UNIT 2 EVOLUTION OF HUMANKIND

Structure

2.0 OBJECTIVES

After reading this Unit, you should be able to learn:

how tool making/using played an important role in the evolution of culture.
how cultural evolution took place in stages with changes in tool making/using ability of human beings.
how did human beings adapt to, and interact with nature and with what implications to their co-existence.
how did the knowing individual evolve over the years till date.

2.1 INTRODUCTION

You have learnt in Unit I why care is necessary in developing a scientific method for the study of human beings. They assimilate and represent both nature and culture. They share biological characteristics from nature and also overcome them through their superior intellectual, creative and cultural abilities. The history of the evolution of human beings

is a long one from the Stone Age to the electronic and the nuclear age. In this Unit we offer you evidence of how this evolution took place. However, here we shall limit our discussion up to the iron Age.

The specific natural abilities of human beings contributed to their cultural and technological success in forging tools, adapting to natural environments and making inventions. All these led to growth of successive stages/periods of social and cultural changes. Some of the remarkable contributions resulting out of this evolutionary transformation include division of labour, agriculture and industry, urbanization and revolutionary leaps in the field of knowledge. It also contributed to the growth of various religious systems and their philosophy. Scientific knowledge too grew together with this process.

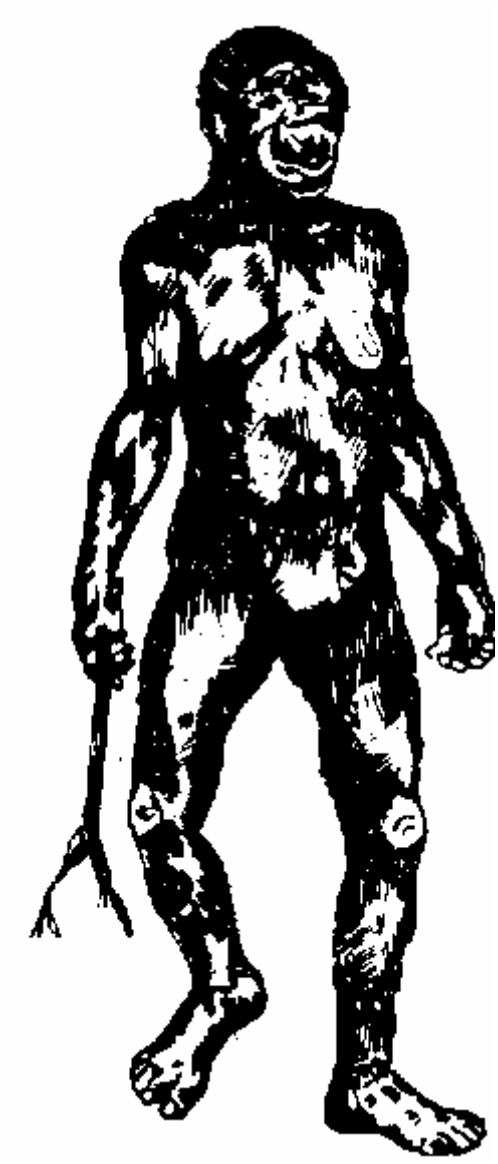
The interaction between human endeavour and natural forces always creates problems of adaptation. Too much exploitation of nature alters the balance of relationships between nature and man. The adaptation of human beings to nature has therefore been always a matter of great social concern. In this Unit we introduce to you several aspects of the relationship between human beings and nature that contributed towards the march of human civilisation.

2.2 TOOL MAKING/USING: AN EVOLUTIONARY PERSPECTIVE

It is often believed that some advanced primates may have used bones and stones as tools. But, with the coming of the Homo Sapiens, tool making and tool using began in the true sense. Only then tools, as we know them, emerged. The human being is an animal that not only uses tools but also constantly improves upon them. It is this tool making ability that has brought us to the present stage. Had it stopped at some stage, then perhaps the world would never have been what it is today.

You may be interested to know that the first human being ever to have lived in a complete environment dates back to about 5000,000 years. He is known as the 'Peking Man'.

On the basis of the tool making skills of human beings, archaeologists have arranged human history into the following periods. The Stone Age (old and new), the Bronze Age and the iron Age. However, all these stages did not evolve simultaneously in all parts of the world. If one region witnessed the Stone Age, in another region Bronze Age had started and in the third region Iron Age had come.

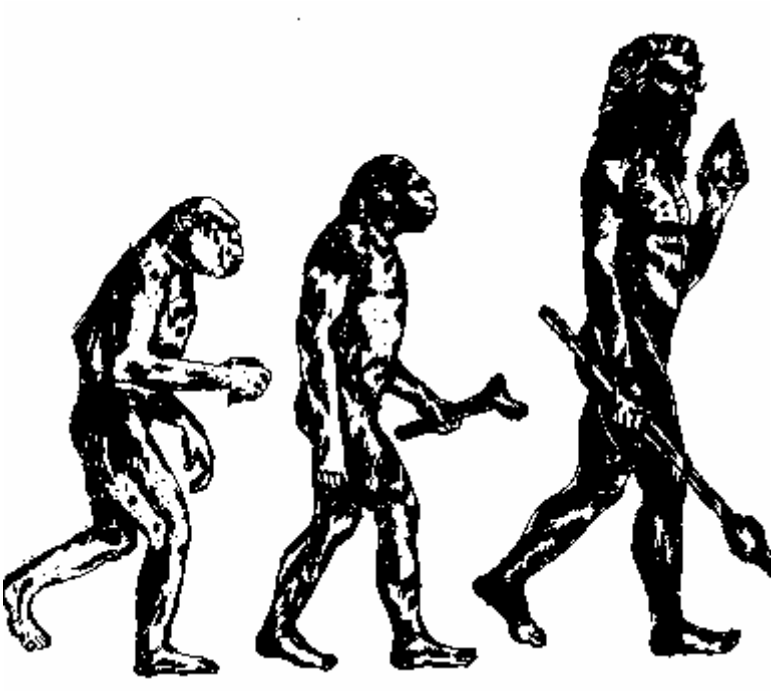


No. 1: The Primate

2.2.1 The Old Stone Age (Paleolithic)

Old Stone Age or the Paleolithic period begins somewhere between 5,00,000 and 2,50,000 years ago. In the Old Stone Age, human beings lived entirely on hunting, fishing and gathering. The tools they fashioned from stone for this purpose were rudimentary in character. These tools only enabled them to live off nature and not to invest in it. Their requirements were met through trapping, hunting, plucking or digging. They had no control over nature. Rather, they were dependent on it.

In cultural evolution, this period is described as a stage of savagery as depicted by Morgan, a British anthropologist. Roughly-chipped flint served a variety of purposes from killing a prey, to removing the skins, to digging up roots and tubers.



No. 2: The evolution of human beings

2.2.2 The New Stone Age (Neolithic)

The new Stone Age or the Neolithic period began some 10,000 to 12,000 years ago. In this age human beings were able to increase, and thus control to some extent, the supply of food. They did this by cultivating cereals and breeding animals. This period also provided us with evidence for the existence of granaries or store houses which imply that food was often produced in excess of current requirements. The cultural characteristics of this period correspond roughly with what Morgan called the Barbaric Age. It is during this period of Neolithic Revolution that pottery, the techniques of spinning wool flax and cotton into threads came into use. Finally, fashioned stone axes sharpened by grinding also made their appearance at this time.

Stone Tools

No. 3(A) left: Hand Axe (Kenya, 8000,000 years); Middle: Laural Leaf Point (West Asia, 60,000-50,000 years); Right: Scrapper (West Asia, 60,000-50,000 years).

(B) Unfinished Hand Axe (Kenya, 8000,000) years

(C) Clever (Kenya, 8000,000) years

2.2.3 The Bronze Age

The next revolution in tool making came with the Bronze Age about 5,000 years ago, that is, around 3000 B.C. This period supported an urban population, skilled craftsmen, traders, priests, writers. Now the principal metals were used for making tools and weapons, this period is described as the Bronze Age. The revolutionary implications of the Bronze Age may not have been possible if human beings had not discovered the mixing copper and tin to make bronze known in India, Mesopotamia and Greece, but the wheel also had been discovered. The application of the wheel (with copper nails) revolutionised transportation and two-wheeled and four-wheeled carts were being commonly used by this time for a variety of purposes.

No. 4: Chariot from Indus Valley (3500 BC 2500 B.C.)

By this time wind too was being used as a source of energy primarily to aid water transportation. We find sail boats being used from Polynesia to Egypt. The ruins of Mohenjodaro and Harappa tell us of the application of kiln-fired bricks which meant a huge expenditure of fuel and the ability of the artisans to control high temperatures.

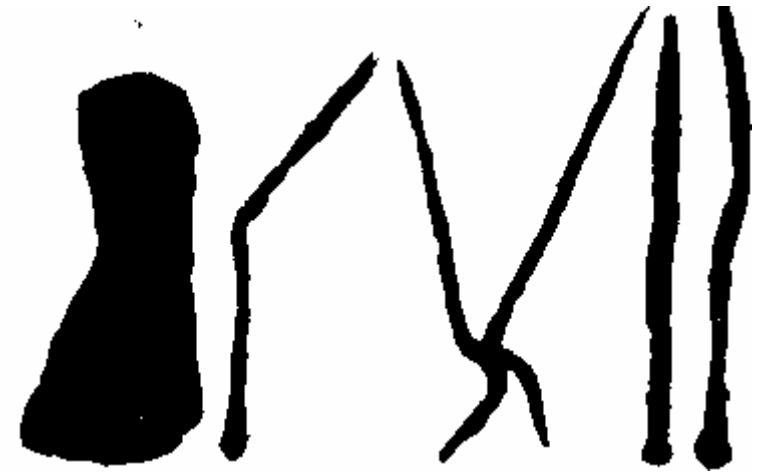
In the Bronze Age, there are evidences to suggest that land was systematically reclaimed from swamp and desert and record quantities of food stuffs were being produced Artificial water ways also helped to protect society against the vagaries of the weather.

2.2.4 The Iron Age

Iron age commenced at around 1200 B.C. Unlike copper and tin which are quite rare and hence expensive, iron is one of the commonest elements found in the earth's crust (here it should not be taken to mean that iron was a commonly available metal all that time), in the beginning, it was however a rare metal. The extraction of iron from its ore follows more or less, the same technique as with the extraction of copper. The secret of its production was however kept closely guarded and it took several years for this knowledge to seep slowly, through a variety of sources, before it was universalised across several cultures.

In the period of the Bronze Age technology, large empires had emerged in Greece, Asia Minor, Mesopotamia and Egypt etc. The invention of iron tools and weapons by the barbarians of Eurasia posed a major threat to these empires. Iron was used in India around 1000 B. C. and excavations show that iron weapons such as arrow heads, spearheads were used commonly in Western Uttar Pradesh from about 800 B.C.

In the words of Gordon Childe, "Cheap iron democratized agriculture and industry and warfare too. Any peasant could afford an iron axe to clear fresh land for himself and iron ploughshares where with to break up stony ground" in the past the superior tools and weapons were rare and expensive. The discovery of iron levelled these differences.



No. 5: Iron Tools from Taxila (1-5 Century A.D.)

Check Your Progress 1

Note: i) Read the following questions carefully and mark the right answers. In each questions
you may find more than one right answer.
ii) Check your answer with that given at the end of the unit.

1) During Old Stone Age people procured food

i) by cultivation of crops.
ii) from hunting
iii) by gathering it from jungles.
iv) by importing if from other countries.

2) Which of the following statements are true or false? During New Stone Age:

i) no surplus food was available after self- consumption
ii) people were not aware of the techniques of making hand axe
iii) people used to breed animals.
iv) bones were used for making weapons.

3) The Bronze tools were made by

i) copper.

ii) tin.
iii) mixing copper with iron.
iv) mixing copper with tin.

4) Wind power and wheel were used for the first time during

I) Old Stone Age.
ii) New Stone Age.
iii) Iron Age.
iv) Bronze Age.

5) During Iron Age, iron was used for

i) making guns.
ii) making axes for clearing forests.
iii) making ploughshares for agriculture.
iv) making machines.

2.3 TOOL MAKING/USING AND MARCH OF CULTURE

Human beings of every race, creed and colour possess identical abilities and are all Homo Sapiens. From Paleolithic time, human beings were not just a tool making, hunting and procreating species. They possessed a spiritual culture, had a vivid notion of spirit, and performed sacrifices, and buried the dead with considerable ceremony. This is not all. Their spiritual culture was enriched by paintings, etchings and engravings.

In the Neolithic Age you find yet another great leap in the culture of human beings. With the ability to grow wheat and barley, control over livestock, and advances in the art of pottery, there took place quite a substantial development of culture. Many inventions and discoveries of this period such as the zymurgy or brewing beer, or the making of pottery, are attributed to the work of Neolithic women. While man cleared land, made huts, hunted, looked after livestock's and manufactured the necessary tools, it was the woman who tilled plots, cooked, spun and baked earthen pots. They also manufactured ornaments and articles for magical and spiritual ceremonies.

2.3.1 Social institutions and Interactions

The Neolithic human beings were, however, still quite isolated. Their villages were generally self-sufficient and the production of food was just about enough to support the existing population. These villages were generally situated in oases surrounded by desert wastes, or at the foothills of mountains, or in clearings in dense forests.

2.3.2 Specialisation and Division of Labour

The use of copper or bronze brought about another revolution. This age gave rise to specialists, such as metallurgists and craftsmen. They began to form guilds and clans which zealously guarded the tricks of the trade. The coming of metal tools also made way for the development of a permanent ruling class. These was more interaction between different small settlements or villages. Women were also being displaced as the plough changed the technique of farming from plot cultivation to large scale agriculture. While woman generally used to hoe plots, it was the man who ploughed fields.

2.3.3 Urban Revolution

During the Bronze Age, an urban revolution also took place. Summer and Akkad were two great urban civilization of this age. Towns became centres of a number of activities. Here temples were constructed with the labour of hundreds of workers who had to be supervised and directed. To do this, an architectural plan had to be drawn in advance. These outlines were laid out with the aid of strings. In India, not surprisingly therefore, the ancient knowledge of architecture was called the Sulve (string) Sutra. The impressive temples thus constructed also needed to be administered. Records of receipts and expenditures had to be kept. This spurred the invention of script writing around 2000 B.C. As worship was so highly institutionalised, here it was natural that a specialised class of priests should also emerge. These priests were the first carriers of the literary tradition and, hence, quite predictably, literary records generally portray the perspective of the priestly class.

The disparity between the rich and the poor grew at an alarming rate from this time onwards. Extortion's, illtreatment, slavery, and all kinds of exploitation were practised by the rich upon the poor. This was made possible because of the technical sophistication that human beings acquired in the Bronze Age. This sophistication brought about surplus in food production giving rise to stratification and formation of social hierarchy. The urban revolution also brought about a stupendous increase in knowledge. Geometry, arithmetic, astronomy, medicine and theology developed at an impressing pace. Egyptian science approximated the sign much more accurately than before. The solar calendar was developed in the Nile Valley. Mohenjodaro and Harappa which were urban civilisations of a later Bronze Age, also shared the characteristics of this revolution and knowledge with other Bronze Age civilisations.

Along with the production of surplus food, superior tools and the growth of a learned class, one also finds increasing institutionalisation and ritualisation of religious systems

2.3.4 Rise of Great Religions

Bronze Age showed further refinements in intellectual development. The Indus Valley civilisation is a unique example of this. Further, we all know about the high intellectual levels of the Vedas and the Upanishadas. These great texts not only deal with day to day matter of life, but delve into the mysteries of life and other philosophical aspects. They describe in great detail the religious doctrines and life of the people.

The growth of religious doctrines took various forms. Gautama Buddha came out with his preachings and attained nirvana around 500 B.C. Around this time, or perhaps a century earlier, Lao-tse and Confucius preached Taoism and Confucianism in China. Eastern Iran saw birth of the great prophet Zarathustra around the time the iron Age began in Iran. Thus, we see a tendency in the Iron Age towards differentation in the religious traditions of the Bronze Age priests. The most compelling problem in Iron Age theology was to reconcile the individual with the society. Soon both in Greece and India, philosophy took a new turn and began to look at nature as comprising several constituent parts. This gave rise to the theory of atoms in Greece or anu in India .

Check Your Progress 2

Note: **i)** Use the provided space for your answer.
ii) Check your answer with that given at the end of the unit.

1) What were the main changes brought about in the production system during Bronze and iron Age?

2) Which of the following statements are right? Tick (✓) or (x)

   i) The Neolithic human being seems to have been a peace loving person.
   ii) The population in the Neolithic Age was on the decrease.
   iii) Urban settlements were there in the stone Age.

3) Write five lines on what you know about Urban Revolution.

2.4 NATURE AND HUMAN BEINGS: ADAPTATION AND INTERACTION

It is quite tempting to explain racial and cultural differences on the basis of climate and geography. You have seen this from earlier review of the developments in science, technology and tool making ability of human beings and their advances in culture, science and religion. Such human differences cannot be understood through differences of geography. The impact of the Bronze Age or the Neolithic Age was not limited to any one geographical area but. spread all over Europe and Asia. Even the long darkness of the Paleolithic Age was shared universally as were its many artistic and spiritual attainments.

2.4.1 Pattern of Adaptation

Even so it is worthwhile to consider how the human being, as a tool making animal, adapts to nature and also tries to tame nature. The Eskimos in the remote Arctic regions have adapted to their surroundings.
One finds people of the same environment often have very different ways of life. For example, in Rajasthan we find the nomadic tribes as well as people living in settled communities. Human beings therefore, are relatively freer from their environment than other creations of nature. But environment places certain constraints on human beings. The Eskimos must have warm clothes while tribal Santhals can afford to even go naked. The Eskimos cannot practise agriculture but must hunt food for their existence. The Hopi know agriculture techniques but are forced to comply with the desert conditions of their regions and hence depend upon flood waters to grow their maize.

People also alter their environment to their advantage. Where slash and burning cultivation takes place, vegetation and bushes are burnt to fertilise the soil. Self made embankments to retain water is a common enough way by which human beings attempt to alter their environment. Contrary to the simplistic belief (that in "primitive" societies man only mystically perceives his environment), contemporary anthropology has demonstrated that a tribal not living in a modern society is often an acute observer of nature.

2.4.2 Tribes and their Patterns of Adaptation

Before tribes were touched by modem civilisation they had greater mobility and roamed in a larger area. Like the Neolithic man, they always took good care to return to the soil the nutrients that they exhausted in growing their produce. Though the tribals had a much wider area to cultivate, even so they would return to the same plot of land after leaving it fallow for some time before saplings were planted, so that the forest may grow again. In this way they were able to maintain the balance in nature to their advantage.

No. 6: A Tribal at hunt

The "primitive" then had come to terms with nature and his environment. In some cases he also learnt how to tame nature. This was most commonly evident in agricultural operations.

The tribals know of the less obvious properties of plants, fibbers, roots, stones, fish, animals, etc. They also know something about the planetary cycles, the movement of tides, weather systems, seasons and so on. They can read signs in things. This helps them to forecast the length, duration and intensity of seasons, natural catastrophes, pestilence and so forth. Much of this knowledge was carried on and improved upon in folk and peasant societies.

2.4.3 Interaction: Dependence, Conquest and Harmony

From Paleolithic times onwards, man has been interacting with and adapting to nature through the medium of his tools. The Paleolithic Man or the Kalahari Bush Man may have had very simple implements, such as the planting dibble, the weed cutter, or the blade bone hoe. It is with implements like these that the paleolithic man interacted with nature for food, shelter and clothing.

From the Neolithic time onwards, the attempt has always been to try and adapt to nature on an ever increasing scale according to requirements. The development of agriculture and animal rearing, the discoveries of bronze and iron, the invention of automated machines and vehicles, are all examples of our many and growing effort to conquer nature. Interaction with nature has two aspects: (1) simple adaptation to nature and (2)

the attempt to dominate nature. Considering the vast powers of nature, what the human beings have been able to tap and train to their advantage is still very small by comparison. Yet, societies today are often too aggressive in their attitude towards nature with little realisation that there are some limits and constraints on using nature.

It is in the nature of human beings to restlessly strive to reach new heights. But in this process they, have to reflect on their knowledge and train themselves to shape tools and technologies, which are in harmony with nature and not always seek to dominate and indiscriminately destroy nature. With great despair we notice all around us the deforestation of land and hills and the pollution of water and air. We watch with equal despair the development of industries and technologies which single-mindedly destroy our natural resources. One may not advocate a retreat from science, technology and inventions. That would be both futile and anachronistic. The solution of our problems also lies in invention and uses of new technologies in a manner which is friendly to and not discriminative of the surrounding ecology. Let us not forget the harsh and miserable lives of hunters and gatherers of the past and how they died helplessly and in great pain from a host of diseases. The wonders of science have helped to prolong the life of human beings and would it not be wonderful if science could assure prolonged existence for their species?

Check Your Progress 3

Note: (i) Use the space given below for your answer.
(ii) Check your answer with that given at the end of the unit.

1) Write in about five lines what you know about the life of a tribal.

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2) How have the human beings been interacting with nature? Answer in about five lines.

2.5 EVOLUTION OF HUMAN BEING AS A THINKING ANIMAL

As you have seen above, human beings are alone among all the species of life who are able to make and use tools according to their requirements. At the same time, they kept moving up on the ladder of evolution in the world of living. How could all this be possible? A simple answer is that all this progress till date could be possible largely

owing to expansion and evolution of the thinking capabilities of human beings. Rest of this unit will address these facets in the evolution of the human being.

2.5.1 Unique Capabilities of Thinking Human Being

The process of evolution endowed human beings with several unique capabilities. Only they have the ability to use symbols, to think, to laugh, to question about secrets of life and death. Such abilities are not found among other animals. Anthropologists have been studying how these capabilities evolved in humans. The large cranial (brain) capacity of humans evolved (to the present average figure of 1,450 cc from about 500 cc capacity) slowly over a period of fifteen to twenty thousand years. Comparatively, the use of language evolved faster, but it was influenced by the growth of the size of brain.

Culture, yet another distinctive feature of human beings, comes from the ability of humans to conceptualise and to abstract through the use of symbols. It evolved slowly, with the process of biological evolution of humans. But within the span of the past twenty thousand years, not the biological but the cultural evolution of humankind has come to dominate the mode of social changes. The use of language made more complex manifestations of culture possible, and acquired institutionalized forms. But culture existed even before the human attained the ability to use language.

The ability to communicate by using linguistic symbols liberated human beings from their physical and environmental dependence. It made it possible for them to have an objective and critical appraisal of natural and social phenomena. This ability is an essential component part of the cultural endowment of human beings.

2.5.2 Species-specific Characteristics

There are, however similarities between human beings and animals which psychologists like Konrad Lorenz, B.F. Skinner and others have identified. Despite many common features that human share with other animals, human beings are unique. The uniqueness lies in their perennial quest for knowledge and their capacity to succeed in it. We get the proof of this in the scientific discoveries and inventions that humankind has made possible since pre-historic days. The thinking ability in human beings has been made possible due to their cortical capacity and their adjustive behaviour. Besides this, human beings have to go through a long period of childhood socialisation. It is therefore said "child is the father of man". It is their species-specific characteristic.

The brain released human beings from dependence upon their physical and environmental situations. They used their brain power to forge tools or create objects to lessen their burden. It also gave them variable power of speech, language and memory; and capacity to organise their experiences with a historical sensibility.

Through socialisation, however, human self imbibes values and norms of society; learns its language and the ability to express cognitive and emotional reactions. This socialisation, however, is never complete. The plasticity of human nature makes it possible for them to innovate, improvise and make creative contributions. It is this ability of human kind that contributed towards scientific and technological knowledge, and through it, to the march to civilisation and progress.

2.6 EVOLUTION OF THE KNOWING INDIVIDUAL

The ability to associate events and cxperiences (through uses of symbols across space and time) gives human beings an insight into the cause and effect relationship. It marks the beginning of scientific logic.
In their quest for knowledge, human beings simultaneously discovered science and values. Science gave them the power to establish causality and explain and control the events of nature. The values offered them the basis to regulate their relationship with fellow human beings. Language, through which we enter into both the scientific and cultural dialogue, is a social heritage. Both science and values thus have a social character.

Human Beings' quest for knowledge led them to great discoveries and scienti0~c achievements. The technological advancement that humankind has made since the stone age equipment are testimony to this reality. It has been made possible through growth in their philosophical reasoning, logical skills and methods of scientific experiments. With this advancement, the rate and volume of production of knowledge has increased manifold. One estimate is that scientific knowledge doubles every ten years and that this rate of growth is further on the rise.

Check Your Progress 4

Note: i) Use the provided space for your answer.
ii) Check your' answer with that given at the end of the unit.

1) The evolution of the thinking ability in humankind illustrates the fact that (check one of the following for correct answer):

I) human beings got this ability from the new environment.
ii) human beings got this ability from social interaction.
iii) human beings got this ability by reciprocal evolution of their biology and sociability.
iv) human beings got this ability as a gift of god.

2.6.1 Growth of 'Two Cultures'

The fast pace of growth of science has, in its turn, created problems of its relationship with values and the moral order of society. In the Western society, scholars have expressed disappointment about the increasing gap between the scientific and the moral order of society. Instead of integration, science and moral values are showing increasing evidence of dissociation or distancing from each other.

The separation of science from values not only creates 'two cultures', but increasingly makes them run at cross purposes. We notice it in the present day race for armaments, ecological destruction through industrialisation, control over human freedom and in invention of weapons of mass annihilation like the atom bomb. Thus, *for the survival and the very existence of human beings, it is necessary that the social and moral character of science is maintained*. The mainstream Western tradition, believes in opposition between nature and culture or between human beings and their physical environment.

In contrast (to the Western tradition), Indian tradition right from it inception took an organic view of the relationship between scientific knowledge and its cultural or value framework. In fact, science was encapsulated within the world view of ethics, and the discovery of truth (*satyam*) was governed instrinsically by the principles of beauty (*sundaram*) and welfare (*sivam*). No dichotomy between the sacred and the profane,

between the instrumental and the transcendental or between science and value was entertained in the Indian tradition and practice of science. The converging points between science and religion in the Indian tradition lie in the notion of science as yoga and sadhna and the conceptualisation of truth as tentative or partial. Science treats the nature of truth as being tentative and revisable with ever new discoveries and experiments. The quest for knowledge, therefore, is perennial. The Indian tradition does not see any opposition between science (discovery of truth) and value (normative basis of truth), it seeks rather a unity among the principles of truth, goodness and beauty (*Satyam, Sivam, Sundaram*).

Cheek Your Progress 5

Note: i) Use the space given below for your answer.
ii) Check your answer with that given at the end of the unit.

1) The notion of two cultures' has emerged due to the belief that (check one of the following for correct answer):

i) science is not sufficient for solving human problems.
ii) the gap between science and humanistic social science has become acute.
iii) the culture of the rich differs from that of the poor.
iv) rural and urban societies form two cultures.

2.6.2 Forms of Knowledge in Transition

Evolution of knowledge till date has passed through three distinct stages of transition and growth as given below.

i) Magical Form of Knowledge

Knowledge in the first instance, grew through symbolic representation of nature, self, and of the fellow human beings. It played a central role in determining the human's relationship with both nature and culture; First, it evolved in magical and religious forms. Magic, which for the primitive human being was equivalent to scientific knowledge, was based on principles of causality governed by two rules:

i) First rule was that "like produces like". For example, since rain is accompanied by thunder, so if one could produce something similar to thunder, rain would follow. It was common among some ancient tribes to roll down heavy boulders from hill-tops to produce thunder-like sound to bring about rainfall.

ii) The second rule was: "Once a part always a part". it was believed that if something is done to a part of a person, or his/her image, the ensuing results would devolve upon that person as such. For instance, if human nail or hair could be obtained and burnt or damaged, then this bum or damage would occur also to the person to whom these parts belonged. Or, if his image could be made and subjected to harm, the harm would be transferred also to the person.

These laws of magic tried to establish causality as sought in modern day science but were based on false premises. They violated the rule of validity. That is why magic is called a pseudo-science.

Some magical rituals and explanations of events, however, integrated with practical knowledge as these evolved through trial and error over a period of time. Magical rituals were very common in all crucial economic activities such as hunting, food gathering and agriculture. Magic was integral to other rituals related to death, birth, marriage and initiation rites, etc. Mother goddess cult emerged from these magical . The process of learning for human beings was from the very beginning related to their conceptions of nature, spirit and supernatural.

IN MAGIC	IN MODERN MEDlClNE
DISEASE	DISEASE
DUE TO	DUE TO
ENTRY OF	ENTRY OF
EVIL SPIRITS (OUTSIDE ELEMENTS)	GERMS
IN HUMAN BODY	BACTERIA & VIRUS

Religious beliefs grew with magical beliefs. In some cases religious beliefs may have followed when magical principles failed. It is said that like science, magic seeks to command nature. Religious beliefs emerge when magical commands fail to materialise. Nature, on which human beings have no control inspires a supernatural awe. It is symbolically converted into (religious) forms of deities, and made object of worship and prayer. The origin of cultural expressions, such as dances, songs, dramas and most objects of arts is attributed to some extent to early magical and religious rituals. As human culture and civilisation advanced through evolution of agriculture, industry and technology, sharp differentiation between religion and magic took place. Religion evolved in Europe into a more organised social institution, such as the Roman Church and various other sects. Magic which right from its beginning was highly individualised as a form of skill and knowledge came under pressure both from science and religion. This was manifest from the persecution of magicians and witches in Europe during the medieval period. Wherever it survived, it did so in the form of the skill of an individual or a few persons.

ii) Separation of Science and Religion

With the emergence of imperial political organization, there took place large scale growth in trade, commerce, technology and industrial production. This is revealed through the history of ancient civilisations like those of India, China, Egypt, Greece and Rome. With few exceptions, now a differentiation between the scientists and religious or priestly classes took place. The separation, however, was often hazy. With the decline of the Graeco-Roman civilization and the rise of Christianity, Church had emerged in Europe as the most powerful social and political institution. It was a major setback to the process of differentiation between religious and scientific knowledge. All knowledge was now subject to approval of religious authority represented by the Church. Its seminaries were the only institutional organisations recognised for generation and communication of knowledge. This pattern continued for several centuries until it was challenged by forces of renaissance and religious reformation during the 15th and 16th centuries. During this period, contributions to science made by Galileo, Copernicus and Newton and the religious reforms initiated by Luther and Calvin made it possible that humanistic, rational and empirical forms of knowledge could slowly emerge. Luther and Calvin emphasised the role of individual over that of Church for religious salvation. Galileo and Newton offered scientific and experimental evidence instead of theological cosmology. Slowly, the nature of seminaries which were like theological schools changed. These were taken out of the control of the Church and taken over by the city councils of citizens for administration and cultivation of knowledge. The modern university system thus came into being on a secular basis of organisation, production and communication of knowledge. This process of secularisation of knowledge in the European society took several hundred years and it was shaped under the influence of its own social, political, cultural and economic transformations.

2.6.3 Division of Knowledge into Disciplines

What we see today as disciplines under the Natural Sciences, Social Sciences and Humanities are the result of the division (of knowledge) which took place during the period of emergence of University system in Europe. This division is based largely on classification of reality on certain philosophical grounds. That is to say, each discipline whether it is physics, chemistry, economics or sociology, assumed that it had for its study a separate 'subject-matter'. However, as knowledge advanced in depth and stock, it was observed that the scope of a discipline could not be demarcated on the basis of the 'subject-matter' which may have been shared by many disciplines in that group. For example, study of individual is the subject matter for disciplines of Social Sciences group (like Economics, Political Science, Sociology etc.). Does this then mean that the 'individual' is artificially divided among these disciplines? Is the economic man different from a 'political' or 'sociological' man? No. The individual which is the subject matter cannot be fragmented among the disciplines. They are merely different because they adopt different conceptual approaches to, and study different facets of the same subject matter i.e. the individual. That is where there lies hope for integration of knowledge for comprehensive understanding of the subject-matter (individual in social sciences) through genuine *inter-disciplinary researches*.

Many social and natural science disciplines such as statistics, economics, chemistry and physics, etc. emerged in response to demands to solve specific needs of society. Necessity indeed was the mother of inventions. But chance discoveries (serendipity) and creativity also played a role in the growth and differentiation of knowledge. All these diversifications have given rise to professional groups of vested interests who pose a major problem to the integration of knowledge. In the domain of logic, concept and method, however, significant advances have already been made during the past few decades which point to the possibility of more and more integration of knowledge.

Check Your Progress 6

Note: i) Use the space given below for your answer.
ii) Check your answer with that given at the end of the unit.

1) How did separation of Science and Religion take place? Answer in about five lines.

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2) What are the problems vis-a-vis the integration of knowledge ? Answer in about five lines.

2.7 LET US SUM UP

Human beings are endowed by nature to be reflective and active. Only they and not other animals, have the ability to abstract and represent their experiences through use of symbols and later, language and other sophisticate mediums of communication.

They grew with the evolution of the tool making ability evolved in course of time. In the process of evolution, stone tools and weapons were replaced by those of metals- first bronze, then iron. Each corresponding stage contributed to the growth of culture, art, social organisation, religious beliefs and economic institutions. Occupational guilds and urban settlements emerged during the Bronze Age; the iron Age saw the rise of complex social and political organizations, systems of scientific knowledge, medicine, astronomy and mathematics which later contributed to the rise of the contemporary historical civilisation. Writing, which was slowly evolving during the Bronze Age, saw its fuller growth during the Iron Age.

Evolution of material aspect of culture coincided with evolution of ideas, values and social institutions. The tool making ability of human beings gave them power to adapt to nature as well as to control it. A part of the crisis of our civilisation today is about the nature and extent of this adaptation. We have yet to establish a harmonious relationship with nature in the wake of our present day industrial and nuclear civilisation. The much talked about topic of "sustainable development" is all about this critical relationship of adaptation and mutual harmony.

Over these years, the ability to think grew into systematic learning and knowledge so much so that today's (post-industrial) society is being described as a 'Knowledge Society'. Magic, religion and science are the major forms, which knowledge took in the course of

evolution but the forces and factors of those changes have remained quintessentially European.

The perennial quest for knowledge has led human beings to great discoveries and scientific achievements. But with exponential growth of knowledge has also come in the train, emergence of the "two cultures" i.e. the worlds of Science and Moral values. Both are increasingly distancing themselves from each other, though this was typically true of the developments in the West. The Indian tradition, however, always focused on an organic, integral relationship between scientific knowledge and its cultural or value framework. Despite various vested interest groups engaged in perpetuation of this divergence, significant advances have already been made during the past few decades to bang about integration of knowledge for which sufficient evidences are forthcoming from the domains of logic, concept and methodology.

2.8 KEY WORDS

Abstraction: Process of formation of ideas, or quality of things by separating it mentally from any particular material object.
Adaptation: The process by which human beings adjust to a situation.
Aesthetic: Related to beauty, art.
Anachronistic: That which is severely out of date.
Annihilation: Bringing to nothingness, to destroy or demolish.
Anthropologist: A student of or specialist in the study of man in totality, his physical, social and cultural life.
Antiquarian: Dealing in antique or rare old objects.
Australopithecine: A primitive group of early man living in Africa a million years ago.
Billet: A wooden club.
Bipedal: Two-footed animal.
Cognitive: Knowing ability related to perception, memory judgement.
Conceptualise : To form concept or idea or thought in general.
Cortical: Related to gray matter or the brain, outer layer of brain.
Cosmology: Study of universe as a whole, its systems and structure.
Cranial: Related to the cranium or skull of the brain.
Culture: Total way of life, arts, modes of thinking, rules and regulations by which society is run.
Dialects: Forms of spoken languages peculiar to a region or regions.
Encapsulate: Enclose inside as if in a capsule.
Ethics: Study of standards of conduct or moral judgement.
Existential: Expressing existence, or based on existence.
Environment: That which surrounds man, e.g. atmosphere, buildings, trees etc.
Evolutionary: Any irreversible process which makes organisms or institutions move forward to a higher stage, e.g. humans have evolved from apes.
Extraction: To remove from the main body.
Heritage: Property that can be inherited, something handed down from one's ancestors.
Homo Sapiens: Latin name for a class of things/organisms of the same nature.
Improvise: To make or provide or do with whatever is in hand, to provide without advance preparation.
Intrinsic: Inherent, or belonging to the real nature of a thing.
Institutionalised: Those norms and rules which have become part and parcel of social process and organisation.
Insular: Isolated and safe outside the environment.
Laity: All the people not belonging to any profession; laymen in society.
Metaphysical: Supernatural.
Morphological: Related to form and structure of plants, animals or societies.
Monolithic: Huge complex structure of single stone.
Mutilate: To damage by removing a part.

Mystically: Exploring the inner vision and direction of man's mind.
Neolithic: New stone culture, when humans lived many centuries ago using stone tools of more sophisticated kind.
Nirvana: Final spiritual release from earthly bonds and struggle.
Over-arching: Across the arches, that which goes across or connects specific or particular.
Palaeontology: The science that deals with the life on earth in earlier times as known from the study of fossils.
Palaeolithic: Old stone culture when humans used instruments of chipped stones many centuries ago for hunting and cutting.
Perennial: Lasting for a long time.
Plasticity: Flexibility, impressionability.
Primates: Highest order of mammals e.g., man, apes etc.
Pseudo: 'False' or spurious.
Putrification: To become rotten, rottenness.
Quantum-leap: An advancement which is elemental or basic in nature.
Renaissance: The great revival of art, literature and social awakening in Europe during 14th and 16th centuries. You will know more about it in Block 2.
Seminaries : Schools, specially private schools and colleges in the past where priests were trained in Europe.
Serendipity: Accidental discoveries; chance discoveries.
Transcendental: Abstract and supernatural.
Transformative: That which changes the original form Taboo: That which must not be done because it contradicts social rules.
Technology: The state or science of industrial arts in which complex instruments are used.
Zymurgy: Chemistry of fermentation for making wine.

2.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) (ii) & (iii)
2) (i) False (ii) False (iii) True (iv) True
3) (iv)
3) (iv)
4) (ii) & (iii)

Check Your Progress 2

1) See sub-section 2.3.2
2) (i) ✓ (ii) x (iii) x
3) See sub-section 2.3.3

Check Your Progress 3

1) See sub-section 2.4.3

Check Your Progress 4
1) (iii)

Check Your Progress 5

1) (ii)

Check Your Progress 6

1) See Section 2.6.2 (ii)
2) See Section 2.6.3