With the help of this method, social traits of the subject can be judged. This technique can be used within a group whose members know one another, e.g., members of a class, club or factory. Every member is asked to select one or more than one member with whom he would like to study, work, eat, play, etc. The subject can give his first, second, or third choice. A graph of social relations can be prepared with the help of this information. This graphic picture of social relations is called a *sociogram.*

2.3.4 Projective techniques

The most popular and important method for the measurement of personality is the projection of wishes, thoughts, ambitions, fears, hopes and repressed desires on some external object. In this kind of test, material which may be interpreted in any of the different way is presented to the person for his interpretation. It is believed that the person tested will project his personality upon this material and thus, reveal what he is like by what he says. Frank S. Freeman has described the projective techniques in the following words :

A projective test is one that provides the people with a stimulus situation giving him a liberty to impose on it his own private needs and particular perception

and interpretation. Projective techniques assess the total personality of the individual and not in piece-meals. Different persons give different responses to different stimulus situations. Each individual's response has to be analysed and interpreted according to set standard theory. Stimulus situations given are unstructured so that individual can give expression to his own ideas, views, wishes and desires. Some of the important projective techniques are as follows

2.3.4.1 Rorschach's Ink Blot Test

This test was originally introduced by Swiss scientist & psychiatrist Hermann Rorschach in 1921. It is also called the ink-blot test named after this psychiatrist. It is one of the most useful techniques for the study of personality. The basis of this test is perceptual approach. This test consists of ten cards, each containing a rather elaborate ink-blot — five are multi-coloured and five are in black and white. The subject studies one blot at a time and tells what each blot resembles. There is no time limit for this test. These are shown for a second time and he is asked to point out the location as it serves to indicate whether the subject reacted to some particular thing. The criteria of scoring, analysing and interpreting the cards is whether the whole or part is seen, whether colour, texture, shading, form movement is seen, whether animals or human beings are seen.

If the individual sees the picture as a whole, then he is regarded as very intelligent and is expected to possess ability to synthesize. Breaking the blot into small, unusual detail is considered to be characteristic of compulsive people. Poor colour naming responses are considered to indicate lack of emotional control. Form indicates outlook. Texture and shading responses are interpreted as indicators of anxiety, feeling of inadequacy or depression. When colour is combined with form but form predominates, it is taken to indicate that the individual has a lively emotional life. Movement responses are inventive and introspective, while low movement responses indicate that the person is stubborn and practical minded. If the individual sees human beings, he is regarded as stable and if animals, he is regarded as unstable.

Besides the above analysis, facts like the time taken by the subject to react to the whole blot, the number of activities which he did and whether he did them normally or not, are also noted and observed. Rorschach test is widely used to classify abnormal subjects by finding their troubles. It is useful to find out the causes of anti-social activities of delinquents and other problematic children. It gives detail information regarding mental, emotional and social aspect of personality.

Psychologists do not agree about the value of these and projective techniques in

general. Because the biggest difficulty in the ink blot test is that the description of the subject's reactions becomes quite subjective, their interpretation is intuitive and lacks experimental verification. It is not suitable for children. It is time-consuming and laborious. It needs experts which are generally available.

2.3.4.2 Murray's Thematic Apperception Test

Thematic apperception test is another kind of projective technique. Murray investigated the peculiarities of personality with the help of some pictures in 1935. In this test, there are 30 pictures showing different life situations out of these, 10 are meant for men, 10 for women and 10 for both. Twenty pictures are shown to each subject. The subject is asked to tell a story for each picture in the light of what has led to this incident ? What are the present condition of it ? What will be the future results? The subject by projection identifies himself with the characters in these pictures. Unknowingly, the subject express many of his hidden desires, wishes, interests, attitudes etc. He does not get time to think. Therefore, the story expresses his natural desires emotions, sentiments etc. On the basis of these stories, the psychologist analysis the personality of the subject and uncovers its unconscious content.

As in the Rorschach ink blot test, there is a lot of complexity in this test also. The personality investigation done by this method is not numerical but qualitative with possibility of great errors. But still, an experienced and skilful psychologist can use this method effectively to uncover the peculiarities of the personality of the subject.

Self Check Exercise

Q. Write a detailed note on Rorschach's Ink Blot Test.

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2.3.4.3 Psychoanalytic Method

Psychoanalytic method for measuring personality was devised be Freud and developed by Jung and Alder. It is true that unconscious factors are very powerful in determining and influencing human behaviour and personality, and a large part of our behaviour and the hidden pattern of our personality

can be understood only when those unconscious factors can be revealed. Two types of techniques in this method for judging personality are more popular : Free-Association and Dream Analysis.

Free Association

In this test, the person is asked to express freely whatever comes in his mind. The individual is called upon to put down every word that comes to his mind when another is spoken or read. From the responses of the person, the expert judges the nature and causes of repressions, frustrations abnormalities and mal-adjustments.

Dream Analysis

In dream analysis, the subject describes his dreams. It supplements free association. During free association, the individual may fail to recall, or hesitate to express certain painful and embarrassing items. These are repressed and may be identified by interpreting individuals dreams. During sleep, the subject is relaxed and repressed ideas and wishes may slip into consciousness in the form of dreams. But they are disguised and their real meaning is expressed symbolically. By analysis of the dreams, the expert can discover the cause of frustrations, emotional conflicts complexes and mal-adjustment. After knowing the root-cause, the psychoanalyst informs the patient what is wrong with him and it is assumed, that the mere knowledge of the cause of this disorder proves benefits for the patient.

2.3.4.4 Sentence Completion Test

In this method, the subject is given some incomplete sentences. In each case the beginning is given. The subject is asked to go through the list quickly and complete each sentence, e.g.,

(a) I do not like_____

(b) I am honest about_____

(c) I love_____

(d) I like music_____

(e) I hate_____

Sentence completion test is very helpful in giving indication of feeling and disliking towards things and people. It is easy to administer this test even to a large group. But the subject conceals things because he knows the nature of the response he is making. It's scope is limited because it can be administered only on fairly literate individuals.

2.3.5 Summary

Hence there are various methods evolved for the assessment of personality. While assessing the personality a psychologist may apply one or all methods in the assessment and then the interpretation of the test results indicate the personality of an individual.

2.3.6 Key Words

Free Association

In this test, the person is asked to express freely whatever comes in his mind. The individual is called upon to put down every word that comes to his mind when another is spoken or read. From the responses of the person, the expert judges the nature and causes of repressions, frustrations abnormalities and mal-adjustments.

Dream Analysis

In dream analysis, the subject describes his dreams. It supplements free association. During free association, the individual may fail to recall, or hesitate to express certain painful and embarrassing items. These are repressed and may be identified by interpreting individuals dreams. During sleep, the subject is relaxed and repressed ideas and wishes may slip into consciousness in the form of dreams.

Autobiography

Autobiography is the story of the subject written by himself. It is a reliable record of past and present. In this method, the subject writes according to his adventures, experiences, interests and activities of his life. It is very economical and very useful to explore the personality of the person.

Interview Method

The interview method is the most common used method for testing personality. It is a face-to-face relationship between interviewer and interviewee. It is largely used by staff selection board and public service commissions. Interviewer asks some questions to get information.

Absolute rating scale

In this method, people are not judged in relation to others but they are judged on the basis of their purpose. Rating can be done by parents, friends, teachers, a board of interviewers, examiner and judges. There can be 3, 5, 7, 9, 11 point rating scales.

2.3.7 Long questions

1. What are the three main methods of assessing personality?
2. Describe the concept of projective techniques and discuss any two projective tests.

2.3.8 Short questions

1. What are the two types of scales used in the Rating Method for personality assessment?

2. What do you understand by sentence completion test?

2.3.9 Suggested Readings

H.R. Bhatia : General Psychology

B.C. Rai : General Psychology

J.S. Walia : A Manual of Psychology

LESSON NO. 2.4 **AUTHOR : Dr. SANGEETA TRAMA**

Last updated May, 2023

Measures of Central Tendency

Lesson Structure

2.4.0 Objectives

In this chapter, we will discuss the following :

* meaning of measures of central tendency;
* different measures of central tendency;
* computation of mean;
* computation of median; and
* computation of mode.

2.4.1 Introduction

Statistics has often been called as the "Science of Average". Whenever we have to deal with the data of mass character, the use of averages, types or measures of central tendency is essential. In order to reduce the complexity of data and to make them comparable, it is essential that the various data which are being compared are reduced to one figure each. A figure which is used to represent a whole series should neither lie at the lowest extreme nor at the highest extreme

but should lie somewhere between those two extremes, possible in the centre. Such figures are called **measures of central tendency.** There are three averages or measures of central tendency in common use :

(a) the arithmetic mean;
(b) median; and
(c) mode.

2.4.2 ARITHMETIC MEAN (M) :

Mean may be defined as the sum of separate scores of other measures divided by their number. This is the most familiar and useful method used to describe the central tendency of a distribution of scores for any group of individuals, objects or events.

2.4.2.1 Calculating the Mean from Ungrouped Data :

For ungrouped data, the mean is calculated by dividing the sum of the scores by the total number of cases.

$$M = \frac{\sum X}{N}$$

2.4.2.2 Example : Let there be a group of 8 students whose scores in a test are 17, 47, 15, 35, 25, 39, 50, 44. Find out the mean.

Solution : N = 8

$\sum X$ = 17+47+15+35+25+39+50+44=272

$$M = \frac{\sum X}{N} = \frac{272}{8} = 34 \text{ (Ans.)}$$

SELF CHECK EXERCISE

Note : Space is given below for you to write your answer :

Find out the mean of the following scores :

10, 47, 32, 18, 44, 50, 10

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2.4.2.3 Calculating the Mean from Grouped Data :

General Method :

In a frequency distribution where all the frequencies are greater than one, the mean is calculated by the following formula :

$$M = \frac{\sum fx}{N}$$

Example :

Scores	*Frequency (f)*	*Mid-point (X)*	*fx*
65-69	1	67	67
60-64	3	62	186
55-59	4	57	228
50-54	7	52	364
45-49	9	47	423
40-44	11	42	462
35-39	8	37	296
30-34	4	32	128
25-29	2	27	54
20-24	1	22	22
	N=50		$\sum fX = 2230$

$$M = \frac{\sum fX}{N} = \frac{2230}{50} = 44.6 \text{ (Ans.)}$$

Short-Cut Method :

This method saves time and labour in computation. It also makes the calculation work easier, particularly when one has to deal with a large amount of data. It can be computed by this formula :

$$M = AM + \left(\frac{\sum fx'}{N}\right) i$$

Where AM = Assumed Mean

i = length of class-interval

N = Total frequency

x' = deviation from the assumed mean = $\left(\frac{X - AM}{i}\right)$

Example :

Scores	*Frequency (f)*	*Mid-point (X)*	x^1	fx^1
65-69	1	67	5	5
60-64	3	62	4	12
55-59	4	57	3	12
50-54	7	52	2	14
45-49	9	47	1	9
40-44	11	42	0	0
35-39	8	37	-1	-8
30-34	4	32	-2	-8
25-29	2	27	-3	-6
20-24	1	22	-4	-4
	N=50			$\sum fx^1=26$

$$M=AM + \left(\frac{\sum fx^1}{N}\right) i$$

$$= 42 + \frac{26}{10} \times 5$$

$$42 + \frac{26}{10} = 42 + 2.6 = 44.6 \text{ (Ans.)}$$

SELF CHECK EXERCISE

Note : Space is given below for you to write your answer :

Explain in 10 lines the steps for calculating mean for grouped data.

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2.4.3 MEDIAN

It is the value of the middle item of a series when it is arranged in ascending or decending order of magnitude. It is the 50% point in the distribution. Thus, median is the score or value of that central item which divides the series into two equal parts. But it should be clearly kept in mind that the central item itself is not the median. Only the measure or value of the central item is known as median.

2.4.3.1 Computation of Median for Ungrouped Data

In ungrouped data, two situations may arise.

When N is Odd

In this case where N is odd (not divisible by 2), the median can be computed by the following formula :

Md = The measure or value of the $\left(\frac{N+1}{2}\right)$ th item.

Example : Suppose the intelligence score of 7 students in intelligence test is 19,49,17,37, 27,41,46.

Solution : First of all, for calculating Median, we have to arrange the scores in ascending or descending order.

The given numbers arranged in ascending order are :-

17, 19, 27, 37, 41, 46, 49.

N = 7

$\therefore$ the score of the $\left(\frac{N+1}{2}\right)$th item

$= \left(\frac{7+1}{2}\right)$ th item = 4th student

The score of the 4th student in arranged order is 37. Therefore, 37 will be median of the given scores.

Md. = 37 (Ans.)

N is even :

In this case, Median is determined by the following formula.

$$Md = \frac{\text{the value of } \left(\frac{N}{2}\right) \text{th item + the value of } \left(\frac{N}{2}+1\right) \text{the item}}{2}$$

Example : The data of a group of 8 students is 16, 18, 23, 19, 25, 21, 26, 22.

Solution : Data in arranged order are

16, 18, 19, 21, 22, 23, 25, 26, N = 8

$\left(\frac{N}{2}+1\right)$ th students = $\left(\frac{8}{2}+1\right)$ th student = (4+1) = 5th student = 22

$$Md = \frac{21+22}{2} = 21.5 \text{ (Ans.)}$$

2.4.3.2 Computation of Median for Grouped Data :

If the data is available in the form of a frequency distribution, the calculation of median first requires the location of the median class. The following formula is used for this type of group :

$$Md = L + \frac{\left(\frac{N}{2} - F\right) \times i}{f} \text{ th item}$$

Example :

Scores	*(f)*	*cf*
65-69	1	60
60-64	3	59
55-59	4	56
50-54	7	52
45-49	9	45
40-44	11	36

35-39	8	25
30-34	4	17
25-29	2	13
20-24	11	11

N = 60

$$Md = L + \frac{\left(\frac{N}{2} - F\right) \times i}{f}$$

1 = exact lower limit

F = Total of all frequencies before the median class

i = class-interval

N = Total No. of frequencies

$$\frac{N}{2} = \frac{60}{2} = 30$$

$\frac{N}{2}$ lies below 26

The lower limit of this class interval is 39.5

$$Md = 39.5 + \left(\frac{30 - 15}{11}\right) \times 5$$

$$= 39.5 + \frac{15}{11} \times 5$$

$$39.5 + \frac{65}{11} = 39.5 + 5.9 = 44.05 \text{ (Ans.)}$$

2.4.4 MODE

Mode is the most frequently occurring score. It is defined as the size of the variable which occurs most frequently.

2.4.4.1 Computation of Mode for Ungrouped Data

It can be easily computed merely by looking at the data. Our task is to find out that score which is repeated the maximum number of times.

Example : Find out the mode from the following scores of students.

25, 29, 24, 25, 27, 25, 28, 25, 29

Solution : The score 25 is repeated maximum number of times.

Thus, value of the mode is 25.

2.4.4.2 Computation of Mode for Grouped Data

In a frequency distribution score, the mode is calculated by the following formula.

Mode = 3 Median - 2 Mean

In the above example of Mean and Median, the values of Mean and Median for the same frequency distribution are :

Mean = 44.6

Median = 44.05

Mode = 3×44.05-2×44.6

= 132.15 - 89.2

= 42.95 (Ans.)

SELF CHECK EXERCISE

Note : Space is given below for you to write your answer :

If the mean and median for a set of data are 44 and 43 respectively, what is the mode ?

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2.4.5 Importance of Measures of Central Tendency

Mean is the most preferred measure of central tendency as it is rigidly defined mathematically and is based upon all of the measures. Median is used when the exact midpoint of the distribution is wanted - 50% point. Mode is used when a quick approximate is wanted. So to conclude we can say that Mean is the most stable measure of central tendency as it is the center of gravity in the distribution, and each score contributes to its determination.

2.4.6 Summary

In this lesson, we explore different statistical tools used to summarize and describe data. The chapter covers the meaning and importance of measures of

central tendency, namely the arithmetic mean, median, and mode. The arithmetic mean is defined as the sum of all scores divided by their count and is commonly used to represent the central value of a distribution. The median represents the middle value when data is arranged in ascending or descending order and is particularly useful when dealing with odd-sized datasets. On the other hand, the mode is the most frequently occurring score in a dataset. The chapter also discusses the computation of measures for both ungrouped and grouped data. Additionally, the summary highlights the significance of each measure in data analysis.

2.4.7 Key Words

Mean

The **mean** is the average of the numbers. It is easy to calculate: add up all the numbers, then divide by how many numbers there are. In other words it is the sum divided by the count.

Median

In statistics and probability theory, the **median** is the value separating the higher half from the lower half of a data sample, a population, or a probability distribution. For a data set, it may be thought of as "the middle" value. The basic feature of the median in describing data compared to the mean (often simply described as the "average") is that it is not skewed by a small proportion of extremely large or small values, and therefore provides a better representation of a "typical" value.

Mode

The **mode** is the value that appears most often in a set of data values. Like the statistical mean and median, the **mode** is a way of expressing, in a (usually) single number, important information about a random variable or a population.

Central Tendency

Central tendency is a descriptive summary of a dataset through a single value that reflects the center of the data distribution. Along with the variability (dispersion) of a dataset, central tendency is a branch of descriptive statistics. The central tendency is one of the most quintessential concepts in statistics.

2.4.8 Long Questions

1. Calculate the mean, median, and mode for the following ungrouped data:
10, 15, 20, 25, 30, 30, 35, 40, 45, 50
2. Find the mean, median, and mode for the following grouped data:

Class Interval	Frequency
10 - 20	5
20 - 30	8
30 - 40	12
40 - 50	6
50 - 60	9

You can use the appropriate formulas and methods discussed in the lesson to solve these numerical questions.

2.4.9 Short Questions

1. Define the term “Median” and explain its significance in statistics.
2. For the given dataset, 12, 14, 16, 18, 18, 20, 22, 24. Calculate the mean.

2.4.10 Suggested Readings

Garret, H.E. (1981), *Statistics in Psychology and Education.* Feffer and Simons Ltd. Bombay.

Guilford, J.P. & Fruchter, B. (1985). *Fundamental Statistics in Psychology and Education.* McGraw Hill, Singapore.

LESSON NO. 2.5 **AUTHOR : Dr. SANGEETA TRAMA**

Last updated May, 2023

MEASURES OF VARIABILITY

Lesson Structure

2.5.0 OBJECTIVES :

In this chapter, we will discuss the following topics :

* meaning of the measures of variability;
* different measures of variability;
* computation of range;
* computation of quartile deviation;
* computation of average deviation; and
* computation of standard deviation.

2.5.1 INTRODUCTION :

We have already studied the three measures of central tendency. The calculation of three measures of central tendency measures typical or representation of a set of scores as a whole. So, our next step is to find some measure of the variability of our scores. Out target is to find out simply the expected range of dispersion or

variation above and below the average or central value for the given data. There are chiefly four measures for indicating variability or dispersion within the set of scores. They are :

(1) Range (R);
(2) Quartile Deviation (QD)
(3) Average Deviation (AD); and
(4) Standard Deviation (SD).

Each of the above **measures of variability** gives us the degree of variability or dispersion by the use of a single number, and tells us how the individual scores are scattered or spread over throughout the distribution of given data.

2.5.2 RANGE (R) :

The easiest method for finding the measure of variability is by means of range. It is calculated by subtracting the lowest score in the series from the highest, or it is the difference between the values of the extreme items of a series. Thus, if we want to find out the degree of dispersion in the daily income of a person, all that we have to do is to find the highest and the lowest limit. Range may be absolute or relative. When we compare the range of two groups, we have to find what is known as the relative measure of range or coefficient of range. Symbolically, the following formula can be used for the measurement of range and its coefficient.

Range = $m_1 - m_0$

Coeff. of Range = $\frac{m_1 - m_0}{m_1 + m_0}$

2.5.2.1 Example :

The following data relate to income of two groups in a week. Find out by the method of range in which income is more variable.

A - 14, 16, 18, 11, 7, 14, 12

B - 24, 29, 15, 23, 19, 23, 33

Solution :

Range of A = $m_1 - m_0$ = 18-7 = 11

Coeff. of Range of A = $\frac{18-7}{18+7} = \frac{11}{25} = 0.44$

Coeff. of Range B = $\frac{3.3-15}{33+15} = \frac{18}{48} = 0.37$

We find that absolute range in case of A is 11 and in case of B it is 18, but the relative measure reverses the position, and shows greater variability in case of A.

2.5.3 QUARTILE DEVIATION (Q)

The quartile deviation or Q is one-half the scale between the 75th or third and 25th or first quartile in a frequency distribution. It is computed by the formula :

$$Q = \frac{Q_3 - Q_1}{2}$$

Where Q or 75th percentile is the third quartile on the score scale-the point below which lie 75% of the scores, and Q_1 or 25th percentile is the first quartile on the score scale, the point below which lie 25% of scores. The formulas for finding out Q_3 and Q_1 are :

$$Q_3 = 1 + \frac{\left(\frac{3N}{4} = cf\right)}{fq} i$$

$$Q_1 = 1 + \frac{\left(\frac{N}{4} = cf\right)}{fq} i$$

Where 1 = the exact lower limit of the interval in which the quartile falls
i = the length of the class-interval
cf = Cumulative frequency upto the interval which contains the quartile.
fq = frequency of the interval containing the quartile.

Example :

Class-Interval	*Frequency*	*cf*
72-74	2	100
69-71	5	98
66-68	8	93
63-65	11	85
60-62	13	74
57-59	20	61
54-56	14	41
51-53	11	27
48-50	9	16
45-47	4	7
42-44	3	3

N = 100

$$\frac{N}{4} = \frac{100}{4} = 25$$

$$\frac{3N}{4} = \frac{3 \times 100}{4} = 75$$

$$Q_1 = 50.5 + \frac{25 - 16}{11} \times 3 = 52.95$$

$$Q_3 = 62.5 + \frac{75 - 74}{11} \times 3 = 62.77$$

$$Q = \frac{Q_3 - Q_1}{2} = \frac{62.77 - 52.95}{2} = \frac{9.82}{2} = 4.91 \text{ (Ans.)}$$

SELF CHECK EXERCISE

Note : Space is given below for you to write your answer :

State in 10 lines the steps for calculating quartile deviation.

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2.5.4 AVERAGE DEVIATION (AD)

Average deviation is the mean of the deviations of all the separate scores in the series taken from their mean. It is also called the Mean Deviation. The mean or average deviation is not a method of limits, but a method of average deviation in averaging deviations to find the MD or AD, no notice is taken of the signs, and all

the deviations, whether plus or minus, are considered as plus. It is the simplest measure of variability that takes into account the fluctuation or variation of all the items in a series.

2.5.4.1 Computation of Average or Mean Deviation from Ungrouped Data :

In case of ungrouped data, average deviation is calculated by the formula :

$$\text{AD or MD} = \frac{\sum|x|}{N}$$

In this formula, the bars || enclosing the x indicate that signs are disregarded as calculating the sum and x is a deviation of a score from the mean (x=X-M). The use of this formula may be explained through the following example.

Example : Find the average deviation of the scores 15, 10, 6, 8, 11 of a series:

Solution :

Scores *X*	*Deviation from the mean* *x=(X-M)*	$\sum \lvert x \rvert$
15	15-10=5	5
10	10-10=0	0
6	6-10=-4	4
8	8-10=2	2
11	11-10=1	1
N=5		$\sum \lvert x \rvert = 12$

$$\text{Mean} = \frac{15+10+6+8+11}{5} = \frac{50}{5} = 10$$

$$\text{Average Deviation or AD or MD} = \frac{\sum|x|}{5} = \frac{12}{5} = 2.4 \text{ (Ans.)}$$

2.5.4.2 Computation of Average Deviation from Grouped Data :

For Grouped data, AD can be computed by the formula :

$$\text{AD or MD} = \frac{\sum|fx|}{N}$$

Example :

Scores	*f*	*Mid-point (X)*	*fX*	*x=(X-M)*	*fx*
110-114	4	112	448	11.94	44.76
105-109	4	107	428	6.94	27.76
100-104	3	102	306	1.94	5.82
95-99	0	97	0	-3.06	0
90-94	3	92	276	-8.06	-24.18
85-89	3	87	261	-13.06	-39.18
80-84	1	82	82	-18.06	-18.06
N=18	$\sum fX=1081$				$\sum \lvert fx \rvert = 162.76$

$$M = \frac{\sum fX}{N} = \frac{1081}{18} = 100.06$$

$$\text{M.D. or A.D.} = \frac{\sum |fx|}{N} = \frac{162.76}{18} = 9.04 \text{ (Ans.)}$$

SELF CHECK EXERCISE

Note : Space is given below for you to write your answer :

State in 10 lines the steps for calculating average deviation for grouped data.

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2.5.5 STANDARD DEVIATION :

Standard deviation is the root-mean square deviation measured from the average or it is the square root of the arithmetic average of the squares of the deviations measured from the mean. It is represented by the Greek letter sigma (σ.) Symbolically,

$$\sigma = \sqrt{\frac{\sum x^2}{N}}$$

Where X = individual score

M = Mean of the given set of scores

N = Total number of the scores

x = Deviations of each score from the mean.

It is considered as the most stable and reliable measure of variability as it employees the mean for its computation.

2.5.5.1 Computation of Standard Deviation from Ungrouped Data

SD can be computed from the ungrouped scores by the following formula :

$$\sigma = \sqrt{\frac{\sum x^2}{N}}$$

Example : Calculate SD for the following set of scores.

52, 50, 56, 68, 65, 62, 57, 70

Solution :

Scores (X)	*x(X-M)*	x^2
52	-8	64
50	-10	100
56	-4	16
68	8	64
65	3	9
62	2	4
57	-3	9
70	10	100

$\sum X=480$ $\sum x^2 = 382$

$$M = \frac{\sum X}{N} = \frac{480}{8} = 60$$

N = 8

$$S.D. = \sigma = \sqrt{\frac{\sum x^2}{N}} = \sqrt{\frac{382}{8}} = \sqrt{47.75} = 6.91 \text{ (Ans.)}$$

2.5.5.2 Computation of Standard Deviation from Grouped Data :

In case of grouped data, SD can be computed by the following formula :

$$\sigma = \sqrt{\frac{\sum fx^2}{N}}$$

Example :

Scores	*X (Mid-point)*	*f*	*fX*	*x=(X-M)*	*fx*	*fx²*
72-74	73	2	146	15.15	30.30	459.00
69-71	70	5	350	12.15	60.75	738.11
66-68	67	8	536	9.15	73.20	669.78
63-65	64	11	704	6.15	67.65	416.05
60-62	61	13	793	3.15	40.95	128.99
57-59	58	20	1160	0.15	3.00	0.45
54-56	55	14	770	-2.85	-39.90	113.72
51-53	52	11	572	-5.85	-64.35	376.45
48-50	49	9	441	-8.85	-79.65	704.90
45-47	46	4	184	-11.85	-47.70	561.69
42-44	43	3	129	-14.85	-44.55	661.57
		N=100	$\sum fx$=5785			

$\sum fx$=551.70 $\sum fx^2$=4830.76

$$\text{Mean} = \frac{5785}{100} = 57.85$$

$$\text{S.D.} = \sqrt{\frac{\sum x^2}{N}} = \sqrt{\frac{4830.76}{100}} = 6.95 \text{ (Ans.)}$$

2.5.5.3 Calculation of S.D. by Short-cut method for Grouped Data :

The formula for computing by short - Method is :

$$\sigma = i \sqrt{\frac{\sum fx^1}{N} - \left(\frac{\sum fx^1}{N}\right)^2}$$

$\sum fx'^2$ = Sum of squared deviations taken from assumed mean multiplied by f.

$\frac{\sum fx^1}{N}$ = correction in units of class-Interval

i = length of the Class-Interval

Example :

Scores	*f*	*x*	*fx*	fx^2
72-74	2	5	10	50
69-71	5	4	20	80
66-68	8	3	24	72
63-65	11	2	22	44
60-62	13	1	13	13
57-59	20	0	0	0
54-56	14	-1	-14	14
51-53	11	-2	-22	44
48-50	9	-3	-27	81
45-47	4	-4	-16	64
42-44	3	-5	-15	75
	N = 100	$\sum fx^1 = -5$	$fx^{12} = 537$	

$$\text{S.D.} = i \sqrt{\frac{\sum fx^2}{N} - \left(\frac{\sum fx}{N}\right)^2}$$

$$= 3\sqrt{\frac{537}{100} - \left(\frac{-5}{100}\right)^2}$$

$$= 3\sqrt{\frac{537}{100} - 0.0025}$$

$$= \frac{3}{10}\sqrt{537 - 0.025}$$

$$= \frac{3}{10}\sqrt{536.75}$$

$$= \frac{3}{10} \times 23.17$$

= 6.25 (Ans.)

2.5.6 Summary

There are four measures to indicate the variability or dispersion within a set of measures. These are (1) the range, (2) the quartile deviation or Q, (3) the average deviation or AD and (4) the standard deviation or SD. Amongst the various measures of variability SD is considered to be the most appropriate index of variability as it has the greatest statistical stability.

2.5.7 Key Words

Range

In statistics: Numerical measures. The range, the difference between the largest value and the smallest value, is the simplest measure of variability in the data. The range is determined by only the two extreme data values.

Deviation

In statistics, deviation is a measure of difference between the observed value of a variable and some other value, often that variable's mean. The sign of the deviation reports the direction of that difference (the deviation is positive when the observed value exceeds the reference value).

Standard Deviation

Standard deviation is a measure of the amount of variation or dispersion of a set of values. A low standard deviation indicates that the values tend to be close to the mean (also called the expected value) of the set, while a high standard deviation indicates that the values are spread out over a wider range.

Quartile Deviation

The Quartile Deviation (QD) is the product of half of the difference between the upper and. lower quartiles. Mathematically we can define as:

Quartile Deviation = (Q3 – Q1) / 2. Quartile Deviation defines the absolute measure of dispersion.

Variability

Variability refers to how spread scores are in a distribution out; that is, it refers to the amount of spread of the scores around the mean. For example, distributions with the same mean can have different amounts of variability or dispersion.

2.5.8 Long questions

1. Find the standard deviation for the following data.

X	9	10	7	5	7	5	9	6	8	7

2. How to find quartile deviation of a grouped data? Please explain with the help of hypothetical example.

2.5.9 Short Questions

Define the following

1. Standard deviation
2. Third Quartile

2.5.10 Suggested Readings

Garrett, H.E. (1981), *Statistics in Psychology and Education,* Vakils, Ferrer and Simons Ltd. Bombay.

Guilford, J.P. & Fruchter, B. (1985). *Fundamental Statistics in Psychology and Education.* McGraw Hill, Singapore.

LESSON NO. 2.6 **AUTHOR : Dr. SANGEETA TRAMA**
Last updated May, 2023

Graphical Representation of Data

Lesson Structure :

2.6.0 OBJECTIVES

In this chapter we will discuss about the graphical representations of data. Our focus will be on

* the different modes of graphical representation of data.
* graphical representation of grouped and ungrouped data.

2.6.1 INTRODUCTION

A graphical representation is the geometrical image of a set of data. It enables us to think of a statistical problem in visual terms. Understanding and interpretation of the collected statistical data is easier on visual scale.

2.6.2 MODES OF GRAPHICAL REPRESENTATION OF DATA

Data is in the form of raw scores and is known as **ungrouped data,** and when it is organized into a frequency distribution, then it is referred to as **grouped data.** Separate modes and methods are used to represent these two types of data ungrouped and grouped.

2.6.2.1 Graphical Representation of Ungrouped Data

For the ungrouped data the following graphical representative are made use of

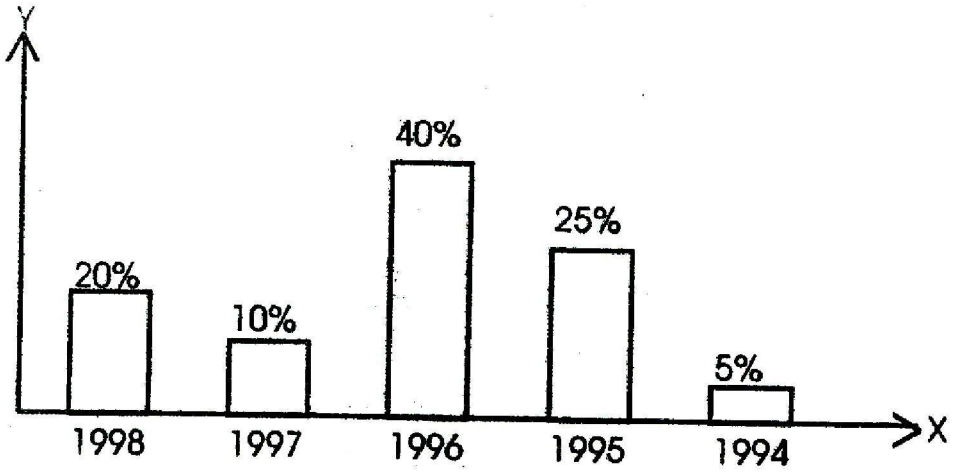
1. Bar graph or Bar Diagram.
2. Circle graph of Pie diagrams
3. Pictograms
4. Line graphs

2.6.2.1.1 Bar graph or Bar Diagram

Here, the data is represented by bars. These diagrams are either vertical or horizontal. In the construction of both these forms, the lengths of the bars are kept proportional to the amount of variable or trait (cost, no. of individuals etc.) possessed. The width of the bar is not governed by any set rules. A space one-half of the width of a bar is left between two bars.

Examples :

Year	No. of Students	Percentage
1994	6	5
1995	30	25
1996	48	40
1997	12	10
1998	24	20



Bar Graph Horizontal % of Students of B.A. I across the years

SELF CHECK EXERCISE

Q. State how ungrouped data can be represented graphically.

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2.6.2.1.2 CIRCLE OR PIE DIAGRAM :

Here, the data is represented through the sections or portions of a circle. The name pie diagram is given to a circle diagram because in determining the circumference of a circle, we have to take into consideration a quantity known as 'Pie' (π).

The surface area of a circle is known to cover 2π or 360 degrees. The data thus, may be represented by 360 degrees, parts or sections of a circle. The total frequencies or value is equated to 360° and then the angles corresponding to component parts are calculated. After calculating these angles, the required sectors in the circle are drawn.

For example, we take the same data as in Fig. 1. then degrees may be calculated as under :-

$$\frac{6}{120} \times 360 = 18°$$

$$\frac{30}{120} \times 360 = 90°$$

$$\frac{48}{120} \times 360 = 144°$$

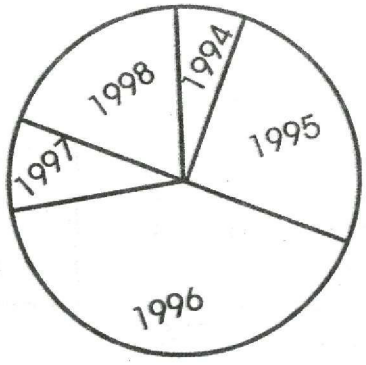
$$\frac{12}{120} \times 360 = 36°$$

$$\frac{24}{120} \times 360 = 72°$$

Total = 360

Total No. of Students = 120

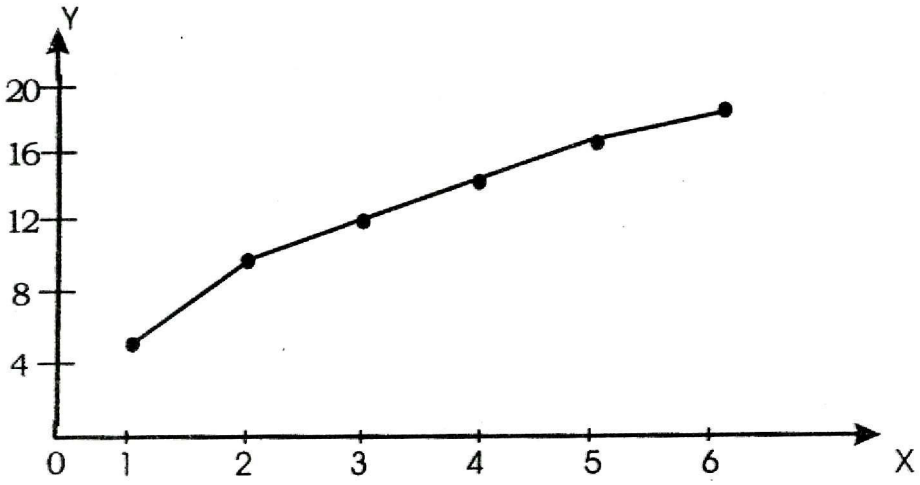
Pie Diagram Yearwise Distribution of Students



2.6.2.1.3 LINE GRAPH : Line graphs are simple Mathematical graphs that are drawn on the graph paper by plotting the data concerning one variable on the horizontal x-axis and other variable of data on the vertical y-axis. With the help of such graphs, the effect of one variable upon another variable during an experimental or normaline study may be demonstrated.

Example :

Trial No.	1	2	3	4	5	6
Score.	5	10	14	16	18	20



Line Graph of score overs Trial

2.6.2.2 GRAPHICAL REPRESENTATION OF GROUPED DATA (FREQUENCY DISTRIBUTION)

There are four methods of representing a frequency distribution graphically.

1. The Histogram
2. The Frequency Polygon
3. The Cumulative Frequency Graph
4. Ogive.

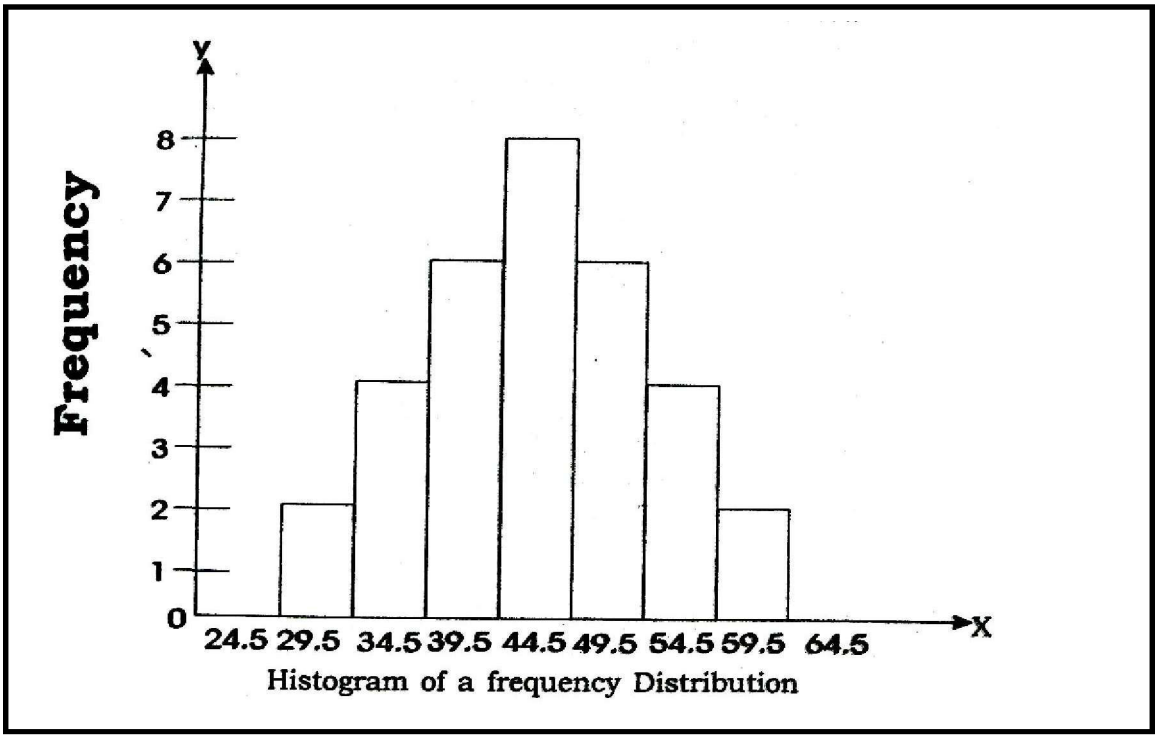
2.6.2.2.1 HISTOGRAM

A histogram or column diagram is essentially a bar graph of a frequency distribution. Important points to be remembered are as under -

1. The source in the form of actual class limits as 20.5-24.5 etc. should be written instead of 20-24 etc.
2. Two extra intervals - one below and other above the given grouped intervals or classes (with zero frequency) are taken. Then,
   1. The extra lower limit is plotted at the intersection of X-axis and Y-

axis.

2. Frequencies of the distribution are plotted on the Y-axis.
3. Each class or interval with its specific frequency is represented by a separate rectangle. The base of each rectangle is the width of the class interval (i) and the height is the respective frequency of that class or interval.
4. It is not necessary to project the sides of the rectangles down to the base line.
5. Both X and Y-axis should not be too long or too short.



Histogram of a frequency Distribution

2.6.2.2.2 FREQUENCY POLYGON

Frequency Polygen is a line graph for the graphical representation of the frequency distribution :

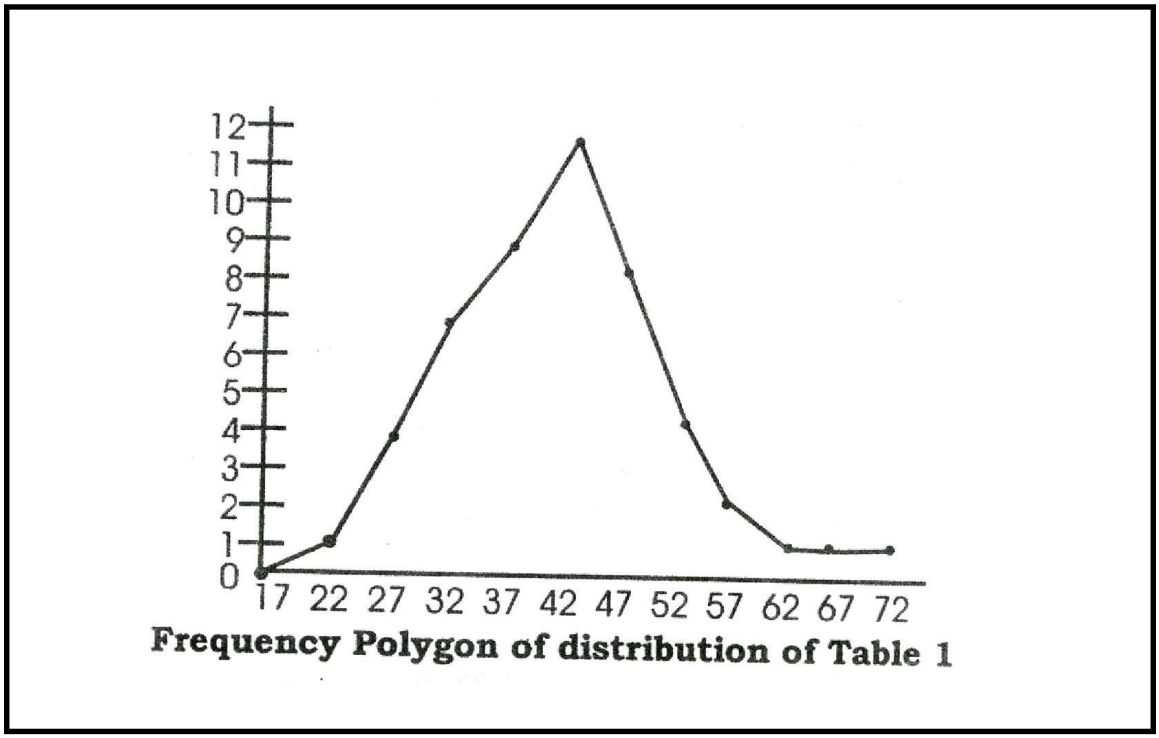
1. As in the histogram, two extra intervals or classes one above and the other below the given intervals are taken.
2. The midpoints of all the classes or intervals are calculated.
3. The midpoints are marked along the X-axis and the corresponding frequencies across the Y-axis by choosing suitable scales on both axis.
4. The various points obtained by plotting the mid-points and frequencies are joined by straight lines to give the frequency polygon.
5. For the approximate height of the figure and selection of X and Y units,

height may be taken as 75% of the width.

Example :

Classes of Scores	**Frequencies**	**Compulative frequency**	**Cum.% Frequencies**
65-69	1	50	100.00
60-64	3	49	98.00
55-59	4	46	92.00
50-54	7	42	84.00
45-49	9	35	70.00
44-44	11	26	52.00
35-39	8	15	30.00
30-34	4	7	14.00
25-29	2	3	6.00
20-24	1	1	2.00

N=50



Frequency Polygon of distribution of Table 1

SELF CHECK EXERCISE

Q. Explain the characterstics of Histogram.

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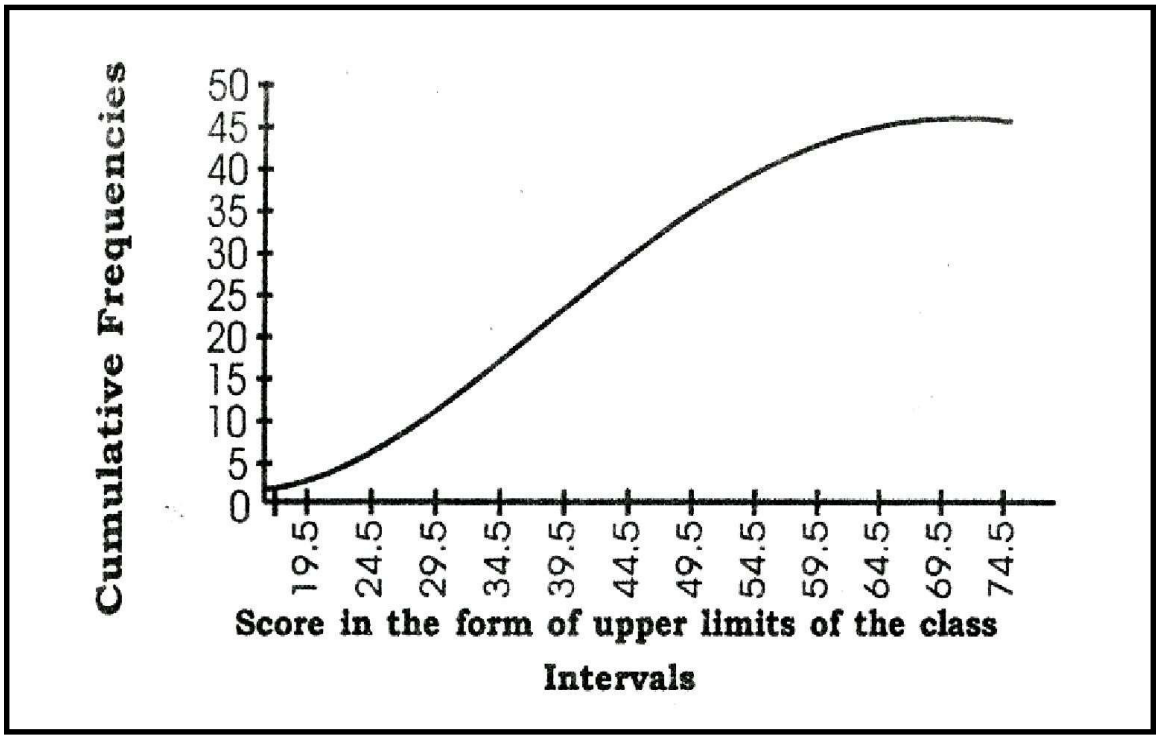
2.6.2.2.3 THE CUMULATIVE FREQUENCY GRAPH :

The data organized in the form of cumulative frequency distribution may be graphically represented through the cumulative frequency graph. It is actually a line graph drawn on graph paper by plotting actual upper limits of the class intervals on the X-axis and the respective cumulative frequencies of these class intervals on the Y-axis. For the data given in Table 1.

1. First of all, we will calculate the actual upper limits of the class intervals as 24.5, 29.5, 34.5, 39.5, 44.5, 49.5, 54.5, 59.5, 64.5 and 69.5
2. For a simple frequency distribution table, the cumulative frequencies are first determined and written at the proper place against the respective class intervals.
3. Upper limits of the class intervals are plotted on the X-axis and respective cumulative frequencies on the Y-axis of the graph.
4. All the plotted points representing upper limits of the class intervals with their respective cumulative frequencies are then joined through a successive chain of straight lines resulting in a line graph.

For the purpose of plotting of the origin of the curve on the X-axis, it is customary to take one extra class interval with zero cumulative frequency and thus calculate the actual upper limits of this class interval for plotting on the X-axis. In this case, the upper limit will be 19.5 and shall be the starting point of the curve located on the "o" origin of the graph.



2.6.2.2.4 Ogive or Cumulative Percentage Frequency Curve

Frequency curve is essentially a line graph drawn on a piece of graph paper by plotting actual upper limits of the class intervals on the X-axis and their respective cumulative percentage on the Y-axis.

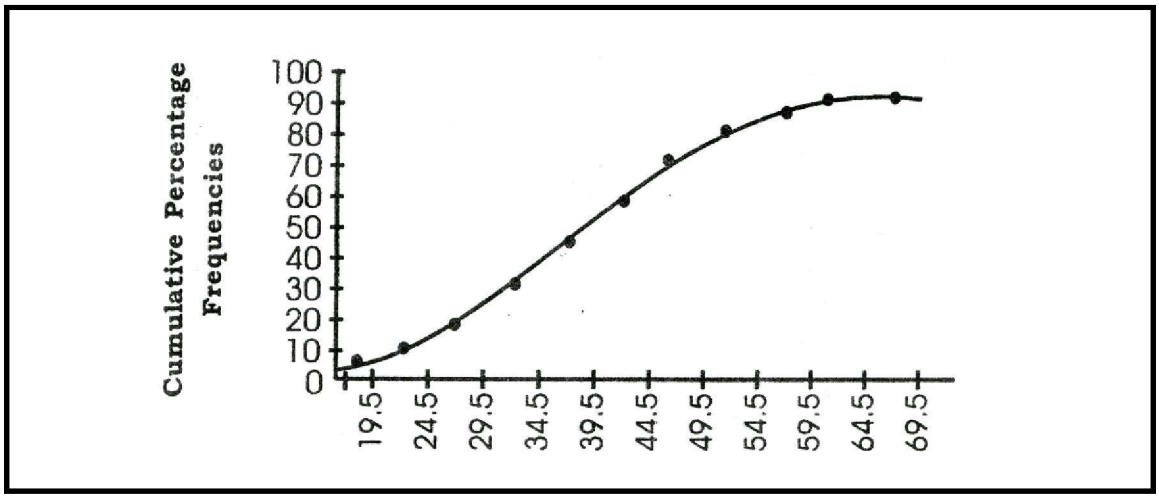


Fig. Cumulative Percentage Frequency Curve of Ogive (Table 1)

Uses of Ogive :

1. The statistics like Median, Quartiles, Quartile Deviation, Percentiles etc.

may be determined quickly and accurately.

2. Percentile norms may be easily determined.

2.6.3 Summary

Analysis of data may be obtained from a graphic or pictorial treatment of the frequency distribution. Graphical representation of the numerical data seeks to translate numerical facts-often abstract and difficult of interpretation into more concrete and unerstandable form.

2.6.4 Key Words

Line Graph : Line graphs are simple Mathematical graphs that are drawn on the graph paper by plotting the data concerning one variable on the horizontal x-axis and other variable of data on the vertical y-axis. With the help of such graphs, the effect of one variable upon another variable during an experimental or normaline study may be demonstrated.

Bar graph or Bar Diagram :

Here, the data is represented by bars. These diagrams are either vertical or horizontal. In the construction of both these forms, the lengths of the bars are kept proportional to the amount of variable or trait (cost, no. of individuals etc.) possessed. The width of the bar is not governed by any set rules. A space one-half of the width of a bar is left between two bars.

Circle or Pie Diagram :

Here, the data is represented through the sections or portions of a circle. The name pie diagram is given to a circle diagram because in determining the circumference of a circle, we have to take into consideration a quantity known as 'Pie' (π).

Histogram

A histogram is a bar graph-like representation of data that buckets a range of outcomes into columns along the x-axis. The y-axis represents the number count or percentage of occurrences in the data for each column and can be used to visualize data distributions.

Ogive

An ogive also called a cumulative frequency polygon, is a type of frequency polygon that shows cumulative frequencies. In other words, the cumulative percents are added on the graph from left to right. An ogive graph plots cumulative frequency on the y-axis and class boundaries along the x-axis.

2.6.5 Long Questions

1. What are the different ways to graphically present grouped data?
2. Explain the various modes of graphical representation of data.

2.6.6 Short Questions

Define the following

1. Pie chart
2. Ogive

2.6.7 Suggested Readings

1. Garrett : Statistics in Psychology and Education.
2. S.K. Mangal : Statistics in Psychology and Education (1987). Tata McGraw-Hill Publishing Co., Ltd., New Delhi.

Mandatory Student Feedback Form

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