

DEVELOPMENT : ITS FACTORS

13.1 Introduction

Development is essential for normal behaviour and normal life. If development is improper then many abnormalities may show in behaviour as physical, mental or functional abnormalities. In the previous lesson you have learnt what is development, how it is different from growth and maturation etc.

In this lesson you will learn about those causal factors that are responsible for development, the factors that are passed on to you from your parents, in terms of your family characteristics, at the time of birth, called the hereditary or genetic factors which affect your personality and behaviour.

13.2 Objectives

After reading this lesson you will be able to do the following :

- identify the genetic factors which affect development;
- understand how the laws of heredity operate in development;
- identify the environmental factors affecting development;
- explain how each environmental factors operates;
- understand that development is a combinations of both genetic (hereditary) and environmental factors.

13.3 Genetic influences on behaviour

Genetic influences refer to the inherited characteristics of persons or the role of heredity on the personality and behaviour. These in-

fluences are also said to account for a large extent of 'individual differences' between persons. Even in physical features we do not find identical faces except may be among 'identical twins'. Genetic influences are biological in nature and are carried over from generation through genes and chromosomes. These are available in each living cell of a body.

13.3.1 Genes and chromosomes

It has already been stated that genes and chromosomes are the carriers of biological heredity in the form of inherited characteristics from the parents. (See Fig.)

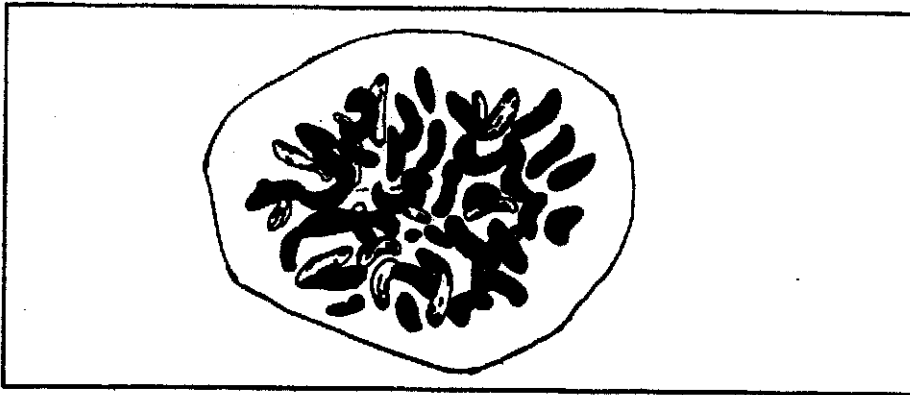


Figure 1 .Microscopic View of Human Chromosomes

Genes are very minute structures available within the nucleus of all living cells. They are so tiny that they are not visible even through a high powered microscope. Genes are passed on to a child through the germ cells (ovum of the female and sperm of the male) of the parents. Each germ cell of parents contains different combinations of genes. The germ cells of mother and father combine to produce the new organism, thereby increasing the variety of possible gene combinations. Thus, even though, each gene is transmitted as a unit, most of the human characteristics (like height, colour of eyes, skin and hair) depend upon the combined influence of several gene combinations. There exist almost unlimited variety of possible gene combinations in human organism. These unlimited varieties are responsible for the occurrence of vast individual differences among persons. No two individuals can be totally identical physically as well as mentally. Some particular varieties of these unlimited gene combinations may result in certain abnormalities like dwarfness or gigantism; Down's syndrome, mental retardation; cleft upper lip; and colour blindness etc.

The genes are grouped into chromosomes. Many genes are thickly packed in a single chromosome. Chromosomes are visible under a microscope and appear to be rodlike or V-shaped bodies in structure, (see Fig.1 for microscopic view of human chromosomes). The chromosomes occur in pairs, the two members of each pair being similar in appearance. Each human cell contains 46 chromosomes

or 24 pairs of chromosomes. For the growth of a new human baby, a fertilized cell (ovum) has to divide itself into two, later these two divide into four, four into eight and so on till the same cell takes the shape of a complete miniature of a human body as a human baby. When a fertilized cell divides, the 46 chromosomes split longitudinally (or length-wise) alongwith splitting each gene in two parts. Remember, that each split up part also is identical to each other and finally the multiple cells after each cell division still have the same constitution or same identity (in terms of nature of genes and chromosomes) which the original-single-fertilized cell had.

By now, you might be wondering that with such strong identity among all split up parts of cells, each offspring from same parents must be identical in characteristics.

But this does not happen because the gene combinations transmitted from each parent may be different for different offsprings. Yet, you see that family resemblances are maintained.

How this is done and whether there are any rules or laws governing the varieties of gene combination, needs some thought. J.G. Mendel, a well known psychologist, tried to study the principles of inheritance. He conducted some experiments on pea plants and later on guinea pigs and formulated the laws of inheritance from hybrid peas (see the given figure)

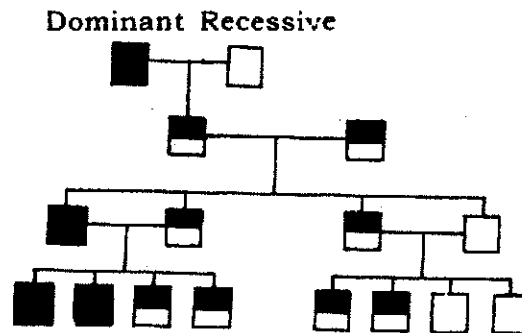


Fig. 2 Mendelian Inheritance : Schematic

In the given figure black is dominant, white is recessive. Hybrids are shown with black on top of white. Pure dominants and pure recessives are solid black and solid white, respectively.

His principles of inheritance explained the hereditary transmission in plants, as well as in animals. (See Fig.3)

By inference from these studies, even human inheritance can be understood. Mendel's findings explained also the role of genes in a clearer way. Now, that you have understood the fact that a new born baby gets half his genes from the father and half from the mother, and he has no genes that his parents did not have, you can understand other genetic principles better.

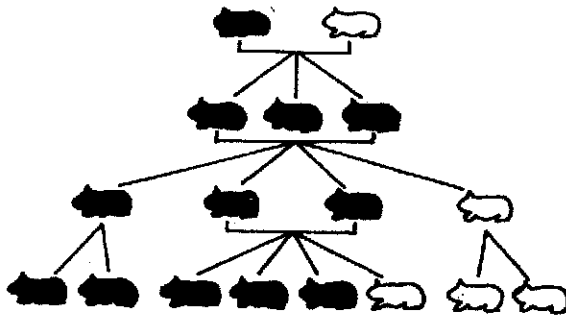


Figure 3. Mendelian Inheritance of Coat Colour in the Guinea Pig

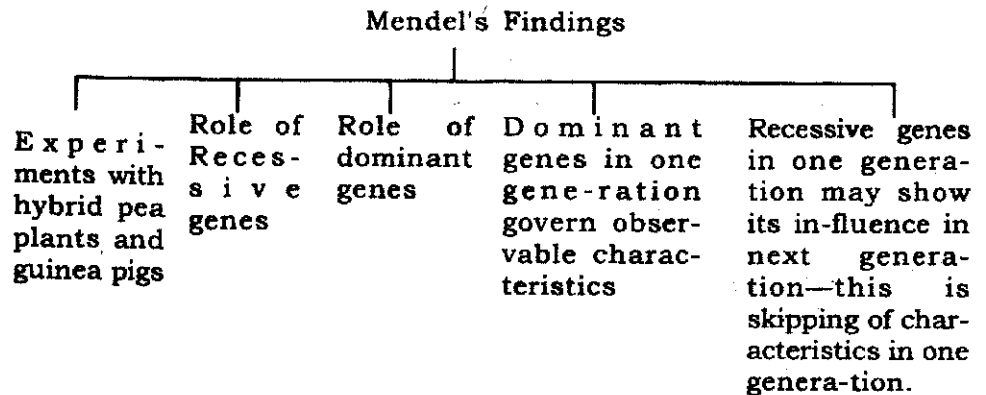
The black coat is dominant over the recessive white coat. The first pair here shows the mating of an animal from a pure black strain with one from a pure white strain. All guinea pigs of the second generation are hybrids, but they look black because black is dominant over white. In the third generation you get pure blacks, black hybrids and pure whites in the ratios shown in Fig.

Mendel, in his studies, began with the assumption that inherited genes in their combinations can be either dominant or recessive. Dominant genes are responsible for giving the observable characteristics of the offspring and their resemblance with either parent. Many genes remain latent in their function or influence. These are called the recessive genes. Recessive genes are not effective when paired with dominant genes. But some recessive genes in one generation may become dominant genes in the next generation, and may result in a set of different observable characteristics. When a person gets two recessive genes from parents, both of whom were hybrids, the offspring may not resemble any parent. But the offspring may carry resemblance to one of the grand or great grand parents or some previous ancestor, because it is from his ancestors that he got his genes.

Mendelian Scheme of inheritance showed us

- (a) the role of recessive and
- (b) dominant genes (See Figs. 3 and 4).

In his experiment he paired one guinea pig of black fur coat and another of white fur coat. Black being dominant, a black guinea pig may be either pure black or a hybrid. The recessive white is hidden under the dominant black in the hybrids. When both parents are hybrids, about $1/4$ of the children may resemble neither parent. Mendel's law has been criticized because in actual life it is found not to be always true e.g. some hybrid children may have intermediate resemblance with their parents. Similarly when one white person's, and one black mate's genes were combined, mulatto children were born in varying degrees of whiteness or blackness of skin colour.

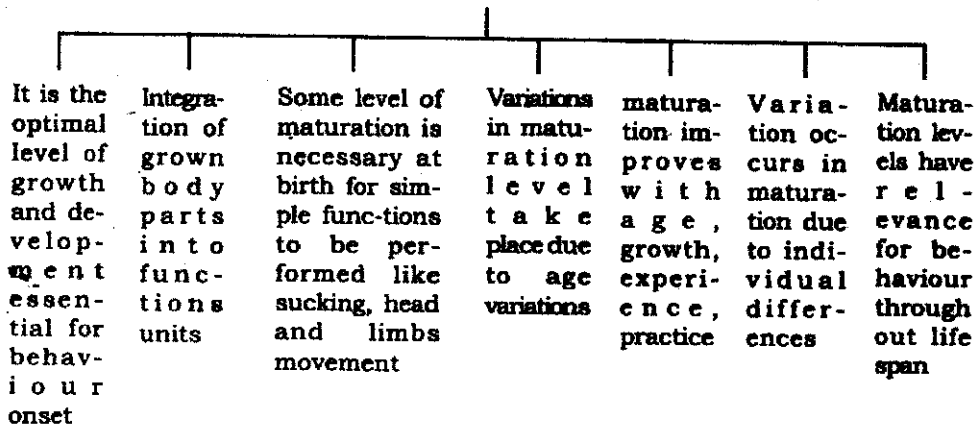
Mendel's Findings :**13.3.2 Maturation**

Maturation, in developmental psychology, is understood as a certain optimal level of growth and development necessary to be attained before the onset of any specific response or behaviour to take place. Maturation in this sense is different from growth and development. Growth, according to biologists, means overall increase in size of the various dimensions of the body like weight, height etc. as well as various body parts like arms, legs, head, skeleton and muscles etc. Development means the changes in the shape of the parts of the body and the integration of the various parts into functional units as growth goes on. Even simple responses by a newborn baby can not be made like holding of head and sitting up because maturation level (proper growth and development) of supporting muscles as well as nerve fibres controlling these organs has not been reached. Similarly the onset of puberty will not take place at the age of 6 or 8 years as the reproductive organs and the relevant hormonal system has not reached the required maturation level. Maturation level, therefore, seems to be age related and developmental milestones for early childhood

Thus, in human beings maturation of various forms like body organs, intellect, emotions for behaviour goes on for a very long time. Although, at birth, maturation of the functions necessary for maintenance of life (like sucking reflex, eye blink, crying, excretory functions) has been reached but it takes a long period before the child can learn to walk, talk, read and write, play games etc. and many years later only, he can contribute to the reproduction of the next generation.

Maturation is not only age related but also governed by the principle of individual differences. Despite similarity in biological functions, different individuals attain maturation levels for normal functions, at very different age levels. These individual differences in maturation could also be the contribution, to some extent different gene combination inherited by everyone from parents.

Maturation



INTEXT QUESTIONS 13.1

State whether the following statements are true or false.

1. Genes and chromosomes come from the environment True/False
2. Genes are visible to the eye True/False
3. Chromosomes are in 48 pairs True/False
4. Chromosomes are packed within genes True/False
5. Genes are carriers of inherited characteristics True/False
6. Genes are passed on through the germ cells of the parents True/False
7. Down's syndrome is an inherited abnormality True/False
8. Levels of maturation are age related True/False
9. Some maturation level is needed even for simple functions like head holding and sitting up for a small baby True/False
10. Maturation relates only to the muscular system and not the nervous system True/False
11. Select the correct alternative :
 - (a) Maturation means growth
 - (b) Maturation means development
 - (c) Maturation means optimal level of growth and development

13.4 Environmental influences in development

Environmental influences mean the total external stimulation that a person receives throughout his life from conception till the end

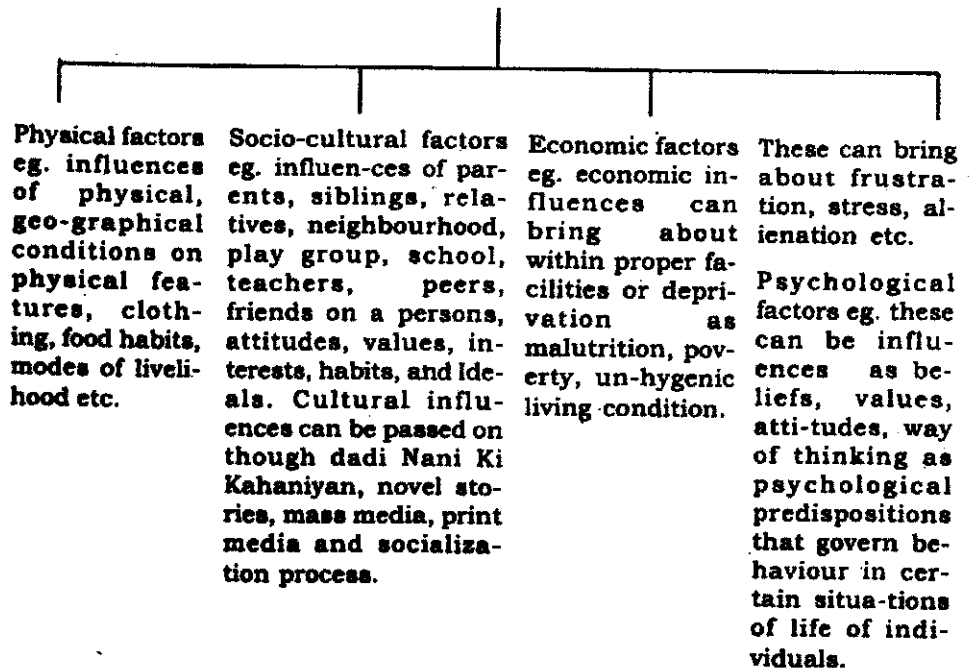
like-language, communication, education, habits, culture, traditions, interests and social motivation.

Environmental influences can arise from such sources as physical, socio-cultural, economic and psychological factors. The environment is everything that affects the individual except his genetic influence. The genes only prepare a predisposition, a foundation and basic mechanisms for behaviour. It is the environment which stimulates this basic mechanism and puts it into action. Only the environment is responsible for all forms of new and learned behaviours except far largely reflexive behaviour. Language and communication, educational and other abilities and skills all are acquired from the environment.

Environmental influences can be classified into four groups:

- (i) Physical,
- (ii) Socio-cultural,
- (iii) Economic and
- (iv) Psychological

Sources of Environmental Influences



13.4.1 Physical-Factors

These include climate and natural resources. Different populations live under different physical conditions in various parts of the world,

like jungles, deserts, plains, mountains, near river banks and near sea-coasts. It can be observed that people living in different geographical areas adapt to the environmental demands like extreme cold or heat, lack of water and cultivation. Their bodies adapt biologically and they become different from each other in their skin colour, body build, eating habits, clothing and other articles of daily usage. Their behaviour also adapts to environmental changes and demands and they engage in such activities like hunting (in jungles), cultivation in plain and mountains, fishing in coastal regions etc.

13.4.2 Socio-cultural factors

Socio-cultural factors include influences of parents, siblings and other relatives with whom an individual has greater frequency of contact. Other social groups influencing the individual in his habits, interests, hobbies and other activities can be neighbourhood, school, play group, hobby clubs, peer groups and fellow students in same school or other schools and most of all friendship groups.

The most important source of influence comes from the family and friends groups. These are also called Primary Groups because they not only have early influences but also deeper impact on the personality of an individual during the growing up period. School influence is very significant though it starts a little later in life at the age of 3 or 4 years for a child. A child soon learns to admire and idealize his teachers and their personality and the mode of instruction can deeply influence the child to imbibe the desired attitudes, beliefs, values and habit patterns. Often it is found that an effective teacher can perceive a wider family problem within or as a cause of a child's problem behaviour and by counselling the parents she can reintegrate the family. By a combined influence of family and school, a child during his formative years itself may learn to be a scholar, an artist, a musician or a teacher. The positive influences and democratic ways of handling are known to make a child happily adjusted and growing normally, along with improving his talent and ability. But unduly strict and authoritative influences can make children rebellious, maladjusted and aggressive or antisocial. Sometimes negative influences from adults can be perceived by a child as unhealthy habits and he may become by imitation, a smoker or drug addict, alcoholic, or even a juvenile delinquent.

The cultural influences are also passed on from generation to generation by social groups through sometimes word of mouth as instructions or commandments or shoulds and should nots, by Daadi-Naani Ki Kahaniyan or moral stories, by reading of scriptures, by rituals or festivals and ceremonies and now-a-days also through mass-media like cinema, radio, television, newspapers, magazines

etc. The impact of culture involves deeply absorption of beliefs, values, customs and faiths of the culture to which one belongs. This passing on of culture to the next generation becomes possible through constant interaction with members of social groups like family, neighbourhood, school and teachers, friends and play groups as well as constant exposure to the mass-media influences. This is called the process of socialization. What needs to be remembered by you here is that despite these strong influences, every individual is influenced differently in the same society and culture by various factors that he interacts with during his socialization process.

13.4.3 Economic Factors

Economic status as poor, middle class or rich class can strongly influence the social acceptance of a person and his family as well as influence person's own physical growth, intellectual, emotional, motivational and social growth. Poverty is likely to lead to malnutrition and unhygienic conditions of living with greater disease proneness. All these can block the physical and intellectual development of children living in poverty conditions. Education-wise either they remain illiterate because the family needs them to work for money or even if they go to school, their school achievement mostly suffers. Sometimes various forms of abnormal behaviours may also be associated with poverty conditions and over-crowded or over-populated living conditions. These could be frustrations of life leading to aggressive behaviour, alienation, suicidal or homicidal tendency, addictive behaviour, delinquency, and mental retardation due to malnutrition, alienation and various types of addictive behaviours as seen in children of very rich classes also. Since they have no lack in life, they miss out the excitement of achievements by self-effort, sometimes they get bored and alienated with life. To get rid of boredom they may experiment with drugs, or indulge in car-stealing etc. for excitement in life, thus they may be termed as delinquents.

13.4.4 Psychological Factors

Each individual is unique and different from others due to his psychological predispositions. Some predispositions he has inherited and some he has cultivated due to influences of the environment in terms of his beliefs, attitudes, values, abilities, interests etc. He also has uniqueness in his style of perceiving things, his methods of learning and memorizing, thinking, imagination, manner of speech, his feelings and emotions. All these put together give him a psychological predisposition to react to future influences from society and culture. He may be rigid and close minded and resist any further influences and adjustments or he may be open minded and flexible to adjust and mould himself to new demands, changes or injurences from other cultures. Thus an individual's own psychological predisposition can determine also the extent of environmental influences on him.

13.5 Interaction Between Genetic and Environmental Influences for Normal Development-

Based on the earlier parts of this lesson, you can well argue that neither genetic influences alone nor environmental influences alone can be responsible for normal development. Heredity gives us a genetic predistion of certain potentials, environmental opportunities can help further unfold and improve upon that potential or alternatively environmental deprivation can curb the growth of that potential. But at the same time, if genetic abnormalities like mongolism or colour blindness exist at birth then best of environmental opportunities also can only bring about least or no improvement. The relative role of heredity and environment may vary from individual to individual but still it is reasonable to conclude that both genetic and environmental influences play significant roles in the occurrence of normal development for living beings.

INTEXT QUESTIONS 13.2

1. What do you mean by environmental influences

2. State whether the following statements are true or false.

- | | |
|---|------------|
| a. Environmental influences are responsible for learned behaviours and skills. | True/False |
| b. Environmental influences can be only physical and economic | True/False |
| c. Physical influences mean geographical and climatic characteristics. | True/False |
| d. Socio-cultural influences are passed on only through the mass media. | True/False |
| e. Socio-cultural influences help in development and imbibing of beliefs, attitudes and values. | True/False |
| f. The influence of school can be ignored. | True/False |
| g. Family influence is always more important than any other influence. | True/False |

What you have learnt

Development is essential for all living beings

Genetic influences refer to the inherited characteristics on the

personality and behaviour. These also account for the individual differences. The genetic influences are biological in nature and are transmitted through genes.

Genes are minute structures available within the nucleus of all living cells.

Genes are grouped into chromosomes. Each human cell contains 46 chromosomes.

J.G Mendel tried to study the principles of inheritance.

Maturation is understood as a certain optimal level of growth necessary to be attained before the onset of any specific response or behaviour.

In human beings maturation of various forms like body organs intellect etc. take place.

Maturation is not only age related but also by the principle of individual differences.

Environmental influences affect development. they can arise from many sources. These can be classified into four groups-

- ★ physical
- ★ socio-cultural
- ★ economic
- ★ psychological

Terminal Exercises

1. Describe the functions of genes.
 2. Explain the structure and functions of chromosomes.
 3. Why are environmental influences important for normal development ?
 4. Explain the note of physical and socio cultural influences on development.
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Key to Intext Questions

13.1

1. False
2. False
3. True
4. False
5. True
6. True
7. True
8. True
9. False
10. False
11. C

13.2

1. Environmental influences mean the total external stimulation that a person receives throughout his life from conception till the end like-language, communication, education, habits, culture, traditions, interests and social motivation.
2.
 - a. True
 - b. False
 - c. True
 - d. False
 - e. True
 - f. False
 - g. True

Hints to terminal exercises

1. Refer section 13.3.1
 2. Refer Section 13.3.1
 3. Refer Section 13.4
 5. Refer. Section 13.4.1 and 13.4.2
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