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# UNIT 24 PSYCHOLOGICAL ASPECTS OF BEHAVIOUR

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## 24.1 INTRODUCTION

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In the previous Unit we studied the structure and working of the brain and the nervous system. We found that all our behaviour is conditioned by the activity of the brain, the nervous system and the endocrine system or the ductless glands which secrete various hormones. But because of the complexity of the human brain and the hard-to-define nature of such activities as “thinking”, “imagining” or “intuition”, there are still large gaps in our knowledge of the functions of the brain. In many ways, therefore, it is more practical to study the behaviour of the brain and the nervous system in terms of the signals they receive and the response they show, rather than the internal working of the brain. This leads us to discuss some aspects of psychology and human behaviour. Several other questions such as the stages of mental development, and the role of learning, creativity and personal characteristics will be briefly explained.

We also give you a brief description of human factor engineering, a science that takes into consideration the capabilities and limitations of the human body while designing any machine, tool or place of work. The desire to understand how human beings adapt to unusual environments leads to various experiments with them in space. We will try to make you aware of some of the observations that were made during such explorations.

### Objectives

After studying this unit you should be able to :

- describe three forms in which learning takes place
- distinguish between intelligence and creativity
- identify some physical and behavioural changes that take place during adolescence
- explain whether aggressive behaviour is instinctive or learned
- give reasons for developing the principles used in human factor engineering
- describe some psychological experiments performed on man in space.

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## 24.2 LEARNING

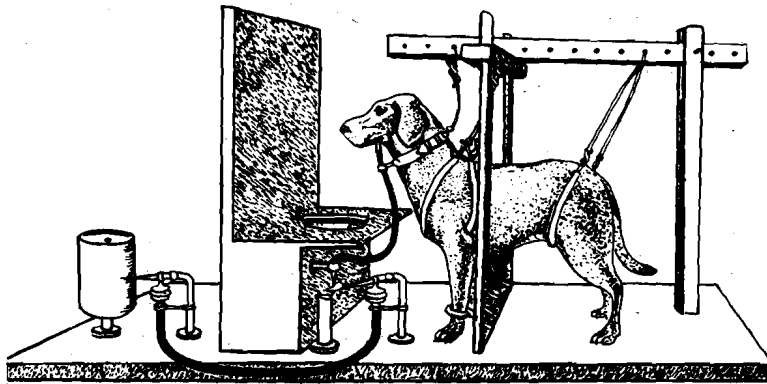
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When we talk about learning, we usually mean acquiring a new skill, new information or new ideas. For instance you may be learning to ride a bicycle or play a game or speak a new language. Coming to think of it you have learnt numerous things in the course of your life—from learning to walk and talk, to the learning of history or geography etc., and again to the learning of social behaviour and ideas about right and wrong, just and unjust. In fact, all your attitudes, values and beliefs, all that distinguishes you as a person different from others

is a result of continuous learning. Everyone of us is exposed to new situations and experiences everyday and all of us are constantly learning from them. Our behaviour strongly depends on the learning we have gone through either by way of training, study or experience. Of course, it does not mean that all behaviour is rational or reasonable. As a child, a person may have picked up unhealthy habits, like not keeping his or her body and clothes clean, or being lazy and slothful. Wrong values are also “learnt”, sometimes from family and friends, like considering other people untouchable, or worth despising, simply because they speak a different language or profess a different religion. However, some behaviour is “instinctive”, i.e. belonging to human species, even without learning one would do certain things—for example, a mother protecting a child from injury.

### 24.2.1 Stimulus and Response

Scientists concerned with human behaviour and attitudes, namely psychologists, have tried to understand the basic process of learning, starting from simple models and situations. The simplest model is that of **stimulus** and **response**. The Russian Nobel Prize winner, Ivan Pavlov in early 1900s carried out some experiments on dogs which were perhaps the best examples of a stimulus producing a certain kind of response. While studying the physiology of digestion in dogs he wanted to measure the flow of saliva. For this he inserted a tube in the cheek of the dog and placed a bowl of meat in front of it and the dog began to salivate (see Fig. 24.1).



**Fig. 24.1: PAVLOV'S EXPERIMENTAL APPARATUS.** One of Pavlov's famous dogs stands surrounded by the apparatus devised by the Russian scientist to test learned reflexes. Saliva carried by a tube to beaker, activated a lever connected to the pen beyond the screen at left. Each drop of saliva was registered by a mark on the revolving drum. The dogs evidently learned to enjoy their work, hopping up onto the platform without being asked.

This, of course, is a natural response of any dog. He begins to salivate when he gets his food. But a strange thing happened. The dog began to salivate at the sight of the apparatus or the experimenter even before the food was placed in front of it. Pavlov could have treated this as an experimental nuisance but being a scientist he started asking questions.

Pavlov knew that salivation at the sight of food was a **natural reflex action**. It happens in every dog since birth, but the other reaction was something new, what we can call a **learned reflex**. Now he decided to investigate if the dog could be made to associate food with other stimuli.

In a typical experiment, a bell was sounded just before the meat was given to the dog. This was repeated several times. Pavlov noticed that the dog now began to salivate as soon as the bell was rung even if food was not given. The animal associated the two stimuli, food and bell, therefore, one could be substituted for the other. Table 24.1 shows the steps in this training process.

**Table 24.1**

**Steps in Pavlov's Experiment**

	Stimulus	Response
Before training	Bell	Attention of the dog but no salivation
	Food	Salivation (Natural Reflex)
During training	Bell and food	Salivation
After training	Bell alone	Salivation (Learned Reflex)

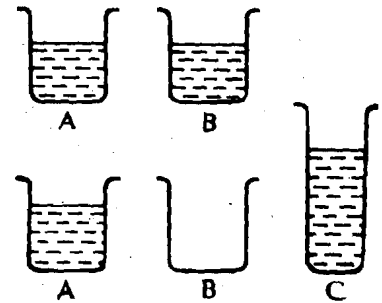
Even human beings learn things according to this simple model. If a person has done good to you many times, you may begin to associate goodness with the person. Sometimes, cheats use this technique to first gain your confidence by a few simple acts, and then when your trust has grown, they might run away with your belonging!

**Table 24.2**  
**Developmental Stages of the Child**

Stage	Behaviour associated with each stage
Sensorimotor Period Birth to 2 yrs	This is the time to coordinate sensory information with motor responses. Sights, sounds and smells are at first signals associated with feeding, cuddling and all good things. But soon the infants struggle to judge distance and catch things with their hands. Already they discover by about 10 months of age that if a thing is hidden from view it still exists. This is known as 'object permanence'. They will search for a face or a toy that is hidden from them. They learn to walk, and begin to talk. The ability of babies to put words in reasonable grammatical order and to make sensible sentences is a subject of considerable wonder among psychologists.
Preoperational Period 2 to 7 yrs of age	Soon children begin to use symbols and language, but they are preoccupied with themselves and cannot see other people's viewpoints. They consider themselves as the centre of the world. Their reasoning ability is very limited. They cannot understand that the amount of something will remain the same even if the shape changes. For example, a child will understand that glass containers A and B which have similar shape (see Fig. 24.2), have the same amount of liquid but if the liquid from B is poured in a narrow tall glass container C, he will say that C contains more liquid. Children at this age can have very good memory; they can memorize easily, but they also forget unless memory is refreshed.
Concrete Operations 7-11 yrs	Thought processes become logical. Children will not be fooled by the tall glass now. However, they can deal with only the concrete and immediate. Parents and teachers may get frustrated if they try to teach children, things far removed from their actual experience or abstract concepts like 'justice' or 'integrity'. Children also acquire the ability to compare two things on a dimension such as weight and size, e.g., if A is taller than B and B is taller than C, then they will say A must be taller than C.
Formal operations 11 yrs upwards	Children can begin to think in abstract terms now. They can reason and find out the elements of a problem. In the next few years, adult thinking emerges.

**Psychological Aspects of  
Behaviour**

You are advised to see the video programme entitled Jean Piaget—Developmental stages of the child.



**Fig. 24.2**

You have to remember that all these are based on general observations on children in Switzerland. Our country provides different type of family life to children and hence our children may not exactly conform to these average situations. Again, individuals can be widely different because of biological factors—some children may be ahead of averages and some may be behind. If you have children around you, you may try to find out for yourself some of these stages in their mental development.

On the other hand, the course of mental development from the youngest to the age of 12-15 years shows that there are limitations to what children can learn at different stages of their lives. This is a fact of great significance for educationists who design courses of study. If we do not pay any attention to this fact and try to give abstract concepts to a child who hasn't developed the mental ability to handle such concepts, it will have no option but to memorise answers and give a false impression about his learning. Unfortunately, this is very common in our lives and memorisation or rote-learning has become more important in the practice of our schools and colleges, than the learning process as a whole.

**SAQ 1**

a). Fill in the blanks using words from the given list.

- i) Any behaviour that is specific and not affected by practice is .....
- ii) ..... decreases the probability that a response will be repeated.
- iii) Feelings of revulsion at the sight or smell of certain foods because of bad experience with those foods is a .....
- iv) Training a dog to help the blind involves learning mostly through .....
- v) Learning and remembering information in a text book involves .....

(punishment, cognitive learning, learned reflex, instinctive, rewards)

Not too long ago, however, it was believed that intelligence was fixed at birth and unaffected by anything in later life. But studies conducted on different groups indicate that inadequate nutritional conditions before birth and during early years of life, not only dwarf the body but dull the mind too.

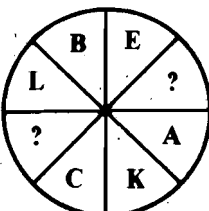
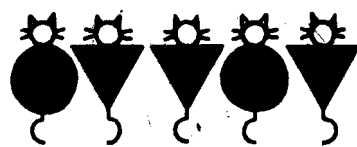
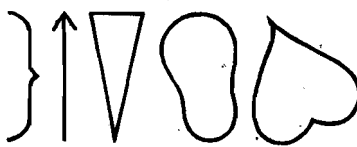
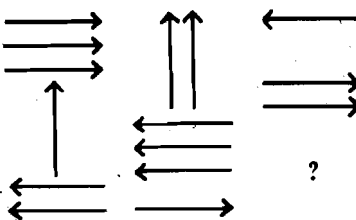
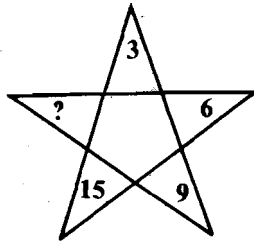

<p>What is the missing number ?</p> <p>7    11    15    19    ?</p>	<p>What are the missing letters ?</p> 
<p>Find the odd cat.</p>  <p>1    2    3    4    5</p>	<p>Find the odd word.</p> <p><b>LUBE NEREG LEPPUR THASER</b></p>
<p>Find the odd figure.</p>  <p>1    2    3    4    5</p>	<p>Draw the missing figure.</p> 
<p>What is the missing number ?</p> 	<p>Find the odd Figure.</p>  <p>1    2    3    4    5</p>

Fig. 24.3: Sample Intelligence Test Problems

Tests for general intelligence correlate highly with achievements in school and to a lesser degree with achievements in later life. For example, a most successful businessman, or a cricketer, or a politician need not necessarily have a top level IQ.

To do well in a typical intelligence test, the subject must be able to recall and to recognise, and to solve a problem in an analytical manner but he need not necessarily be able to invent new things—such as write poetry, paint a picture, invent a new kind of engine, or create a new theory. These latter abilities are involved in “creativity”—which we will discuss next.

## 24.4 CREATIVITY

The ability to come up with novel ideas, is not entirely based on reasoning — because reasoning will lead every person to tread the same path, and reach the same conclusion. One has to go beyond reasoning to state a new idea, which then may be tested for its usefulness. Similarly an artists paint a new picture, not because of geometrical considerations but because of an impulse to create something beautiful. Imagination is said to play an important role in creativity. People who are able to fluently think of many, and even unusual alternatives in a given situation are said to possess fluency and flexibility of ideas, which is conducive to creativity. It is this rather unusual ability, different from reasoning, analysis and synthesis, which is the source of major advances in our understanding of the world, and equally of great works of art which have been universally admired. Newton and Einstein are examples from science, Tagore and Tansen from the arts, and Marx and Gandhi from social science.

It has been found that those who excel in generating uncommon ideas are also not rigidly bound to many traditions and rules, they are more independent minded, free thinking and unconventional in their ways. Students who show such qualities are not always the favourites of their teachers, and schools prove even a hurdle to their careers. Since creative people make a large contribution to advancement of society, we should be keen to develop education and schooling so as give them a chance to show their worth.

A sample of the types of tests which have been evolved to measure creative potential is shown in Fig. 24.4. Several such tests were devised to find a relationship between the intelligence and creativity of a person. The results showed that there was only a low correlation between IQ and creativity.

- If a person has a low IQ his creativity was low too.
- If creativity was high then IQ was above average.
- But high IQ did not necessarily mean high creativity.
- Within a group of subjects with above average intelligence, there was no relationship between creativity and IQ.

1. In five minutes, see how many words you can make out of the following word.
2. In five minutes, list all the things you can do with a paper clip.
3. Trace the figure onto a blank piece of paper and draw a picture, incorporating the figure into it.
4. Find ten coins and arrange them in the configuration shown. By moving only two coins, form two rows that each contain 6 coins.

CONSTANTINOPE

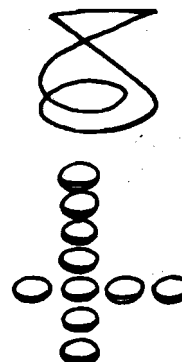


Fig. 24.4: Shows a sample of the kind of test administered to measure the creativity of a person.

Before proceeding further try this SAQ to check what you have learnt in the above section.

### SAQ 2

- a) Tick mark the correct statements in the space provided against them.
 

i) Measuring IQ is really measuring a person's mental age.	<input type="checkbox"/>
ii) Economically deprived people are bound to have a low IQ.	<input type="checkbox"/>
iii) IQ tests used in America are the best to use in India.	<input type="checkbox"/>
iv) Highly creative people must have an IQ of 140.	<input type="checkbox"/>
v) A student's ability to reason, analyse and synthesise depends on his or her schooling.	<input type="checkbox"/>
vi) Intelligence is to find a single solution to a problem, and creativity is to look for many possible solutions.	<input type="checkbox"/>
- b) See Figure 24.4 and try to complete the creativity tasks indicated there.

## 24.5 ADOLESCENCE

In Unit 23, Mind and Body, you have already studied that certain hormones are essential for proper physical development of an individual. Around the age of 12, starts a period when special hormones are secreted in the body and transition from childhood to adulthood takes place. This is known as **adolescence**, a period of very rapid physical growth, accompanied

by a gradual development of reproductive organs and secondary sexual characteristics such as beard for men and breasts for women. The age limits of adolescence roughly extend from around 12 to about 18 years when physical growth is nearly complete.

During adolescence, not only is physical growth rapid, but its sex-related character changes the social position of the individual. Cognitive development and knowledge base also reaches a point when a person is able to formulate his or her ideas, fairly clearly, about various questions in life. People are able to develop a world outlook or an ideology of their own, and hence personality. At the end, they are no more boys or girls, but they are men and women, generally able to stand on their own. The five or six years of adolescence stage are very crucial for everyone, and since they generally correspond to classes 7th or 8th to 12th or first year of college, they are important for teachers to keep in mind while dealing with their students. The transition can be clumsy and confusing, too aggressive or too timid for the young person, but it is also a wonderful experience to grow out of childhood and face the world as a confident member ready to change it.

### SAQ 3

Choose the correct word from those given below to fill in the blanks.

- i) ..... is a time of transition from childhood to adulthood.
- ii) Hormones produced by testes and ovaries are responsible for the .....  
..... seen in boys and girls.
- iii) Adolescence is often a period of stress and emotional instability because it involves a search for .....

( Secondary sexual characters, personal identity, adolescence )

## 24.6 ASPIRATIONS, CONFLICTS AND FRUSTRATION

In the previous section we discussed that during adolescence, an individual has to adjust to new physical and mental conditions. We often have to make decisions and choices about how to spend our time, money and energy. Sometimes the choices are simple like whether to wear a blue dress or a green one. At other times conflicts may put us in a dilemma, such as, whether to go to the cinema or to study at home? In other spheres of life, such as marriage, religious beliefs, changing jobs, conflicts may be severe and persistent, which may lead to anxiety, or even frustration. We often aspire to be something or attain some objective or position, but such aspirations or goal may be limited by several factors which may relate to the family, nature of job or place of work, or other social and personal circumstances. A potential source of tension is a situation when there is a **conflict between two goals**. You may want to become an athlete, at the same time you may want to attain the maximum marks in your class. For both these activities you must have a lot of time. You would have to make a decision. Failure to find a solution or compromise between conflicts can build up to serious psychological or mental disorders.

What happens when you are frustrated? You are upset and angry, which may lead to other types of behaviour that are irrational, unpleasant or abnormal. We shall look into these reactions later. But a feeling of frustration is a signal that there is a problem to be solved. Usually, the problem is not clearly identified, and the first struggle is to identify it. One has to search one's intentions and preferences, and examine where exactly do the impediments lie. But once we do that, we can make a realistic decision about our options. It is through these kinds of experiences that our mental growth takes place. For example, a student who did not do well in the examination, fails. He is frustrated, but when he can identify what was it, that caused the failure, whether it was other interests that prevented study, or friends who proved to be a distraction, or if the teacher didn't explain well etc., he can try again in a modified situation. Unresolved frustrations can lead to a peculiar behaviour which is called "aggression", or aggressive behaviour.

## 24.7 AGGRESSION

We often have difficulty in dealing with our anger and hostile feelings and this leads to aggression. We need to define what we mean by that. Aggression is often described as the *intention* to injure another person either physically or verbally or to destroy property. Notice

the word intention has been italicised. If you accidentally step on someone's foot in the crowd and apologise immediately, the act would not be termed aggressive because you did not step on the foot intentionally.

### 24.7.1 Instinct or Learned?

Having defined aggression let us try to analyse if it is a basic instinct or a learned behaviour. Some psychologists believe that aggression is a natural instinct and give at least two kinds of arguments for it. Firstly, that it is so widespread. Our history is largely a history of wars and we hear about the violent acts that take place daily in our society. Secondly, we know that aggressive behaviour in animals is observable at every stage, we can even breed animals selectively for their aggressiveness, for example bull dogs, hounds and terriers are more aggressive than other dogs, say poodles. Such dogs are trained for hunting and as police dogs. In the older days, the kings and nawabs bred and trained rams, cocks, eagles etc., for fighting matches. The pedigree was maintained for their aggressiveness. On the other hand, another group of psychologists believe that aggression is a result of frustration and conflict and is a learned response and it must find an outlet. We will explain this later.

### 24.7.2 Biological Basis of Aggression

Studies show that mild electrical stimulation of a specific region of the hypothalamus produces aggressive behaviour in animals. When a cat's hypothalamus was stimulated by implanting electrodes in the brain and passing an electric current, it's hair stood on end; it hissed and arched it's back and would strike at anything that was placed in its cage.

In higher mammals like monkeys this instinctive pattern is not observed. Their behaviour was seen to be more controlled by the cerebral cortex rather than mere stimulation of the hypothalamus. The hypothalamus may send a message to the cerebral cortex that its aggressive centres have been stimulated, the cortex then chooses the response considering what is going on in the environment, and what has been stored in the memory from past experiences.

We too have centres in the brain that can make us behave aggressively, but the activation is under cognitive control. Some brain damaged persons may react to stimulation with aggressive behaviour, which would not elicit any response from normal persons. In such cases, it was found that the cerebral cortex was the damaged area of the brain. In normal persons, we can say that aggressive behaviour is determined largely by social influences and personal experiences.

### 24.7.3 Aggression as a Learned Response

Reading through the previous section must have given you an idea that aggression is not just an instinct in man. A person who is frustrated by a blocked goal may or may not behave aggressively, depending on how he has learned to cope with stressful situations.



Fig. 24.5: Frustration is one of the causes for aggressive behaviour.



Fig. 24.6: Aggression is instinctive in animals.

To elaborate this further, let us assume that you are preparing for an exam or reading something that requires concentration. Your neighbour plays his radio at full volume. You would probably first go and request him to lower the volume. If he refuses, you have to think about what to do.

- you could get very angry and exchange some harsh words or,
- you might even beat him up,
- another alternative would be that you let your temper cool off, or move away to a quieter place. This might enable you to take up the matter with your neighbour when both of you are in a reasonable mood.

Out of these three, the response chosen by you would be one, that has been the most successful in the past in a similar situation.

Unpleasant situations often lead to aggressive behaviour. In a study involving two groups, one group was made to work in a stuffy and hot room while the other was made to work in a cooler and pleasant room. A person was made to behave aggressively with each group. The reaction of the group working in uncomfortable circumstances was significantly more aggressive to this person than the group that was working under comfortable conditions. Children, too, learn to respond aggressively by imitation of elders. In some studies, children who watched an adult behave aggressively learned to imitate him and thus behaved in a more aggressive fashion like, hitting each other or pushing one another around. While another groups of children who hadn't been exposed to such adult behaviour showed no increase in their aggressive attitude.

Aggressive behaviour is learned through observation and is often reinforced by its consequences. For instances, if an adolescent who is larger and has more muscle power than other boys sees that he can get what he wants by threatening or beating smaller boys he will repeat this act as often as he can.

Sometimes we can't take out our aggression directly on whoever is the cause of our frustrations. What happens then is a case of **displaced aggression**. For example, a boy of 15 or 16 wants to go out with his friends for a weekend and his parents refuse to give him permission. The boy may not be able to do much about it but may, in anger, break a few things in the house or bang the door or go and quarrel with the neighbour.

Sometimes, this displaced aggression can lead to much more serious consequences than what we are suggesting in our example. A group of striking students or workers may go on a rampage damaging public property, and may hurt even innocent bystanders, just because of frustration in their attempts to cause harm to the authority concerned.

#### SAQ 4

Match the term on the left with correct phrases from the list on the right.

- |                         |   |   |                          |
|-------------------------|---|---|--------------------------|
| a) Frustration          | - | i) Indirect anger                               | <input type="checkbox"/> |
| b) Aggression           | - | ii) Caused by blocking or confusing of goals    | <input type="checkbox"/> |
| c) Conflict             | - | iii) Intention to hurt another person or object | <input type="checkbox"/> |
| d) Aspirations          | - | iv) Having to make choices                      | <input type="checkbox"/> |
| e) Displaced aggression | - | v) To want to reach a goal                      | <input type="checkbox"/> |

## 24.8 HUMAN FACTOR ENGINEERING

With the advances in science and technology, we have to constantly interact with machines and engineering systems. The range is wide, whether it is a worker in a factory, or a driver of motor vehicles or a farmer using farm implements like threshers and tractors or an individual using a sophisticated computer. In each case it is important that the machines and manner of their operation should be suited to human abilities, if the maximum work output is to be realised. The study of the efficiency of a person in his working environment is called **human factor engineering or ergonomics**. The people who are trained in this branch of applied psychology are known as human factor specialists.

To get a better perspective of the subject you are advised to listen to the audio programme — 'Human Factor Engineering'.

How was the importance of suitable working environments and machine designs realised? During World War II, 457 US Air Force accidents took place in a 22 month period. An



analysis of these accidents showed that pilots confused between two control levers, one related to landing and the other to wings. Often they didn't even know if they had enough petrol to complete their missions. Soon it was realised that selection and training alone would not produce efficient pilots. The equipment itself needed to be redesigned.

For the first time, design engineers started working in collaboration with psychologists to try and ensure that the machine systems will suit human requirements and abilities. The shapes of the controls for landing gear and wings were so designed, that the difference between them was obvious and chances of mistakes were eliminated. Similarly, the markings on the fuel gauge were changed to indicate fuel quantity as **FULL; HALF FULL; EMPTY** instead of in actual gallons. You must have noticed this in present day buses and motor cars etc. Thus, the essential job of human factor specialists is to see that machine systems are designed with the user in mind, so that they can be run with maximum efficiency and minimum error. For this purpose, they study the effects of work environment such as ventilation, noise and illumination. This leads to improvement in the design of the work place, to make it more comfortable, safe, and conducive to performance. The duration of the shifts is also studied in relation to production, to see how long a person can work with full concentration. The speed of the workers' reflexes and motor movements has also to be taken into consideration.

The result of human factor engineering may not always be obvious, especially if the effect is of convenience rather than safety. The telephone instrument is one machine that can be easily operated by men, women and children alike. So every change in design is preceded by elaborate tests and calculations. For example, in 1937 a new handset was designed and 2000 male and female heads were measured before they decided on the dimensions indicated in Fig. 24.7.

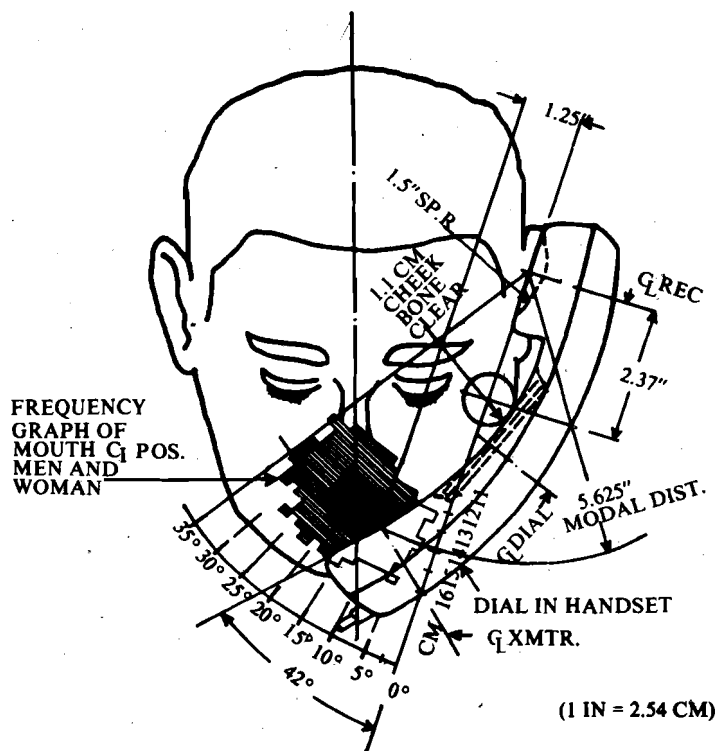


Fig. 24.7: Data of an average telephone user's head. Such data is known as anthropometric data. Each of the shades near the mouthpiece represent the ear to mouth distance of 20 per cent of the population.

Almost all of us use the chair for varied lengths of time during the day. Some of us use it for more than 8 hrs. a day. May be you are sitting on a chair while reading this unit! Jiro Koharo of Chiba University in Japan has studied how chairs affect our body. He found that if the seat of a chair is too high or too long it may disturb the circulation of blood in the thigh blood vessels. If the back of the chair does not support the spine properly, abdominal and back muscles get tired and cause discomfort. Soft cushions in chairs cause the maximum discomfort because they do not help the body balance, so muscles must work continuously to maintain the balance of the body.

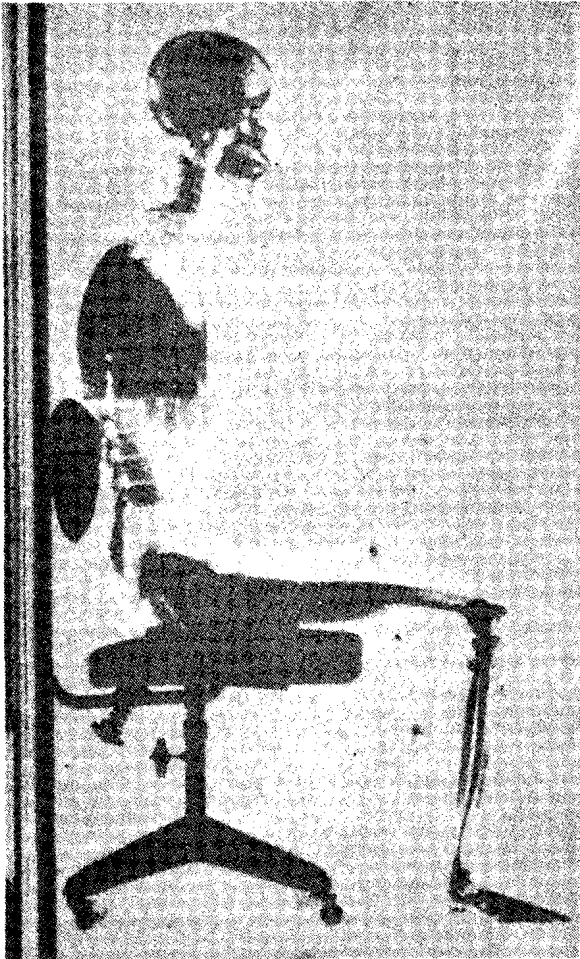


Fig. 24.8: Relating chairs to body mechanics. Support for the spine. X-ray photograph of an office worker showing where the back rest of the chair presses. After seeing the X-ray, it was suggested that the backrest be lowered by 2.5 cm. to make sitting more comfortable.

We often do not realise it, but most of the things we use in our daily life have been designed keeping the human abilities and conveniences in mind. The slabs or shelves in the kitchen for example, are of a particular height so that the user is least tired while working.

## 24.9 EXPERIMENTS WITH MAN IN SPACE

We have already discussed the usefulness of space flights in Blocks 3 & 4. One is able to make astronomical observations from satellites; get meteorological information; obtain invaluable data on resources of the earth and the condition of crops and forests. The human urge to know the unknown and, if possible see what the conditions on the moon or planets are like, has also been a great factor in space exploration. Human ingenuity and creative power have given us the opportunity to carry out much of this research and exploration with the help of instruments which can be controlled from the earth. For example, samples of soil from the moon have been brought back to earth by automatic machines and rockets, without actual human presence on the moon.

Nevertheless, there is nothing like a human eye observing the panorama of the moon, and describing the scenery—beyond what a camera can do through a picture. But, space travel for human beings is a very difficult proposition, and in order to make it possible, lot of research has been done by sending up other biological organisms and animals, such as virus, bacteria, mice, dogs and even monkeys.

Human beings have to travel in the most unnatural circumstances—if there is a single astronaut, he has absolutely no company for as long as he travels, and most unfamiliar scenes—looking out of the window, he sees nothing except stars. This **loneliness**, and **absence of sensations** from outside has been found to be a source of great mental stress. Man is a social animal, and he has to receive sensations through his eyes, ears, nose and skin etc., to feel normal. Travelling in a satellite, one feels “**weightless**”—if you turn a glass

upside down the liquid does not fall out! So, food also does not naturally move down the throat—even water is not easy to swallow. It seems our whole body—(digestive system, and even blood circulation) is accustomed to earth's gravity, and if it is nullified, we cannot be at ease. Even movement of muscles is difficult. The air inside the space vehicle is kept under artificial pressure, because outside the vehicle there is near absolute vacuum and no sound of any kind can reach the space craft. Of course, there are great problems in washing, or taking a bath or in passing stools. Obviously any space traveller would feel out of sorts — but that is a mild word, he or she can feel absolutely confused, lethargic and psychologically unstable.

But practice is a great help. Modern astronauts go through a long period of training. If they know what to expect in space, they are mentally and physically prepared for it. Weightlessness is also simulated so that a space man or woman can be adjusted to its peculiarities. Communication is now much better, the travellers can receive television pictures and can make telephone calls. They are made to take exercise. It is now the practice to have a group of men, or men and women in space rather than single persons. That is how, in one Soviet space craft, people have spent more than a year at one stretch without adverse effects. The tasks of control and communication are also numerous for the spacemen and hence a team is needed.

All this shows that our body and mind are attuned to live under normal conditions of *pressure, gravity, sensations and communication*. Abnormal physical environment puts our system under great stress, which shows serious physical as well as psychological effects. But many of these aspects have come to light only because space had to be conquered and human beings had to get adjusted to new living conditions. If a colony is made on the moon or elsewhere, there will be other conditions to be experienced, and hopefully man will prove equal to the task.

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## 24.10 SUMMARY

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In this unit, you have learned the following:

- Learning is a relatively permanent change in behaviour that can take place : through training, where a given stimulus produces a response; through reward or punishment; through cognitive learning that involves memory, reasoning, analysis and synthesis.
- Cognitive development proceeds in an orderly sequence and is related to physical development as was suggested by Piaget.
- Performance in cognitive development is measured in terms of the IQ, while the ability for original thinking is measured in terms of the creativity of an individual. However, there is low correlation between IQ and creativity.
- Adolescence is the period that bridges the gap between childhood and adulthood. It is a time of rapid physical growth and of uncertainty, trials and experimentation with new roles.
- Aggression is a behaviour that is intended to harm another person or property. Aggression is instinctive behaviour in animals while in human beings it is mostly learned. It is often the response to stress, conflict or frustration.
- Human factor engineering is concerned with study of the efficiency of a person in his working environment. This is accomplished through the design of equipment and work place.
- Possibility of space travel led to experiments with human beings in space. Weightlessness, isolation and having to work in a confined environment leads to stress and disorientation of thought processes.

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## 24.11 TERMINAL QUESTIONS

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- 1 In this unit we have discussed three ways in which learning takes place. Can you give one example to illustrate each kind?

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- 2 Sudha who is 12 years old, always comes first in her class. She was tested for intelligence and creativity both by her school psychologists. The score on the IQ test was 15 points while that on creativity test was rather low.
- Calculate her IQ.
  - Why do you think she did not score well in the test for creativity?
- 3 Listed below are examples of changes that occur during adolescence. Indicate whether each change is physical, mental or social.
- Fifteen year old Ramesh sings very well and used to sing and show off before groups. Lately he blushes and cringes when his parents ask him to sing for their friends.
  - Thirteen year old Mohan has been asked to withdraw from the group song to be sung in his school function because he seems to be out of tune with the rest of the boys.
  - Now that Krishan is 16 years old, he seems to be more understanding. He has begun to understand individual human rights and dignity.
- 4 There is a society in New Guinea where aggression and conflicts within communities are virtually unknown. Adults are extremely cooperative and have a spontaneous urge to help and share food, affection, trust, work etc. Among children, even accidental aggressive behaviour during play does not persist or get encouraged. What would you deduce from these observations? Is aggression instinctive or learned behaviour.
- 5 Give some examples from your experience where you think human factor engineering has benefited the user and has improved work output.
- 6 What are the three main factors that affect the psychological stability of an astronaut in space?

## 24.12 ANSWERS

### Self-Assessment Questions

- instinctive
    - punishment

- iii) learned reflex
- iv) rewards
- v) cognitive learning
- b) a) matches    iii)  
    b) matches    i)  
    c) matches    iv)  
    d) matches    ii)
- 2 a) i) T  
    ii) F  
    iii) F  
    iv) F  
    v) T  
    vi) T  
    b) There are no 'correct' answers to the task in Fig. 24.3. Creativity involves finding novel answers!
- 3 i) adolescence  
    ii) secondary sexual characters  
    iii) personal identity
- 4 a) matches    ii)  
    b) matches    iii)  
    c) matches    iv)  
    d) matches    v)  
    e) matches    i)

#### Terminal Questions

- 1 a) **Stimulus-Response**  
Commercial advertising uses the model of stimulus-response. They pair their products with attractive places or people. Repeated viewing of such advertisements causes favourable response from the customers when they see the products.
- b) **Reward and Punishment**  
Recruits in the armed forces learn to maintain discipline through the principle of reward and punishment.
- c) **Cognitive Learning**  
If you go to a new place and have to remember your way back, you use cognitive learning to do so because you will make a mental map of the way, remember the road signs or landmarks etc., and then recall all of it when you come back along that way. You can, of course, think of many more such examples to illustrate the three forms of learning.
- 2 a) Sudha's IQ is 125  
    b) because high IQ does not necessarily indicate high creativity.
- 3 a) mental  
    b) physical  
    c) social
- 4 In human beings aggression is generally considered to be a learned response. As the children never encountered aggression they did not learn it.
- 5 You can think of several other examples to illustrate the principles of human factor engineering. We have given these two:
  - i) The typewriter's keyboards have been designed so that the letters that are most often used are easier to reach.
  - ii) Brooms with long handles do not strain the back as much as short handles.
- 6 Isolation, lack of sensory stimuli and weightlessness.