

PSYCHOLOGY

INDIVIDUAL DIFFERENCES

PART I

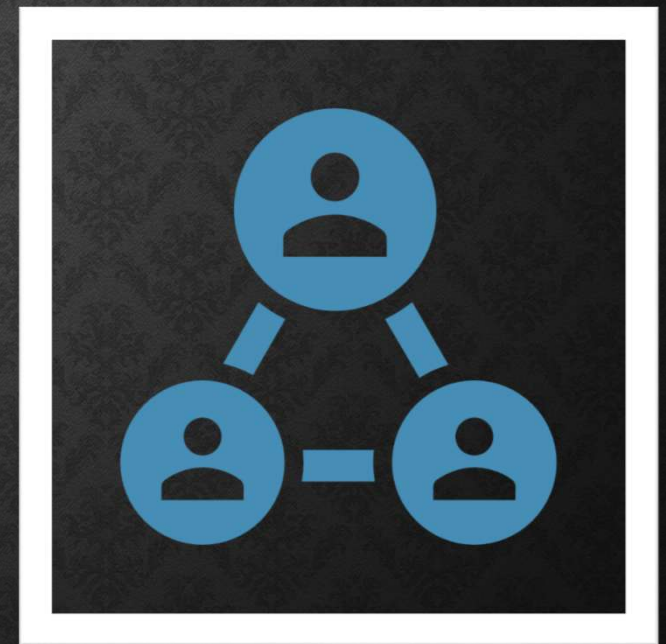
- ✓ Heredity & Environment
- ✓ Role of Biological Factors

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WHAT IS INDIVIDUAL DIFFERENCES

- Individual differences refer to the variations that exist among human beings in terms of their physical, mental, emotional, social, and moral traits. These differences make each person unique and distinguishable from others, even within the same family or species.
- • Carter B. Good (1959) defines individual differences in two ways:
 1. Specific Variation: “The variations or deviations among individuals in regard to a single characteristic or a number of characteristics.”
 2. Holistic Distinction: “Those differences which in their totality distinguish one individual from another.”



UNDERSTANDING INDIVIDUAL DIFFERENCES

There is an infinite variety and deviation present among all creations, both living and non-living. While we can group objects or living beings into categories or species based on common characteristics—allowing us to distinguish a crow from a parrot—it is a mistake to assume members of the same species are identical.

* **Universality of Difference:** Even within a species, such as cows or buffaloes, individuals differ from one another in many aspects despite sharing species-specific qualities.

* **Human Uniqueness:** Differences become most intense and remarkable in human beings. We differ in size, shape, appearance, speed of reaction, and countless other personality traits.

* **The Individual as a Type:** No two humans are exactly the same; even identical twins or children of the same parents possess distinct individualities. Every person is a typical human being in themselves, unique in their totality.

THE DISTRIBUTION OF DIFFERENCES



Individual differences in a large population generally follow the pattern of a Normal Distribution Curve.



* **The Average Majority:** Most people (approximately 68.26%) possess average attributes, such as height, weight, or an IQ ranging between 90 and 110.



* **The Extremes:** A small, equal percentage of the population (15.74% each) falls into the "above average" (e.g., geniuses) or "below average" (e.g., those with intellectual disabilities) categories

BROAD CATEGORIES OF DIFFERENCES

Whatever variations exist among human beings can be classified into two expansive categories:

* **Physical or Physiological Differences:** Related to the makeup of our bodies (height, weight, internal organ functioning).

* **Psychological Differences:** Related to mental makeup, including intellectual potential, interests, attitudes, and emotional development.

SPECIFIC VARIETIES OF INDIVIDUAL DIFFERENCES

Beyond the broad split of physical and psychological, researchers identify several specific areas where variations are most prominent:

1. Physical and Physiological Differences

* **Structural Variation:** Individuals differ in height, weight, skin color, eye and hair color, and the size of hands, heads, and feet.

* **Internal Functioning:** Differences exist in the structure and functioning of internal organs.

* **External Expression:** Variations are seen in facial expressions, hair styles, and mannerisms of speech and walk.

2. Mental and Intellectual Differences

* **Cognitive Capacities:** People differ in intellectual abilities such as reasoning, thinking, power of imagination, and creative expression.

* **IQ Classification:** Based on general intelligence, individuals are often classified into categories ranging from "idiot" and "imbecile" to "normal," "very superior," and "genius".

3. Differences in Motor Ability

* **Physical Reaction:** There are wide variations in reaction time and speed of action.

* **Technical Skill:** Differences occur in muscular movement rate, manual dexterity, steadiness, and resistance to fatigue.

4. Differences in Achievement

* **Academic Performance:** Even when provided with equal schooling and having similar intelligence, individuals show marked differences in their levels of achievement and knowledge.

5. Emotional Differences

* **Emotional Dominance:** In some, positive emotions like love and affection are prominent, while in others, negative emotions are more powerful.

* **Stability:** Individuals differ in emotional maturity and stability; some are stable and mature, while others remain unstable and immature.

* **Expression:** There are significant variations in how different people choose to express their emotions.

6. Interests and Aptitudes

* **Social Tastes:** Some enjoy social gatherings and group excursions, while others prefer solitude, meditation, or the company of books.

* **Specific Aptitudes:** People possess different inherent bents, such as mechanical, musical, artistic, or scholastic aptitudes.

7. Attitudes, Beliefs, and Opinions

* **Direction of Attitude:** Attitudes toward people, objects, or ideas may be positive, negative, or indifferent.

* **Ideological Outlook:** Some individuals are conservative and rigid, while others are progressive, liberal, and dynamic.

8. Learning Differences

* Pace of Learning: Some students learn and utilize information more easily and comfortably than others.

* Method Suitability: A learning method or environment that suits one person may be completely ineffective for another.

9. Social and Moral Development

* Social Adjustment: Some individuals adjust properly to social situations and lead happy social lives, while others may become socially handicapped or even anti-social.

DETERMINANTS OF INDIVIDUAL DIFFERENCES

Researchers in education, sociology, and psychology have concluded that variations among humans are not accidental but are the result of two primary factors working together.

The Two Pillars of Development

* **Heredity:** The "native capital" or biological endowment an individual receives at the time of conception.

* **Environment:** The sum total of all external forces and influences that affect an individual from conception until death.

THE CONCEPT OF HEREDITY



Heredity is the biological process by which offspring inherit traits from their parents and ancestors, making them resemble their family line while remaining distinct members of their species.



* Douglas and Holland (1947): They defined heredity as consisting of "all the structures, physical characteristics, functions or capacities derived from parents, other ancestry or species".



* Biological Inheritance: Unlike social or financial inheritance, in psychology, heredity refers strictly to biological transmission through germ cells.



* Ancestral Stock: A child's inheritance is not limited to their immediate parents; it includes traits from the entire ancestral line, including grandparents and great-grandparents.

HOW LIFE BEGINS (THE MECHANISM OF CONCEPTION)

The process of inheritance begins approximately nine months before birth at the moment of conception.

1. The Role of Germ Cells

* **Male Contribution:** The testes produce male germ cells known as spermatozoa.

* **Female Contribution:** The ovaries produce female germ cells known as ova (singular: ovum).

2. Fertilization

* **The Union:** Life is the result of the union of one male sperm cell and one female ovum.

* **The Zygote:** When a sperm cell establishes contact with and fertilizes an ovum, it creates a single-cell structure technically known as a zygote.

* **Complexity:** From this single fertilized cell, the human body gradually develops into a complex composition of trillions of cells, all carrying the same genetic material inherited at the start.

THE BIOLOGICAL MECHANISM OF INHERITANCE

Chromosomes: The Structural Blueprint

* Within the cytoplasm of the fertilized egg (zygote) lies the nucleus, which contains the chromosomes.

* Human life begins with 23 pairs of chromosomes, totaling 46 individual chromosomes.

* **Equal Contribution:** Exactly 23 chromosomes are contributed by the father through the sperm and 23 by the mother through the ovum.

* **Autosomes:** The first 22 pairs of chromosomes are known as autosomes. These are responsible for determining the growth, structural composition, and general characteristics of the body.

* **Sex Chromosomes:** The 23rd pair consists of the sex chromosomes, which determine the biological sex of the child.

GENES: THE REAL CARRIERS OF TRAITS

Chromosomes possess a thread-like structure and are made up of very small units called genes.

* It is estimated that there are more than 1,000 genes in each human chromosome cell.

* Genes are the actual physical substances and the "real carriers" or determiners of hereditary traits.

* DNA and RNA: The chemical composition of genes consists of DNA (deoxyribonucleic acid) and RNA (ribonucleic acid). DNA is the basic chemical substance primarily responsible for genetic inheritance, while RNA acts as an assistant to carry the genetic code message.

THE PRINCIPLES OF GENE EXPRESSION

Gene Pairing and Dominance

* Like chromosomes, genes occur in pairs, with one member of each pair donated by each parent.

* Principle of Dominance: Gregor Mendel hypothesized that some genes are dominant while others are recessive.

* Trait Expression: A dominant gene will exhibit its characteristics over a recessive one. For example, if one parent provides a dominant gene for brown eyes and the other a recessive gene for blue eyes, the offspring will have brown eyes.

* Dormancy: A recessive trait may lie dormant in one generation but can reappear in the future if it is paired with another recessive gene.

THE DETERMINATION OF SEX

Chromosomal Composition: There are two types of sex chromosomes: X (large) and Y (small).

* Female (XX): A female child inherits one X chromosome from each parent.

* Male (XY): A male child inherits an X chromosome from the mother and a Y chromosome from the father.

* The Father's Role: Since all female eggs contain only X chromosomes, the sex of the child is determined entirely by whether the father's sperm contributes an X or a Y chromosome.

* Accountability: Biologically, the father is more accountable for the determination of the child's sex.

THE ROLE OF CHANCE IN INHERITANCE

Even with the same parents, offspring vary significantly because the process of inheritance is governed by chance factors.

* **Fusion Probability:** It is purely a matter of chance which specific sperm fuses with which specific ovum to form a zygote.

* **Chromosomal Pairing:** Which of the 23 chromosomes from the mother will pair with which 23 from the father is also determined by chance.

* **Permutations:** Millions of different permutations and combinations are possible during the union of genes.

* **Uniqueness:** This massive statistical variety explains why no two individuals are perfectly identical, even if they share the same biological parents.

- While most births involve a single offspring, multiple births provide unique insights into the power of heredity.
- 1. Identical Twins (Monozygotic)
 - * Origin: These occur when a single fertilized ovum (zygote) splits into two parts that fail to unite and instead develop into two separate individuals.
 - * Genetic Makeup: Because they originate from the same zygote, they carry exactly the same genes.
 - * Characteristics: They possess almost the same physical traits and are always of the same sex.
- 2. Fraternal Twins (Dizygotic)
 - * Origin: These result when two different ova mature simultaneously and are fertilized by two different sperms.
 - * Genetic Makeup: This creates two distinct zygotes with different combinations of chromosomes and genes.
 - * Characteristics: They are no more genetically similar than regular siblings; they may be of different sexes and often differ in many personality and physical traits.

TWINS AND INDIVIDUAL DIFFERENCES

THEORIES OF HEREDITY MECHANISM

August Weismann proposed that the human body consists of two distinct types of cells: somatic cells (which maintain the body structure) and germ cells (which handle reproduction).

* **Transmission:** Germ cells are formed through germplasm, which is transmitted in a continuous process from one generation to the next.

* **Parental Role:** Parents act as "trustees" or custodians of the ancestral germplasm rather than its creators.

* **Non-Inheritance of Acquired Traits:** Weismann famously argued that modifications to the body (somatic cells) are not passed to offspring.

* **The Rat Experiment:** He cut off the tails of rats for several generations, yet every new generation was born with a full tail.

* **Human Example:** Scars from diseases like smallpox or skills acquired through practice (like carpentry) are not biologically inherited by children.

GALTON'S BIOMETRY THEORY

Sir Francis Galton was the first to use statistical methods to study the inheritance of psychological traits. His "Law of Ancestral Inheritance" suggests that a child's heredity is a fund contributed to by all ancestors, not just parents.

* Diminishing Contributions: Inheritance is received from ancestors in a diminished order.

* The Mathematical Ratio:

* Immediate Parents: Contribute $1/2$ of the total heritage ($1/4$ each).

* Grandparents: Contribute $1/4$ of the total ($1/16$ each).

* Great-Grandparents: Contribute $1/8$ of the total.

* Great-Great-Grandparents: Contribute $1/16$.

* Total Heritage: The sum of this infinite series ($1/2 + 1/4 + 1/8 + 1/16\dots$) equals 1, representing the organism's total inheritance.

- Gregor Mendel, an Austrian monk and botanist, formulated the foundational laws of genetics through his experiments with garden peas.
- The Pea Plant Experiment
- Mendel crossed "giant" (tall) peas with "dwarf" (short) peas over several generations.
- * 1st Generation (F1): All offspring were tall, but they were "hybrids" carrying both traits. Tallness proved to be the dominant characteristic.
- * 2nd Generation (F2): When F1 plants self-fertilized, they produced tall and short plants in a 3:1 ratio.
- * 3rd Generation (F3):
 - * All dwarf plants produced only dwarfs.
 - * 1/3 of the tall plants produced only tall offspring.
 - * 2/3 of the tall plants produced both tall and dwarf offspring in the 3:1 ratio.
- Core Mendelian Principles
 - * Principle of Dominance: When two different traits are paired, one becomes dominant and the other recessive. The dominant trait is more likely to be expressed in the offspring.
 - * Principle of Segregation: Basic traits (like tallness or shortness) always try to retain their individuality. Even if a trait is recessive and hidden in one generation, it is "segregated" and can reappear in future generations.

MENDEL'S THEORY OF HEREDITY

EVOLUTIONARY THEORIES OF HEREDITY

1. Darwin's Theory (Natural Selection)

* **Struggle for Existence:** Life is a constant struggle for survival and limited resources.

* **Survival of the Fittest:** Only those individuals or species that are the "fittest" and can adapt to changing circumstances survive.

* **Natural Selection:** Over generations, favorable variations are selected by nature and transmitted to offspring, leading to the evolution of life.

2. Lamarck's Theory (Inheritance of Acquired Traits)

* **Inward Urge:** Organisms possess an inner drive to adjust to their environment.

* **Acquired Characteristics:** Efforts to adapt result in physical changes or "acquired traits" during an individual's lifetime.

* **Transmission:** These acquired changes are then passed on to the next generation.

* **The Giraffe Example:** Lamarck argued that giraffes originally had short necks but elongated them over generations to reach high leaves; this acquired length became a permanent hereditary feature.

THE THREE LAWS OF HEREDITY

1. Law of Similarity ("Like Begets Like")

* **Basic Principle:** Children tend to be similar to their parents.

* **Physical and Mental Traits:** Fair-colored parents often have fair children, and bright parents are likely to have bright children.

* **Limitations:** This law is not universal; exceptions occur where children differ in complexion or intelligence from their parents.

2. Law of Variation

* **Basis of Difference:** Children often vary or differ from their parents in specific traits.

* **Cause:** Variations are caused by the unique and chance combinations of chromosomes and genes during conception.

* **Individuality:** This law explains why even siblings or twins can have widely different personalities or appearances.

3. Law of Regression

* **Tendency Toward the Mean:** There is an inherent tendency for traits to move toward the average (mean) of the population in successive generations.

* **The "Good News" for Extremes:**

* Children of extraordinarily talented parents may be less gifted than their parents but still above average.

* Children of very dull parents will likely exceed their parents' ability and move closer to the normal range.

* **Stability:** This law prevents a species from becoming too extreme in any one direction.

- 1. Which of the following best defines individual differences?

- A. Similarities among individuals
- B. Variations in physical and mental traits
- C. Common traits in a species
- D. Identical characteristics in twins

- Answer: B

- 2. According to Carter B. Good, individual differences include:

- A. Only physical traits
- B. Deviations in a single or multiple characteristics
- C. Similarities in emotional traits
- D. Uniformity in social behavior

- Answer: B

- 3. The Normal Distribution Curve shows that most individuals fall under:

- A. Genius category
- B. Below average
- C. Average range
- D. Above average

- Answer: C

- 4. Which of the following is NOT a broad category of individual differences?

- A. Physiological
- B. Psychological
- C. Genetic
- D. Physical

- Answer: C

- 5. Differences in reaction time and manual dexterity fall under:

- A. Emotional differences
- B. Motor ability differences
- C. Intellectual differences
- D. Learning differences

- Answer: B

- 6. Which type of twin shares identical genetic makeup?

- A. Fraternal twins
- B. Dizygotic twins
- C. Monozygotic twins
- D. Conjoined twins

- Answer: C

- 7. The biological process of trait transmission is known as:

- A. Evolution
- B. Heredity
- C. Mutation
- D. Adaptation

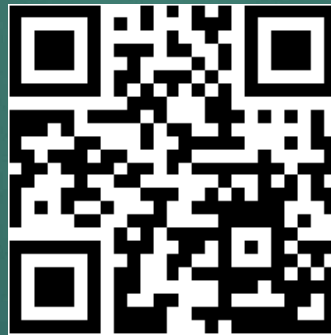
- Answer: B

- 8. Which chromosome pair determines the sex of a child?

- A. 1st pair
- B. 22nd pair
- C. 23rd pair
- D. All pairs

- Answer: C

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