LOGIC AND PHILOSOPHY

(For Higher Secondary Second Year)

Assam Higher Secondary Education Council

LOGIC AND PHILOSOPHY : *A textbook on Logic and Philosophy, compiled and prescribed by the Assam Higher Secondary Education Council, for second year Higher Secondary Course and published by Jyoti Prakashan, on behalf of Assam Higher Secondary Education Council.*

Publishers :
On behalf of Assam Higher Secondary Education Council
Jyoti Prakashan,Panbazar, Guwahati

Edition : First Edition : March, 2011
Reprint : Second Edition : 2012
Reprint : Fourth Edition : 2014
Reprint : Fifth Edition : 2015
Reprint : Sixth Edition : 2016
Reprint : Seventh Edition : 2017
Reprint : Eighteenth : 2018
Reprint : Nineteenth : 2019
Reprint : Twentieth : 2022
Reprint : Twenty 1st : 2023

Price : Rs. 85.00

Print Text : 70 GSM
Cover : 150 GSM

Published by Jyoti Prakashan on behalf of Assam Higher Secondary Education Council
Bamunimaidam, Guwahati-781021

Printers : Trinayan Graphic Offset, Bamunimaidam
Guwahati-781 021

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Foreword

In order to impart quality education to the students of Higher Secondary level and also to cater its need of the hour Assam Higher Secondary Education Council has been revising its curriculum and syllabi time to time. It has introduced a revised curricula with effect from 2010-2011 which has its base on NCF-2005. In the context of globalization of the economy, emergence of Information Technologies and application of new technologies in production processes, the National Council of Education Research and Training has proposed a new National Curriculum Framework (NCF-2005) for grades I-XII. This framework, which addresses the emerging development issues and other social concerns, provides a basis for the state to design their curricula, syllabi, teaching learning materials etc. In its endeavour to keep the uniformity with the national level Assam Higher Secondary Education Council after due deliberation decided to develop its curricula and syllabi on the basis of NCF-2005. Accordingly textbooks have been prepared to materialize the objectives of the curricula syllabi.

Writing this book was a collective effort of a group of people. Assam Higher Secondary Education Council appreciates the hard work done by the textbook development committee responsible for this book. AHSEC welcomes comments and suggestions which will enable us to undertake further revision and refinement. From teachers and students also we would appreciate feedback about the book and its design.

Bamunimaidam, Guwahati-21

Secretary
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CONSTITUTION OF INDIA

Preamble

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a **SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC** and to secure to all its citizen :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

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Unit-I

NATURE OF INDUCTIVE ENQUIRY, VARIOUS KINDS OF INDUCTION

After going through this unit you would be able to learn :

- The nature of reasoning or inference and its different kinds.
- The nature of induction and its various kinds.
- How to establish a universal real proposition.

Contents

- Relation between induction and deduction.
- Necessity of induction
- Problem of induction
- Different kinds of induction
- Scientific induction and and its characteristics
- Unscientific induction
- Relation between scientific and unscientific induction
- Value of unscientific induction
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- Kinds of Analogy
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● Introduction :

Logic is a normative science of reasoning. The main subject matter of Logic is reasoning. Reasoning is a process by which we pass from something known to something unknown. As a normative science, the aim of Logic is to attain truth. Truth is the ideal of Logic. Truth is of two types viz. formal truth and material truth. Deductive Logic deals with formal truth. It is not concerned with material truth. Inductive logic deals with material truth. Deductive logic deals with deductive reasoning and Inductive Logic deals with inductive reasoning. In Higher Secondary First Year Logic course, you have learnt about deductive reasoning or inference. In this chapter, inductive reasoning or induction with its various kinds will be discussed.

● Relation between Induction and Deduction :

Reasoning in the main subject matter of logic. Reasoning or inference is a

mental process in which we pass from one or more propositions to another which is justified by them. When a reasoning is expressed in language, it is called an argument. An argument consists of two or more propositions. The proposition or propositions which are given are called the premise or premises and the proposition which is drawn from them is called the conclusion. Thus, an argument consists of two parts viz. premise or premises and conclusion. In an argument, the conclusion is drawn from the premises as there is a relation between them.

In western logic, reasoning or inference is broadly divided into two kinds viz. deductive inference and inductive inference. Deductive inference is also called deduction and inductive inference is called induction.

● Deductive inference :

Deductive inference is that inference in which the conclusion can not be more general than the premises. In other words, the conclusion of a deductive inference can not go beyond the premises. Moreover, in a deductive inference the conclusion follows necessarily from the premises. For example :

(i) All men are mortal
Ram is a man
∴ Ram is mortal.

(ii) Some men are wise
∴ Some wise beings are men.

● Inductive Inference :

Inductive inference in that inference in which the conclusion is more general than the premises. In other words, the conclusion of an inductive inference goes beyond the premises. In an inductive inference the conclusion does not follow necessarily from the premises. Inductive inference in mainly an inference from 'particular to general'. Here a general conclusion is established on the basis of some observed facts.

For example :

Ram is mortal.
Hari is mortal.
Jadu is mortal.
Madhu is mortal.
∴ All men are mortal.

If we analyse the nature of deductive and inductive inferences, we notice the following points of difference between them.

1. In deductive inference, the conclusion can not be more general than the premises. That is, the conclusion can be as general or less general than the premises but it can not be more general than the premises. But the conclusion of an inductive inference is always more general than the premises.

2. In deductive inference we pass from the general to the particular or from

the more general to the less general proposition but in an inductive inference we pass from particular propositions to a general proposition.

3. In deductive inference, the premises are assumed to be true. We are not concerned with the material truth of the premises. But in an inductive inference, the premises are true as a matter of fact. As the premises are based on observation of facts, so they are materially true.

4. Deductive inference aims only at formal truth but inductive inference aims at both formal and material truth.

5. In deductive inference, the conclusion follows necessarily from the premises. So, in a valid deductive inference if the premises are true, the conclusion must be true. In other words, the conclusion can not be false if the premises are true. Moreover, in a deductive inference the premises provide conclusive evidence for the conclusion. So, the conclusion of a valid deductive inference in certain.

On the other hand, in an inductive inference the conclusion does not follow necessarily from the premises. So, the premises of an inductive inference may be true but the conclusion may be false. Moreover, in an inductive inference the premises do not offer conclusive evidence for the truth of the conclusion. So, the conclusion of an inductive inference is probable.

Although there are differences between deductive inference and inductive inference, yet the difference between them is not fundamental. Deduction and induction are supplementary processes. They differ in their starting points only but not in principle. Deduction starts with a general proposition and arrives at a particular or less general proposition. On the other hand, induction starts with particular propositions and arrives at a general proposition. But both deduction and induction are based on the same principle of unification of the particular and the general into a common system. The general proposition which is assumed to be true in deduction is established by induction. Again, the general proposition which is established in induction is verified by applying to particular facts with the help of deduction. Hence, deduction and induction are interdependent.

- **Necessity of Induction :**

Logic is generally defined to be the science of reasoning. It is a normative science as it deals with the ideal of truth. Logic sets before itself the ideal of truth and seeks to know the conditions which our reasoning must fulfil in order that the

ideal of truth may be attained. Truth is of two types viz. formal truth and material truth. Deductive inference aims at formal truth only. In a deductive inference, the premises are assumed to be true and our task is only to determine whether the conclusion follows necessarily from the premises. Here, we do not question the material truth of the premises. In other words, we are not concerned whether the premises are true as a matter of fact. But formal truth is only one aspect of truth and not the whole truth. An argument to be sound must not only be formally true but also materially true.

An argument is formally true if the conclusion follows necessarily from the premises according to the rules of that particular form of argument. In other words, the formal truth of a deductive argument depends on the observence of the rules of that form of argument. On the other hand, the material truth of an argument depends on the material truth of its premises.

Deductive inference aims only at formal truth and not at material truth. But Logic as a whole aims both at formal truth and material truth. Hence the question arises how are we to establish the material truth of premises?

Every premise is a proposition. According to quantity, propositions may be universal or particular. A universal proposition is one in which the predicate is affirmed or denied of the whole subject. For example, 'All men are mortal'. On the other hand, a particular proposition is one in which the predicate is affirmed or denied of a part of the subject. The truth of a particular proposition can be easily determined by experience. For example, the material truth of particular propositions 'Some men are honest', 'Some men are mortal' can be determined by observation. But how are we to establish the material truth of universal propositions like 'All men are mortal.' 'All crows are black'? Induction is necessary to establish the material truth of such universal propositions.

According to import, a universal proposition may be of two kinds viz. (i) Analytic or Verbal and (ii) Real or Synthetic. An analytic or a verbal proposition is one in which the predicate merely states the connotation or a part of the connotation of the subject. For example, "All men are rational'. In this proposition, the predicate 'rational' is a part of the connotation of the subject 'men'. To determine the truth of analytic proposition we do not have to depend upon experience. On the other hand, a real or synthetic proposition is one in which the predicate asserts an additional fact which an analysis of the connotation of the subject does not reveal. For example, 'All men are mortal.' In this proposition, the predicate does not state

the connotation of the subject but gives us some new information about the subject. The truth of this proposition can not be determined by analysing the connotation of the subject. So, how are we to establish the material truth of universal real propositions?

If universal real propositions are axioms, then they do not require any proof. This is because they are self-evident. These axioms are however very few in number and the vast majority of universal real propositions are not axioms.

Key Words
Verbal or Analytic proposition,
Real or Synthetic proposition

Again, some universal real propositions may be deductions from more general propositions. The truth of these universal propositions can be determined from the truth of more general propositions. For example,

All animals are mortal.
All men are animals
∴ All men are mortal.

In the above argument, the conclusion 'All men are mortal' which is a universal real proposition is a deduction from the more general premise ' All animals are mortal'. But all universal real propositions are not established by deduction.

Hence, the question arises : How are we to establish universal real propositions which are neither axioms nor deductions? The answer is that such universal real propositions are established by induction. It is induction which establishes the vast majority of general propositions. Deduction assumes the material truth of its universal premise but induction proves it. For example, syllogism assumes the truth of its universal premise. According to one of the rules of syllogism, a syllogism must have at least one universal premise because from two particular premises no conclusion can be drawn. This universal premise is supplied by induction. Syllogism depends upon induction for the establishment of its universal premise. Hence, it is said that induction supplies the universal premises of deduction.

Induction is necessary for the establishment of material truth. Deduction can only give us formal truth. But the aim of Logic is to attain both formal truth and material truth. Hence, induction is necessary for the establishment of material truth.

ACTIVITY

1. Write a few examples of Verbal or Analytic propositions.
2. Write a few examples of Real or Synthetic propositions.
3. 'All men are laughing animals'– Is this proposition a Verbal or a Real proposition?

• Problem of Induction :

Induction seeks to establish the material truth of universal real propositions. In induction we establish a universal real proposition based on the observation of particular instances. But how are we justified in establishing a universal real proposition from particular instances?

Experience provides us with particular facts and not with universal propositions. For instance, experience informs us that Jadu is mortal, Hari is mortal, Tom is mortal etc., but not that all men are mortal. It is not possible for us to observe all cases of death of all men of past, present and future. But the general proposition when established covers observed as well as unobserved cases. Thus, on the observation of mortality of some men we conclude "All men are mortal.' Again, observing some crows to be black we conclude "All crows are black". In all these cases, the number of instances that we have observed is infinitely small compared to the number of unobserved instances. So, how we are justified in passing from the observation of some cases to the universal proposition. In other words, how we are justified in inferring the general from the particular or the more general from the less general is the problem of induction.

The solution to this problem of induction lies in the fact that in passing from the particular to the general, induction relies on two fundamental principles viz. the Law of the Uniformity of Nature and the Law of Causation. The Law of Causation states that every event has a cause. The Law of Uniformity of Nature states that the same cause produces the same effect under similar conditions. In other words, Nature behaves in the same way under similar circumstances. In the establishment of the universal real proposition 'All men are mortal' we observe particular cases of death of persons and on discovering causal connection between 'humanity' and 'mortality', pass on to unobserved cases on the assumption that the same cause will produce the same effect under similar circumstances, in all places, and at all times. Thus, the problem of Induction is solved when it is based on the Law of causation and the Law of Uniformity of Nature.

Key Words
Law of Uniformity of Nature, Law of Causation

ACTIVITY

Observe some particular instances of the same kind and on its basis establish a universal real proposition covering all instances, known and unknown.

● Different kinds of Induction:

Following Mill, we may broadly divide induction into two kinds viz.

(i) Induction proper

(ii) Induction improperly so-called

(i) Induction proper : Induction proper is that type of induction where there is 'Inductive leap' i.e. there is a leap or jump from the known to the unknown, observed to the unobserved, particular to general i.e. 'some' to 'all'. Here, a general or universal proposition is established on the basis of observation of particular facts.

(ii) Induction improperly so-called : Induction improperly so-called is that type of induction where there is no 'Inductive Leap.'

Induction proper, again is of there kinds :

(i) Scientific Induction,

(ii) Unscientific Induction or Induction per Simple Enumeration, and

(iii) Analogy.

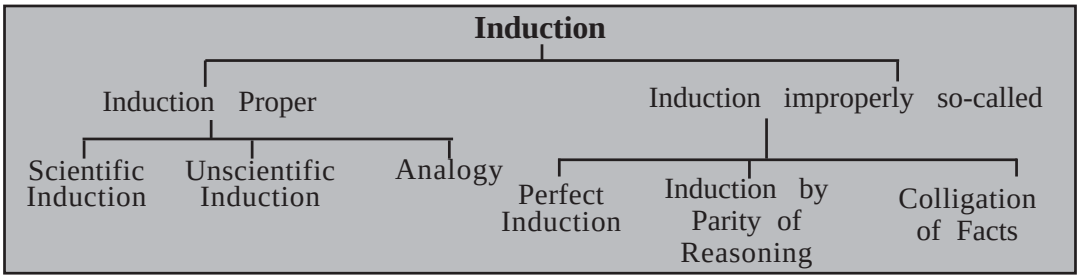
Induction improperly so-called is also of three kinds :

(i) Perfect Induction,

(ii) Induction by Parity of Reasoning, and

(iii) Colligation of facts.

The following table illustrates the classification of induction.



Although induction is divided into induction proper and Induction improperly so-called, in this chapter we shall discuss only Induction proper.

● Induction Proper :

1. Scientific Induction and its characteristics

Scientific Induction is the establishment of a general real proposition based on the observation of particular instances, in reliance on the principle of the Uniformity of Nature and the Law of Causation.

For example : All men are mortal.

An analysis of the above definition reveals the following characteristics of scientific induction.

1. Scientific induction establishes a general real proposition.

(a) Scientific induction establishes a

proposition. A proposition is a statement which expresses a relation between two terms. For e.g., 'Man is mortal' is a proposition. It expresses a relation between two terms 'man' and 'mortal'. Scientific induction establishes such a proposition and not an idea or concept.

(b) The proposition established by scientific induction is a general proposition. According to quantity, proposition are divided into universal or general and particular. A general proposition is one in which the predicate is affirmed or denied of the whole subject. For example, "All men are mortal." A particular proposition is one in which the predicate is affirmed or denied of a part of the subject. For example, "Some men are mortal." The aim of scientific induction is to establish a general proposition and not a particular one.

(c)The general proposition which a scientific induction establishes is a real proposition and not a verbal one. According to import, propositions are divided into two kinds viz., verbal or analytic and real or synthetic. A verbal proposition is one in which the predicate merely states the connotation or a part of the connotation of the subject. For example, "All men are rational" – A real proposition is one which gives us some new information about the subject, not contained in the connotation of the subject. For example, "All men are mortal" is a real proposition because the predicate 'mortal' connotes an attribute which is not a part of the connotation of the term 'man'. Scientific induction is concerned only with real propositions and not with verbal propositions.

(2) Scientific induction is based on observation of facts.

The general proposition established by scientific induction is based on observation of particular instances. Observation is of two kinds– simple observation and experiment. By means of simple observation and experiment particular instances are collected. For example, the general proposition "All men are mortal" is established on the basis of observation of particular instances of death of persons like Ram, Hari, Jadu, Madhu etc. Similarly, the general proposition "All metals expand when heated" is based on an examination of particular instances of metals like iron, copper, silver etc. Induction aims at material truth. The general porpositions established by induction must conform to the actual state of things. So, scientific induction depends upon observation of facts to establish materially true general propositions. As observation and experiment supply materials to induction and guarantee the material truth of induction, so they are called the material grounds of induction.

This characteristic distinguishes scientific induction from axioms on one hand and deduction on the other.

(3) In scientific induction, there is an "Inductive leap or hazard."

Though scientific induction is based on observation of facts, yet for the establishment of a general proposition it can not depend upon observation alone. It has to depend upon inference for the scope of observation is limited. For instance, it is possible for us to observe some cases of man's death and not all cases of man's death. But the aim of scientific induction is to establish a general real proposition. So, it has to jump from the observed cases to the unobserved cases, the known to the unknown, from particular to general. This jump from the known to the unknown, particular to general or 'some' to 'all' is called 'Inductive Leap'. This leap is not an ordinary one. It is a leap in the dark. This passage from particular to general, the known to the unknown invlolves some hazard or risk as we are going beyond the evidence. So, the inductive leap is also known as 'inductive hazard'. According to Mill and Bain, the Inductive leap or hazard constitutes the very essence of induction. If this characteristic in absent, then the process cannot be called induction at all.

(4) Scientific induction is based on two presuppositions, viz., the Law of Causation and the principle of the Uniformity of Nature.

To remove the difficulty of 'Inductive hazard' which scientific induction faces in establishing a general proposition from particular instances, it depends on two presuppositions, viz.,

(i) The Law of Causation, and

(ii) The principle of the Uniformity of Nature.

Key Words

Scientific Induction, Observation, Experiment, Inductive Leap

Both the Law of Causation and the principle of the Uniformity of Nature are two fundamental principles. These two fundamental principles are called the formal grounds of scientific induction because scientific induction takes them for granted in order that a general proposition may be established on an observation of particular instances. They are also called the postulates or assumptions of induction.

The Law of Causation, states that 'Every event has a cause'. Scientific induction is based on the Law of Causation. It is based upon the discovery and proof of causal connection between events. For example, a causal connection is proved between 'humanity' and 'mortality' and on the strength of this causal connection the general proposition 'All men are mortal' is established.

The principle of the Uniformity of Nature states that 'Under similar conditions, the same cause produces the same effect'. This means that Nature behaves in the same way under similar circumstances. For example, when we find that there is a causal connection between 'humanity' and 'mortality', we further assume that this causal connection will be true in all cases of man under similar circumstances.

(5) The conclusion of scientific is regarded a certain as it is based on causal connection.

Thus, we find that scientific induction is the establishment of a general real proposition based on the observation of particular instances, in reliance on the principle of the Uniformity of Nature and the Law of Causation.

ACTIVITY

* Is induction concerned with formal truth only?
* What are the grounds of scientific induction?
* What kind of proposition does scientific induction establish?

- **Unscientific Induction or Induction per Simple Enumeration :**

Unscientific Induction or Induction per simple enumeration is the establishment of a general real proposition on the basis of mere uniform or uncontradicted experience without any attempt at explaining a causal connection.

An analysis of the definition reveals the following characteristics of unscientific induction.

1. Unscientific induction establishes a general real proposition.

Like scientific induction, unscientific induction establishes a proposition and that proposition is a general real porposition.

2. Unscientific induction is based on observation of particular facts of experience.

Induction aims at material truth. In order to establish a materially true general proposition, unscientific induction depends on observation of particular facts of experience.

3. In unscientific induction there is an 'Inductive Leap'.

In unscientific induction there in an 'Inductive Leap' from 'some' to 'all', from particular to general, observed to unobserved cases. Unscientific induction aims to establish a general real proposition based on the observation of particular instances. But by mere observation alone a general proposition can not be established. So, unscientific

induction has to depend on inference. It observes particular instances and on its basis establishes a general real proposition by inference. Thus, in unscientific induction there is an 'Inductive Leap' on jump from particular to general, which is the very essence of induction. So, unscientific induction is regarded as a form of induction proper.

(4) In unscientific induction, the generalisation is made on the basis of mere uniform or uncontradicted experience.

By observing a large number of particular instances and finding not a single contrary instance, unscientific induction establishes a general real proposition. Thus, uncontradicted experience in the ground of unscientific induction.

(5) Unscientific induction is not based on the Law of Causation.

In unscientific induction, there is no attempt to establish a causal connection between events. The general real proposition is established without the discovery of causal connection. As there is no knowledge of causal connection, this kind of induction is called unscientific.

(6)The conclusion of unscientific induction is only probable.

As unscientific induction is based on mere uncontradicted experience and not on the strength of causal connection, its conclusion is only probable and not certain.

For example, "All crows are black."

So far as our experience goes, we have seen only black crows. We have not come across any crow which is not black. On the basis this uniform or uncontradicted experience we arrive at the general proposition. 'All crows are black'. Here, we have not discovered or proved any causal connection between 'crows' and 'blackness'. So, the conclusion is probable only and not certain.

Unscientific induction is also called Induction per simple enumeration because it based on mere enumeration or counting of instances.

- **Relation between Scientific and Unscientific Induction :**

Scientific Induction is the establishment of a general real proposition based on the observation of particular instances, in reliance on the principle of the Uniformity of Nature and the Law of Causation.

For example : 'All men are mortal.'

This general real proposition is established on the basis of observation of particular instances of man's death and is based on the causal connection between 'man' and 'mortality' in reliance on the principle of the Uniformity of Nautre.

Unscientific induction is the establishment of a general real proposition on the basis of mere uniform or un-contradicted experience without any attempt at explaining a causal connection.

For example : 'All crows are black.'

This general real proposition is established on the basis of mere uniform or uncontradicted experience of large number of crows without any attempt at discovering a causal connection between 'crows' and 'blackness'.

If we analyse the above definitions of scientific induction and unscientific induction, we find the following points of similarities and dissimilarities between them.

Points of similarity :

1. Both scientific induction and unscientific induction establish general real propositions.

2. Both scientific induction and unscientific induction are based on observation of facts. In both we arrive at general real propositions on the observation of particular instances.

3. In both the kinds of induction there is 'Inductive Leap'– a passage from particular to general, from observed to unobserved cases. So, both scientific and unscientific induction are two forms of induction proper.

Points of dissimilarity :

1. Scientific induction is based on two kinds of observation viz., simple observation and experiment. But unscientific induction is based on simple observation only and not on experiment.

2. Scientific induction is grounded on the principle of the Uniformity of Nature and the Law of Causation whereas unscientific induction is grounded on mere uniform or uncontradicted experience.

3. The process of scientific induction is complex as it involves observation, formation of hypothesis, generalisation, verification etc. But the process of unscientific induction is simple.

4. The conclusion of scientific induction is certain as it is based on the Law of Causation. But there is no attempt to establish a causal connection in unscientific induction. So, its conclusion is probable only.

Value of Unscientific Induction :

Unscientific induction establishes a general real proposition on the basis of mere uniform or uncontradicted experience. As there is no attempt at explaining causal connection in unscientific induction, its conclusion is probable only. Hence, the question arises what is the value of unscientific induction?

Regarding answer to this question, there is difference of opinions among logicians. According to Bacon, unscientific induction has no value at all.

He says, "Induction which proceeds by merely citing instances, is res puerilis, a childish affair, and being without any principle of inference, it may be overthrown by any contradictory instance."

Logicians, however, acknowledge that in a large number of popular generalisations, the condemnation of Bacon is just. It is true that the hasty and perfunctory generalisations of the man in the street are often worthless. But we also cannot deny the uncontradicted experience of all known men, in all the known parts of the world, during all the known periods of history. So, according to some logicians unscientific induction has some value.

Fowler points out that the value of unscientific induction depends on two considerations.

1. If the number of positive instances, which have occured in our experience, be large then the value of unscientific induction is comparatively high; while if the number be small, its value is rather low.

2. The absence of negative instances, when experience is of wide range, shows that unscientific induction possesses a high degree of probability.

But, however high the degree of probability, unscientific induction can never reach the certainty of scientific induction. The conclusion of unscientific induction is not certain because a knowledge of causal connection is wanting. Although the conclusion of unscientific induciton is not certain, still it can not be regarded as useless from the scientific point of view as it is the starting point of scientific induction.

According to Grumley, the chief value of unscientific induction lies in its power to suggest a causal connection. The condition that two phenomena are always or very frequently connected suggests that they may be causally connected. With this suggestion we start our scientific investigation to find out whether there is really any causal connection or not. If a causal connection is discovered and proved, Induction per simple enumeration or unscientific induction attains the certainty of scientific induction and is elevated to the rank of scientific induction. Hence, it is a stepping stone to scientific induction.

Thus, we can conclude that unscientific induction is not without any value. It is a valuable aid to scientific induction. It paves the way for scientific induction. It is of great help in the preliminary stages of induction.

- **Analogy :**

Analogy is a kind of induction in which on the basis of observation of resemblance in some particular

properties between two things, we infer further resemblance in some other property between them.

Analogy is a kind of induction proper because in analogy there is inductive leap.

Analogy is defined in different ways by different logicians.

According to Mill, analogy may be stated in the following way : "Two things resemble each other in one or more respects; a certain proposition is true of the one, therefore it is true of the other."

Welton defines analogy as "an inference from partial identity of content to further identity of content."

Carveth Read defines analogy as "a kind of probable proof based on imperfect similarity ..... between the data of comparison and the subject of our inference."

In analogy, we first observe that two different things resemble each other in some respects. Secondly, one of them possesses of further quality and so it is inferred, on the ground of previous resemblance, that the other thing also possesses that same quality.

Symbolic example :

A resembles B in certain properties, viz. *x*, *y* and *z*.

B further possesses the property *m*.

∴ A possesses the property *m*, even though no connection is known to exist between *m* and the common properties *x*, *y* and *z*.

Concrete example :

Mars resembles the Earth in certain respects, viz., in being a planet, possessing similar atmosphere, land, seas, polar regions, temperature etc.

The Earth possesses the further property of being inhabited.

∴ Mars possesses the property of being inhabited.

If we analyse the nature of analogy we find the following characteristics.

(i) Analogy is a kind of inference in which we pass from particular to particular.

This means that in analogy we pass from a particular proposition to another particular proposition and not from particular to a general proposition.

(ii) Analogy is based on resemblance of certain properties between two things. This resemblance or similarity is imperfect.

(iii) Analogy is not based on causal connection. So, its conclusion is probable and not certain.

(iv) In analogy, there is 'Inductive Leap' as we pass from the known to the unknown. So, it is a kind of induction proper.

Thus, Analogy is a kind of inference from particular to particular based on imperfect similarity without any knowledge of a causal connection and is only probable in character.

- **Value of Analogy :**

Analogy is based on imperfect

similarity between two things and not causal connection. So, the conclusion of analogical argument is always probable. But probability is not a fixed quantity. It is a matter of degree. An argument from analogy may have any degree of probability from zero almost up to the limit of certainty. Now let us determine the conditions on which the strength or value of an analogical argument depends.

According to Mill, the value of an analogical argument depends on the following conditions :

(i) The extent of known resemblance,

(ii) The extent of known difference,

(iii) The extent of unexplored region of unknown properties.

Mill said that where the resemblance is very great, the ascertained difference very small and our knowledge of the subject matter fairly extensive, the analogical argument has a high probability. Mill's criteria laid emphasis on the number of points of resemblance and difference.

According to Bain, "The probability is measured by comparing the number and importance of the points of agreement with the number and importance of the points of difference; having respect also to the extent of unknown properties as compared with known."

According to Welton, Bosanquet, Sidgwick and others, the value of an analogical argument does not depend merely upon the number of the points of resemblance, but also upon their importance. Even if two things resemble one another in many properties, the analogical argument may have no value whatsoever, if the points of resemblance are not of importance. So, Bosanquet says, "We must weigh the points of resemblance rather than count them." Hence, in determining the value of an analogical argument we must not only put emphasis on the number of the points resemblance but also their importance.

The value or strength of an analogical argument depends on the following rules :

(i) The greater the number and the importance of the known points of resemblance, the greater the value of the analogical argument. For example, the points of resemblance between men and lower animals are more in number and more important than the points of resemblance between men and plants. Hence, the analogical argument, 'Lower animals feel pleasure and pain as men do' is more probable than the argument 'Plants feel pleasure and pain as men do.'

(ii) The greater the number and the importance of the known points of difference, the less the value of the analogical argument.

For example : the known points of difference between the Earth and the Moon are more in number and more

important than the points of difference between the Earth and Mars. The Moon has no atmosphere while air is an indispensable condition of life on the Earth. The absence of air is an important point of difference. Hence, the analogical argument 'The Moon is inhabited like the Earth' is less probable than the argument 'Mars is inhabited like the Earth.'

(iii) The greater the number of unknown points as compared with the number of known points, the less the value of the analogical argument.

In other words, if the number of known points is small in comparision with the unknown points, then the value of the analogical argument will be less. If the number of unknown points is smaller than the number of known points, then the value of the analogical argument will be more.

The value of an analogical argument has been expressed by some logicians mathematically in the form of a fraction thus :

$$\frac{\text{Resemblance}}{\text{Difference + Unknown Points}}$$

The significance of this mathematical expression is this. The numerator consists of factors which make for strength, and the denominator consists of factors which weaken the force of the argument, so that the fraction represents the value of a particular analogical argument.

However, we must not think that it is possible to determine the value of any particular analogical argument in exact mathematical ratio. The fraction given above merely suggests in a general way that the number and importance of resemblances constitute a favourable factor and the other two i.e. the points of difference and unknown points constitute an adverse factor in determining the value of an analogical argument.

The determination of the value of an analogical argument is not an easy process. There are two main difficulties in this process.

(i) Two different principles viz., number of points and their importance are involved here. In practice, it is often impossible to reconcile them. Moreover, the number of points of similarity is a matter of comparative indifference when their importance is small. Hence, it is difficult to decide whether in a given case, number or importance should be the guiding factor.

(ii) It is futile to talk of the number of unknown points. If they are unknown, how can we know how many they are? So, the unknown can not be used as a standard of comparison.

• Kinds of Analogy :

The ground of analogy in similarity or resemblance between two things. In analogy no casual connection is established and so its conclusion is

probable in character. The strength or value of analogy depends on the number and the importance of the points of similarity, as contrasted with the number and the importance of the points of difference and the number of the unknown points.

On the basis of the importance of the points of similarity, analogy is divided into two kinds viz.—

(i) Good Analogy, and

(ii) Bad Analogy

A good analogy is one in which a conclusion in drawn from the presence of essential resemblance between two things. For example, Mars resembles the Earth in being planet, possessing similar atmosphere, land, seas temperature etc.. The Earth is inhabited. Therefore, Mars is also inhabited.

A bad analogy is one in which the conclusion is drawn from superficial points of resemblance between two things. It is also called False analogy.

For example: Plants, like men, have birth, growth and decay and death. Men possess intelligence, therefore plants also possess intelligence. Here, there is no essential connection between the points of resemblance and the inferred quality. So, this is a false or bad analogy.

Analogy and Scientific Induction :

Analogy is a kind of induction in which on the basis of observation of resemblance in some particular properties between two things, we infer further resemblance in some other property between them.

Scientific induction, on the other hand, is the establishment of a general real proposition based on the observation of particular instances in reliance on the principle of the Uniformity of Nature and the Laws of Causation.

If we analyse these two definitions of analogy and scientific induction, we find the following points of similarity and dissimilarity between them.

Poins of similarity:

(1) Both analogy and scientific induction are forms of induction proper. In both, there is 'Inductive Leap' from the known to the unknown.

(2) Both analogy and scientific induction are based on observation. In analogy, we first observe that one thing resembles another in some properties. We then infer further resemblance in some other property between them. Scientific induction is also based on the observation of particular instances for the establishment of a general real proposition.

Points of Dissimilarity :

(1) In analogy, we proceed of from the particular to the particular while in scientific induction we proceed from the particular to the general.

In analogy, we pass from one particular to another particular which resembles the former in certain respects. But in scientific induction, on an observation of particular instances we establish a general proposition.

(2) In analogy there is no knowledge of a causal connection but scientific induction is based on the knowledge of a causal connection. In scientific induction, the causal connection is established by the application of the Experimental Methods, but in analogy, no such causal connection is established.

(3) The conclusion of analogy is probable as it is not based on causal connection. But the conclusion of scientific induction is certain because it is based on causal connection.

Though there are differences between analogy and scientific induction yet both are forms of induction proper. However, analogy is a weak form of inductive argument because it is based on imperfect similarity. But we should not think that analogical argument has no value at all. In analogy, no causal connection is known to exist. But there is a vague belief that though no causal connection is at present known to exist, such a connection will at some future time be discovered and then the analogical argument will perfect itself into a scientific induction. So, analogy is regarded as a stage on the road to scientific induction. In the words of Mill, analogy is 'a guide-post pointing out the direction in which more rigorous investigations should be prosecuted.' Analogy is a source of hypothesis which when proved, results in scientific induction. Thus, analogy is a stepping-stone to scientific induction.

- **Analogy and Unscientific Induction :**

In analogy, on the basis of observation of similarity in certain properties between two things, it is inferred that those two things will resemble in some other property.

In unscientific induction, a general real proposition is established on the basis of mere uniform or uncontradicted experience without any attempt at discovering a causal connection.

An analysis of the nature of analogy and unscientific induction reveals that there are certain points of similarity and certain points of dissimilarity between them.

Points of Similarity :

(1) Both analogy and unscientific induction are two forms of induction proper. There is 'Inductive Leap' in both analogy and unscientific induction.

(2) Both analogy and unscientific induction are based on observation. In analogy, we observe that one thing resembles another in some properties and then infer further resemblance in some

other property between them. In unscientific induction also, we observe particular instances and on its basis establish a general real proposition.

(3) In both analogy and unscientific induction there is no attempt to establish a causal connection.

(4) The conclusions of both analogy unscientific induction are probable as they are not based on causal connection.

(5) Both analogy and unscientific induction are great sources of hypotheses. Both possess suggestive power and are valuable aids to scientific induction.

Points of Dissimilarity :

(1) In analogy we pass from one particular to another particular but in unscientific induction we pass from particular to general.

(2) The basis of analogy is imperfect similarity while the basis of unscientific induction is uncontradicted experience.

(3) Although both the conclusions of analogy and unscientific induction are probable, yet the probability of analogical conclusion depends mainly on the number and importance of the known points of resemblance. In unscientific induction, the probability of the conclusion depends on the number of particular instances which are collected by observation on the basis of uncontradicted experience. In unscientific induction, we simply count the instances but in analogy we weigh the points of resemblance.

(4) Analogy deals with the connotation of a term. It increases our knowledge of the connotation of the term. But unscientific induction deals with the denotation of a term. It increases our knowledge of the denotation of the term.

ACTIVITY

- ✶ Is the conclusion of analogical argument probable?
- ✶ Observe some points of similarity between two objects or instances (suppose man and chimpanzee). On the basis of their similarity infer a further quality, which is present in one of them to be also present in the other and name this inference.

SUMMARY

- ✶ Reasoning is the main subject matter of Logic. In western logic, reasoning or inference is broadly divided into two kinds viz. deductive and inference.
- ✶ In deductive inference, the conclusion can not be more general than the premises.

- In inductive inference the conclusion is more general than the premises.
- Deductive inference aims only at formal truth.
- Inductive inference aims at both formal and material truth.
- According to Mill, induction is broadly divided into two kinds.
  (i) Induction proper and (ii) Induction improperly so-called.
- Inductive proper is that type of induction where there is 'Inductive Leap' i.e. there is a leap or jump from the known to the unknown, observed to the unobserved, particular to general i.e. 'some' to 'all'.
- Induction improperly so-called is that type of induction where there is no 'Inductive Leap'.
- Induction proper is of three kinds :
  (i) Scientific Induction (ii) Unscientific Induction and (iii) Analogy
- Induction improperly so-called is also of three kinds :
  (i) Perfect Induction (ii) Induction by parity of Reasoning (3) Colligation of facts.
- Scientific Induction is the establishment of a general real proposition based on the observation of particular instances in reliance on the principle of the Uniformity of Nature and the Law of Causation.

Characteristics of Scientific Induction :

- Scientific Induction establishes a general real proposition.
- Scientific Induction is based on observation of facts.
- In scientific induction, there is an 'Inductive leap or hazard'.
- Scientific induction is based on two presuppositions, viz., the Law of Causation and the principle of the Uniformity of Nature.
- Unscientific induction is the establishment of a general real proposition on the basis of mere uniform or uncontradicted experience without any attempt at explaninig a causal connection.

Characteristics of unscientific induction:

- Unscientific induction establishes a general real proposition.
- Unscientific induction is based on observation of particular facts of experience.
- In unscientific induction there is an 'Inductive Leap'.

- In unscientific induction, the generalisation is made on the basis of mere uniform or uncontradicted experience.
- Unscientific induction is not based on the Law of Causation.
- The conclusion of unscientific induction is probable.

Relation between scientific and unscientific induction :

Points of similarity :

- Both scientific induction and unscientific induction establish general real propositions.
- Both scientific induction and unscientific induction are based on observation of facts.
- In both the kinds of induction there is 'Inductive Leap'.

Points of dissimilarity :

- Scientific induction is based on two kinds of observation viz., simple observation and experiment. But unscientific induction is based on simple observation only.
- Scientific induction is grounded on the principle of the Uniformity of Nature and the Law of causation whereas unscientific induction is grounded on mere uniform or uncontradicted experience.
- The process of scientific induction is complex but the process of unscientific induction is simple.
- The conclusion of scientific induction is certain but the conclusion of unscientific induction is probable.
- Analogy is a kind of induction in which on the basis of observation of resemblance in some particular properties between two things, we infer further resemblance in some other property between them.

Characteristics :

1. Analogy is a kind of inference in which we pass from particular to particular.
2. Analogy is based on resemblance of certain properties between two things.
3. Analogy is not based on causal connection. So, its conclusion is probable.
4. In analogy there is 'Inductive Leap'.

- Analogy is of two kinds : (i) Good Analogy and (ii) Bad Analogy.
- Analogy and scientific induction :

Points of similarity :

1. Both analogy and scientific induction are forms of induction proper. In both there is 'Inductive Leap'.
2. Both analogy and scientific induction are based on observation.

Points of Dissimilarity :

1. In analogy, we proceed from the particular to the particular while in scientific induction we proceed from particular to the general.
2. In analogy there is no knowledge of a causal connection but scientific induction is based on the knowledge of a causal connection.
3. The conclusion of analogy is probable but the conclusion of scientific induction is certain.

- Analogy and unscientific induction :

Points of similarity :

1. Both analogy and unscientific induction are two forms of induction proper. In both there is 'Inductive Leap'.
2. Both analogy and unscientific induction are based on observation.
3. In both analogy and unscientific induction, there is no attempt to establish a causal connection.
4. The conclusions of both analogy and unscientific induction are probable.
5. Both analogy and unscientific induction are great sources of hypotheses and are valuable aids to scientific induction.

Points of Dissimilarity :

1. In analogy, we pass from one particular to another particular but in unscientific induction we pass from particular to general.
2. The basis of analogy is imperfect similarity while the basis of unscientific induction is uncontradicted experience.
3. The probability of analogical conclusion depends mainly on the number and importance of the known points of resemblance. In unscientific induction, the probability of the conclusion depends on the number of particular instances which are collected by observation on the basis of uncontradicted experience.

4. Analogy increases of our knowledge of the connotation of a term but unscientific induction increases our knowledge of the denotation of a term.

PROBABLE QUESTIONS

I. Define :
   (a) Scientific induction (b) Unscientific induction (c) Analogy
   (d) Inductive Leap (d) Induction proper (f) Real proposition
   (g) Good Analogy (h) Bad Analogy

2. Illustrate :
   (a) Scientific induction (b) Unscientific induction
   (c) Verbal proposition (d) Good Analogy

3. Distinguish between :
   (a) Deduction and Induction (b) Scientific and Unscientific Induction
   (c) Analogy and Scientific Induction
   (d) Analogy and Unscientific Induction
   (e) Induction proper and Induction improperly so-called.
   (f) Good Analogy and Bad Analogy.

4. Write short notes on :
   (a) Induction proper (b) Inductive Leap
   (c) Induction improperly so-called (d) Necessity of induction

5. Answer briefly :
   (a) How many kinds of induction are there? What are they?
   (b) What is the essence of induction?
   (c) How can you determine the value of analogy?
   (d) What kind of proposition does scientific induction establish?
   (e) How many kinds of analogy are there? Name them.
   (f) Is induction concerned only with formal truth?
   (g) 'Induction supplies the universal premises of deduction'. Is it true?
   (h) What is the passage from the known to unknown in induction called?
   (i) Is the conclusion of analogical argument probable?

6. Answer the following :
   (a) What is scientific induction?
   (b) What are the characteristics of scientific induction?
   (c) What is unscientific induction? What are the characteristics of unscientific induction?
   (d) Find out the points of similarity between scientific and unscientific induction.
   (e) Discuss the nature of analogy?
   (f) What is analogy? What are the different kinds of analogy? Discuss.
   (g) What are the grounds of scientific induction?
   (h) What are the different kinds of induction improperly so-called?
   (i) What is unscientific induction? In what sense unscientific induction paves the way for scientific induction.
   (j) Why is the conclusion of analogical argument probable?

Unit-II
Chapter-1

GROUNDS OF INDUCTION

After reading this chapter you would be able to learn :

- Get an idea about the ground of Induction.
- Understand the formal and material grounds of Induction.
- Know about the role of uniformity of nature as a formal ground of Induction.

Contents

1. Introduction.
2. Ground of Induction.
3. Formal and material grounds of Induction.
4. The Law of Uniformity of Nature and the Law of Causation. [Formal grounds of Induction]
5. The Law of the Uniformity of Nature.
6. Paradox of Induction.

1. Introduction :

The aim of induction is to establish a general real proposition on the basis of observation of some particular instances of the same kind. Then, with the help of generalisation, induction establishes the conclusion. But the problem arises when all the conclusions that are established as universal real propositions are not always true. Some of them are true and some of them are false, i.e., some conform to the actual state of things while others not. For example, observing the mortality of some men in our experience, we establish the general real proposition 'All men are mortal'. This proposition is always true. It is accepted by all. But observing kindness of some men if we establish "All men are kind" then it is not true.

Now, to solve this problem, induction depends on two grounds i.e., some laws and processes. With the help of these laws and process, we can establish a general real proposition correctly. These two types of grounds are :

(i) Formal ground and

(ii) Material ground.

The Law of Uniformity of Nature and the Law of Causation are two formal grounds of induction. On the other hand, observation in general is the material ground of induction. Both simple observation and experiment are included in observation.

2. Ground of Induction :

The laws and processes depending on which induction establishes a general real proposition is known as the ground of induction.

3. Formal and Material Grounds of Induction :

Already, we have known that, in deduction we are not concerned with the question whether the argument is materially true or not. Deduction aims at only formal truth. But in induction the argument is concerned with both formal and material truth : i.e. must conform to the actual state of things.

Induction seeks to establish a general real proposition. To establish general real proposition, firstly, induction observes some particular instances of the same kind. Secondly, with the help of these particular instances and depending on some laws and processes, induction tries to establish a general real proposition of the same kind. To be formally true, induction establishes the conclusion relying on some formal laws and to be materially true, the conclusion must conform to the actual state of things.

So, induction depends on two types of grounds i.e. formal and material to get both formal truth and material truth of an argument.

In induction, we have two formal grounds–

(i) The Law of Uniformity of Nature, and

(ii) The Law of Causation.

Also, we have two material grounds:

(i) Observation and

(ii)Experiment.

- The laws which guarantee the formal truth of induction are called formal grounds of induction.
- The processes which guarantee the material truth of induction are called material grounds of induction.

The Law of Uniformity of Nature and the Law of Causation :

4. Formal grounds of Induction :

The Law of Uniformity of Nature and the Law of Causation are known as the formal grounds of induction. In induction, we seek to establish a general real proposition, on the basis of some particular facts of experience. For example, observing the mortality of some men e.g. Ram, Hari, Jadu, Madhu, Karim, Joseph etc. we infer a general proposition "All men are mortal". But a question arises, how can we establish a general real proposition on the basis of some particular facts of experience. To establish "All men are mortal" a man can observe the mortality of some persons, not all. It is impossible for a man to observe all the mortalities of all human beings because it is beyond the range of his experience. So, this problem can not

be solved by observation. Only, the Uniformity of Nature and Law of Causation can solve this problem. With the help of these two laws; observing the mortalities of some men, we come to the conclusion "All men are mortal". So, these two laws are called the formal grounds of induction.

5. The Law of Uniformity of Nature

Logicians have expressed the Law of Uniformity of Nature in various forms, viz., 'Nature is uniform', 'The universe is under the laws', 'Nature repeats itself', 'The present resembles the past and the future will resemble the present', 'There are parallel cases in Nature' and so on. These various expressions mean that "Under similar circumstances, Nature behaves in the same way." Nature never violates her laws until any accidental condition appears.

In our everyday life, we see many events. We perceive some events which repeat itself. For example, as the sun rises, the earth glows with the light of the sun and as the sun sets, the light diminishes. We feel very hot in the months of June, July and feel cold in the months of December and January. So, nature is governed by laws.

In nature, if the circumstances are repeated, the events must be repeated. If the same circumstances occur, the same event will follow. If under some circumstances, water quenched our thirst in the past, under similar circumstances, water will quench our thirst in future also. If fire burnt us in the past under certain circumstances, under similar circumstances in future also, fire will burn us.

In nature, there are parallel cases. We observe, as winter comes, leaves of the trees dry up and fall down. Again, when spring comes, new leaves appear on trees. From the above given statement we see that both of them come from the same source i.e., 'Nature'. Therefore, one is related to the other and as soon as one changes the other also changes.

Everything in the universe is uniform in accordance to nature. Anything happened in the past and is happening at present, have the chances of happening the same in the future also. In the past, the Sun rose in the east, at present the Sun rises in the east and therfore according to the law of uniformity of nature we can say that the Sun will rise in the east in future also. If water quenched our thirst in the past, surely it will quench our thirst in the future also.

Nature is uniform with regard to the essence of things. All the things of a class possess certain essential qualities and these essential qualities are present in all the things of a class. But the accidental or superficial qualities are not equally present in all the things of a class. The

accidental qualities of man i.e., black-white, tall-short, rich-poor may be various. Inspite of these differences, only for essential qualities, we can put them in the same class i.e., Man.

'Uniformity of co-existence' and 'uniformity of succession' are the two forms of the Uniformity of Nature. In the uniformity of co-existence we perceive two events that occur co-existently. For example, milk is white, water is liquid, coal is black etc. Milk and whiteness, water and liquidness and coal and blackness co-exist everywhere and at all times. Again, in the uniformity of succession, we perceive two events that occur successively. For example, day follows night and night follows day. Day follows night expresses uniformity of succession. Day follows or succeeds night regularly or uniformly. Likewise night also succeeds day regularly or uniformly.

Though, nature has uniformity in all respects, yet sometimes it appears that nature is not at all uniform. She is whimsical rather than regular. She is multiform rather than uniform. For example, earthquake, eclipse, flood, storm, tides, tsunami etc., all are under the nature. But sometimes it seems that regarding these events, Nature is not uniform. These events are governed by no laws. Nobody is sure when earthquake will come, when flood will come, when Tsunami will destroy us. So, in ordinary observation, it appears that nature is not at all uniform. But after thinking deeply it proves that any event in the universe is not accidental. The accidental event also must have a cause. So from ordinary point of view, any event may be accidental but from natural point of view no event is accidental. Sometimes, it seems to rain when the sky is clear whereas, sometimes it doesnot rain even if the sky is cloudy. But the universe and its laws are the only cause for the appearance of these types of accidental circumstances.

The uniformity of nature does not mean that there is no variety in nature. As Mill says, the course of nature, in fact, is not only uniform. The universe is infinitely various. There is not one uniformity or law governing the whole Nature but that corresponding to the different uniformities or laws, in nature, we find various departments and these departments are governed by their own laws. Since the various departments are under various laws, so, all these various departments cannot be maintained by only one law. For example: in the department of physics, there is the law of gravitation, which holds good of all physical phenomena. In the department of chemistry, by the law of Definite proportions, elementary substances combine with one another in certain

fixed proportion and so on. Corresponding to different departments of nature like Botany, Zoology, Sociology, Astrology etc., there are different laws which carry on their investigation in their respective spheres.

But, though there are various departments in nature and also uniformities or laws governing these different departments, yet, these different laws are part of one whole. The parts of nature are organically related to the whole. It is not just disorganised jumble of parts. All its different parts are parts of one system. Nature is a unity in variety. Nature is a cosmos, not a chaos.

The principle of the Uniformity of Nature is a postulate or formal ground of induction. The uniformity of nature forms the very basis of all inductive generalisations. According to Mill, this is an assumption in every case of induction– scientific and unscientific. If this law is not accepted as true we can not pass from the known to the unknown, from the observed to the unobserved, from the particular to the general. On the ground of this law only by observing 'mortality' of some men, we infer that "All men are mortal". So the principle of the Uniformity of Nature is regarded as the ground of all induction. According to Mill, the principle of the Uniformity of Nature is a 'fundamental principle' or a general axiom of induction. We cannot prove the law of Uniformity of Nature but with the help of this law, we can prove all inductions. The same idea is expressed by Mill, when he says that the Uniformity of Nature is the guarantee, the ultimate major premise of all induction. Thus, this principle is a postulate or formal ground of induction.

6. Paradox of Induction

Mill's contradictory statement regarding the principle of the Uniformity of Nature is known as the paradox of induction. It simply means that the ground of induction is itself the result of induction. Mills calls it a fundamental principle or general axiom of induction and an assumption implied in every case of induction. It is the ground of all kinds of induction. For example, by observing the mortality of some men i.e., Ram, Hari, Karim etc. and on the basis of these experiences a general real proposition 'All men are mortal' is inferred.

Though Mill regards the 'principle of the Uniformity of Nature' as assumption, a postulate of induction yet, in another occasion he says that the principle of Uniformity of Nature is the result of unscientific induction or induction per simple enumeration. Uncontradicted experience is the ground of unscientific induction. Without casual connection unscientific induction aims at establishing the conclusion.

All the happenings in the world are depended on our experience. We can see in our experience that the sun rises in the morning and sets in the evening. Water quenches our thirst, fire burns etc. Depending on these types of experience, we can establish the 'principle of Uniformity of Nature". According to Mill also, this 'principle of Uniformity of Nature' is the result of uncontradicted experience and observing this type of uncontradicted experience we can say that Nature is uniform in every respect.

By observing a large number of particular instances and finding no contrary instances, we establish a general proposition. We have seen a large number of crows and found that all of them are black. We have not come across a single crow of any other colour except black. Our experience about the black crows remains uncontradicted uptil now and on the basis of this uncontradicted experience we establish the general conclusion "All crows are black". So, experience gives us instances of 'particular uniformities' and from the particular uniformities we establish general uniformity. Thus, the Law of Uniformity of Nature is established. When the general principle of the Uniformity of Nature is established, it forms the foundation of all induction. So, the ground of induction is itself a result of induction.

Regarding the principle of Uniformity of Nature; the two statements made by Mill are contradictory to each other. Once, he says that this law is the ground of induction. It can not be derived from our experience. That means it is postulate, axiom and pre-supposition. To establish the conclusion of an induction, we must accept this Law as a ground of induction. On another occasion, he says that 'Law of Uniformity of Nature' is derived from experience.

Thus, paradox of induction means that the ground of induction is itself the result of induction.

Criticism :

Mill's view about the 'principle of Uniformity of Nature' is not acceptable.

(1) According to Mill, the principle of the Uniformity of Nature, is an assumption implied in every case of induction. It is impossible to establish a general proposition without the help of this law. So, we must accept this law. From that point of view, this law is the ground of unscientific induction. Again, the 'principle of uniformity of Nature' is said to be the result of unscientific induction or induction per simple enumeration. But the same law can not be the 'ground' and also a 'result' at the same time. So, here Mill commits a simple logical fallacy which is known as the fallacy of 'arguing in circle' or the fallacy of 'petitio principii.'

(2) According to Mill, the law of uniformity is the ground of unscientific induction. But the conclusion of unscientific induction is always probable. If the conclusion is probable, the ground is also probable. Again, according to Mill, the law of Uniformity of Nature is also the ground of scientific induction and the conclusion of scientific induction is always certain. So, Mill is compelled to admit that we can get certainty out of probability, but this is absurd. The 'principle of Uniformity of Nature' can not be the result of induction also.

(3)According to empiricism, we get knowledge through experience. So, we can not accept anything as pre-supposition. The knowledge of the Uniformity of Nature can not be exception. It must also be derived from experience. As Mill was an empiricist philosopher, he was unable to admit the law of Uniformity of Nature as the ground of induction. So, he has accepted this law as the result of unscientific induction.

In conclusion, we can say that in logic, the law of Uniformity of Nature is a pre-supposition. We must accept this law. Otherwise, it will be impossible for us to generalise the induction. This law can never be the result of unscientific induction. In fact, this law is the ground of all induction.

Key Words

Induction, formal ground, material ground, uniformity, causation, succession, co-existence, paradox, assumption, postulate, generalisation.

SUMMARY

In inductive inference, a real general proposition is established through the observation of particular instances. So, an inductive inference must satisfy – (i) formal truth as well as, (ii) material truth. Formal truth is established depending on the Law of Uniformity of Nature and the Law of Causation. So, these two types of laws are the Formal grounds of induction. Again, material truth is established by observation. Observation is based on these two types of processes– observation and experiment. So, these two types of processes are Material grounds of induction.

The law of Uniformity of Nature states that nature behaves uniformly under similar circumstances. There is a unity among the diversities of nature. Among the changeable relations between the different parts of the world-process, there is a general character. The law of Uniformity of Nature expresses this general character.

According to Mill, the law of Uniformity of Nature is an assumption, a postulate, an axiom of induction and it means that before we make use of induction, we must take this principle to be granted. Again, Mill holds that the principle of the uniformity of nature is the result of induction by simple Enumeration, or in other words, it is based on uncontradicted experience. In this way, the general principle of the Uniformity of Nature is established and when established, it forms the foundation of all induction. We come thus to this conclusion that "the ground of induction is itself an induction." This is known as the "paradox of induction." The paradox points to the inconsistencies involved in Mill's view that the ground of induction is itself a result of induction.

PROBABLE QUESTIONS

1. Fill in the blanks :
   (a) There are ..... kinds of grounds of induction.
   (b) The Law of Uniformity of Nature is a ..... ground of induction.
   (c) Nature behaves similarly under ..... conditions.
   (d) The name of the logical fallacy involved in the contradictory statement made by Mill about the Law of uniformity of Nature is .....
   (e) The meaning of the paradox of induction lies in the statement, 'The ground of induction is the ..... of induction.
2. Give short answers:
   (a) How many kinds of grounds of induction are there and what are these?
   (b) Why is the Law of Uniformity of Nature called the formal ground of induction?
   (c) What do you understand by the paradox of induction?
3. Distinguish between :
   (a) Formal ground and Material ground of induction.
   (b) The Law of Uniformity of Nature and the Law of Causation.

4. Write short notes on :
   (a) The paradox of induction.
   (b) Formal ground of induction.
   (c) The Law of Uniformity of Nature.
5. What do you understand by the Law of Uniformity of Nature? Explain the nature of the world process according to the Law of Uniformity of Nature.
6. Write what do you know about the paradox of induction. Is Mill's view acceptable?

Unit-II
Chapter-2

LAW OF CAUSATION

By studying this chapter you would be able to

- know the meaning of causation.
- have a general idea of cause.
- know the relation between cause and condition.
- get an idea of causation according to Aristotle.

Contents

1. Law of causation.
2. Definition and marks of cause.
3. Cause and condition.
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7. Plurality of causes.
8. Plurality of causes and conjunction of causes.
9. Aristotle's view of causation.
10. Three different views of causation.
11. Relation between The Law of Uniformity of Nature and The Law of Causation.

1. The Law of Causation

According to the Law of Causation, in nature, nothing happens accidently, every event must have a cause. Nothing can be derived out of nothing. Whatever happens has a cause. This is known as the 'Law of Causation.'

Without cause no event happens. Nothing will come out of nothing. (Ex Nihilo Nihil fit). Bain states it very nicely when he says– "Every event that happens is definitely connected with some prior event, which happening, it happens and which failing, it fails."

According to Mill also, what happens has a cause. What is produced must have a definite cause.

Though, at the first sight, the cause of an event is not revealed, yet, we must accept that there is a definite cause of that event. A definite cause can produce a definite effect. Sometimes, it seems that not only one cause but many causes acting jointly produce an event. Thus, the cause

of an event may be one or more than one but it must have cause. So, according to 'Law of Causation' what happens has a cause and the cause must be present regularly. If the cause it absent the event cannot be produced.

The Law of Causation is a formal ground of induction. This law establishes the formal truth of generalisation in induction.

According to Bain, Mill and some other logicians by discovering and proving a causal connection with all certainty, we can establish a general real proposition on the basis of observation of some particular instances. To discover and prove a causal connection, induction depends on certain methods which are based on certain fundamental principles.

These principles are known as 'Canons of Elimination'. With the help of these methods, we can find out the cause of an event. These canons of Elimination are deduced from the Law of Causation. This Law of Causation guarantees the formal truth of inductive generalisation. This law is the ultimate ground of induction and therefore, the 'Law of Causation' is known as the formal ground of Induction.

2. Definition of cause

Regarding cause, different logicians have put forward different definitions. Mill offers two definitions of cause. According to the first definiton, 'a cause is an invariable, unconditional, antecedent of the effect'; and according to the second definition, 'cause is the sum total of the conditions, positive and negative together.'

According to Hume, the empiricist philosopher, cause is the invariable antecedent of the effect.

Bain defines cause as 'the entire aggregate of conditions or circumstances requisite to the effect.'

Analysing the above definitions, Carveth Read offers a new definition of cause which is scientifically acceptable.

According to Carveth Read, the cause of an event is qualitatively 'the immediate, unconditional, invariable antecedent of the effect, and quantitatively is 'equal to the effect.'

So, according to this definition of cause, we find two types of marks or characteristics.

(1) qualitative marks, and

(2) quantitative marks.

Qualitative marks of causation :

(1) The cause is relative to a given phenomenon called the effect. Cause and effect are relative to each other. This may mean two things– Firstly, without cause the effect is impossible and without effect the cause is also impossible. Both of them depend on each other. One derives its meaning from the other. An effect has no meaning without a cause. A cause also has no meaning without the effect.

Secondly, the same cause sometimes may be a cause and sometimes as an effect. We should not suppose that the same cause always be cause and the effect

always be an effect. The same phenomenon may be a cause in relation to a succeeding thing and may be an effect in relation to a preceding thing. For example– due to drinking cold water, a man suffers from cold fever. Here, 'cold water' is cause and 'fever' is effect. Again, due to very hot weather the man drank cold water. But here, 'very hot weather' is cause and 'cold water' is effect. Therefore, it seems that the same cause 'cold water' is used as effect in another one. So, same cause may be both cause and effect. Similarly, same effect may be an effect and may be cause also.

(2) The cause and effect are always events in time.

An event in time means that there is a change in the existing state of things. If there are changes in existing state of things, then the causational question will come to our mind, why does a change happen? If there is not any change in the world, then no causational question will arise in our mind. So, after occurence of earthquake, eclipse, cyclone, Tsunami etc. we are anxious to know the causes of these events. Likewise, we also enquire into the cause of flood, war, political revolution and so on.

(3) Cause is antecedent to the effect.

Cause is always antecedent to the effect. Cause and effect are successively related. When two events happen successively, then the preceding one is called, 'antecendent' and the following one as the 'consequent'. The cause is always antecedent and the effect is always consequent. For example, due to drinking dirty water, the boy suffers from Jaundice. Here, 'drinking dirty water' is cause and 'suffer from Jaundice' is effect.

(4) Cause is invariable antecedent to the effect.

Every effect has a cause. This cause always precedes the effect means the cause is antecedent, but irregular antecedent to the effect cannot be cause. Only invariable antecedent is regarded as the cause of an effect. Invariable antecedent is that which is always followed by the effect. This is what is called the uniformity of causation, that is, the same cause has same effect. According to Hume, this invariable succession between antecedent and consequent phenomena should be the mark of causation.

An event has both variable and invariable antecedent. But only invariable antecedent can be the cause of the effect. If we regard any antecedent of an effect as its cause, then we commit the fallacy of post hoc ergo propter hoc.

For example, a doctor enters in a room and the patient dies. If the entrance of doctor is regarded as the cause of the death of the patient, then it would involve the fallacy of post hoc ergo propter hoc.

A crow sat on a palm tree and immediately thereafter, a fruit from the tree fell down. So, sitting of the crow on the tree

is the cause of the fall of the fruit. In a special sense. this involves the 'fallacy of post hoc ergo propter hoc' because here any antecedent event is regarded as cause of the consequent event.

(5) Cause is unconditional, invariable antecedent to the effect.

According to Hume, causation is nothing more than invariably sequence and therefore the cause is merely the invariable antecedent and the effect is merely the invariable consequent. Thomas Reid criticised Hume's view regarding causation and said that if that were so, day would be the cause of night and night would be the cause of day, because if we start from day, then without any changes, night follows day and day follows night. That means, day is the cause of night and night is the cause of day. But actually, day cannot be the cause of night and night also cannot be the cause of day. We cannot take any one of them as the cause of the other. It happens only for the rotation of the earth on its own axis facing the sun. So, both are co-effects produced by the same cause.

According to Mill also, the cause is not merely invariable antecedent. The antecedent must be unconditional also. It means that a cause must be sufficient by itself to produce the effect. The same conditions, sufficient by themselves, will be present, the same effect will necessarily follow. Mill said, the cause not only precedes the effect but also produces it. So, relation between cause and effect is necessary.

(6) Cause is unconditional, invariable, immediate antecedent to the effect.

The cause is an immediate antecedent to the effect, not remote from the effect. This immediacy follows from the principle that the cause must be unconditional antecedent. If the cause has to wait for another antecedent to produce the effect, it will loose its unconditionality. So, as soon as the cause appears, without delay, the effect must follow. For example, six months ago. I ate sea fishes in Chennai. But now, I am suffering from disorder of bowel. The cause of my disorder of bowel cannot be those sea fishes which I ate six months ago. Because, within these six months, I had many other health problems. If these problems and those sea fishes are the causes of my disease, then, it will be a conditional one.

Thus, qualitatively, the cause of any event is the immediate, unconditional, invariable antecedent.

Quantitative marks of a cause :

Quantitatively, the cause is equal to the effect. It means that as regards quantity, the matter and the energy in the cause are equal to those in the effect. This mark or characteristic of causation follows from the laws of conservation of matter and energy.

According to this law, the total quantity of matter and energy of this world is constant. It neither increases nor

decreases though it may change its form. For example, when a certain quantity of oxygen is mixed with a certain quantity of hydrogen then we get a new form i.e., water. Both the causes, 'oxygen and hydrogen' are the form of gas but the effect 'water' is the form of liquid. Here the gases transform into the form of liquid. So, the form is certainly changed but the weight of water produced is exactly equal to the weight of the substances combined to produce it. Hence, so far as matter is concerned, though the form is different but weight is same.

Again, according to the 'Law of Conservation of energy' also, the quantity of energy in the effect is completely identical to that in the cause. Quantity of the energy in the world remains same. It is constant and can neither be increased nor decreased, though one form of energy may be changed into another form. For example, when a moving fan loses its motion, it seems to appear that the energy is lost, but as a matter of fact, it is converted into another form of energy viz., 'heat'. Here the energy of motion is turned to the energy of heat. Therefore, so far as energy is concerned, the quantity of energy in the effect is exactly equal to that in the cause. Thus, it can be seen that, according to the law of conservation of energy, total amount of energy in the world remains constant.

Hence, it follows that the quantitative mark of the cause is its equality with the effect.

3. Cause and Condition

Already, we have discussed about cause. Cause is an immediate, invariable, unconditional antecedent to the effect. According to this definition, cause never depends upon another condition (external) to produce the effect. That, the cause does not depend upon another condition, so, the important conditions which are used to produce the effect must be present in the cause. It seems that the cause is not a particular one. Cause is the sum-total of conditions. So, condition is an indispensable part of cause.

For example, suppose a labour falls from the roof of a house and dies. Ordinarily 'falling from the roof' is the cause of his death. But 'falling from the roof' cannot be the only cause of his death because, after falling from the roof some men remain alive. So, some other conditions must be present which help to produce the effect. The other conditions of the labour's death are such factors as his falling from the roof, hardness of the soil where he falls, hurt in his chest, not physically strong and healthy, other person's help, proper treatment etc.

Thus, we find that, a cause is a group of conditions. It is not so simple as it looks.

According to Carveth Read, condition means any necessary factor of a cause.

Conditions are of two kinds– positive and negative. If the effect is to be produced, positive conditions must be present and negative conditions must be absent. On the other hand, if negative conditions are present, the effect would be frustrated.

According to Mill, cause and condition are not same. Cause is the sum-total of positive and negative conditions.

Conditions are two types :

(1) Positive condition,

(2) Negative condition.

Positive Condition : The condition which helps to produce the effect is called positive condition. In presence of positive condition, the event occurs.

Negative condition : The condition which tends to prevent the effect is called negative condition. Negative condition must be absent in order that the effect may be produced.

Positive and Negative conditions both taken together produce the effect. In the above example, highness of the roof, hardness of the soil, get hurt in his chest are positive conditions. On the other hand, his physical strength, getting anybody's help and proper treatment are the negative conditions.

Relation between cause and condition:

Cause is the sum-total of conditions. Conditions again are the parts of cause. So, cause and condition are related like a whole and its parts. A whole consists of parts. Similarly, a cause consists of conditions. Condition is not only a part but a necessary part of a cause. The relation between cause and condition is such that a cause which is a whole, can not be formed without the totality of conditions. Also, a condition can not be known as condition without its relation with a cause.

Generally, we call one of the conditions as the cause, and the other mere conditions. The condition which comes last and upon which the effect immediately follows is called the cause. A man gets drowned in the river and dies. Popularly, drowning in the river is the only cause of death. But in fact, this cause is one amongst the other conditions which helped the man to die. It is only a condition. If drowning in the river is the only cause of death then all men drown in the river must die. But it seems that some of them remain alive. So, if we want to be certain about the actual cause of man's death, we must take into consideration such conditions also as depth of the river, physical weakness of the man, proper treatment and so on. So, these necessary conditions taken together constitute the cause of the man's death. Similarly, for fire, we regard a match stick as the only cause. But in fact, a match stick can not be the only cause of fire because if the match stick is the only cause of fire, then a fire will occur wherever a match stick is placed.

4. Moving Power and Collocation

The cause of event from the conservation of energy stand point is divided into two elements viz., (1) Moving power, (2) Collocation. Moving power is the force which moves or incites to action and Collocation means the arrangment of circumstances which is needed in order that the moving power can produce the changes. For example, if a glowing match stick is thrown into a heap of straw, there is fire. Here, the 'glowing match stick' is moving power and 'heap of straw' is collocation. The effect 'fire' is produced by the action of the moving power on the collocation.

Popularly speaking, sometimes we are apt to identify the cause the moving power alone and sometimes with the collocation alone. From the scientific point of view, such views are unsatisfactory. Just as the effect 'fire' would not have been produced, if the match stick had not been lighted. So, again, it would not have been produced, if there had not been straw. A glowing match stick thrown into water would not produce fire, nor would a wet heap of straw produce a fire. So, both of them are the ingredients of the cause. So, scientifically cause is the sum-total of all conditions taken together including both the moving power and collocation.

5. Agent and Patient

Again some logicians made distinction between Agent and Patient. The thing acting is said to be the Agent and the thing acted upon is said to be the Patient. Agents are those which acts and patients are those which are acted upon. For example, if a glowing match stick is thrown to a heap of straw, there is fire. Here, the 'glowing match stick' is Agent and the 'heap of straw' is Patient. The difference between Agent and Patient is similar to the difference between Moving power and Collocation.

But scientifically, this difference is not satisfactory. Popularly, it seems to be true. This kind of difference appears to be based on the supposition that the Agent is the real source of energy and the patient is merely passive possessing no energy whatever. According to the law of Conservation of Energy, the passive condition is the store house of potential energy and for this potential energy of patient the effect is produced. If there would not be any potential energy of patient, then it would be impossible for Agent to produce the effect. Everything that is acted upon reacts according to its own nature. So, patients are also not without any energy. Agent and patient are equally responsible to produce the effect. So, according to Mill, the difference between Agent and Patient is merely verbal. Patients are always Agents.

6. Conjunction of Causes and Intermixture of Effects.

Every event has a definite cause. Without cause, there can not be any event. One cause can produce only one event.

But it often happens that several causes act together to produce an event. So, only one cause can not produce such type of complex event.

When several causes acting together produce a joint event, it is called conjunction of causes.

On the other hand, combining together of separate effects by the joint operation of mere separate causes is called intermixture of effects. For example, to win a football match, combined efforts of several players (11 players) are needed. Only one player cannot win a football match.

Tea is prepared combining several ingredients i.e., milk, tea leaves, sugar, water etc.

In the first case, football match is won out of the combined efforts of certain players. Hence, the 'combined efforts of certain players' is conjunction of causes and the act to win the match is called intermixture of effects.

In the second example, tea is prepared out of the combination of certain ingredients. Here, the 'combination of certain ingredients' is conjunction of causes and the act to prepare tea is called intermixture of effects.

So, several causes acting together, produce a joint effect is called conjunction of causes. On the other hand, the blending of their separate effects is called intermixture of effects.

Kinds of Intermixture of Effects: Intermixutre of effects again has two different forms viz., (1) Homogeneous intermixture of effects, (2) Heterogeneous intermixture of effects.

The two or more same causes act together produce the same kind of joint effect is called Homogeneous Intermixture of Effects. This form of Intermixture is called homogeneous as the causes and their joint effect are same kind. For example, with the help of two 50 candle power electric lights, we get 100 candle power electric light.

The two or more causes act together produce a joint effect, is different in kind from its separate effects is called Heterogeneous Intermixture of Effects. For example, if two gases, oxygen and hydrogen are mixed together in certain proportions and electric current is passed, as a result we get water. When water is produced by such combination, no trace of the separate properties of the two gases can be found in the effect. The properties are gases but the production is liquid. So, this is Heterogeneous Intermixture of effects.

7. Plurality of Causes

Plurality of causes is a false notion about the causal relation. According to plurality of causes, the same effect may be produced by different causes in different cases. The events of the universe are

very complex. So, the causes of the event are so related that it is very difficult to find out the actual cause of an event.

Scientifically, both cause and effect are complex one. Popularly, we do not justify all the conditions as cause that are also related with effect. We give importance only to that cause which is immediate antecedent of the effect and consider that cause as the main cause of that effect. We commit this error not only in the cause but also in the effect. The equal importance is not given on the causes and the effects related to event. As a result, some misconceptions appear in our mind, and thus, plurality of causes originated. For example, death may be caused by disease, by violence, by poison, by old age and so on. Fainting may be due to loss of blood, fright, sudden shock, intense pain etc.

Criticism

Firstly, if we analyse the different causes under the effect, we find that the effects produced in different cases have only one thing in common. In the above example, death may be caused by poisoning, by disease, by old age, by violence etc. But the common factor of one of the vital functions called 'heart failure' is the actual cause of death. The effect 'death' is thus found to be related to its one cause, viz., heart failure. 'Generalising the cause' is the common characteristic of different causes. So by generalising the cause it may be proved that there can be no plurality of causes.

Secondly, we give great importance on the specialisation of causes not effects. In the above example, death may due to different causes at different times, and they are not same in character. Death caused by poisoning is different from death caused by old age. Death caused by disease is different from death caused by violence. So, there are many kinds of death only because there are many causes of death, though the effects produced differently have only one thing in common viz., death. But they differ in another respects. Each death have certain characters which are enitirely absent from death of others. If in every case, the characters of death are same, then it will be impossible to determine the cause of death in post mortem examination. If we specialise the effect, it cannot be said to be due to different causes. Specialise the effect is the proof of unsoundness of the doctrine of plurality of causes.

Thirdly, from scientific point of view also, plurality of causes is untenable. The doctrine of plurality of causes is inconsistent with the definition of cause as the invariable antecedent. According to this definition, the same effect can be produced by same cause. But the effect 'death' is produced by disease in one case and by suicide in another case. It means that death is sometimes preceded by disease, sometimes by suicide, sometimes by old age etc.So, neither disease nor suicide can be said to be the invariable antecedent.

From the above discussion, we come to the conclusion that plurality of causes is unacceptable. It is only the misconception about cause-effect relation.

8. Plurality of causes and conjunction of causes.

The doctrine of plurality of causes is not identical with the doctrine of conjunction of causes.

According to plurality of causes, an effect can be produced by different causes. For example, light is produced by the sun, candle, lamp, electricity, torchlight etc. Here if light is considered as 'effect' then sun, candle, lamp, electricity etc. are considered as causes. The same light is produced by different sources of light.

On the other hand, according to the doctrine of conjunction of causes, several causes acting jointly, produce a joint effect. It is not possible to produce the joint effect by any one of them single acting. For example, to prepare tea, some essential ingredients i.e. milk, sugar, tea leaves, water, fire and kettle are very important. Any one of them cannot prepare tea alone. So, in conjuction of causes, all the causes are equally important to produce the effect.

Though, plurality of causes and conjunction of causes, both are related to causal connection, yet, they have some dissimilarities also.

(1) According to plurality of causes, several causes acting independently produce the same effect at different times.

On the other hand, according to conjunction of causes, several causes acting independently cannot produce the effect. They can produce the effect jointly.

(2) Regarding causal relation, doctrine of plurality of causes is a mis-conception. But the conjunction of causes is not a misconception. In fact, acting together several causes can produce an effect. So, it is a correct conception.

9. Aristotle's view of causation.

According to Aristotle, a western philosopher, the cause is always a compound containing four factors and each of these four factors is a cause. Without combining these four factors, the effect is impossible. These four factors are material cause, formal cause, efficient cause and final cause.

The Material cause :

The material or substance from which a thing is made is called the material cause. Whenever an effect is produced, it is produced in some substance and the effect will always depend on the nature of the material or substance. For example, threads are the material cause of cloth.

The formless clay from which the potter plans to make a pot is the material cause of that pot.

The Formal cause :

The new form or shape which is imposed on the object produced is called the formal cause. When an effect is produced, not only is there some material

or substance but there is also some change in the form of the object. For example, the weaver takes a bundle of threads and impress on it the form of a particular cloth.

The potter takes some clay to produce a particular kind of pot. The form of particular pot is the formal cause of the pot.

The Efficient cause :

The labour, skill or energy spent in making a thing is called the Efficient cause. Efficient cause is the active agent in producing the effect. For example, strength or skill which the weaver applies to the material in making cloth is the efficient cause of the effect. Sometimes, the agent (weaver) is called the efficient cause.

The Final cause :

The purpose for which the processes are directed in making a thing is called the final cause. The final cause is originally present in the form of an idea in the material cause. For example, the purpose for which a cloth is made.

10. Cause viewed under three different aspects.

Causation may be viewed under three different aspects or standpoints.

(1) Popular view of causation.

Popularly speaking, ‘‘the cause of an event is some one circumstance selected from the assemblage of conditions, as being practically the turning point at the moment.’’ –Bain.

Suppose, a man falls from a tree and dies. Popularly ‘falling from the tree’ is the cause of man’s death because, it is argued that if he had not fallen from the tree, death would not have happened. However, some other necessary conditions are also related to the effect, e.g., (a) highness of the tree, (b) hardness of the soil where he fell, (c) Physical weakness of the man, (d) anybody’s help, (e) proper treatment and so on. For practical purposes, we leave out all these conditions and mention only ‘falling from the tree’ as the only cause.

Similarly, success of a political movement is popularly supposed to be due to the personality of a great leader.

We attribute the issue of a war to the commander in chief and so on.

But scientifically, this view of causation cannot be accepted. From scientific point of view, the cause is the totality of conditions, positive and negative taken together and no condition, however prominent can by itself be considered as the sole cause.

(2) Scientific view of causation. Scientifically, the cause is ‘‘the invariable, unconditional and immediate antecedent’’ or "the sum total of conditions– positive and negative taken together". As Bain puts it, ‘‘In scientific investigations, the cause must be regarded as the entire aggregate of conditions or circumstances requisite to the effect."

In scientific point of view, to be sure about the cause of the death of the man who falls from a tree and is killed, the scientist would enumerate such positive conditions as, the height from which he fell, the weight of the man’s body,

physical weakness of the man etc. and also such negative conditions as the absences of support, the want of skill, proper treatment etc.

Conservation of energy view of causation :

According to the doctrine of conservation of energy, an energy can be transferred to another energy. It means the transference of a definite amount of force from the cause to the effect. The total quantity of energy in the world is constant; it can neither be increased nor decreased though they may change in another form and in this process of change, work is done. So, the cause is the same thing as the effect in another form. The law of conservation of energy proves that quantitatively, the cause and the effect are equal to each other. Conservation means that a definite amount of form of energy is transferred from the cause to the effect. Effect is nothing but the cause transformed.

Suppose, a body falling from a height strikes the ground and is at a standstill. Here, the mechanical energy of the falling body disappears as such but it transformed into another form of energy viz., Heat. Though one form of energy is transferred to another form actually no energy is lost.

11. Relation between the Law of Uniformity of Nature and the Law of causation.

Both the Law of Uniformity of Nature and the Law of Causation are the formal grounds of induction. According to the law of Uniformity of Nature, under similar circumstances, Nature behaves in the same way. According to the Law of Causation, every event must have a definite cause. Regarding the relation between these two laws, different logicians have given different opinions.

According to Mill, Bain, Venn, the Law of Causation is a special form of the law of Uniformity of Nature. The Law of Causation is not primary and also not an independent law. According to them, causation is a special kind of uniformity. Bain recognises three kinds of uniformities. viz.,

(1) Uniformity of co-existence,

(2) Uniformity of succession, and

(3) Uniformity of equality and inequality.

According to Bain, the Law of Causation, is a special kind of uniformity of succession. The Law of Causation not only implies that every event has a cause but also that same cause always produces the same effect. For example, spring follows winter, night follows day etc. But we can not regard that day is the cause of night and winter is the cause of spring. Thus, uniformity of succession is present in the law of causation.

According to Joseph, Mellone etc., the Law of Causation is not a special kind of the Law of Uniformity of Nature. The Law of Uniformity of Nature is a special kind of Law of Causation. According to these logicians, Law of Causation is fully an independent law of nature. The causal relation is a necessary relation. It is certain. Two events cannot be related with causal relation until they have any necessary connection. For example, milk produces curd. So, milk is the only cause of curd.

Between milk and curd, there is a necessary relation. Curd is produced from milk in every respect. A definite cause can produce only a definite effect. So, the Law of Uniformity of Nature inheres in the Law of Causation . Thus, Law of Causation is a primary and also an independent law. So the Law of Uniformity of Nature is a special kind of Law of Causation.

Again, according to other logicians e.g., Sigwart, Bosanquet, Welton, however, the Law of Uniformity of Nature and the Law of Causation are distinct principles, They criticised the above two opinions and regard that both the laws are independent of each other. One cannot be a special form of other. According to the Law of Causation, every event has a cause and according to the Law of Uniformity of Nature, under similar circumstances, Nature behaves in the same way. It means that same cause produces the same effect. The Law of Causation simply states that every event has a cause and in order that we may go further and say that the same cause always produces the same effect, we must take the help of the Law of Uniformity of Nature.

From above discussion, we come to know that though these two laws have a mutual relation yet, we cannot recognise one as the special form of other because the Law of Uniformity of Nature is a formal ground of all induction i.e., scientific and unscientific. Here, we generalise our inferences and generalisation is not possible unless we believe nature is uniform. But Law of Causation is only the ground of scientific induction. Generalisation of scientific induction depends on the discovery and proof of a causal connection. Scientific induction depends upon Law of Causation for which the conclusion of scientific induction is always certain.

So, we conclude that the Law of Uniformity of nature and the Law of Causation both are independent laws. Both taken together consititute the formal grounds of induction.

Key Words

Causation, moving power, collocation, Agent, patient, conjunction oc causes, intermixture of effects, Homogeneous, Heterogeneous, plurality of causes, material cause, formal cause, efficient cause, final cause.

SUMMARY

The Law of Causation is a formal ground of induction. The Law of Causation states that every event has a cause and that the same cause always produces the same effect. There is a relation between the cause and the effect. This relation is known as the causal relation. It is invariable, uniform, inseparable and necessary. Mill, Bain, Venn and some other logicians hold that the Law of Causation is a special form of the Law of Uniformity of Nature.

According to some writers, e.g., Bosanquet, Welton, Sigwart, the Law of Causation is a distinct principle from the Law of Uniformity of Nature.

According to Mill, a cause is the sum-total of the conditions positive and negative taken together. Some of the conditions are positive and some are negative. A factor, which, by it presence, helps in the production of the effect is called a positive condition; a factor which tends to prevent the effect and so must be absent in order that the effect can be produced is called an negative condition. But a cause becomes completed with the help of both positive and negative conditions.

The doctrine of plurality of causes means that an effect may be produced by different causes at different times. According to this theory the relation between the cause and the effect is a relation between different causes (many) and (one) effect. The law of plurality of causes is based on the false notion about the cause. But the doctrine of plurality of causes is not acceptable from the scientific point of view. A man can die by falling from a tree, drowning in water or by eating poison or a road accident etc. But all these types of aspects can not be the main cause. There must be one cause behind that death. And that is the failure of heart functions. Others are conditions but not main cause.

PROBABLE QUESTIONS

1. Fill in the blanks :
   (a) The law of causation is the —— ground of induction.
   (b) The fallacy of —— arises when each and every antecedent of an event is regarded as the cause.
   (c) The doctrine of plurality of causes is a —— notion about causation.
   (d) According to ——, ''cause is the sum-total of the conditions, positive and negative taken together.
   (e) The cause of the effect is an —— antecedent event.
2. Give short answers :
   (a) How many types of causes are there and what are these according to aristotle?
   (b) Name the logician associated with the statement ''cause is the sum-total of the conditions, positive and negative taken together.
3. Distinguish between :
   (a) Cause and condition.
   (b) The doctrine of plurality of causes and conjunction of causes.
4. Write short notes on :
   (a) The doctrine of plurality of causes.
   (b) Conjuncion of causes and intermixture of effects.
   (c) Positive and Negative condition.
5. Define cause. Describe the qualitative and quantitative marks of cause.
6. State five qualitative marks of cause.

Unit-II
Chapter-3

OBSERVATION AND EXPERIMENT

After reading this chapter you would be able to know

- *about the material grounds of Induction i.e., observation and experiment.*
- *what are the conditions and the fallacies of observation.*
- *get an idea about the advantages of simple observation and experiment in human life.*

Contents

1. Material grounds of Induction.
2. Observation in general.
3. Observation with science and technology.
4. General conditions of observation.
5. Fallacies of observation.
6. Difference between Non-observation and Mal-observation.
7. Kinds of observation.
8. Relation between simple observation and experiment.
9. Advantages of simple observation over experiment.
10. Advantages of experiment over simple observation.

1. Material grounds of Induction (Simple observation and experiment)

In induction, we establish a general real proposition. In deductive inference, we are concerned only with formal truth. But in induction, we are not only concerned with formal truth but with material truth also. The formal truth of inductive reasoning is guaranteed by the Law of Uniformity of Nature and the Law of Causation. Now, the material truth of an inductive reasoning is guaranteed by observation. Observation may be both simple observation and experiment.

According to Carveth Read, simple observation and experiment are the material grounds of induction. Induction aims at a materially true general proposition on the examination of particular instances. These particular instances are supplied by our observation. For example, observing the mortality of some persons we establish a general real proposition ''All men are mortal''. So, observation supplies the data or premises

from which a materially true conclusion is drawn.

Similarly, sometimes, experiment also supplies the materials to establish a general real proposition. For example, the chemist, mixes a certain quantity of oxygen with certain quantity of hydrogen and by using electric current finds that these two gases combined produce water. So, water is composed of hydrogen and oxygen. Here, we are to depend on the instances collected by experiment made in chemistry laboratory.

Thus, the data or premises of inductive generalisation are supplied by observation i.e., simple observation and experiment. Simple observation and experiment are the two processes by which the materials of inductive generalisation are collected.

So, the processes depending on which induction establishes a materially true general proposition are called the material grounds of induction.

2. Observation in general

Observation is a careful, selective and regulated perception of facts and circumstances with a certain purpose in view. If we analyse this definition, we find some common characteristics of observation in general.

(a) Observation is perception :

Observation involves perception. In perception, we obtain knowledge through our different sense organs such as eye, ear, nose etc. When we see a tiger it means we perceive it. Similarly, we hear the sound of thunder thus we perceive it and so on. In observation, our sense organs come in contact with various things and events and we get knowledge directly.

(b) Observation is regulated perception with a definite purpose :

Though observation is perception, any kind of perception cannot be observation. Every day, we perceive so many things and events. But all of them cannot be kept in our minds because without any preparation and interest, we only percieve them. A casual or careless perception cannot be observation. Observation is a regulated perception. In the regulated perception, our mind is concentrated towards a definite object withdrawing it from other irrelevant objects. There must be a definite purpose behind our perception. So, the regulated perception with a definite purpose is called observation.

(c) Observation is always selective :

Although we perceive various things in our daily life, we do not pay attention to all of them. To be observation, there must be a definite purpose in view and according to purpose, first of all, we select the object of perception. Observation is selective in the sense that the observer pays attention to significant things and aspects of things. For example, if we want to ascertain the cause of malarial fever, we observe the circumstances which are related with the malaria fever. We neglect all other circumstances which have no connection with this disease.

So, it is said that observation is necessarily selective. It must not be random or haphazard.

(d) Observation is well organised :

In observation, there must be a definite purpose in view and according to the purpose we select the object of perception. After selecting the object of perception, we carefully and in organised manner concentrate our mind towards that selected object. We withdraw our mind from other unnecessary or irrelevant objects. Thus, we systematically and methodically perceive the object and this perception is known as observation.

3. Observation with Science and Technology :

Man is curious to know about unknown things. But it is not possible to reach our goal only through our five sense-organs. The power of sense-organs is limited. Limited power can give limited knowledge only. So, to acquire complete knowledge, besides sense organs, we need to take the help of science and technology. Observation done by the sense-organs have chances of making mistakes. But scientific observations do not have chances of making mistakes. Science and technology have been trying to establish the accuracy of our observations. For example, microscope helps us to observe the micro-mini organism which cannot be perceived through our naked eyes. Galileo Galilie invented the telescope to observe the distant objects of the universe. With the help of microphone, we can hear the sound easily which cannot be heard through our ears. Thus, we have seen that science and technology have extended our knowledge of observations. Besides these, it is proved that accurate knowledge can be attained only through science and technology.

So, for clear, real and complete knowledge, we must depend upon science and its instruments.

4. General Conditions of Observation :

The aim of induction is to establish a general real proposition. To establish a general real proposition induction depends on observation of particular instances. Thus, the role of observation, in this regard is very important. If the instances of observation are not correct then the conclusion drawn from the instances will also not be correct. So, for a correct observation, before going to observe, certain general rules or conditions must be observed by the observer. Joyce mentions three kinds of conditions of observation viz.

(1) Intellectual condition.

(2) Physical condition.

(3) Moral condition.

Intellectual condition :

For correct observation, the observer must be intellectually fit. It means the observer must be attentive to know the reason of event to have an explanation of things which occur in experience. Hence,

a craving for knowledge is the essential condition of observation.

Physical condition :

Our sense organs are very important physical conditions of observation. Generally, we observe with our sense organs. These sense-organs depend upon the human body. So, if the body is not sound, then the sense-organs have chances of making mistakes. Thus, sense-organs play a very important role for correct observation. If the body and senses are sound, then only there will be correct observation. Therefore, healthy organs are the physical conditions for correct observation.

Moral condition :

Impartiality is regarded as the moral condition of observation. It is very difficult to fulfil this condition because a man is not free from prejudices, pre-conception, superstition etc. Though Jevons says that it is not easy to find persons who can with perfect fairness, register facts both for and against the fact observed yet, the observer must keep himself away from all these partialities. As a result, there will be an impartial observation.

5. Fallacies of observation :

Already, we have found that for right observation we need three conditions viz., intellectual, physical and moral conditions. If we follow these conditions, then there will be less chances of making mistakes. But it is not possible to observe the events or things rightly in every respect. It may happen due to either inattentiveness or some other circumstances (prejudices, pre-conception, partiality etc.) So, there are the possiblities of fallacies. These fallacies are of two types :

(1) Fallacy of non-observation.

(2) Fallacy of mal-observation.

(1) Fallacy of non-observation :

Non-observation is the fallacy of overlooking something which ought to have been observed. In non-observation, we neglect something which should not be neglected. All observations are selective and in making selection, sometimes, we overlook either instances or essential circumstances in those instances. So, the fallacy of non-observation has two different forms. viz.,

(a) Fallacy of non-observation of instances.

(b) Fallacy of non-observation of essential circumstances.

Fallacy of non-observation of instances.

Fallacy of non-observation of instances is a fallacy where we ignore instances which are relevant to our enquiry. When our observation is influenced by our preconceived opinions, then we commit this fallacy. It is a natural tendency to overlook instances which are not in favour of observer's theory and pay attention only to those instances which support the same. This fallacy may also occur from the circumstances that some of the instances are more impressive than the others. We give more attention to positive instances

which are more impressive than the negative instances. For example, a boy finds that he could not succeed in the examination because he ate egg just before going to examination. Then the boy concluded that 'eating egg before examination' is the only cause of his failure in the examination. Here, negative instances such as, the instances of those eating egg passed the examination and those without eating egg failed the examination are totally overlooked. Many superstitions are due to this tendency to overlook negative instances. Sneezing before departure is cause of accident, future events are mirrored in dreams, if you hear dog whinning get ready to start mourning because some one close to you is going to die are the examples of the fallacy of non-observation of instances.

Fallacy of non-observation of essential circumstances. :

Fallacy of non-observation of essential circumstances is a fallacy in which we overlook essential circumstances in our inductive enquiry. It is needed to observe all the essential circumstances at the time of observation. But when all the essential circumstances are not given equal importance and recognise any one prior instance as the sole cause of event then it commits the fallacy of non-observation of essential circumstances. For example, a man suffers from jaundice. The physician prescribes him some medicine. The man takes the medicine and gets well. According to the man, medicine is alone the cause of his recovery from jaundice. Here, the man ignores other important circumstances such as boiled diet, nursing, bed-rest and so on. Here, he commits the fallacy of non-observation of essential circumstances.

Therefore, non-observation is a negative fallacy because in non-observation we do not observe what is to be observed.

(2) Fallacy of Mal-observation :

The observation in which by mistake we perceive a thing not as it is but as it appears is called mal-observation. In mal-observation, a thing is perceived as different from what it is. In mal observation, we commit this fallacy because sense-impression is wrongly interpreted in perception. Every illusion is mal-observation. For example, in the dark we mistake a rope for a snake.

Fallacy of mal-observation is of two kinds viz.,

(a) Individual fallacy of mal-observation.

(b) Universal fallacy of mal-observation.

Individual fallacy of mal-observation:

The mal-observation in which the mistake is commited individually is called individual fallacy of mal-observation. On the other hand, the mal observation in which the mistake is commited universally is called universal fallacy of mal-observation.

For example, in the dark mistaking of a rope for a snake; a man for a lamp post etc. the examples of individual fallacy of mal-observation. On the other hand, when looking out of the window of a moving railway train, we sometimes imagine that the train is at rest, while the trees and the hills at a distance are all running in the opposite direction is an example of universal fallacy of mal- observation.

6. Difference between non-observation and mal observation :

Though both non-observation and mal-observation are two kinds of the fallacies of observation, yet, they have some differences.

(1) In non-observation we overlook something which ought to have been observed. While in mal-observation by mistake we perceive a thing not as it is but as it appears.

(2) In non-observation, the essential instances and circumstances of an event are neglected by us. We totally neglect them and as a result we commit the error. In non-observation, thing is overlooked altogether. On the other hand, in mal-observation we have wrong interpretation of sense-perception. Nothing is neglected by us. Only we see the thing wrongly.

(3) Non-observation is a negative fallacy because in it we do not observe something. Whereas, mal-obervation is a positive fallacy because in it we observe a thing wrongly.

7. Kinds of observation :

Simple observation and experiment are the two kinds of observation. Depending on simple observation and experiment, induction establishes a materially true general proposition. So, both of them are regarded as the material grounds of induction.

Simple observation :

Simple observation is regulated perception of natural events under conditions presented by nature.

Characteristics of simple observation :

(1) Simple observation is a perception with a definite purpose in view. And for this purpose, we select the object of observation. After selecting the object, we try to regulate our mind towards that object and fix it only to relevant circumstances.

(2) Simple observation is a perception of natural events. Since simple observation is a natural event under natural condition, we always have to depend on nature for observing the events. We watch events as they occur in nature. We have to wait for the events to happen and attend to them as they directly present themselves to us.

(3) Simple observation is a perception of events under natural conditions. Simple observation always depends on natural conditions. The conditions under which the events occur are presented by nature.

We are not able to control or change the natural circumstances as the circumstances which precede, accompany or follow the events in question depend on nature. To find out the cause of earthquake, we have to wait for the occurence of earthquake and we cannot produce earthquake according to our will.

(4) Natural events are out of the control of the observer. Nature produces the events of simple observation. So, the events are not under the control of the observer. Neither the observer produces the event nor destroys it. Sometimes it happens that for a natural event, the observer has to wait a long time under the mercy of the nature. Again it seems that, all of a sudden, the event happens but at that time, the observer is not ready for observing the same.

Experiment :

Experiment is the artificial reproduction of events, under artificial arrangement i.e. in laboratory.

Characteristics of Experiment :

(1) Like simple observation, experiment is also a perception with a definite purpose in view. And for this purpose, we select the object of experiment and regulate our mind towards that object and fix it only to that object of experiment.

(2) Experiment is a perception of artificial event.

In experiment, events are artificially reproduced by us. Since we ourselves produce the events in the laboratory, therefore, we need not wait for things to happen in the ordinary course of nature.

(3) Experiment is a perception of artificial events under artificial arrangement.

In experiment, the artificial events are perceived in an artificial condition. In experiment we can change the conditions according to our necessity because the conditions under which the events are produced are pre-arranged by ourselves. Without depending on nature, a chemist can produce water by mixing a certain quantity of hydrogen with a certain quantity of oxygen using an electric current. Here, the chemist does not wait for the combination to occur in the ordinary course of nature but himself produces it at will in his laboratory.

(4) Experimental events are always under the control of investigator.

In experiment, events are artificially reproduced by the investigator in a laboratory. The investigator can vary the circumstances as he likes. Every experiment involves varying the circumstances. So, the subject matter and circumstances completely depend on the investigator. It means it is completely under the control of investigator.

8. Relation between observation and experiment :

Simple observation and experiment are the two forms of observation in general. So, in both cases, the general characters of observation in general are present. Thus they are similar in some respects.

Similarity :

(1) Both in simple observation and experiment, the perception is directed with a definite purpose in view. In both cases, we try to find out the real cause of the phenomena under investigation.

(2) Both simple observation and experiment are necessarily selective. In both cases we select to perceive the relevant instances that will serve our purpose and reject unnecessary or irrelevant instances.

(3) Both simple observation and experiment are regulated perception. In both cases we regulate our scattered minds toward those objects of relevant instances and perceive them attentively and carefully.

But in spite of these similarities, there are certain points of dissimilarities also between these two forms of observation.

Dissimilarity :

(1) Simple observation is regulated perception of natural events. On the other hand, experiment is regulated perception of events artificially reproduced.

(2) In simple observation, the natural events are watched in ordinary course of nature. We have to wait for the events and attend them as and when they directly present themselves to us.

So, the observer can observe the events according to the Nature. He himself can not change the events and circumstances of an instance. On the other hand, in experiment, the artificial events are produced by the investigator. So, we need not to wait for the events to happen in ordinary course of nature. Since the events and circumstances are reproduced by the investigator, so he can watch them according to his will. He need not wait for things or events in ordinary course of nature. If needed he also can change both the events and the circumstances of an instance.

Based on these differences between simple observation and experiment. Bain says– ''Observation is finding a fact and experiment is making one.''

In distinguishing them from each other, it is necessary that we should guard ourselves against certain misconceptions. According to some writers, simple observation is natural while experiment is artificial. However, the remarks about simple observation and experiment mislead us. In observation, we depend on nature for the events. But only relying on our natural powers alone, our problem cannot be solved. To enlarge the scope of our sense-organs we must take the help of scientific instruments also. Thus simple observation is not wholly natural. Likewise, experiment is not wholly artificial. In experiment we have to make use of our natural powers in observing the event produced.

Stock and some other logicians again remark, simple observation as passive experience while experiment as active experience. In observation, we are totally dependent on nature. We watch events

and changes as they occur in the ordinary course of nature, without interfering in the activity of nature and without any attempt to control them. But in experiment, the investigator himself prepares the special circumstances where events and changes occur. In experiment the investigator is active than in simple observation. It needs considerable activity to prepare the special circumstances necessary for an experiment. But it is not true to say that even in simple observation, the observer is completely passive. Simple observation is a regulated perception with a definite purpose in view. Observation is selective and for this the observer observes those facts which are relevant to our enquiry and rejects the irrelevant and unnecessary facts. It is true that for this selection and rejection, the observer requires mental activity. So even in observation, there is an element of activity though in experiment the degree of activity is greater.

Therefore, from the above discussion, we can say that there is no real opposition between simple observation and experiment. They are not different in kind. We cannot draw any sharp distinction between them. Because in both cases, we collect materials and try to establish a materially true general proposition. For this in both cases we rely on our natural power of sense organs and study natural phenomena. Physical and mental energy are used in both the cases.

According to Jevons, the difference between simple observation and experiment is the difference of degree only. Simple observation is more natural than experiment. Experiment is more artificial than simple observation. Since simple observation is natural, in simple observation we are less active than in experiment. In experiment we are more active than in simple observation.

9. Advantages of simple observation over experiment :

(1) The scope of simple observation is wider than in experiment as it can be applied universally. There are certain things and events with which we cannot make any experiment. For studying these things and events, we must depend on observation only. For example, we cannot artificially by experiment reproduce an earthquake. We cannot pull down a comet from the sky and bring it to the laboratory for experiment. Again, there are certain cases which cannot be experimented in laboratory. We cannot create a famine to study its effect. In such cases, we have to fall back on observation and wait until the phenomenon occurs naturally. Again, when a boy attempts to commit suicide by swallowing some poison, we may undertake observation. Similarly, we may observe the effects of war when it actually happens. Thus, the scope of observation is considerably wider than experiment.

(2) In observation, we can proceed from a cause to the effect as well as from an effect to its cause.

In observation we can proceed from a cause to the effect, also from an effect to its cause. But in experiment we can proceed from a cause to the effect only, not from the effect to its cause. Suppose, a man is found to be suffering from malarial fever. By an observation of antecedent condition, asking him it is clear that he has been bitten by anopheles mosquito. So, bitten by anopheles mosquito is the cause of the effect malarial fever. Again, a man is found to be bitten by anopheles mosquito. We can direcly conclude that it is because of this he has to suffer from malarial fever by an examination of the consequent circumstances.

But in experiment, we can only proceed from cause to its effect. For example, if heat is applied to a piece of iron and study the effect and can come to the conclusion that heat expands body but not from the effect to its cause.

(3) Observation precedes experiment :

Experiments are possible only when some knowledge has already been acquired by simple observation. For a successful application of experiment, by observation there must be a careful preparation before hand. For experiment of an event, the preliminary knowledge about that event must be collected by observation. Hence, we can say that experiment depends on observation.

10. Advantages of experiment over simple observation :

(1) Experiment can be repeated and for this it enables us to multiply as many instances as we need. In experiment, the events are reproduced by the investigator. So, all the events are under his control. If the investigator fails in one experiment, he may try again and again and have as many instances as he prefers. For example, a student of chemistry can make as many experiments as he likes to prove that water is composed of hydrogen and oxygen. But an astronomer can observe a comet only when it appears in the sky. He cannot observe a comet according to his will.

(2) Experiment helps us to isolate the particular thing.

Experiment is superior to observation in some respects. For example, we have to find out whether an animal can survive without oxygen. In this case, observation can do nothing. But with the help of experiment we can easily find out that without oxygen an animal cannot survive.

(3) Experiment enables us to vary the circumstances indefinitely.

Key words

Observation, non-observation, mal-observation, individual mal-observation, universal mal-observation, simple observation, experiment.

In experiment we can vary the circumstances because the circumstances are under the investigator's control. The investigator thereby examines the different behaviour of the phenomenon under

different conditions but in simple observation, this is not always possible.

(4) Experiment enables us to examine an event with coolness and quietness.

In experiment an event can be examined in a calm and quiet manner. In experiment we are not in a hurry because the phenomenon to be examined is completely within our control. But it is not possible in the case of observation because the phenomena are not under observer's control.

SUMMARY

Both Observation and Experiment are the two material grounds of induction because, the material truth of an inductive reasoning is assured by observation and experiment. So, these two processes are called the material grounds of induction.

Simple observation is a careful perception of things under natural circumstances. On the other hand, experiment is a special way of observing various events by artificially reproducing them under conditions pre-arranged and selected by ourselves (investigators). In order to apply both Observation and Experiment successfully on any event, the investigator must be healthy, sound and neutral physically, intellectually and morally. Otherwise fallacies may sometimes occur if any one of these above mentioned conditions of observation remain unfulfilled. Mill points out that the fallacies of Observation are of two kinds, viz, Non-observation and Mal-observation. Again the fallacy of non-observation has two different forms namely, non-observation of instances and non-observation of essential circumstances. Again Mal-observation may be of two types.

(a) Individual Mal-observation. (b) Universal Mal-observation.

Non-observation is the fallacy of overlooking something which ought to have been observed. Non-observation is a negative fallacy. Here the observer ignores something which should not be ignored. Again, Mal-observation arises when a thing is perceived as different from what it is. In place of something, the observer perceives something else. This fallacy arises due to the wrong interpretation of the sense-organs.

Though the scope of observation is much more wider than that of experiment, yet the conclusion of observation is not certain like the experiment. The conclusion established by experiment is certain than that of observation. Though the difference between observation and experiment is that as Bain says : ''Observation is finding a fact and experiment is making one'', yet, there is no such qualitative difference between them. The difference is only in quantity.

It is thus clear that both observation and experiment have certain limitations. Within these limits, they are valuable and useful in scientific investigations.

PROBABLE QUESTIONS

1. Fill in the blanks :
   (a) The —— truth of inductive inference depends on observation and experiment.
   (b) Observation is finding a fact and experiment is ——.
   (c) The difference between observation and experiment is ——.
   (d) Observation ——— experiment.
   (e) The scope of pure observation is ——— than that of experiment.
2. Write short notes on :
   (a) The condition of good observation.
   (b) Fallacy of mal-observation.
   (c) Fallacy of non-observation.
3. Define :
   (a) Observation
   (b) Experiment
   (c) Fallacy of non-observation.
   (d) Individual mal-observation.
4. Distinguish between :
   (a) Simple observation and experiment.
   (b) The fallacy of non-observation and the fallacy of mal-observation.
   (c) Individual mal-observation and universal mal-observation.
5. Give short answers :
   (a) How many material grounds of induction are there and what are these?
   (b) Why are observation and experiment called the material grounds of induction?
   (c) What are the fallacies of observation and what are these?
   (d) Is simple observation completely passive experience?
6. What is observation? What are its advantages over experiment?
7. What is experiment? What are its advantages over observation?
8. ''There is no qualitative difference, only a quantitative difference between observation and experiment'' – Explain the statement.
9. What is observation? What conditions are to be followed before observation?

Unit-III HYPOTHESIS

After going through this unit you would be able to learn :

● *the nature and meaning of hypothesis* ● *the various kinds of hypothesis* ● *the conditions of valid hypothesis*

Contents

1. Introduction.
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4. Kinds of hypothesis.
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   (b) Hypothesis concerning Law.
   (c) Hypothesis concerning collocation.
5. Conditions of valid hypothesis.
   (i) The hypothesis must be verifiable.
   (ii) Testability
   (iii) Compatibility with established facts.
   (iv) Hypothesis must be definite, credible and consistent.
   (v) Predictive power.
   (vi) Hypothesis must be based on facts.
   (vii) Hypothesis must be simple.
6. Summary.
   Exercise.

● Introduction :

Scientific Induction aims at establishing a general real proposition on the basis of observation of particular instances, in reliance on the principle of the Uniformity of Nature and the Law of Causation.

Observation and Experiment furnish the materials of induction. These materials consist of particular facts of experience. Thus, Observation and Experiment guarantee the material truth of induction. So, Obervation and Experiment are called the material grounds of induction. Scientific induction relies on two

fundamental principles, viz, the Law of Causation and the principle of the Uniformity of Nature in order to establish a general proposition on the basis of observation of facts. The law of Causation states that every event has a cause. The law of the Uniformity of Nature states that Nature is uniform in its behaviour; so the same cause produces the same effect under similar circumstances. These two principles guarantee the formal truth of induction. Therefore, the law of causation and the uniformity of Nature are called the formal grounds of induction.

Scientific induction can establish a general real proposition on the basis of observation of particulars instances only by discovering and proving a causal connection among facts. But to discover and prove a causal connection is not an easy task. Because Nature is so complicated that it is very difficult to find out the exact relation between cause and effect. So before going to start a scientific investigation, we are to frame a supposition or assumption that there is such a connection. And such supposition or assumption which forms the starting point of an inductive investigation to discover and prove a causal connection leads to the formation of Hypothesis.

• What is Hypothesis?

A Hypothesis is a provisional supposition which we make in order to explain some fact or phenomenon that needs an explanation. J.S. Mill puts forward a satisfactory definition of hypothesis as follows– ''A hypothesis is any supposition which we make (either without actual evidence, or on evidence avowedly insufficient) in order to endeavour to deduce from it conclusions in accordance with facts which are known to be real; under the idea that if the conclusions to which the hypothesis leads are known truths, the hypothesis itself either must be or at least is likely to be true.''

For example, a theft is committed in a house. No one knows who has committed the theft. After observing the relevant circumstances, a supposition is made that the newly engaged servant in the house has committed the theft. Investigation starts and in course of investigation the stolen articles are found at his disposal. And the provisional supposition is proved to be true. To take an example of a scientific hypothesis. Newton saw an apple fall on the ground and supposed that it was due to the attraction of the earth. This supposition or hypothesis was subsequently proved to be true, and the Law of Gravitation was established.

• Stages of Hypothesis :

If we analyse the definition of Mill, we find that it involves the following four stages :

(1) Obervation of facts.

(2) Formation of hypothesis.

(3) Application of the deductive method and

(4) Verification.

Let us explain the stages of hypothesis in detail–

Stage-I : Observation of facts :

Observation of facts is the first stage of hypothesis. Observation presents before us some facts to be explaind. Through observation we come in contact with the facts. And as a result of this contact, questions arise in our mind about the event which call for explanation.

For example, Newton observed an apple falling on the ground from a tree. So, the question arose in his mind ''why does the apple fall on the ground?''

Stage-II : Formation of a hypothesis :

The next stage is the formation of a hypothesis. Since we have to explain the cause behind a phenomenon and the real explanation is not known to us, we frame a provisional hypothesis in order to explain the phenomenon. At this stage, the data at our disposal are insufficient, yet we must proceed for explanation of fact with some provisional supposition, otherwise the real explanation will be difficult to make.

For example, on the basis of observation of falling apple on the ground, Newton framed the hypothesis that probably the attraction of the centre of the earth may be the cause of falling of the apple.

Stage-III : Application of deductive method:

The third stage is the deduction of the consequences from such a probable supposition. In this stage, from the tentative supposition, thus framed, certain conclusions are deduced. For example, from the provisional hypothesis, Newton deduced the conclusion that the earth attracts all material bodies, or in other words, all material bodies, are subject to the attraction of the earth. As for example, the sun, the moon and the earth have this gravitational pull.

Stage-IV : verification :

At this stage, the conclusions deduced from the hypothesis are verified. Such verification is made under the idea that if the conclusion which we deduce from that hypothesis tallies with facts, the hypothesis is true or likely to be true. If not, the hypothesis is discarded in favour of another provisional supposition. For example, Newton's Law of Gravitaion is reached in this way.

- **Hypothesis in everyday life :**

In our everyday life, we are constantly making hypotheses to explain facts of our experience e.g. on returning home in the evening, we find that the glass-pane of the window has been broken. We make a supposition that a stone or a cricket ball or a similar object had been thrown against it from outside. In the stage of verification if we look for a stone or a cricket ball in the room and trace it out, then the supposition will be confirmed i.e. it is true or is likely to be true. Otherwise, it will not be true and then we abandon the supposition and frame another hypothesis. This is called a case of ''Popular Hypothesis''.

- **Hypothesis in science :**

In case of scientific investigation, hypotheses are framed in order to explain facts legitimately and scientifically. Usually, the hypotheses used in science are not directly verified. They need indirect proof. Once a hypothesis is proved to be true, either directly or indirectly it is accepted as a real explanation. Otherwise, it has to be rejected as worthless.

So we may say that hypothesis, both popular and scientific, agree with the fact that it is a provisional supposition that is made in order to explain some fact. In popular use, a hypothesis may not be legitimate and scientific, but in scientific use, it must be legitimate and systematic.

Hence, we conclude with the words of Coffey that ''A hypothesis is an attempt at explanation; a provisional supposition made in order to explain scientifically some fact or phenomenon.''

- **Kinds of Hypothesis :**

A hypothesis is an attempt at explanation of some fact. In order to explain a fact, some questions naturally crop up in our mind. For example, who has done the incident, how was it done and what necessary arrangement of circumstances was made for the purpose etc. Thus, there are three kinds of hypothesis. These are–

(1) Hypothesis concerning Agent.
(2) Hypothesis concerning Law and
(3) Hypothesis concerning Collocation.

(1) Hypothesis concerning Agent :

Hypothesis concerning Agent is related with the agent of the incident. Sometimes it is found that the law of operation is known, but the particular agent who is to operate according to the known law is unknown. In such a case, we frame a hypothesis regarding an agent and such a hypothesis is called ''Hypothesis concerning Agent.'' To take an example from everyday life. A burglary is committed in my neighbour's house. In order to know the thief, we may frame a hypothesis as to the agent in question. This is a kind of hypothesis known as 'hypothesis concerning Agent.'

To take an example from science. Adams and Leverrier discovered the planet Neptune with the help of this kind of hypothesis. It was calculated by these two scientists that the planet Uranus should move in a particular orbit due to the attractions of the then known planets. But it was observed that, in reality, the planet was deviating from the calculated path. Adams and Leverrier then made the supposition that there was some unknown agent influencing the planet Uranus to cause this deviation. A hypothesis of this kind is called ''Hypothesis concerning Agent.'' And the unknown agent was subsequently discovered to be the planet Neptune.

(2) Hypothesis concerning Law :

Hypothesis concerning Law is related with the law of operation. Sometimes it may be that we know the agent, but the law according to which the agent has acted is not known to us. In such cases we frame a hypothesis concerning the law of operation or the way in which the agent acts. This kind of hypothesis is called ''Hypothesis concerning Law.''

To take an example from everyday life. A burglary is committed in a house. We do very well know that the servant has stolen away the money. But we do not know how he managed to do it. So, we frame a hypothesis that the servant committed the theft by opening the room and breaking the locker where the money was kept.

To take an example from science. Newton knew the agents viz, the sun, the moon, the earth and other planets. But the way in which all these agents acted upon each other was not known. So, Newton supposed that their motions might be due to their attracting one another in a particular way and on the basis of this supposition he finally discovered the law of operation i.e. the Law of Gravitation.

(3) Hypothesis concerning collocation:

'Collocation' means ''arrangement of circumstances''. For the occurrence of an effect, the agent, law as well as collocation are necessary. Sometimes we know the agent, what is the law of operation according to which the agent acted, but we do not know anything about the arrangement of circumstances. In that case we frame a hypothesis regarding the collocation. Such hypothesis is called ''Hypothesis concerning Collocation.''

To take our previous example of theft. The breaking of locker by the servant is due to the circumstances that in that very day all the members of the family were outside the house keeping the servant alone. So the absence of family members is the circumstance for which the theft was committed.

To take a scientific explanation. The agents, such as the sun, the moon etc, were known and their law of operation i.e. the law of gravitation was also known. But the collocation of these heavenly bodies was not known. So Ptolemy, an Egyptian astronomer, formed the hypothesis that the earth was the centre of the universe and all other planets revolved round the earth. But this hypothesis was proved to be false by Copernicus, a Polish astronomer. His supposition was that the sun is the centre of the solar system and all other planets revolve round the sun and owing to this type of collocation only the order of the solar system is maintained.

And ultimately this hypothesis, framed by Copernicus was proved to be true.

We must remember that in every case these three forms of hypothesis may not be formed separately. In a given case these three may all be blended together. According to some logicians both the law and the collocation taken together constitute

the cause. In this sense, hypothesis is only of one kind and this is hypothesis of cause.

According to some logicians the agent and collocation taken together constitute the cause. So Welton, Coffey and others say that hypothesis is of two kinds– (i) Hypothesis of Cause and (ii) Hypothesis of Law.

But most of the logicians recognise all three kinds of hypothesis viz (i) Hypothesis concerning agent. (ii) Hypothesis concerning law and (iii) Hypothesis concerning collocation, for detailed explanation of facts.

- **Classification of Hypothesis in modern science :**

Scientific investigation is inseparably related to hypothesis. Through the formation of hypothesis, modern science successfully explains different laws and events. Thus, framing of a hypothesis plays a very important role in the area of scientific researches or investigations. Considering all these purposes, L.S. Stebbing, a modern logician, distinguishes three main kinds of hypothesis–

(i) Explanatory hypothesis.
(ii) Descriptive hypothesis.
(iii) Analogical hypothesis.

(i) Explanatory hypothesis :

The simplest kind of hypothesis is the Explanatory hypothesis. This kind of hypothesis is framed for explaining an event. These hypotheses are intended to account for the occurrence of an event by the interpolation of facts. These facts can be observed by the observer under suitable conditions. The supposed facts are of the same type as the facts that constitute the data of the problem. There is another kind of Explanatory hypothesis. Here the interpolated facts mean the elements which can not be observed as relations between the occurences to be connected. Newton's hypothesis relating to the gravitational attraction is a hypothesis of this kind.

(ii) Descriptive hypothesis :

This type of hypothesis is generally framed to offer a description of a complex event with a view to give an accurate description which helps in the investigation of the phenomenon under investigation. The main function of a descriptive hypothesis is to symbolise the systematic relation among facts.

A descriptive hypothesis is generally framed to describe a geometrical representation of the movements of the heavenly bodies, e.g. Ptolemy's Geo-centric hypothesis offered a geometrical representation of the heavenly bodies. It is a descriptive hypothesis.

Descriptive hypothesis is not an empirical generalisation. It does not imply any imaginary law of Nature subject to proof. They are the descriptions that serve the function of models, which help the scientists to understand the mode of connection between the facts. Of course, such hypotheses are essentially provisional and temporary.

(3) Analogical hypothesis :

This kind of hypothesis is a development of desciptive hypothesis. An Analogical hypothesis means a hypothesis that what is true of one set of phenomena may be true of another set as both the sets possess in common certain formal properties. For example, Maxwell established his famous Electro-magnetic theory on the basis of resemblance between gravitaion and electrostatics.

This kind of hypothesis is based on the 'structural identity' between two sets of instances. By developing this analogical or 'structural hypothesis', Maxwell formulated his electromagnetic theory of light.

Working hypothesis :

A working hypothesis is a provisional supposition offered mainly for guiding investigation. Sometimes facts are so unfamilar or complex that we can not make any satisfactory supposition on the basis of observation of data. Yet some provisional supposition is required to carry out our investigation. In such cases, only to start our work, we frame some hypothesis, knowing fully that it is not at all adequate to explain the fact under investigation. Such type of hypothesis is called working hypothesis.

'A working hypothesis, is defined as ''a provisional supposition, which though known to be inadequate, is still accepted as true, for the time being, because in the absence of a better hypothesis, it is useful as a guide to further enquiry.''

According to Stebbing, a working hypothesis is a supposition, advanced solely for the purpose of conducting investigation. For example, the hypothesis ''Electricity is a fluid'' – is a working hypothesis. Scientists were not able to understand the nature of electricity. Yet they framed the above mentioned hypothesis only to conduct their investigations by comparing electricity to a fluid, though they were fully aware of the differences of electricity from the fluids.

A working hypothesis is discarded when the nature of the phenomenon is understood better. Then we can have a more reliable and acceptable hypothesis which will replace the previous one.

- **Conditions of Valid Hypothesis or Legitimate hypothesis :**

Hypothesis is a provisional supposition made in order to explain scientifically some fact or phenomenon. It is through the formation of hypothesis that science can explain different laws and events. But any and every supposition is not a scientific hypothesis. There are certain rules or criteria for evaluating hypotheses. The hypotheses which are in consonance with the rules or conditions, are considered to be suitable for explanation of events. Some of the important conditions of valid or legitimate hypothesis are mentioned as follows :

(i) The hypothesis must be relevant: Relevance is an important condition of

a legitimate hypothesis. If the hypothesis which is framed to explain an event be not relevant then the event can not be deduced from the irrelevant hypothesis. For example, in order to explain the sudden outbreak of cholera in Assam, if we suppose that the drought prevailing in China is the cause, then the hypothesis will be irrelevant, and our hypothesis will be invalid. Our hypothesis will be relevant only when the event to be explained can be deduced from it or from certain laws or conditions with it. So, relevance is a necessary condition for a legitimate hypothesis.

(ii) Testability or verifiability :

A valid hypothesis must be capable of being tested or verified. This is the most important condition of a legitimate hypothesis. Testability means that the hypothesis must be such that it can be proved either to be true or to be false. The hypothesis which can neither be proved to be true nor false can not be accepted as the real explanation of the event in question.

Verification of a hypothesis may be done in two ways– (a) by direct observation or experiment and (b) Indirect verification. Direct verification consists in direct observation or direct experiment of fact. If the observation or experiment shows that the supposed cause exists, the hypothesis is verified. Verification is indirect, when we can not directly observe the supposed cause, but only the consequences deduced from it. There are things which can not be perceived by the senses such as atoms, ether etc. There are also some events that can not be observed directly even by means of scientific instrument. An eminent scientist Lloyd Smith says that the modern physicists have discussed those elements of substances which can not be directly verified. They discuss the radiation of light that can not be seen, energy that can not be felt, the atoms which can not be touched. Such things are to be verified indirectly. That means, the legitimate hypotheses are to be expressed in such statements from which conclusions can be deduced and these conclusions can be verified. The main point is that a valid hypothesis must have some relation to the observable facts.

(iii) Compatibility with previously well-established hypotheses and compatibility also with itself :

A hypotheses must be compatible or consistent with previously well-established hypotheses, theories and laws. Certain things have been established rather definitely and our hypothesis should not contradict such well-established facts. For example, Leverrier's hypothesis which states that there is another planet beyond the orbit of Uranus was consistent with the established astronomical theories and hence acceptable.

It is to be noted that this condition is not a necessary condition of a legitimate hypothesis. Scientist very often reject or

modify the traditional views or prevailing theories; new theories may be accepted as true and old theories may be rejected as false. For example, the Ptolemic theory was rejected in due course and the Copernican theory was accepted. With the advancement of science and technology many laws are modified and will be modified in future also. But the important point is that in the absence of sufficient proof, it is not proper to reject the established theories and frame a new one.

(iv) The hypothesis should not be indefinite, vague, absurd or self-contradictory, but should be definite, credible and consistent.

(a) An indefinite or vague hypothesis can not lead us to a definite channel of investigation. For example, if we suppose that an earthquake is due to some disturbances in the interior part of the earth, then that supposition is nothing but a vague one and from this we can not start our investigation to find out the real cause of earthquake.

(b) A hypothesis should not be self contradictory, but should be conceivable i.e. consistent with itself. For example, if we suppose that careful study is the cause of one's failure in the examination, then the hypothesis will be self-contradictory or inconsistent.

(c) The hypothesis must not be absurd but must be credible or conceivable. All that is meant by this condition is that we should not make any wild guess to explain a fact. For example, a boy is missing from his home. Here we should not suppose that he was carried away by angels. Similarly, we should not suppose that the Earth is being supported on the crest of a serpent or that an eclipse of the sun or the moon occurs, because, a malicious demon devours the sun or the moon at cestain intervals.

It is to be noted that this condition is not of much value because many things which appear absurd at one time, were subsequently found to be existing in fact. For example, when Columbus framed the hypothesis that there was another continent besides the known four planets, then it was consided as absurd by the then wise men, but ultimately that continent viz. America was discovered. However, the point is that hypothesis must not be absurd, it must be concievable.

(v) Predictive power :

The predictive power of a hypothesis means the range of observable facts that can be deduced from it. It is the power that makes the prediction or to offer explanation which proves the fertility or productivity of a hypothesis. Of two hypotheses if one has a greater number of observable facts deducible from it than the other, then it is said to have a greater predictive power. For example, Newton's hypothesis of gravitational attraction together with his three laws of motion has greater predictive power than that of Kepler's or Galelio's hypothesis; because Newton's

hypothesis can explain many more facts than Kepler's and Galileo's hypotheses.

This criterion is not the same as the testability of a hypothesis. The hypothesis from which some consequences can be deduced is called a 'testable hypothesis', but the hypothesis from which we can deduce the greatest number of observable consequences is called a hypothesis having the greatest power of prediction.

This criterion has a negative side which is of great importance. Sometimes we find that two different hypotheses are both relevant, to explaining some set of facts, both are testable, and both are compatible with the well-established theories. In trying to choose which of them affords the real explanation, we take what Bacon calls a 'crucial instance'.

Crucial instance : ''A crucial instance (instantia crucis) is an instance which can only be explained by one of the contending hypotheses, and not by the other.'' A crucial instance may be obtained by simple Observation or by Experiment. If it is obtained by Experiment, it is called an ''Experimentum crucis'' or 'crucial experiment'. The term ''Crucial instance' is, as Bacon says, ''borrowed from the crosses (or finger posts) which are put up in crossways to point out the different ways.'' When we come to the crossing of two roads and are unable to decide, which way we should go to reach our destination, the finger post indicates us the actual way we should take. Similarly, when we obtain a crucial instance, it decides conclusively which of the rival hypotheses is proved. According to Jevons ''A crucial instance not only confirms one hypothesis but negatives the other.'' Let us take an example of crucial experiment (Experimentum crucis).

Suppose, there is a glass jar containing some gas and we are to determine whether it is Hydrogen or Oxygen. The gas is found to be colourless, tasteless and without any smell. As these are the common properties of Hydrogen and Oxygen, we are unable to identify them. So we may make an experiment. We introduce a glowing stick into the jar and find that gas begins to burn. This shows that the inflamability is a property of the gas in the jar. As this property is to be found only in Hydrogen and not in Oxygen, so the experiment decides conclusively that the gas in the jar is Hydrogen and not Oxygen. The inflamability is the crucial instance which establishes the Hydrogen gas and rejects the Oxygen gas.

As a crucial instance obtained by simple observation we may take the following example.

Suppose there is a theft in the house and we are to decide whether the thief was in league with any member of the house or not. In the course of investigation, we discover a plan of the building (showing the location of the room where valuables were kept) lying on the floor by following which the burglar can easily enter into the

room. This fact is a crucial instance – which conclusively proves that the information contained in the plan, could have been supplied only by an inmate and not by outsiders.

(vi) The hypothesis must be based on facts and must have for its object a real cause or vera cause.

A hypothesis is framed is order to explain the fact that needs explanation. In order to frame any hypothesis we are to observe the fact without any bias. Again, when we proceed to test or verify the hypothesis, then also we must observe the fact with an impartial mind. Hence a hypothesis depends on facts at the starting point and also at the end for its verification.

Secondly, if we frame a hypothesis regarding an agent or a cause, then that agent or cause should be a vera cause or a real cause.

Vera cause : The term 'vera cause' literally means a true cause. It should not, however, be taken to mean merely a cause which is actually known to exist, or something which is directly perceptible by the senses. For example, a child, when missing must not be supposed to have been carried away by an angel. Here the angel is non existent, it is not a true cause. But we should not use the term in this restricted sense. There are some elements like atoms, ether, electrical energy etc. which though not perceptible, can be regarded as 'vera cause'. Though these elements can not be directly perceived, they are indirectly known through their perceptible effects. Hence 'vera cause' should be understood to mean a cause ''which alone avoids contradiction in our thought, that is, which alone enables us to think the phenomena as a part of systematic reality'' (Welton).

(vii) Lastly, the hypothesis must be simple.

A valid hypothesis must be simple. The term 'simplicity' has been used in logic in a special sense. In Logic a simple hypothesis is one which makes the minimum number of independent assumptions. Sometimes it is found that there are two or more rival hypotheses which appear to afford an explanation of the facts under investigation. In such cases the hypotheses which is more simpler than the other, is generally accepted.

For example, the most important examples of a pair of hypotheses were those of Ptolemy and Copernicus. The Ptolemic hypothesis is : the earth is the centre of the universe and round the earth there is rotation of the sun and other planets and stars. On the other hand, the Copernican hypothesis is– the sun is the centre of the universe and round the sun there is the rotation of the earth and other planets and stars. Both the hypotheses fulfill all the conditions of legitimate hypothesis. But Copernicus' hypothesis fulfils one more condition which is simplicity. Ptolemy had taken the help of many ad hoc hypotheses like high and low tides, rotation of day and night,

changes of seasons etc which have no intimate relation with the main hypothesis. But Copernicus took the help of only one or two supplementary hypotheses to account for some observed positions of heavenly bodies. So, comparatively Copernicus' hypothesis is more simple and acceptable.

Thus, we can say that a hypothesis that has more comprehensive information and wider in scope can offer a reliable and systematic explanation of facts and is regarded as simple. Of course, an accurate definition of 'simplicity' is very difficult to give. Yet simplicity is an important criterion for a legitimate hypothesis.

SUMMARY

- The aim of induction is to establish a general real proposition by discovering and proving a causal connection. But in order to establish a causal connection we have to make a supposition and this supposition is called a hypothesis.
- A hypothesis is any supposition which we make is order to endeavour to deduce from it conclusions in accordance with facts which are known to be real. If the conclusions tally with facts, then the hypothesis is true or atleast likely to be true.
- Stages of hypothesis : There are four stages of hypothesis–
  (i) Observation of facts.
  (ii) Formation of hypothesis.
  (iii) Application of Deductive method.
  (iv) Verification.
- Kinds of hypothesis– There are three kinds of hypothesis–
  (i) Hypothesis concerning Agent.
  (ii) Hypothesis concerning Law.
  (iii) Hypothesis concerning Collocation.
- According to some logicians, hypothesis is of one kind and this is hypothesis of cause.
- According to Coffey and Welton, since Agent and collocation taken together constitute the cause so there are only two kinds of hypothesis–
  (i) Hypothesis of cause and.
  (ii) Hypothesis concerning Law.
- Kinds of hypothesis in modern science.

Prof. L.S. Stebbing has mentioned three kinds of hypothesis on the basis of their different purposes– (i) Explanatory hypothesis.
(ii) Descriptive
(iii) Analogical.

- Some other Logicians have admitted another form of hypothesis–
  Working hypothesis.
- Conditions of legitimate hypothesis– Any and every hypothesis may not be valid. A hypothesis in order to be legitimate must fullfill certain rules or conditions as follows:
  1. The hypothesis must be relevant.
  2. Testability or verifiability.
  3. Compatibility with previously established hypotheses and compatibility also with itself.
  4. The hypothesis should be definite, credible and consistent.
  5. Predictive power.
  6. The hypothesis must be based on facts and must have for its object a real cause or vera cause.
  7. The hypothesis must be simple.

PROBABLE QUESTIONS

1. What is a hypothesis? Explain the nature of hypothesis.
2. What are the various kinds of hypothesis? Explain.
3. What is hypothesis? What are the conditions of valid hypothesis?
4. Give example–
   (i) Hypothesis concerning Agent.
   (ii) Hypothesis concerning Collocation.
   (iii) Hypothesis concerning Law.

4. Define :
   (i) Hypothesis, (ii) Hypothesis concerning Agent, (iii) Hypothesis concerning law, (iv) Hypothesis concerning collocation, (v) Explanatory hypothesis, (vi) Descriptive hypothesis, (vii) Analogical hypothesis, (viii) Working hypothesis, (ix) Vera cause.

5. Write short notes on–
(i) Hypothesis, (ii) Explanatory hypothesis, (iii) Descriptive hypothesis, (iv) Working hypothesis, (v) Crucial instance, (vi) Vera cause, (vii) Hypothesis concerning Agent, (viii) Hypothesis concerning Law, (ix) Hypothesis concerning Collocation, (x) Experimentum crucis.
6. Answer briefly :
(i) What are the different forms of hypothesis?
(ii) What is crucial instance?
(iii) What are the stages of hypothesis?
(iv) State four conditions of a legitimate hypothesis?
(v) What do you mean by experimentum crucis?
(vi) What are the various kinds of hypothesis according to Stebbing.
7. Distinguish between :
(i) Hypothesis concerning Agent and Law.
(ii) Explanatory and Descriptive hypothesis.
8. Give answer :
(i) What is the first stage of hypothesis.
(ii) How many stages of hypothesis are there?
(iii) The power of prediction is a —— of hypothesis.
(iv) How many types of verification are there in a hypothesis?

Unit-IV

MILL'S METHODS OF EXPERIMENTAL ENQUIRY

After reading this chapter you will be able to know :

- *the nature of experimental method.*
- *canons of elimination in scientific enquiry.*
- *Mill's five experimental methods– their nature, advantages and disadvantages.*

Contents

- Inductive Method.
- Canons of Elimination.
- The Method of Agreement.
- The Method of Difference.
- The Joint Method of Agreement and Difference.
- The Method of Concomitant Variation.
- The Method of Residues.

• Introduction :

The ideal of logic is truth. To determine the truth we need some specialized methods. Deductive logic is concerned with formal truth. While inductive logic is concerned with material truth for which it is to enquire into the complex structure of the natural phenomena.

Logician Peter Ramus* was the first to propose the addition of the doctrine of method in logic. We find three methods applied in logic–

(a) Deductive Method,
(d) Inductive Method, and
(c) Complete Method.

In the process of enquiring truth, Deductive method is the analytic method. Inductive method is called the synthetic method which is also known as the method of discovery. And finally knowledge reaches scientific form only by the combination of inductive and deductive methods. It is called complete method that culminates in proper verification.

In this chapter, our discussion will be concentrated on the Inductive Methods only.

• Inductive Method :

Mill's method of enquiry is included in the inductive method. The ideal kind of inductive inference is scientific induction. The aim of scientific induction is to establish a general real proposition. In order to establish a general real proposition we need to apply some experimental methods of enquiry.

Mill's experimental methods of enquiry are called the Inductive Methods. Mill devised the inductive methods to solve the problem of determining the

**"Peter Ramus, who was a victim of the massacre of St. Bartholomew was the first to propose the addition of the doctrine of Method as a fourth part of logical science"*

causal connection. The law of causation is a universal law. It is not an easy task to establish cause– effect relation as the natural phenomena are intermixed in a very complex manner. So, in order to mitigate this problem, Mill formulated five experimental methods which are also known by diverse names of Inductive Methods, ''Methods of Determining causal connection'', ''Methods of Observation and Experiment'', and above all the ''Methods of Elimination''.

Mill's experimental methods are also known as the Methods of Elimination. The term 'Elimination' means ''to eliminate'' or ''to reject''. Therefore, elimination implies rejecting the accidental and irrelevent circumstances which are found in natural phenomena in determining cause– effect relation.

Therefore, we find two aspects of elimination– the negative aspect and the positive aspect. The negative aspect of elimination implies the rejection of the accidental and irrelevent circumstances. The positive aspect of elimination consists in the discovery and proof of causal connection between facts. This positive aspect of elimination is the main objective of Mill's method of enquiry.

Long before Mill, in the sixteenth century, the British logician Francis Bacon also mentioned about these methods. Bacon applied these methods as a process of discovering a causal connection in the form of a table. Of course, he used the different methods by other names like the Table of Presence, the Table of Absence, the Table of Degrees for Mill's methods of Agreement, Difference and Concomitant Variation respectively. But in Mill's study we find an exclusive and elaborate account of the experimental methods.

- **Canons of Elimination :**

The aim of science is to discover and find out a causal connection between two facts. Qualitatively, a cause is the immediate, unconditional, invariable, antecedent of the effect and quantitatively a cause is equal to the effect. The canons of elimination are based on this relationship between cause and effect.

The following canons of elimination can be derived from the cause effect relation–

1. ''Whatever antecedent can be left out, without prejudice to the effect, can be no part of the cause.''

From the point of view of quality, as it is already mentioned, a cause is an invariable, unconditional antecedent of the effect. It necessarily indicates that if the cause is found to be absent then the effect will also cease to exist. The presence of effect without the presence of cause is a sheer impossibility. As such we can conclude that whatever antecedent can be left out without frustrating the effect can never be the cause.

The method of Agreement is established on this canon of elimination.

2. ''When an antecedent cannot be left out, without the consequent disappearing, such antecedent must be the cause or a part of the cause.''

This canon is also drawn from the qualitative aspect of the definition of the cause. From the point of view of quality, a cause is the invariable and unconditional antecedent of the effect. It implies that if the antecedent part is eliminated then the consequent disappears, then there must be a causal relation between them. In other words if the cause is absent, effect also must remain absent.

The method of Difference is based on this canon of elimination.

3. ''An antecedent and a consequent rising and falling together in numerical concomitance are to be held as cause and effect.''

This canon is deduced from the quantitative aspect of cause. From the point of view of quantity, cause and effect are equal. If two events are found to rise or fall simultaneously or concomitantly then we can draw the conclusion that the said events are causally related. This means that if there is any quantitative variation in the cause, there must be a variation in the effect also.

Mill's method of concomitant variation is based on this principle.

4. The above three canons, according to Bain, are the principal principles or the main canons of elimination. Moreover, Joseph has given another canon of elimination as given below:

''Nothing is the cause of a phenomenon which is known to be the cause of a different phenomenon.''

This canon is based on the law of causation. It shows that one cause cannot have many effects. The same cause produces the same effect. For example, if we know that A is the cause of the event B then A cannot be the cause of C or D or E etc.

The method of Residues is based on this principle.

Thus, according to Mill these canons of elimination are used in the five inductive methods. The five methods of induction are as follows :

(a) The Method of Agreement

(b) The Method of Difference

(c) The Joint Method of Agreement and Difference

(d) The method of Concomitant Variation

(e) The Method of Residues

I. The Method of Agreement

Mill states the Method of Agreement as follows :

''If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon.''

If we analyse this method of Mill, we find that in order to apply the method of agreement.

(a) Firstly, we have to collect two or more instances of the phenomenon under

investigation. The number of instances should be more than one. This method cannot be applied to a single instance. The instances are collected by means of observation.

(b) The collected instances are to be analysed into different circumstances or factors by means of observation.

(c) The circumstances which are not present invariably are to be eliminated. It implies that all the instances have only one circumstance in common, while in other respects they are different.

(d) Lastly, the circumstance which is invariably present in all the instances must be the cause or the effect of the said phenomenon. It means, the common circumstance in which alone all the instances agree is the cause or the effect of the phenomenon.

For example :

Symbolic example :

No. of instances	**Antecedents**	**Consequents**
1st	ABCD	abcd
2nd	AMNO	amno
3rd	APQR	apqr
4th	AXYZ	axyz

∴ 'A' is the cause of 'a'

In this example, we have taken four instances under investigation (i.e. two or more than two). In all the four instances there is only one common circumstance, that is, 'A' which is followed by 'a'. The antecedents and consequents are varying in all other respects. Therefore, we can conclude that 'A' is the cause of 'a'.

Concrete example :

Suppose Malaria is the effect. We have to find out the cause of it. For this we have to collect some instances of Malaria patients and observe disverse aspects of their living like drinking water, daily food habit, living place, physical exercise etc. On examination it is found that though they are having different life styles, yet in one respect everyone is having the common factor that they are bitten by anopheles mosquito. Hence, we can conclude that the bite of anopheles mosquito is the cause of Malaria.

This is an example where we move from effect to find out its cause. In the method of agreement we can move from cause to effect also. Let us take an example :

Suppose we want to find out the effect of smoking. For this we are to take few instances of some smokers. On examination, we find that though all the smokers have different health conditions, yet in one respect they are having the common problem, that is the heart of everyone is very weak. As such, we can conclude that smoking causes weak heart.

In this example, we have proceeded from cause to its possible effect.

The method of Agreement is called by its name because, according to Mill, this method proceeds by comparing different instances to ascertain the circumstance in

which they agree. Again the proof consists in the agreement in only one circumstance compared with difference in all the other circumstances. Here the proof is constituted by the singleness of the agreement. Therefore, logicians like Mellone, Coffey etc. call this method ''the method of single Agreement.''

The canon of Elimination used in the Method of Agreement :

The method of Agreement is based on the following canon of Elimination–

''Whatever antecedent can be left out without prejudice to the effect can be no part of the cause.''

It implies that if some circumstance is left out and yet we find that the given phenomenon is present, then necessarily the left out circumstance can be in no way causally connected with it. Therefore, if a particular circumstance is commonly present with the given phenomenon then we can say that they are causally connected.

The Method of Agreement is Called the Method of Observation :

Observation is regulated perception of natural events under natural circumstances. The Method of Agreement is pre-eminently a method of observation. Of course, the scope of the application of experiment in certain cases cannot be denied. But all the natural events cannot be brought under experimentation. For example, earthquake, flood, drought etc cannot be experimented under artificial conditions for which observation is the only way to carry on investigation. To say that the Method of Agreement is pre-eminently a method of observation means that this method is applied to those cases mainly where experiments are not possible. Moreover, this method does not require instances of any special and definite character, so observation can supply its instances. Therefore, the Method of Agreement is called the method of observation.

Advantages of the Method of Agreement :

The Method of Agreement has the following advantages–

(a) The Method of Agreement has a wider and extended scope of application. It is a very easy and simple method. As this method is pre-eminently a method of observation, it has a wide range of application than the methods of experiment. Again, whatever can be experimented can also be observed. But whatever can be observed may not be experimented. Therefore, the Method of Agreement has a wider scope.

(b) This method enables us to proceed from the cause to the effect and from the effect to the cause. This advantage of the Method of Agreement also follows from the fact that it is a method of observation. By observation we can move from cause to its effect and from effect to its cause simultaneously. This means to find out the causal connection we can investigate from

both directions, from the cause to the effect and from the effect to the cause as well.

(c) In any scientific enquiry the method of Agreement helps to frame hypothesis relating to causal connection. Formation of hypothesis occupies an important place in any scientific enquiry. As the method of Agreement is a method of observation, therefore certainty in causal connection may not be proved by it. By observation, instances are collected from nature and one is to form hypothesis regarding causal connection. In the later phases, the hypothesis can be verified by applying the Joint Method of Agreement and Difference.

Thus, this method helps in the discovery and proof of causal connection. As such it has a great suggestive value.

Disadvantages of the Method of Agreement :

As the Method of Agreement is a method of observation, it involves all the disadvantages of the method of observation. Basically in the application of this method the following disadvantages are found–

(a) Practical Imperfection.

(b) Characteristic Imperfection.

(c) Problem in distinguishing causation from co-effects and co-existence.

(a) Practical Imperfection :

Practical Imperfection implies some practical difficulties involved in the application of the method in our life. The practical problems involved in this method are:

1. Difficulty of collecting required instances–

In the Method of Agreement two or more instances are to be collected by observation. But there are certain cases where collection of instances is to depend on the mercy of nature as all natural phenomena do not occur as certainly and frequently as the rising and setting of the sun. For example, the instances of earthquake, volcano eruption etc are some rare phenomena for which one is to wait indefinite time during his life time.

2. Difficulty of correct analysis of the instances–

As the Method of Agreement is a method of simple observation, therefore it suffers from the problem of correct analysis of the collected instances. Simple observation can not ensure the correct and sufficient analysis of the data. There is the possibility of highlighting the insignificant factors by throwing aside the relevant factors of cause-effect relation in this method.

Thus, we can see that the Method of Agreement is vitiated by practical imperfection. But this problem can be removed to certain extent by the multiplication of instances. If the number of instances can be increased and a common antecedent circumstance can be found out then the probability of that common antecedent being the cause becomes high. Of course, the problem of the collection of data which depends on the mercy of nature cannot be removed. Moreover, even after the ap-

plication of certain remedies we can not say that the method of Agreement can be totally free from practical imperfection.

(b) Characteristic Imperfection :

The characteristic imperfection of the Method of Agreement is the limitation of the method rooted in the very character or the nature of this method. This defect is inherent in this method.

The characteristic imperfection of the Method of Agreement is all about the possibility of the plurality of the causes. According to the doctrine of the plurality of the causes, the same effect can be produced by different causes on different occassions. But from the scientific point of view, the doctrine of the plurality of the causes can not be accepted. The possibility of this doctrine frustrates the Method of Agreement.

For example, suppose a man is found to have taken wine with water and he is found in an intoxicated mood.

The second man has taken whisky with water and he is also found in an intoxicated mood.

The third man has taken brandy with water and he is also found in an intoxicated mood.

By applying the Method of Agreement we find that water is the cause of intoxication. But we know it well that water can not be the cause of some one's intoxicated mood. Only the diverse things used with water like wine, whisky, brandy etc are the causes of the said occurence. That means the plurality of causes may spoil the method of Agreement.

In order to overcome the problem associated with it, we have the following remedies–

1. The multiplication of instances.

2. The application of the Joint Method of Agreement and Difference wherever it is possible. In the Joint Method of Agreement and Difference we require one set of positive and one set of negative instances. If this method can be fruitfully used then the conclusion becomes highly probable.

(c) Problem in distinguishing causation from co-effect and co-existence :

According to the Method of Agreement if two events are invariably found to be present or they are invariably succeeding one another then they are causally connected. But from this we can not say that the invariable antecedent is the cause of the invariable consequent.

For example, 'day' is the invariable antecedent of 'night'. But from this we can not say that 'day' is the cause of 'night'. In fact 'day' and 'night' are the co-effects of the same cause i.e. the rotation of the earth on its own axis.

Thus, we can say that the Method of Agreement cannot precisely distinguish causation from co-effects and co-existence.

● The Method of Difference :

The Method of Difference is stated by Mill as follows :

''If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occuring only in the former; the circumstance in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon.''

The analysis of the Method of Difference reveals the following points–

(a) In this method two instances are collected. Of these two instances one is positive instance, while the other instance is negative. Here, we find that in the positive instance the phenomenon under investigation is present and in the negative instance the phenomenon under investigation is absent.

(b) The two instances have their own definite nature. These instances differ in respect of the presence of a circumstance in the positive instance and absence of the circumstance in the negative instance. In all other respects, these two instances are same.

(c) The differing circusmstance is the cause or effect or the indispensable part of the cause of the phenomenon under investigation.

For example :

Symbolic example :

No. of instances	Antecedents	Consequents
1st Positive	ABCEF	abcef
2nd Negative	ABCE	abce

∴ 'F' is the cause of the 'f'

In this example two instances are taken, where one is positive and the other is negative instance. In these two instances, other than one circumstance i.e. 'F' and 'f' in antecedent and consequent respectively, all the other circumstances are same and identical. In the positive instance along with other circumstances 'F' and 'f' are present. In the negative instance other than 'F' and 'f' all the other circumstances are present. Therefore, we can conclude that 'F' is the cause of 'f'.

Concrete example :

Suppose a bell is rung in a jar filled with air. Then the sound of the bell will be heard. On the otherhand, if the bell is rung in a vacuum no sound will be heard. This means, the presence of air is the cause of hearing sound.

Forms of Method of Difference :

The method of Difference is found in two forms. According to the first form of it, the positive instance is stated first and the negative instance is stated next. In such case, in the negative instance an antecedent circumstance which is present in the positive instance is eliminated. As such, a circumstance is seen to be absent in the consequent.

For example:

Instances	Antecedents	Consequents
Positive	ABC	abc
Negative	BC	bc

∴ 'A' is the cause of 'a'

According to the second form, the negative instance is stated first and the positive instance is stated next. In such case, in the positive instance a circumstance is added to the antecedents and necessarily a circumstance has also been added to the consequent.

For example :

Instances	Antecedents	Consequents
Negative	BC	bc
Positive	ABC	abc

∴ 'A' and 'a' are causally connected.

The Method of Difference is called by this name because in this method two instances are compared and we find that they differ only in one respect. It is to be noted that there should be difference only in one circumstance between the two instances. Therefore, logicians like Mellone, Coffey etc called this method as the ''Method of Single Difference''.

Canon of Elimination used in this method :

The canon of Elimination which is used in the Method of Difference is–

''When an antecedent can not be left out without the consequent disappearing, such antecedent must be the cause or a part of the cause.''

We know that cause is antecedent and effect is consequent. Cause is invariably present as antecedent to the effect. If an antecedent is eliminated and simultaneously the consequent does not disappear then we are to conclude that the left out antecedent cannot be the cause or the part of the cause. And if with the elimination of the antecedent, the consequent is also eliminated then that part must be the cause or the part of the cause.

The Method of Difference is the Method of Experiment :

The Method of Difference essentially depends on experiment. Therefore, Mill called this method as the method of Experiment. In the Method of Difference we need two instances. Of these two instances, one is positive instance while the other is negative instance. This means that in the positive instance, the phenomenon under investigation is found to be present and in the negative instance the phenomenon under investigation is found to be asbent.

The two instances should be same in all circumstances excluding one circumstance. Simple observation can not furnish the instances of this special kind. It is possible only by means of experiment. Because, in experiment one can precisely and correctly analyse the data of positive and negative instances in an artificial condition. Therefore, the Method of Difference is called the Method of Experiment.

Again though this method is pre-eminently a method of experiment, there is scope of applying observation in this method. But a careless application of observation in the Method of Difference may lead to the fallacy of 'post hoc ergo propter hoc'.

Advantages of the Method of Difference :

According to Mill, the Method of Difference is the best method of all the methods of experimental enquiry. As it is a method of experiment, therefore all the advantages of the method of experiment are present in this method. Besides, the other advantages of the Method of Difference are as follows–

1. The application of the Method of Difference is very simple. It is because in order to find the cause effect relation, only two instances are required. These two instances are sufficient for determining the cause effect relation.

2. The Method of Difference can lead to certain conclusion because it is pre-eminently a method of experiment. In this method we can prove causal cannection. Therefore, it is considered as the best method of experimental enquiry.

3. In the other methods of experimental enquiry also if experiment can be applied then the Method of Difference can function effectively. For example, the Method of Agreement that yeilds us the idea of cause effect relation can also be verified and proved by the Method of Difference.

Disadvantages of the Method of Difference :

The Method of Difference is basically a method of experiment. Therefore, all the limitations of experiment are involved in the Method of Difference. The following are some of the disadvantages of the Method of Difference–

1. The application of the Method of Difference is very troublesome. In this method two instances are required, where one is positive and other is negative. In these two instances other than one circumstance, in all other circumstances there should be agreement. It is considerably a difficult task to collect such instances which are regulated by experiment.

2. As it is primarily a method of experiment, therefore we can pass from cause to effect but can not pass from effect to cause in this method.

3. The Method of Difference is not totally free from the difficulties arising out of the plurality of causes. Here we can prove that a particular event is the cause of a particular effect. But from it we can not prove that the said cause is the only cause of the effect. In other cases, some other event may be proved as the cause. Therefore, we can say that the Method of Difference can prove a cause but not the only cause.

4. The Method of Difference can not distinguish between the cause and a condition. In the application of the Method of Difference it is seen that a particular element takes a leading role in functioning the effect. But that particular element can not be considered as the whole cause of the effect. For example, a dish can not be tasty without the adequate quantity of salt. But the adequate quantity of salt is just

one of the conditions of a tasty dish. Other conditions like requisite quantity of spices, cooking in required heat, the appetite of the eater etc. are also indispensable components of the cause.

5. A careless application of the Method of Difference may lead to the fallacy of post hoc ergo propter hoc or the fallacy of taking any immediate antecedent to be the cause.

6. As the Method of Difference is primarily a method of Experiment, therefore the scope of the application of this method is very limited.

- **The Joint Method of Agreement and Difference:**

Mill states the Joint Method of Agreement and Difference as follows–

''If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of the circumstance, the circumstance in which alone the two sets of instances differ is the effect or the cause or an indispensable part of the cause, of the phenomenon''.

If this definition of Joint Method of Agreement and Difference is analysed, then we find the following points–

1. Firstly, two sets of instances are collected by observation. There should be two or more than two instances in each set. Though this method is basically a method of observation there is the scope of application of experiment.

2. Secondly, of these two sets of instances, one set consists of positive instances while the other consists of negative instances. Only one circumstance is common in the set of positive instances in which the phenomenon under investigation is present. Again, in the set of negative instances in which the phenomenon under investigation is absent, that common circumstance is absent.

3. Finally, the two sets of instances are compared and analysed. On the basis of agreement in respect of presence and in respect of absence, we can conclude that two things are causally connected.

For example :

Symbolic example :

No. of instances	Set of positive instances	Set of negative instances
1st	ABC – abc	BCD – bcd
2nd	ADE – ade	DEF – def
3rd	AFG – afg	FGH – fgh

∴ 'A' is the cause of 'a'

In this example, two sets of instances are taken. One set is positive while the other set of instances is negative. In each set three instances are taken. In all the three instances of the positive set where the circumstance 'A' is present in the antecedent, circumstance 'a' is also present in the consequent. In all the three instances of the negative set, along with the absence of the circumstance 'A' in the antecedent, circumstance 'a' is also absent in the consequent. Therefore, we can conclude that

'A' and 'a' are causally connected or one is the indispensable part of the other.

Concrete example :

Malaria is present in the places where there are anopheles mosquitoes. Again, in the places where there are no anopheles mosquitoes, Malaria is absent. Therefore, on the basis of this observation we can conclude that anopheles mosquito is the cause of Malaria.

In this example, the presence of Malaria along with the presence of anopheles mosquito is the positive instance. And the absence of Malaria along with the absence of anopheles mosquito is the negative instance.

So, on the basis of the agreement of the circumstance in the positive instances and the agreement in absence of the circumstance in the negative instances, anopheles mosquito is considered as the cause of Malaria. Therefore, it is an example of the Joint Method of Agreement and Difference.

This method is called the Joint Method of Agreement and Difference because two sets of instances are taken. Here, one positive set of instances is taken where there is the agreement of one circumstance in all the instances. In the negative set of instances there is agreement in absence of that circumstance i.e. in both the antecedent and consequent the same circumstance is found to be absent.

In other words, in this method we find ''agreement of presence'' of the positive instances and ''agreement of absence'' of the negative instances. By this double method of agreement of absence and presence, cause-effect relation is established. Therefore, it is called ''The Double Method of Agreement''. Mill himself is of the view that this method is not an independent and distinct method of proof. This method, according to Mill, is the extension and improvement of the Method of Agreement.

Sometimes this method is also called ''The Indirect Method of Difference'', because the negative instances are obtained not by experiment, but indirectly by showing what would be the result if experiment could be made.

The canons of Elimination used in this method :

The Joint Method of Agreement and Difference is established on two canons of Elimination–

Firstly : ''Whatever antecedent can be left out without prejudice to the effect, can be no part of the cause.''

Secondly : ''When an antecedent can not be left out without the consequent disappearing, such antecedent must be the cause or a part of the cause.''

In the Joint method of Agreement and Difference two sets of instances are collected. Therefore, for the two sets of instances two canons of elimination are used.

In this method, for the positive and negative instances the first and second

canons of elimination are applied respectively. To sum up these two canons, it can be said that, if the cause is present, the effect will also be present and if the cause is absent the effect will also remain absent.

Advantages of the Joint Method of Agreement and Difference :

The Joint Method of Agreement and Difference has the following advantages–

1. First, as this method is primarily a method of observation, therefore we can pass from cause to effect and from effect to cause. Moreover, the cases in which experiment is not possible, there is the scope for the application of the Joint Method of Agreement and Difference for determining the causal connection.

2. The Method of Agreement merely suggests but cannot prove the cause-effect relation. The Joint Method of Agreement and Difference can confirm the cause-effect relation very effectively because the negative set of instances plays a vital role in it.

3. As there are two sets of instances in this method, it is more or less free from the difficulty arising out of the possibility of the plurality of causes.

4. The scope of application of this method is very wide, as it is a method of observation.

Disadvantages of the Joint Method of Agreement and Difference :

The Joint Method of Agreement and Difference has the following disadvantages :

1. The Joint Method of Agreement and Difference is primarily a method of observation. Therefore, all the demerits of observation are found in this method. For example, the actual cause may be hidden and there is the possibility of taking any condition as the whole cause of the effect. As such in this method there is the possibility of the fallacy of Non-observation.

2. This method is not totally free from the difficulties arising from insufficient analysis and plurality of causes.

3. The Joint Method of Agreement and Difference cannot properly distinguish causation from co-existence.

4. The application of the Joint Method of Agreement and Difference requires much labour and time. Though the positive set of instances can be easily collected, it is very tough job to collect the negative instances.

In the conclusion it can be said that the possibility of the causal connection between two events which is detected by the Method of Agreement is confirmed by the Joint Method of Agreement and Difference. Yet the conclusion found in this method always remain uncertain because it is basically a method of observation. But we can say that it is a more reliable method than the Method of Agreement and certainly an improvement upon the Method of Agreement.

• The Method of Concomitant Variation :

Mill states the Method of Concomitant Variation as follows :

''Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation''.

If we interprete this definition of Mill, then we find the following points of the Method of Concomitant Variation—

1. Firstly, two phenomena are to be observed.

2. Secondly, we have to analyse the two phenomena. On analysis, if it is found that the phenomena vary together, then from the experience of their co-variation it can be concluded that the phenomena are causally connected.

Variation may be of two types :

(a) Direct Variation

(b) Inverse Variation

(a) Direct Variation :

In a variation if the antecedent increases, then the consequent also increases and if the antecedent decreases, the consequent also decreases then it is called Direct Variation.

For example :

Symbolic example :

No. of instances	Antecedent	Consequent
1st	A_1BC	a_1bc
2nd	A_2BC	a_2bc
3rd	A_3BC	a_3bc

$\therefore$ 'A' is the cause of 'a'

Concrete example :

The increase of heat is followed by the rise of mercury in the thermometer. Again the decrease of heat is followed by the fall of mercury in the thermometer. Therefore, we can conclude that the increase or decrease of heat is the cause of the rise or fall of mercury in the thermometer.

(b) Inverse Variation :

In a variation, if the antecedent increases, the consequent decreases and if the antecedent decreases, the consequent increases, then it is called Inverse Variation.

For example :

Symbolic example :

No. of instances	Antecedent	Consequent
1st	$A^{+}BC$	$a^{-}bc$
2nd	$A^{++}DC$	$a^{--}dc$
3rd	$A^{+++}FG$	$a^{---}fg$

$\therefore$ 'A' is the cause of 'a'

Concrete example :

The more is the supply of a commodity, the less is the price of that commodity. Similarly the less is the supply of a commodity, the more is the price of that commodity. Therefore, the increase or decrease of supply is the cause of rise or fall in the price of the commodity.

These two types of variation show that the Method of Concomitant Variation is not a new method. It is a modified form of the Method of Agreement or the Method of Difference.

When the accompanying circumstances are different, then this method is a modified form of the Method of Agreement because the agreeing circumstance is found through observation only. When the accompanying circumstances are the same then this method is the modified form of the Method of Difference. Here the circumstance that differs can be found only through experiment.

Therefore, the Method of Concomitant Variation is said to be a modified version of the Method of Agreement or the Method of Difference.

Special Feature of the Method of Concomitant variation :

This method is applicable to those cases where complete elimination is not possible. There are certain causes which cannot be wholly eliminated. These causes are called by Mill permanent causes. For example, heat, gravitation, pressure of atmosphere etc. are some permanent causes which can not be totally eliminated but can only be quantitatively measured. In these cases only the Method of Concomitant Variation can be effectively employed to find the causal connection among the natural phenomena.

Again, in order to determine the causal connection by quantitative variation, only this method is of great use. Other methods of experimental enquiry can not function effectively in such cases. Therefore, Mellone is of the view that ''A special case for its application is when the phenomenon goes through periodic changes, i.e. alternately increases or decreases of which tides are the most obvious example''.

Advantages of the Method of Concomitant Variation :

The advantages of the Method of Concomitant Variation are as follows :

1. In order to find the causal connection related to permanent causes like pressure, heat, gravitional force etc., only the Method of Concomitant Variation can effectively be applied.

2. While the other methods of experimental enquiry are qualitative, the Method of Concomitant Variation is the only quantitative method. So, in order to find out the quantitative relation of cause and effect this method is of great use.

3. This method can be used as supplementary to other methods.

Disadvantages of the Method of Concomitant Variation :

The disadvantages and limitations of the Method of Concomitant Variation are as follows :

1. This method can not be applied out side the range of our observation. Noticing the variation of two phenomena is matter of our observation. But when a variation takes place beyond the range of our observation, then this method cannot be applied. Therefore, it has a limited scope of application.

2. The Method of Concomitant Variation is applicable to quantitative aspect only and not in anyway to

qualitative aspect of any variation. But in certain cases we find that the qualitative variation determines the cause-effect relation. In such cases this method is of no use.

3. This method is a modified form of the Method of Agreement or the Method of Difference. If it is a modification of the Method of Agreement then it is vitiated by the defect of this method for which it remains probable only. Again, if it is a modified form of the Method of Difference, then it is vitiated by the defect of this method by confining its limit of application.

In the conclusion it can be said that inspite of the above defects the Method of Concomitant Variation plays a significant role in scientific investigation.

- **The Method of Residues :**

The Method of Residues is stated by Mill as follows :

''Subduct from any given phenomenon such part as is known by previous induction to be the effect of certain antecedents and the residue of the phenomenon is the effect of the remaining antecedents.''

The analysis of this method reveals the following points :

1. A complex event or effect is caused by a group of antecedents.

2. From previous induction, we know that certain parts of the complex event are caused by certain antecedents.

3. The known parts of the complex event are to be subtracted from the whole complex event and then we can conclude that the residue of the complex effect is the effect of the remaining antecedent.

For example :

Symbolic example :

Antecedent	Consequent
ABC	abc
BC	bc

∴ 'A' is the cause of 'a'

In this example, it is known from previous induction that 'B' is the cause of 'b' or 'C' is the cause of 'c'. Therefore, the remainder 'A' will be considered as the cause of 'a'.

Concrete example :

A tin containing petrol weighs 30 kilograms. From our previous knowledge it is known that the tin contains 25 kilograms of petrol. By applying the Method of Residues we can conclude that the tin weighs 5 kilograms.

The canon of Elimination used in the Method of Residues :

In order to apply the Method of Residues the following canon of elimination is used–

''Nothing is the cause of a phenomenon which is known to be the cause of a different phenomenon''.

According to the Law of Causation, one cause cannot have many effects. One cause can produce one effect only. Therefore if something is known as the cause of an effect or some part of the event, then the said cause cannot be the cause of any other event.

The Method of Residues is based on this canon of elimination.

Advantages of the Method of Residues :

The advantages of the Method of Residues are as follows :

1. The Method of Residues helps extensively in any discovery. Specifically in astronomy and chemical sciences, this method helps widely to discover many new things.

2. This is the only method for determining the causal relation between a complex cause and a complex effect. It is significant because if we have the knowledge of some part of a complex phenomena, then to find out the knowledge of the remaining part this method can function effectively.

3. By the Method of Residues we can pass from cause to the effect and from the effect to the cause.

4. All inductive methods are in one or other way, dependent on the Method of Residues.

Disadvantages of the Method of Residues :

Inspite of some advantages of the Method of Residues, it has certain limitations also–

1. The method of Residues cannot initiate any scientific enquiry, because this method requires previous knowledge of the cause or effect for its application. It cannot function as the first step of scientific enquiry.

2. The instances of the Method of Residues are collected both by observation and experiment. It the instances are collected by observation then it becomes probable only. Again, if the instances are collected by experiment then there is the possibility of mistaking a condition for the whole cause.

3. The application of this method is very limited. This method is applicable only to the homogeneous intermixture of effects. In case of the heterogeneous intermixture of effects this method cannot be applied.

Assessment of Mill's Methods of Experimental Enquiry

Mill's methods of Experimental Enquiry occupy a very significant place in any research work or in scientific enquiry. It has great contemporary relevance for the research of many unexplored phenomena.

But Mill's methods of Experimental Enquiry have certain limitations. Very specifically the critics are of the view that, if these methods had been developed before the dawn of modern science, say before the publication of Newton's ''Principia'' (1687), Mill's Inductive methods would have carried a great significance. But Mill's work is dated mid 19th century, when scientific development reached a far developed stage than that of Mill's writings.

Mill's methods are meant for finding out the causal connection among the

natural phenomena. Mill claimed that these methods are capable of determining the cause-effect relation. Long before Mill,

Key words
Experimental Method. Elimination, Phenomenon Circumstance, Causal relation

Bacon was also of the similar view that these methods can function effectively to find out the cause-effect relation. But a careful analysis shows that, the success of these methods, to a large extent, depends on the efficiency of the person who applies them. These methods themselves are not sufficient. Had they been sufficient in themselves many unexplicated mysteries would have been explored. For example, till date the exact cause of why cancer is caused, could not be discovered.

Yet Mill's Inductive methods have great suggestive value, for these methods are involved with the material truth which is the key of any inductive enquiry.

SUMMARY

The aim of scientific induction is to establish a general real proposition. According to Mill, there are five methods, which are known as ''Inductive Methods'' or the ''Methods of Experimental Enquiry'', which are devised to establish a causal connection among facts. These five methods are :

(a) The Method of Agreement

(b) The Method of Difference

(c) The Joint method of Agreement and Difference

(d) The Method of Concomitant Variation.

(e) The method of Residues

But it is not an easy task to determine the causal connection among the natural phenomena. For this, there are four canons of elimination which are positively used to concentrate on the relevant things and negatively used to eliminate the irrelevant things involved in the causal connection.

These methods are applied by following diverse norms and as such, they have different application procedures, different advantages and disadvantages etc. Though these methods help in many scientific research and general investigation to fulfil in meeting its end, yet these methods themselves are not sufficient. The skillfulness, efficiency of the user of these methods, are also of a great concern for the success of these methods.

PROBABLE QUESTIONS

1. Give brief answer of the following :
   (a) How many Experimental methods are recognised by Mill? What are they?
   (b) What, according to Mill, are the two principal Experimental Methods?
   (c) What is the goal of Mill's Inductive Methods?
   (d) What is meant by the Canon of Elimination?
   (e) Is the Method of Residues deductive?
   (f) How many instances are required for the method of Difference?
   (g) What is ''Post hoc ergo propter hoc?
   (h) Is the conclusion of the Method of Agreement certain?
   (i) On which Canon of Elimination is the method of Difference established?
   (j) What do you mean by Direct Variation?
2. Give examples :
   (a) Inverse variation. (b) Post hoc ergo propter hoc.
   (c) The method of Difference. (d) The method of Residues.
   (e) Characteristic Imperfection.
3. Write short notes :
   (a) The method of Concomitant Variation.
   (b) Direct Variation. (c) Canons of elimination.
   (d) Practical Imperfection. (e) Post hoc ergo propter hoc.
4. Answer the following–
   (a) How many canons of Elimination are there and what are they?
   (b) Explain the Method of Agreement with example.
   (c) Write three disadvantages of the Method of Agreement by mentioning their remedies.
   (d) What do you mean by the Method of Difference? Why is it called the ''method of Discovery''?
   (e) Explain the Method of Concomitant Variation with example.
   (f) What do you mean by the Method of Residues? Is it a special form of the Method of Difference.
   (g) Explain with suitable example the Joint method of Agreement and Difference.
   (h) Write two advantages and disadvantages of the method of Concomitant Variation.
   (i) ''The method of Difference is basically a method of experiment' – elaborate.
   (j) Is the Method of Residues deductive? Discuss.

Unit-V

REALISM : NAIVE AND SCIENTIFIC

After going through this unit you would be able to learn:

- Realism and its kinds.

Contents

- Naive Realism
- Scientific Realism

In the first year course we studied the nature and the characteristics of Realism. We did also mention that realism is of four kinds. In this chapter, we will discuss on Naive or Popular Realism and Scientific Realism of John Locke.

● Naive or Popular Realism :

Naive or Popular Realism is the simplest form of Realism. As one of the types of Realism, the central theme of it is that the object of knowledge is independent of the knower's mind. The knower of the objects, knows something directly with all its qualities. The nature of the known object is exactly similar to the way the knower knows it. There is nothing to intervene that functions as the mediator between the knower and the known object. The object of knowledge is exactly reflected before us as like as something is seen in front of a mirror.

Durant Drake (1878–1933), is said to have used the term Naive Realism for the first time in his book "Invitation to Philosophy'', which was published in 1933. The main theme of Naive Realism is that the object of knowledge, along with its qualities like colour, taste, smell, extension, length etc. has its existence independent of knowing mind. It is called Naive Realism because it is the common sense view about the external world in the most unphilosophical manner.

Naive Realism, is therefore, all about the idea of the external object which an ordinary man possesses. Therefore R.W. Sellers (1912–89) has regarded Naive Realism as Popular Realism and Natural Realism as well. He says that we obtain knowledge as a result of the direct contact between the object and senses. The nature of the external object is exactly the same, the way in which our sense organs give information about them. Therefore, sometimes, this form of realism is also called as Direct Realism.

Naive Realism believes in an external world constituted by matter. Any proposition related to this material world brings forth the sense experiences of the particulars. It is not that these particulars exist only because we experience them. They will not cease to exist irrespective

of our perception of them. Therefore, the existence of the external world is independent of the knower's mind.

Following are some of the characteristics of naive or popular realism :

(i) The object of knowledge is independent of the knower's mind. The existence of an external object does not depend on the knowledge of it by any knower. An object will continue to exist with all its qualities with or without any interference on it by the knower.

(ii) There is an external world outside our mind.

(iii) We obtain knowledge of the external world by perception. The nature of the external world is exactly same as the way a perceptor perceives it. That means an object is that what it appears to be.

(iv) The knowledge of the external world is possible because of the qualities of the particular objects. The qualities of the objects are the inherent properties of them. The diverse qualities of an object like colour, taste, smell, extension, length etc. all are independent of the knower's mind.

(v) The relation between the knower and the known is a direct relation. There is nothing that intervenes our knowing of any object.

(vi) The object of our knowledge produces sensation in us. The sensation of an object is similar to everyone.

(vii) Naive realism supports the correspondence theory of truth.

The significance of Naive realism lies in the fact that it tries to give a philosophical basis of the common sense view regarding the nature of the external world. But this form of realism is criticised on a number of grounds :

(i) Naive Realism gives over emphasis on perception. The over emphasis on perception is the repetition of the mistake commited by the Greek Sophist. All the limitations of the perceptual knowledge occur in this form of realism.

(ii) Naive realism cannot explain error. illusions. hallucinations etc. For example, to see a snake in a rope, refraction etc. cannot be explained by naive realism

(iii) As it depends on perceptual knowledge, the universalizability of knowledge is robbed by naive realism. Individual experiences of qualities are relative. Naive realism commits a serious mistake by giving the individual knowledge a universal status.

(iv) Naive realism refuses to accept the subjective aspect of knowledge. But in the knowing process both subjective and objective aspects have their own role.

(v) According to Naive Realism, the knowledge of the external world is wholly independent of the knower's mind. But it is not correct. The knowledge of the external world produces idea or concept in our mind. Similary, we obtain knowledge from the ideas or the concepts.

Thus we can see that naive realism, though it claims to be the common sense

view of the external world, is not a good philosophical theory. From the point of view of philosophical knowledge it is a very weak theory.

- **Scientific Realism :**

Scientific realism is a form of realism established by British philosopher John Locke. The origin of scientific realism has come with a negative approach by criticising the limitations of naive realism. As a kind of realism, scientific realism believes in the existence of an external world independent of the knowing mind. Locke in his analysis, tries to give a scientific account of the experience of the external world.

Locke is an empiricist philosopher. Locke in his book ''An Essay Concerning Human Understanding'', gives a detailed analysis of the nature of knowledge. In this context, Locke analyses the nature of the external object and its relation to the knower. Locke tries to explain the relationship between the knower and the known object scientifically. That is why Locke's version of realism is known as scientific realism.

According to this theory of Locke, we can not know an object directly. We can have knowledge of an object only by the copy or image or representation of the object. We can know an object by the qualities it possesses. But all the qualities of an object are not independent of the mind. Some qualities are the inherent properties of an object, whereas, some are dependent on the mind or the consciousness of the knower. As Locke's theory is based on an analysis of the qualities of the external objects, therefore, sometimes it is also known as critical realism.

It is already mentioned that, we can know an object only by its qualities. According to Locke qualities are of two types :

(a) Primary qualities.

(b) Secondary qualities.

The qualities which are independent of the knowing mind or the qualities which are objective properties of an object are called the primary qualities. For example extension, weight, divisibility, motion etc.

On the other hand, the qualities which are not independent of the knowing mind or the qualities which are the subjective properties of an object are called the secondary qualities. For example, taste, colour, smell etc. of an object.

Thus it can be seen that primary qualities and the secondary qualities are not same. Some of the basic distinctions between these two are :

(i) Primary qualities are the inherent properties of an object. They are the fundamental qualities of an object in the sense that they are the objective qualities and the necessary properties of an object. On the other hand, secondary qualities are not fundamental to an object since they depend on the knower's mind.

(ii) Primary qualities remain unchanged through all the changes of time

and place. For example, the shape, extension etc. of an object remain unchanged in all occassions. But secondary qualities may be changed from person to person, from place to place. For example, the taste or smell of an object may vary from person to person.

(iii) According to Locke, the external objects are the main shelter or the abode of the primary qualities. On the other hand, both the external object and the knower's mind are the shelter or the abode of the secondary qualities.

(iv) Primary qualities reflect the idea of the mind directly because they are the unchanging properties of something. But secondary qualities may appear differently to different individuals. Locke is of the view that secondary qualities are some of the sensations generated by the primary qualities.

(v) Since the primary qualities are objective, therefore they can only determine the original nature of an object. But secondary qualities are mind dependent. Therefore, they can not determine the exact nature of an object.

Thus Locke, by distinguishing between primary qualities and secondary qualities, gives a scientific interpretation of the nature of the external objects. He does also opine that we can know an object only by the representation or copy of the object. Therefore Locke's scientific realism is also regarded as Representationalism.

Some of the main characteristics of scientific realism of Locke are :

(i) Like the other forms of realism, scientific realism also asserts that the object of knowledge is independent of the knower's mind.

(ii) We can not know an object directly. We can know it by its qualities. Primary qualities are independent of the knower's mind. On the contrary, secondary qualities are mind dependent.

(iii) We can not see an object. We can see only the copies or images of the objects.

(iv) The process of knowledge is totally an independent process. The nature of an object is not affected by this process. Only copies or images are affected by this process.

(v) According to scientific realism knowledge is an indirect process. It is indirect in the sense that the object of knowledge can not be comprehended by the knower. Only the copy or image of an object is known by the knower.

(vi) The original nature of an object can be manifested by the primary qualities only, because they are the unchanging and objective properties of an object.

Thus in the scientific realism of Locke we see that an object remains unknown and unknowable. Our mind or consciousness functions like a screen. The subject matter of our knowledge is mirrored on this screen and reflected in the form of ideas. Therefore, knowledge

can be obtained by the representations of the external objects. Thus the possibility of direct knowledge is ruled out by Locke. Therefore, knowledge is an indirect process.

- **Criticism :**

(i) According to Locke, the knowledge of the external object is unknown and unknowable. Thus, we can see that Locke restricts the limit of knowledge and closes the door of certainty of knowledge permanently.

(ii) According to Locke, the correspondence of an object to its ideas, gives knowledge. If there is no correspondence of the object to its ideas then knowledge is proved to be false. But Locke is of the view that we can not percieve a thing directly. If it is the case then how can we verify whether there is any correspondence between the object of knowledge and its ideas? As such this theory can not distinguish between truth and falsity of knowledge.

(iii) Locke's distinction between primary and secondary quality is not satisfactory. As George Berkeley has remarked, like the secondary qualities, the primary qualities are also mind dependent. For example, the weight of an object varies from individual to individual.

(iv) Locke's scientific realism divides the world into two parts– objective world and the subjective world. But he fails to engulf a bridge between these two worlds by his vain attempt by the images of the objects.

(v) One can experience the downfall of realism in Locke's philosophy for his inclination to idealism in the form of mind dependent secondary qualities.

Though Locke's scientific realism has come in for severe criticism, yet in the epistemological solution of philosophical problem it occupies an important place. Very specifically, it succeded in overcoming the mistakes committed by the naive realists. Though it is criticised as a blending of realism-idealism, yet indirectly Locke's inclination to idealism helps to solve many epistemological problems. As Kant has rightly said that in the knowledge process neither realism nor idealism by itself is sufficient

SUMMARY

The central theme of realism is that the object of knowledge is independent of the knowing mind. But on the basis of the whole or the partial independence of the object on the knower's mind, realism is divided into four types. Naive or popular realism is the simplest form of realism. It is also known as natural realism and commonsense view of the external world. Naive realism says that the nature of an object is as like as we percieve it. Though it is one of the popular theories among ordinary man, from the point of view of philosophy it is a very weak theory.

John Locke is the founder of scientific realism. According to Locke, we can not know an object, but its copies or images. A thing is known by its qualities. Qualities are of two types– Primary quality and Secondary quality. Primary qualities are the fundamental qualities as they are unchanging and the objective properties of something. Secondary qualities are changing mind dependent and subjective.

According to Locke, external objects are unknown and unknowable. His realism is known by various names such as scientific realism, representationalism etc. We can see Locke's inclination to idealism when he says that secondary qualities are mind dependent. Though Locke could reform the mistakes of the naive realists, yet his scientific realism is also vehemently criticised. Yet it bears a lot of significance in the history of epistemology.

PROBABLE QUESTIONS

1. What is naive realism? Write the characteristics of naive realism.
2. What is scientific realism? What are the characteristics of it?
3. Distinguish between primary qualities and secondary qualities.
4. Is Locke's scientific realism a satisfactory theory? Give reasons.
5. Write short notes :
   (a) Naive or Popular Realism
   (b) Primary quality
   (c) Secondary quality
   (d) Representationalism of John Locke
6. Distinguish between naive and scientific realism.

Unit-VI

IDEALISM : SUBJECTIVE & OBJECTIVE

By studying this unit you will be able to know Idealisim and its kinds.

Contents

- Subjective Idealisim.
- Objective Idealism.

• Introduction :

Knowledge is the apprehension of the relation between the knower and the object of knowledge. The knower is the subject of knowledge and the object of knowledge is called as known. The relation which is created between the knower and the known is knowledge. This relation is internal and not external. Regarding this relation between the knower and the known a question is naturally raised in philopophy- whether the object of knowledge is dependent on the knowing mind, or it is independent of the knowing mind? In this context we find two theories. Some philosophers hold that the object of knowledge is independent of the knowing mind. This view is called Realism. On the other hand, some philosophers hold that the object of knowledge is dependent on the knowing mind. According to them, objects can not exist independently of the knowing mind. This view is called Idealism and the supporters of this view are called Idealists.

Already we come to know that knowledge is the relation between the knower and the known. According to the Idealists, the object which is independent of the knowing mind can never be known. Because the object which is not related to the mind, is impossible to be known. Like can know like. Hence anything non-mental can not be known. All objects of knowledge, therefore, are dependent on the knowing mind. This means that there is nothing independent of the mind and its ideas. Mind or the self is the ultimate reality, all objects are mental. Rene Descartes, who is regarded as the father of Modern Philosophy, says that things can be doubted; but the mind or the self can not be doubted. Because it is self which doubts other. His famous saying is ''Cogito ergo sum'', I think, therefore I exit; Thus according to the Idealists, mind or self is the Ultimate Reality and objects of knowledge depend on mind.

Plato, the apostle of great Socrates, is generally regarded as the founder of Idealism in Western Philosophy. According to him this world and its objects are contingent. Physical objects are regarded by Plato as particulars. Particulars are always destructible. Behind

these particulars there are universals or concepts. These universals are eternal and not changeable. Universals are spiritual or ideal. Plato says that this is the real world, eternal and permanent. It is beyond of change. According to him the sensible world is like a shadow of the spiritual world.

Leibniz also contributes to the development of idealism. He says that Reality is eternal, existent and indivisible. He takes help of Greek Atomic theory to explain what is indivisible reality. According to the atomists, if we divide a material object into various parts; at last we find some particulars which are indivisible. These indivisible physical elements are called atoms. But atoms are material, extensive and indivisible according to the Greek Atomists. Therefore, Leibniz says that material atoms can not be ultimate Reality. He enquires into such atoms which are existent like material atoms even then indivisible and spiritual. Finally, he finds out that conscious as well as ideal atoms are Ultimate Realities. These are named as ''Monads'' by Leibniz. These are dynamic and innumerable. Therefore the theory of Leibniz is known as 'Pluralistic Idealism.'

According to Leibniz monads are independent of one another. Then question arises– how the monads exist in harmony and order. Leibniz replies this question in this way that God is the Highest Monad among all monads. He pre-established harmony among monads in the outset of creation of this universe. Thus, Leibniz introduced the ''Theory of Pre-established Harmony''.

Idealism is divided into two types :

(1) Subjective Idealism,

(2) Objective Idealism.

- **Subjective Idealism :**

According to Subjective Idealism, only ideas can be known or have any reality. Nature has no objective existence independent of the mind that perceives it. George Berkeley (who was born in 1685 in Ireland) is known as the first clear cut Subjective idealist in modern period in the West. He developed the empiricism of Locke to its logical consequence in Subjective Idealism. According to Locke, there are two types of qualities of object– (a) Primary and (b) Secondary. Primary qualities exist in things, independent of knowing minds and are not changeable. On the other hand, secondary qualities are dependent on the knowing mind, they do not exist in things and also vary from person to person. Berkeley holds that this distinction of qualities which is made by Locke is unpsychological. Berkeley propounded his doctrine in his three books– (1) Essay towards a new theory of vision (1709), (2) The Principles of human knowledge (1710), and (3) Three Dialogues between Hylas and Philonous (1713). Berkeley's Subjective Idealism may be stated thus. Matter is nothing but

a cluster of qualities. All qualities, both primary and secondary are nothing but subjective states or ideas of our mind. Hence, Berkeley argues that the existence of a thing consists in its being perceived. This is characterised by Berkeley's slogan: ''Esse est percipii'' or ''To be is to be perceived or to perceive''. It means that something only exists when it is being perceived (seen, felt etc.) by an observing subject.

If all knowledge comes from experience, as Locke holds, we know nothing except our ideas. Then the concept of extramental matter is dogmatic and superfluous.

Formulated in these terms Berkeley's Idealism may be regarded as subjective and psychological. Because the external world is appropriated by individual consciousness.

In this position the material world will lose its existence and unity when it is unperceived by other minds. It is the individual subject alone that will determine the external world outside us is neither hot nor cold, neither bright nor dark, neither sweet nor sour, neither fragrant nor foul smelling, neither mobile nor immobile. Similarly Locke's assumption of the reality of matter as an unknown and unknownable substratum of primary qualities is dogmatic and arbitrary according to Berkeley. There is no objective existence of bodies outside the mind. In addition to the mere existence of ideas, there are two characteristics of our sense experience-1) Its necessity and 2) orderly coherence. Berkeley illustrates this point with an example that when in broad day light, we open our eyes, it is not in our power to choose whether we shall see or not, what objects we shall see or not. Sensations are not determined by my will. But ideas are the effects of human will. It means that our ideas require some cause beyond our unthinking matter. Berkeley maintains that it is active substance or spirit. In this phase Berkeley's idealism is subjective through and through. It may be equated with solipsism. Solipsism is the doctrine which holds that one' self alone exists.

But such a view creates difficulties in many ways. Firstly when an individual does not perceive an object, will it cease to exist? Secondly it is impossible for any person to perceive all things at a time.

To solve these problems Berkeley shifted his ground of idealism from the finite mind to the Infinite Mind. In order to maintain continuity and unity of existence of things, Berkeley introduces God as the immediate cause of all of our perceptions, all as permanent ideas in God's mind. Now this second phase of idealism of Berkeley may be said to be a revival of Platonic Idealism. In this phase an idea is not a phenomenon of a finite mind, but a real constituent of Divine Mind.

Criticism : Realists of the present day have severely criticized Berkeley's subjective idealism–

(1) Moore, a modern realist, points out that for a sound theory of knowledge distinction must be accepted between object and sensation.

(2) An object first exists, then it is known or perceived.

(3) For Berkeley, sensible object is identical with sensation. But it is not so. Inseparability between sensation and object of sensation, does not prove identity.

(4) Solipsism is the logical outcome of Berkeley's doctrine of 'esse- est percipii.' The concept of God as the Infinite Perceiver of objects saves Berkeley from lapsing into solipsism. But rather it proves the weakness of his theory. Pure Subjective Idealism is not acceptable.

Critics of Berkeley have raised the question whether Berkeley is to be regarded as a Subjective or an Objective Idealist. The later phase of Berkeley's Idealism seems to have objective character. But most critics hold that Berkeley's idealism cannot be regarded as Objective Idealism.

- **Objective Idealism :**

According to objective idealism, all objects are identical with some idea and the ideal knowledge is itself the system of ideas. Unlike the other forms of idealism, this is ***monistic***– there is only mind in which reality is created. Objective idealism supposes the world to consist of exemplifications of universals which have their being independent of the mind. Objective idealism accepts common sense realism (the view that material objects exist) but rejects naturalism (according to which the mind and spiritual values have emerged from material things). Objective idealism is better known as absolute idealism. It is associated with the philosophy of Hegel.

- **Objective idealism of Hegel :**

The objective idealism of Hegel is the culmination of idealism in European philosophy. According to Hegel, the ultimate idea is the Ultimate Reality. All our finite ideas are included at last in the Absolute. The Absolute manifests its consciousness through finite ideas. This is the inherent Supreme Reality of this world.

Objective idealism, as Hegel formulates it, consists in postulating the ultimate reality as Absolute Idea or Thought or Mind. The Absolute Idea is the alpha and omega of all that is and is known. The relation between the Absolute Idea and the world of things and minds is that the one cannot be without the other, just as neither of the organs and the organism can be without the other.

Hegel's Absolute Reality is living as well as dynamic. It manifests its own being in and through the diversity of this world. The Absolute is incomplete without this world. It is inevitable for the Absolute for the realization of self consciousness. Inner conflicts of thoughts are there. But these are the mysteries of the Absolute. Conflicts are synthesized and

harmonized in the bosom of the Absolute. 'Thought and Reality are at bottom identical' according to Hegel. This is Hegel's famous contention in his thought. Thus the manifestation of the Absolute through the finite is revealed as more luminous and more beautiful. Hegel's idealism admits the reality of the world. It tries to reconcile idealism and realism recognising the due status of the world. It is real manifestation of the Absolute. In Hegel's view neither the world loses its value nor the Absolute becomes limited. Thus, we find that Idealism is best expressed in Hegel's objective Idealism.

However, Hegel's objective idealism also faces criticisms of modern realists. G.E. Moore, offers his criticism from the analytic philosophical framework. Bertrand Russell's *The Problems of Philosophy,* is another critic of this kind although it is mainly written for a general audience rather than academia. ***Soren Kierkegaard*** argued against the famous dictum of Hegel, that'What is rational is actual, and what is actual is rational,' that it can not be so for any individual, because both reality and humans are incomplete. ***Neitzsche*** is the first to mount a logically serious criticism of idealism in his book ''Beyond Good and Evil''. Despite various criticisms from many other fronts, Idealism retains its strong fascination for many. British philosopher Bradley was a notable follower of Hegel's philosophy of objective idealism. American philosopher Josiah Royce described himself as an objective idealist. Hegel's philosophy most closely resembles that of Plato and Plotinus. None of these three thinkers associates their idealism with the ***epistemological*** thesis that what we know are 'ideas' in our minds.

SUMMARY

Idealism is a term originating in the concept of ideas in the mind. In philosophy the term refers to account for all objects in nature and experience as representations of the mind. Idealism broadly is of two types–

1. Subjective, and
2. Objective.

Subjective idealism holds that only ideas can be known or have any reality. Berkeley may be said to be the founder of subjective idealism in the modern period.

Objective idealism holds that all objects are identical with some idea and the ideal knowledge is itself the system of ideas. It also known as absolute idealism. Its main advocate is Hegel.

PROBABLE QUESTIONS

1. Define Idealism.
2. Who is the founder of Idealism in western philosophy?
3. Who is the propounder of ‘‘Esse-est-percipii’’?
4. The theory of ‘‘pre-established harmony’’ was propounded by whom?
5. What is subjective Idealism?
6. Write note on Hegel’s objective Idealism.

Unit-VII

ETHICS AND PURUSARTHAS

After reading this chapter you will be able to:

● understand what is meant by the terms 'Ethics', 'Ethos', 'Moral', 'Mores'. Motive, Intention... ● realize that Ethics prepares the way for virtuous lives by enabling men to know and to do what is right...● understand the actual meaning of Purusartha– Dharma, Artha, Kāma and Mokṣa and its importance in human life.

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7.2. Definition of Ethics
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7.7. Object of Moral Judgement
7.8. Purusartha– Dharma, Artha, Kāma, Mokṣa.

7.1. Introduction :

Men are rational social beings and so, live with moral values. We have faith in morality and believe in right and wrong, good and evil, virtue and vice etc. We get these ideas from our social environment. But normally we do not indulge in rational reflection on the nature of right and wrong. But Ethics is the science of reflective morality. It converts our moral faith into a rational insight. It investigates the nature and validity of rightness and wrongness of human conduct with reference to the ideal of the Highest Good.

7.2. The Definition of Ethics :

The word 'Ethics' is derived from the Greek word 'Ethica'. 'Ethica is also derived from the word 'Ethos'. 'Ethos' means character, customs, usages or habits.

Ethics is also called Moral philosophy. The word 'Moral' comes from the Latin word 'Mores' which means customs or habits.

Ethics may be briefly defined as the 'science of morality' or as "the study of right conduct - or duty." It is the science which explains the facts of moral life and also indicates the course in which human activities are to be directed. It is essentially an investigation into the notions of good and bad, right and wrong and the connected notion of duty as applied to conduct.

Ethics is the science of rightness and wrongness of conduct. But conduct is the exponent of character. The character of a person finds its expression in and through his conduct. Character is the inner counterpart of conduct. Hence, Ethics may also be defined as the science of character as expressing itself in right or wrong conduct or action.

The notions of right and wrong, good and bad are meaningless without any reference to the idea of Ultimate end or Highest Good. Thus, ethics is sometimes defined as the 'science of the Highest Good'. Mackenzie defines Ethics as 'the study of what is right or good in human conduct' or 'the science of the ideal involved in human life.' The ideal involved in human life includes 'Truth', 'Good', and 'Beauty'. Ethics is the Science of Moral Good of man.

7.3. The Nature of Ethics

Ethics is a Normative Science. Ethics is a science which is systematic knowledge. It is a science because it depends upon observation, classification and explanation of human conduct with reference to an ideal. It deals with human conduct together with the inner volitions and their motives systematically.

But Ethics is not a positive science. It is not concerned with the nature, origin and growth of human conduct. It does not explain human actions by means of certain laws. It is not concerned with conduct as a fact. It is concerned with judgement upon conduct, its rightness or wrongness. Ethics is not concerned with human conduct as it is but as it ought to be. It is not concerned with judgement of fact, but with judgement of value. Judgements of facts are judgements of what is. Judgements of value are judgements of what ought to be. Thus, Ethics in not a positive science, but a normative science.

Normative sciences seek to determine Norms, Ideals, Standards. There are three Ideals of human life viz., Truth, Beauty and Good. These are the supreme values in human experience. Truth is the ideal of knowledge. Good is the ideal of will. Beauty is the ideal of feeling. Ethics is the science of Good.

Ethics in not a practical science

A science teaches us to know, and an art to do. But a practical science teaches us to know how to do. It lies midway between science and art. A practical science is concerned with means for the realization of a definite end. For example, medical science is a practical science, because it does not seek to determine the ideal of health but points to the means by which one may be healthy. In this sense, Ethics cannot be regarded as a practical science. Ethics merely tries to ascertain the moral ideal, but does not lay down rules or means for the attainment of it. It does not teach us how to live a moral life.

The term 'practical' as applied to Ethics, has been criticised by Mackenzie. He says that Ethics, though a normative science, is not to be regarded as a practical science. It gives us a knowledge of the guiding principles of life, but does not tell us how to apply them. It is not concerned with the means to the end or goal. It tells us what the virtue is, but it cannot make us a saint.

Thus Ethics, though a normative science, is not a practical science. But the study of Ethics has a bearing on our moral life. Its study definitely affects our behaviour, acts and character, but we cannot thereby call it practical science. Ethics is a theory of morality and theory is bound to act on practice. It influences our practice. But this does not make Ethics a practical science.

7.4. Scope of Ethics :

The scope of Ethics is the range of its subject matter. We may point out here the more important problems with which Ethics deals.

1. Ethics is primarily concerned with the moral attributes of rightness and wrongness of human actions. Here actions mean voluntary actions and habitual actions. Ethics, therefore, discusses the nature of voluntary actions, the distinction between voluntary and non-voluntary actions and other related topics like desire, motive, intention etc.

2. The most important question with regard to moral judgement is that of the moral standard by which we judge actions. The question of moral standard is intimately related to the question of the ultimate end or the highest good. Different thinkers have laid down different moral ideals. According to some it is a Law. To some others it is pleasure or happiness; to some it is duty for duty's sake. According to some others again it is perfection or self-realization. So, ascertainment of moral ideal or ultimate end is the subject matter of Ethics.

3. The consciousness of right and wrong is accompanied by the consciousness of 'oughtness', 'duty' or moral-obligation. When we perceive something to be right, we feel under moral obligation to do it. When we perceive something to be wrong, we feel under moral obligation not to do it. Ethics, therefore, has to account for this sense of duty or moral obligation.

4. Our right actions have merit and our wrong actions have demerit. Ethics enquires into the criterion of merit and demerit. It tries to find out what makes an action meritorious. Merit and demerit are called deserts. They are investigated by Ethics.

5. Ethics deals with moral judgement which leads to the questions as to which is the real subject of moral judgement. It has to enquire what should be the object of moral judgement and what is the nature of the moral judgement.

6. Every science has certain fundamental postulates. Personality, Reason, Freedom of will are the postulates of Ethics. Ethics, therefore, concerns itself with the discussion of these postulates.

7. Ethics discusses the nature of human freedom. We are responsible for our own actions. Ethics, therefore, enquires into the nature of responsibility. Criminals are responsible for their crimes. So they

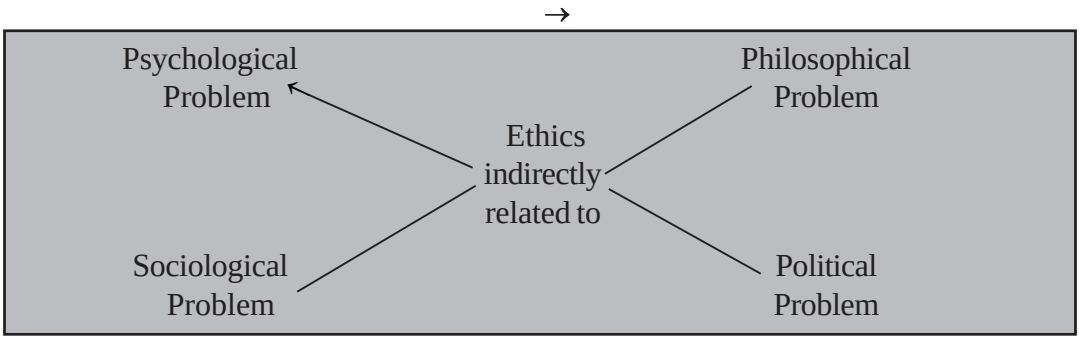
ought to be punished. Ethics gives the moral justification for punishment.

8. Ethics determines the nature and kinds of rights, duties and virtues determined by the ultimate moral standard. Virtue and vice come within its scope.

9. Besides, Ethics deals with moral sentiment. Moral sentiment means the feelings arising in the mind in connection with moral ideals and judgements. The questions like nature and origin of moral sentiment and its relation to moral judgement are discussed in Ethics.

10. The main moral words we use in Ethics are good, bad, right, wrong etc. The field of enquiry that considers the meaning and inter-relations of meaning of ethical words is called meta-ethics. The term meta-ethics was introduced in Ethics by the logical positivists. According to them it is a section of ethics which elaborated the problems of the epistemological and logical nature of ethics in terms of language. Meta-ethics does not propound any moral principles. It consists entirely of philosophical analysis. Thus, the revival of philosophical interest in the working of language has brought about a profound change in the field of meta-ethics.

Though Ethics has a province of its own, yet it is not entirely divorced from all other departments of study. It has indirectly to treat of several problems which are psychological, philosophical, sociological and political in nature.



The psychological problems are those of the nature of voluntary actions, springs of actions, relation between desire and pleasure.

The philosophical problems are those of the nature of human personality, freedom of the will, immortality of the soul, God, man's place in the universe.

The sociological problem is that of the relation of the individual to the society.

The political problem is that of the relation of the individual to the state, the ethical basis and moral functions of the state.

7.5. Moral and Non-Moral Actions:

Moral actions are those actions in which moral quality i.e., rightness or wrongness is present. Non-moral actions are those actions that are devoid of moral quality.

All actions are not objects of moral judgement. Only voluntary and habitual actions are objects of moral judgement. By a voluntary action we mean an action that is performed by a rational agent with desire, pre-vision and choice of ends and means. Therefore, they are objects of moral judgement. Habits are the results of repeated voluntary actions. They are also objects of moral judgement.

Non-voluntary actions are non-moral. Following classes of actions which are non-voluntary are non-moral. These actions are outside the moral sphere and are not objects of moral judgement.

1. Actions of inanimate things. For example, hurricanes, floods etc.

2. Spontaneous or random actions – i.e., actions that are the results of spontaneous outflow of energy from never centres.

3. Reflex action – i.e., automatic response to sensory stimulation from without.

4. Instinctive actions : Instinctive tendencies are found most explicitly in lower animals – in seeking food, in self-defence, attack of enemies etc.

5. Imitative actions– Imitative movements seen in children and many animals.

Moreover Ideo-motor actions, accidental actions, actions of children and insane persons, actions of idiots and actions under hypnotic suggestion are devoid of moral quality. They, therefore, are not objects of moral judgement. They cannot be characterised as right or wrong.

We come, then to a conclusion that voluntary actions and habitual actions are moral actions. The following table shows the different classes of Moral and Non-moral actions.

Table- 1

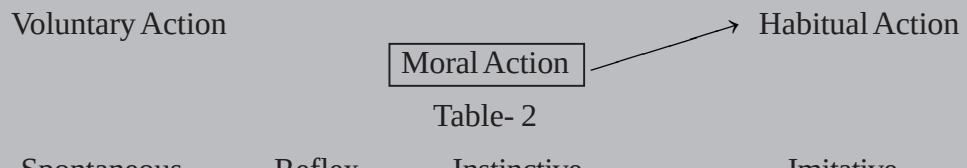
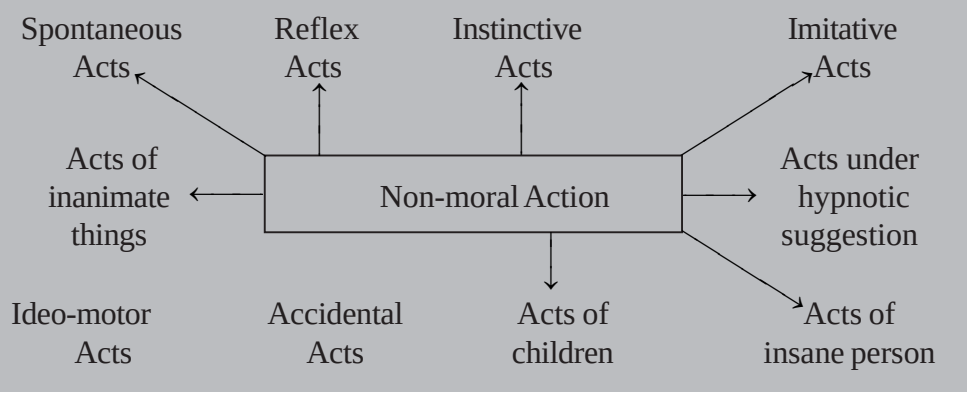


Table- 2



7.6. Analysis of Voluntary Action :

A Voluntary action has three stages, viz., 1. The mental stage, 2. Bodily stage, 3. External stage of consequences.

1. Mental Stage: (a) The spring of action: Every voluntary action springs out of some want or need. This feeling of want may be actual or ideal. The feeling of want is always painful. But it is usually mingled with pleasure which arises from the anticipation of satisfaction of the want in future.

(b) End or Motive: The feeling of want leads the rational agent to think out some appropriate object which is necessary to relieve the want. The object itself to remove the want, is said to be the end of the action. The idea or thought of the object which excites the state of desire for its attainment is called the motive.

(c) Desire : The spring of action or the feeling of want is converted into a desire. Desire is a craving to satisfy a feeling of want by attaining its proper object. In desire there is the idea of the object or end or motive which will satisfy the feeling of want. There is also the idea of the means for realising the end.

(d) Conflict of Desires: In a complex action many wants demand satisfaction. If one is satisfied, the other has to be rejected altogether. Thus, there arises in the mind a competition, rivalry or conflict between the different motives and desires.

(e) Deliberation : When there is a conflict of motives, the self arrests action and deliberates upon the merits and demerits of the different courses of action suggested by different motives. The self weighs them in the balance and considers the pros and cons. This is called deliberation.

(f) Decision or choice : After deliberation, the self chooses a particular motive and identifies itself with it. It chooses a particular course of action and rejects the rest. This act of selection of one motive to the exclusion of others is called choice or decision.

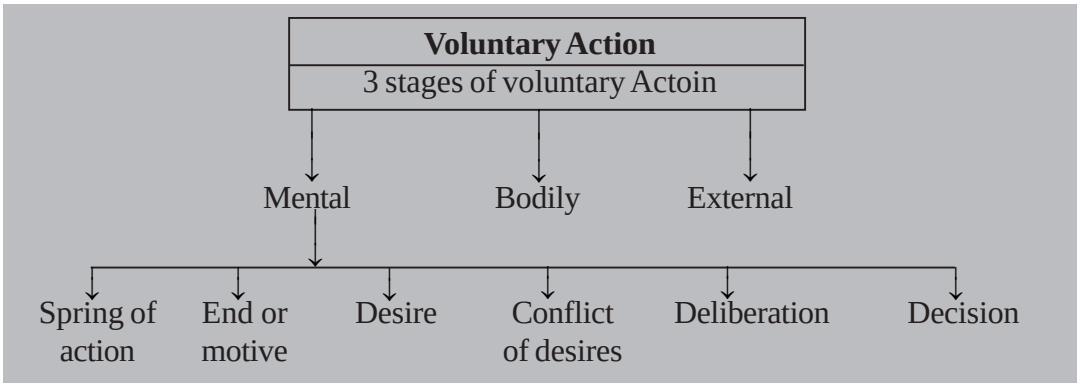
2. Organic or Bodily Stage : Next the action passes into the stage of organic work and muscular movements necessary for realising the end.

3. Final Stage of Completion or External stage of consequences : The bodily action produces changes in the external world. These changes are called consequences. They include the following :

1. Realisation of the chosen end or motive,
2. Realisation of the chosen means,
3. Certain foreseen consequences, and
4. Certain unforeseen, accidental consequences.

ACTIVITY

1. How far do our habitual actions come under the scope of moral judgement?
2. What is meant by conflict of desires? Can such a conflict be transcended?



7.7. Object of Moral Judgement :

We have seen before that voluntary actions and habitual actions are objects of moral judgement. We also know that every complete voluntary action involves internal and external factors. It consists of three main stages –

(1) The mental stage of spring of action, motive, intention, desire, deliberation, choice and resolution.

(2) Bodily stage.

(3) The external stage of consequences.

Now, the question arises– on which of the factors of an action does the moral quality depend?

(i) Do we judge an Act by its motives or its consequences?

There is a hot controversy between Hedonists and Intuitionists. The Hedonists maintain that the rightness or wrongness of an action depends upon the consequences, while the Intuitionists maintain that it depends upon the motive.

Is, then, the motive or the consequence of a voluntary action the object of moral judgement? Which of them determines its moral quality? When there is a harmony between the inner motive and the outer consequence, both are objects of moral judgement. Motive and consequence are not really opposed to each other. The consequence is the outer manifestation of the inner motive.

But sometimes it is found that the motive is good, but the consequence turns out to be bad. For example, a skillful surgeon performs an operation most carefully in order to cure a patient, but the patient dies. The consequence here is bad, but the motive is good.

Again sometimes the motive is bad, but the consequence turns out to be good. Thus, when there is a conflict between the inner motive and the outer consequence, the moral quality of an action is determined by the inner motive and not by the consequence.

(ii) Is Motive or Intention the object of Moral Judgement?

We should not judge an action by motive alone. Sometimes the motive is good, but the means employed for the attainment of the end are bad. For

example, a merchant adopts unfair means to gain wealth. His motive is gain which is not wrong. But he adopts wrong means. This makes his action wrong. If an act is judged by motive alone, we will thereby assume the dangerous principle that "the end justifies the means." which means that a good end justifies wicked means. Therefore, motive alone is not the object of moral judgement. The end never justifies the means.

Thus we come to the conclusion that 'intention' is the object of moral judgement. It includes the 'motive' or the idea of the 'end' as well as the idea of the 'means'. An action is good if its intention is good. Intention = motive + means + foreseen consequences. In other words, an action is right if both the end or motive and the means are good; an action is wrong if either of them is bad.

ACTIVITY

Do you agree with the view that end justifies the means?

SUMMARY

Ethics is the study which deals with human conduct in so far as this conduct may be considered right or wrong. It is also called Moral philosophy. Morality is the attempt to discover the nature of the good life and then to live it.

Ethics may be briefly defined as the science of morality or as the right conduct or duty.

Ethics is a normative science. It is not a positive science. Ethics is not concerned with human conduct as it is, but as it ought to be.

Ethics is not a practical science. A practical science is concerned with the means for the realisation of a definite end. But the study of Ethics has a bearing on our moral life.

The province or scope of Ethics – is the range of its subject matter. Ethics as the science of morality studies the contents or elements of moral consciousness, viz, (1) the ideas of rightness and wrongness, (2) of moral obligation and responsibility, (3) moral standard by which we judge action, (4) of merit and demerit, (5) object of moral judgement, (6) postulates of morality, (7) of virtue and vice, (8) moral sentiments, (9) concept of meta-ethics.

Moral actions are those actions in which moral quality i.e., rightness or wrongness is present. Non-moral actions are devoid of moral quality.

All actions are not objects of moral judgement. Only voluntary and habitual actions are the objects of moral judgement.

Non-voluntary actions are non moral and are not-objects of moral judgement.

A voluntary action has three stages– mental, bodily and external Mental stage– spring of action, motive, desire, conflict of desires, deliberation, decision or choice.

Bodily stage – When choice or resolution has been made, it is converted into bodily action.

External stage – The bodily action produces changes in the external word.

Voluntary actions and habitual actions are the objects of moral judgement.

The moral quality of a voluntary action depends not upon the actual external consequences or results, but upon the intention. Because it includes the motive or the idea of the end as well as the idea of the means. Thus, it is intention including motive that determines the moral quality of an action.

PROBABLE QUESTIONS

1. Answer the following:
   (a) What is Ethics?
   (b) What is Voluntary Action?
   (c) What is habitual Action?
   (d) Why is Ethics called a Normative Science?
   (e) What are three stages of Voluntary Action?
2. Distinguish between:
   (a) Positive Science and Normative Science.
   (b) Moral and Non-Moral action.
   (c) Motive and Intention.
3. Define:
   (a) Ethics
   (b) Positive Science
   (c) Practical Science
   (d) Normative Science
   (e) Moral Science
4. Write short notes on:
   (a) Normative Science.
   (b) Scope of Ethics.
   (c) Conflict of desires.
   (d) Mental stage of Voluntary Action.
   (e) Non-moral Action.

5. Define Ethics and indicate its scope.
6. Can Ethics be called a practical science?
7. Explain the nature of Ethics.
8. Distinguish between Positive Science and Normative Science.
9. Why is Ethics called a Normative Science?
10. Explain the difference between Moral and Non-moral Action.
11. What is Voluntary Action? Describe the successive stages of Voluntary Action.
12. What is object of moral judgement? Give a reasoned answer.
13. Do you agree with the view that "end justifies the means"?

7.8. Purusarthas– Dharma, Artha, Kāma, Mokṣa.

Introduction : The Hindu social organisation is regulated by certain spiritual principles. According to Hindu philosophy, the ultimate aim of human life is to attain Mokṣa. But it is only possible when there is proper management of activities and conduct.

Hence on the one side, we find Ashrama system and on the other side the Varna system. Both the systems function as an institution which enables individual to attain purusarthas.

The idea of purusarthas is the fundamental value system of Indian ethics. According to it, the aim of every person in the world is to attain the four purusarthas – (i) Dharma, (ii) Artha, (iii) Kāma, (iv) Mokṣa.

Dharma :

Dharma occupies a very important place and position in Hindu social organisation. In our system everything is done in the name of dharma. The society does not tolerate anything which is based on a-dharma.

Dharma is the code of right action. Dharma implies the laws or principles on which society is based. Once this righteous conduct is developed, one can try to secure the objects of one's desire. Money and satisfaction of desire, therefore, will not mislead a person.

"Dharma, according to the Mahabharata, is created for the well-being of all creation. All that is free from doing harm to any created being is certainly dharma..." Thus dharma protects all. It is capable of preserving the universe. Thus, in principle, the social implication of dharma is to regulate human behaviour towards the path of righteousness.

In other words, Dharma does not mean a creed or religion. It denotes a mode of

life or a code of conduct. It regulates the work and conduct of a man as a member of society. The aim of Dharma is to bring the gradual development of a man and to enable him to reach the goal of human existence.

Artha (wealth) :

The next purusartha after Dharma is Artha. It has been given an important place in Indian culture. Kautilya* has defined Artha in his Arthashastra** as, 'The livelihood of human beings is the Artha'.

Artha refers to wealth and power. Man is unable to conduct his life without the material means of living, because material aspect is as important as any other aspect of life. Man is not only spirit, he is body too. Our body demands certain things. To satisfy the demands of the body we need bread, clothes, house, items of luxuries at times. We should try to earn money so that we may satisfy these demands. But the satisfaction of our desires and earning of wealth must be obtained on the basis of our righteous conduct. One must not try to fulfil one's wants and desires in an unrighteous manner. The Hindu thinkers give more stress on means rather than on ends. If the means for earning wealth are good the ends will be justified. Such a wealth will give prosperity both to the individual as well as to the society.

Kāma :

The third Purusartha is Kāma. Kāma has been literally defined as desire. Desire is the motivating power of all activities. Among the several aspects of the human mind, the desire aspect is, according to the Hindu thinkers, significant. The nature of man is largely the nature of his desires.

Kāma is the cause of mutual attraction among different living beings. It is the basis of creation. It is essential for increase of race. But it has been insisted by the Hindu thinkers that Kāma must be based on Dharma. No enjoyment should be aimed at which is anti-social. They however, make it clear that the urge for Kāma becomes a curse when it does not take into consideration the proper time and place. When time and place is not taken into consideration it can result in evil

** Kautilya or Chanakya (350-283 B. C.) was an adviser to the 1st Mauryan emperor Chandragupta (340–293 B. C). He has been considered as the pioneer of the field of economics and political science. Kautilya was the scholar at Takshashila (ancient Indian University) and later the Prime Minister of Maurya.*

*** Arthashastra was composed and written by Kautilya. Arthashastra is so comprehensive that it has left no aspect of social life untouched. In fact, it is an ancient Indian treatise on statecraft economic policy and military strategy.*

consequence and defame. Therefore, it is important in the regulation of social life.

Mokṣa :

The whole Hindu social system and organisation aims at Moksa. It is the desire and will of every Hindu that he or she should attain Mokṣa, i.e., salvation, when the soul rises above all activities of worldly life. It then rests in eternal peace and does not suffer the tortures of life and death. This is considered to be the supreme and ultimate end of human life. It is pure bliss. It is the unity of the Atman with Brahman. It is the absolute aim. It is the highest value of human life.

Dharma, Artha, Kāma are the instruments which enable man to attain this supreme end. The Hindu thinkers, therefore, insist on cultivation of these four ends of life. This will enable an individual to understand the proper significance of every value.

Thus individual life should begin from righteous conduct and should end in liberation.

According to most of the schools of Indian philosophy, the success of human life lies in the attainment of Mokṣa. The ultimate end of Buddha's philosophy is 'Nirvana'. Extinction of suffering is called Nirvana. It is a state of perfect peace. The Nyāya and the Vaisesika look upon the existence of the self in its natural condition as liberation. It consists in absolute cessation of pain.

The Mimaṁsa philosophy also considers complete destruction of merit and demerit and absolute extinction of pain as liberation. The Sankhya considers absolute negation of "threefold sufferings"* as release.According to Advaita philosophy of Sankara, Mokṣa is the realisation of the absolute identity or oneness of the self with the Highest Reality, Brahman. Mokṣa is liberation of the self from avidya (ignorance).

The different systems of Indian philosophy lay down the means to the attainment of liberation. The path of knowledge or Jñānamarga, path of Karma or Karmamarga, path of devotion or Bhaktimarga are some of them.

Thus, the philosophical bases of the Hindu social organization are material as well as spiritual. Of the four Purusarthas almost all have a social basis. K ma is a natural tendency in every person. Wealth is the means of fulfilment of Kāma and other needs and the life system of society. Dharma implies the laws or principles on which society is based. Besides trivargas (Kāma, Artha, and Dharma), Mokṣa is also important in human life. In this way, it is clear that with regard to the aim of life, Indian ethics emphasizes an integral approach.

**Three kinds of suffering are– (i) adhyatmika, (2) adhibhautika and (3) adhidaivika. The suffering due to bodily disorders and mental agitation are of the first kind; those caused by men, beasts, birds, reptiles are of second kind; and those caused by super-natural agencies, planets, ghosts, demons etc. are of the third kind .*

SUMMARY

● – According to Hindu Dharmashastras the purusarthas are four in number,
– Dharma, Artha, Kāma and Mokṣa.

● – Dharma is the code of right action.

● – The term Artha refers to worldly prosperity such as wealth and power.

● – The concept of Kāma refers to enjoyment and the satisfaction of senses.

● – Mokṣa (liberation) is a state when soul attains purity, and all the miseries, pains and discomforts of life are destroyed forever. It is the state when our soul experiences an eternal joy and bliss.

Thus, Indian thinkers have insisted upon a harmony between Dharma, Artha, Kāma and Mokṣa.

PROBABLE QUESTIONS

1. Answer the following :
   (a) What is meant by Purusartha?
   (b) What are the four Purusarthas of life?
   (c) Explain the meaning of Kāma.
   (d) Explain the meaning of Artha.
2. What is Mokṣa or Liberation? How do the different systems of Indian Philosophy conceive its nature?
3. Explain the concept of Dharma.
4. What is the social significance of the concept of Purusartha? Give a reasoned answer.

Unit-VIII

RELIGION : ITS MEANING AND NATURE, RELIGION AND MORALITY

After reading this chapter you will know :

● What is religion? ● What is morality? ● The relation between religion and morality.

Contents

1. Meaning of religion.
2. Nature of religion.
3. Religion and morality.

Introduction :

Religion is one of the most important aspects of human life. From primitive time onwards, religion has played a significant role in society. In every age man has entertained religious beliefs and practices. So, it has been said that man is inherently religious. Religion is basically man's belief in a supernatural power or God on whom human beings depend for their well-being. In this chapter, we shall explain the meaning and nature of religion and its relation to mortality.

1. Meaning of Religion :

The word 'Religion' is derived from the Latin word 'religare' which means bond. Etymologically, religion means a bond which unites the human life as well as the social life. It is a principle of unification and harmonisation. This unification may be understood in two senses. In one sense, religion unifies individuals together. In other sense, it integrates or harmonises the personality of an individual. In religion, the whole of human being's personality is involved. The Indian term for the word 'religion' is 'dharma'. 'Dharma' is derived from the Sanskrit root 'dhri' which means 'to sustain'. So, 'Dharma is that which sustains life. It is the principle which sustains human society.

Religion is one of the most important aspects of human life. In some form or other it exists it every society whether primitive or modern. Although it is difficult to define religion as it is ever growing and dynamic, yet its essential traits may be indicated as follows.

(1) The motives and the driving forces in religion are the basic human wants and desires– survival, growth, well being, self-realization.

(2) Religion involves belief in a supreme power or powers on whom human beings depend for their well-being.

(3) Religion involves rituals which are believed to be ways of winning the favour of God or gods.

(4) Like all major human activities, religion assumes a social institutional form.

ACTIVITY :

- The word religion is derived from which word?
- What is the meaning of the word 'religare'?
- From which Sanskrit root, the word 'dharma' is derived?

2. The Nature of Religion :

The nature of religion may be approached in two ways. Firstly we may ask : What religion is in itself and secondly we may explain its inner nature by defining its relation to other forms of behaviour or activities.

Religion is generally defined as consisting in a belief in an everliving God as the Creator, Sustainer and Moral Governor of the world together with the feelings of awe, reverence, trust and love and the voluntary acts of devotion, dedication and worship. Thus, religion touches the whole man, the total individuality with all the aspects of life. All the three elements of human life viz., thinking, feeling and willing are involved in religion in a characteristic way.

Religion implies man's belief in God or gods and his attempts to commune with Him. Religion has two aspects viz. internal and external. The internal aspect refers to the intellectual and emotional elements present in consciouness i.e., ideas, thoughts and feelings concerning man's relation to God. The external aspect refers to the practical activities i.e., rites, ceremonies through which the religious feeling is expressed.

Religion also has an individual and a social aspect. In its individual aspect, religion is more or less a matter of individual experience and conviction of personal realisation, personal salvation. By the social aspect of religion we mean a spirit a devotion to the ideal of social unity and to all that is essential for its promotion and maintenance.

Religion is undeniably a feature of our personality which is constituted by the three elements of thinking, feeling and willing. But when we consider some of the prevalent definitions of religion, we find that they restrict religion to one or other of these elements. A critical estimate of these definitions may help us in understanding the nature of religion.

Some definitions make religion a matter of the intellect. For example, Hegel defined religion as ''the knowledge possessed by the finite mind of its nature as absolute mind.'' Looking at the matter from the divine side, religion is ''The Divine Spirit's knowledge of itself through the mediation of the finite spirit.'' Thus, for Hegel religion is a form of knowledge, the knowledge of the Absolute Idea involving the ultimate unity of the finite and the infinite.

It is evident that Hegel's definition of religion is too much intellectual. He puts emphasis on the logical character of the absolute in complete disregard of its conative and volitional aspect. In religion we not only have knowledge of God but also try to enter into moral and spiritual relationship with certain superhuman power or Reality whom we believe to be the master of our destiny. Religion devoid of feeling or devotion or worship and religious practices is nothing more than a barren abstraction.

Besides Hegel, others have also made religion to consist essentially of belief. For example, E.B. Tylor in his minimum definition of religion describes it as ''the belief in spiritual beings''. This definition is not satisfactory as it does not clearly say anything about the nature of spiritual beings. Max Muller's definition of religion as ''the perception or apprehension of the Infinite' is vague. Herbert Spencer defines religion as ''A hypothesis supposed to render the universe comprehensible''. This definition emphasises the intellectual aspect of religion which is by no means the only element of religious conciousness.

Others again define religion in terms of feeling or emotion. According to Schliermacher ''the essence of religion consists in feeling i.e. feeling disconnected from thought on the one hand and morality or action on the other. Religion is a warm, intimate, immediate awareness of the infinite in the finite, the Eternal in the temporal, a sense of dependence on the whole.''

Schliermacher saved religion from barren intellectualism and mere moralism. The essence of religion consists in its mystic inwardness as immediate awareness of God. But it may be pointed out that the element of feeling in religion cannot be mere feeling. It must have some ideal content and religious feeling cannot be separated from the idea as to make the former essential and the latter non essential.

Mc Taggart defines religon as ''an emotion resting on a conviction of harmony between ourselves and the universe at large''. This definition defines religion mainly in terms of emotion neglecting the element of action.

Religion has also been defined in terms of moral will, identifying religion with moral consciouness. For example, Kant defined religion as the ''recognition of all our duties as divine commandments. According to Mathew Arnold ''Religion is morality touched with emotion.'' Although religion and morality are closely connected experiences yet they are not to be indentified. In Kant's definition of religion there is no room left for the mystic experience of fellowship with God, prayer, reverence and worship which are characteristics of religious experience. Frazer defined religion as ''propitiation or conciliation of powers superior to man which are believed to direct and control

the course of nature and of human life''. His definition also emphasises the element of volition and action in religion.

According to Martineau, ''Religion is the belief in an everliving God, that is, in a Divine Mind and Will ruling the universe and holding moral relations with mankind.'' The defect of this definition is that it is only applicable to advanced religions.

Attempts have also been made in modern times to define religion in terms of value. Hoffding defines religion as ''faith in the conservation of values''. In its inner most essence, religion is not concerned with the comprehension but with the valuation of existence.

Hoffding has no doubt pointed out the most important element in religion. Man's religious consciousness certainly implies a faith in the highest value of life, faith in a good and sympathetic universe which will somehow back him up in his endeavour to realise and conserve his values. Man realises that his own powers are not sufficient for realising and conserving human good. So, he needs help from someone who is more than human power if his highest values are to be conserved and sustained. This religious faith reaches out to an omnipotent, ommniscient power working for righteousness. Man believes that there is ultimate harmony between human values and the nature of reality.

But Hoffding's axiom of the conservation of values fails to do justice to the active and purposive character of religious experience. He identifies religious consciousness too exclusively with feeling and too little with conation. He says, ''Religous experience is essentially religious feeling, the feeling which is determined by faith in the conservation of value.'' But the fact is that religion is not a mere passive faith in the conservation of values that already exists. It is also an experimental search for new values. Moreover, Hoffding's definition ignores the intimate and personal relation to a supreme being called God regarded as the source and ground of all values.

According to Flint, ''Religion is man's belief in a being or beings mightier than himself and inaccessible to his senses but not indifferent to his sentiments and actions, with the feelings and practices which flow from such a belief.'' This definition seems to be more or less satisfactory as it includes all the three elements of religion.

The most satisfactory view of the nature of Religion :

The above discussion makes it clear that neither feeling nor activity nor the intellect alone constitutes the true essence of religion. Against the partial truths of all the above mentioned definitions regarding the nature of religion we should bear in mind that religion does not occupy a part of man's nature but is a reaction of his whole being to a Supreme Being. Religion

involves a subject, an object and a relation of the subject to the object. On the subjective side, it includes man's psychical functions viz., feeling, will and thought. On the objective side, it has reference to a trans-subjective divine Reality. It further involves a living relation of the subject to that trans-subjective objective Reality in worship, fellowship and service. Such a relation is controlled by a purpose viz., the conservation and enhancement of human values both social and the individual, ultimately culminating in devotional love of the divine Reality for its own sake. Religious experience is more than a subjective state of consciouness. It points to a suprasensible world wherein values coincide with Reality. Religion is not a mere belief in a supra-sensible Reality as the source of all values. It is also the emotional reaction to that ultimate Reality which involves the adjustment of one's whole life so as to bring it into unity and harmony with such Reality.

ACTIVITY

- Name some major religions of the world.
- Who has defined religion in terms of values?

3. Religion and Morality :

Morality is the side of life which is regarded as nearest to religion. Morality and religion are usually recognised not only among the most influential forces of social control but also the most effective guides of human behaviour. Both morality and religion formulate rules of conduct within a particular framework of society for the highest personal and social good.

By religion we generally mean man's belief in a supreme power or God and his attempts to commune with Him. Religion involves thinking, feeling and willing Dr. Flint has defined religion as ''man's belief in a being or beings mightier than himself and inaccessible to his senses, but not indifferent to his sentiments and actions, with the feelings and practices which flow from such belief.''

The term 'Morality' literally means the science of customs or habits of men. It is the science of the highest good. Morality also means the rules of behaviour which are admitted at large in a community.

Historically, religion and morality have been like siamese twins. At the primitive age, morality and religion were not clearly distinguished and what there was of each seems almost identical with the other. In the ordinary life of an individual morality and religion are intimately connected with each other. But though morality and religion generally go together, yet they are not identical.

Regarding the relation between religion and morality there is a controversy whether religion precedes morality or morality precedes religion. In

this connection there are three main views which are as follows.

I. Religion is the source of morality:

According to Descartes, Locke and Paley, it is religion that make morality. God creates morality by his will. What is commanded by Him is right and what is forbidden by Him is wrong. Acts are right or wrong simply because they are commanded or forbidden by Him. Thus, morality arises out of religion.

But this view may be objected on the following grounds.

(i) It deprives God of moral character. It supposes that moral distinctions are dependent on His arbitrary will and are therefore reversible by Him. But the truth is that God is the perfect being and righteousness is an element of His nature. What is right or good is in harmony with His nature and what is wrong or bad is repugnant to Him. He cannot turn the right into wrong and the wrong into right for He cannot act against his moral nature. Thus, moral distinctions do not depend upon his arbitrary will, but upon his moral nature.

(2) Men obey the moral law simply because God is almighty and He will reward or punish them according as they obey or disobey these laws. But acts done out of fear of punishment or in the hope of reward can never have moral merit.

II. Morality is the source of religion :

According to Kant and Martineau, religion is not the source of morality but morality is the source of religion. Kant believes that happiness invariably accompanies virtue. The complete good is in harmony with happiness. We have a conviction that virtue will ultimately lead to happiness and vice to pain. But our experience shows that good people suffer while bad people enjoy themselves. But if the ethical order is to be true, this must not be so. Thus, Kant holds that there must be some personal and moral power behind the world that will ultimately combine virtue with happiness and vice with pain. This moral power is God. Hence, according to Kant, morality is the basis of religion.

Martineau also holds that morality leads to religion. Our conscience or moral faculty gives us an intuition of right and wrong and of the obligatoriness of right conduct. It is obligatory upon us to do what is right. Obligation means obligation to some higher authority. I am not the source of this moral obligation. If I were so, I could annul my sense of obligation at my pleasure. The society or state also cannot be the source of my moral obligation because it can not take cognizance of all my actions, motives and intentions. So, God who is omniscient and omnipresent must be the ultimate source of moral authority to whom obligation is ultimatly due and to whom we are responsible for our actions. Hence, Martineau holds that moral obligation and responsibility necessarily lead to the idea of God.

Further, our conscience or moral faculty provides us with an ideal of perfect moral excellence. This ideal of excellence is realised in God. Thus, according to Martineau, morality gives rise to the belief in God as the source of moral authority and as ideally perfect being.

III. Religion and morality are independent :

According to this view, religion and morality are independent of each other. Niether religion rises out of morality nor morality rises out of religion. But each springs from a distinct source in the human mind. Religion arises out of a 'feeling of dependence' on power or powers higher than man for self-preservation and well being. Morality again, arises from the idea and aspiration toward perfection of self. Morality thus springs up in the human mind at a higher stage of its development. Though religion and morality arise independently of each other, yet it is found that intellectual and moral developments lead to a final synthesis between the two.

The true view seems to be that neither religion precedes morality nor morality precedes religion but both are inter-dependent. Both religion and morality influence each other. Religion reacts upon morality and inspires and elevates it. Morality again reacts on religion and refines and purifies it. In normal experience, religion and morality interfuse and interpentrate each other. Moral values are likewise religious values. It is rightly believed that the religious man should be a morally good man. If morality appears to be a part of religion, religion in turn is judged by an ethical test. Thus religion and morality are closely connected and interdependent. There are certain points of similarity between religion and morality which are as follows.

Points of similarity :

Belief in God and immortality of the soul are common to religion and morality. Existence of God and immortality of the soul are the fundamental articles of faith in religion. Similarly, immortality of the soul and the existence of God are fundamental postulates of morality. The moral ideal is eternally realized in God who is an embodiment of moral perfection. Again, moral life demands that the soul does not perish along with the body.

Points of Dissimilarity :

However, closely religion and morality are connected there are following points of difference between them.

1. Religion has its centre in God while morality has its centre in man.

2. It is conceivable that there may be a purely humanistic morality which contains no reference to the supernatural but religion would lose its essential nature if all reference to the supernatural is excluded from it.

3. Religion is wider in scope than morality. Morality deals with goodness only but religion is more comprehensive as it includes other values i.e. the Beautiful, the True as well as the Good.

4. Morality implies progress towards the Infinite while religion implies progress within the Infinite.

5. Religion is more characteristically an emotional experience than morality. This is the difference that was expressed by Mathew Arnold's definition of religion as 'Morality touched by emotion.'

6. Morality depends entirely in the conciousness of freedom whereas religion moves in the opposite sphere of necessity.

Inspite of these distinctions between religion and morality, we must not ignore their deeper unity. They are stages of the developing spiritual life of man who moves upward to his divine goal. We can regard morality and religion as respectively a lower and a higher level of human experience, the lower leading to the higher. Morality is not self-sufficient; it is a phase of the spiritual life which points beyond itself. It raises problems which can find their solutions only in religion. Hence, religion is necessary to morality. Similarly, morality is neccessary to religion. Morality refines and purifies religion. The great prophets of all religions have emphasised on the ethical qualities of righteousness and love as attributes of God and of the truly religious life.

Thus, we can conclude that religion and morality are closely connected. Religion without morality is blind superstition and morality without religion is incomplete. Morality culminates in religion and religion finds its expression in morality. Religion and morality are partners in the spiritual enterprise of life. Both religion and morality are indispensable for a complete and integral development of the individual.

ACTIVITY

- What are the three elements involved in religion?
- Who said "Moral obligation and responsibility lead to the idea of God"?

SUMMARY

- The word 'religion' is derived from the Latin word 'religare'
- 'Religare' means bond or to bind.
- The word 'Dharma' is derived from the Sanskrit root 'dhri' which means to sustain. 'Dharma' is that which sustains life.
- Religion is generally defined as consisting in a belief in an everliving God as the Creator, Sustainer and Moral Governor of the world together with the feelings of awe, reverence, trust and love and the voluntary acts of devotion, dedication and worship.

- There are four main traits or characteristics of religion.
- Different thinkers have given different definitions of religion. Of these, Flint's definition is noteworthy. According to him, "Religion is man's belief in a being or beings mightier than himself and inaccessible to his senses but not indifferent to his sentiments and actions, with the feelings and practices which flow from such a belief.''
- There are three main views regarding the relation of religion to morality, whether religion precedes morality or morality precedes religion.
- According to Descartes, Locke and Paley religion is the source of morality.
- According to Kant and Martineau, morality is the source of religion.
- According to the third view, religion and morality are independent. Neither religion rises out of morality nor morality rises out of religion.

PROBABLE QUESTIONS

I. Answer briefly :

1. The word religion is derived from which word?
2. What is the meaning of the word 'religare'?
3. From which Sanskrit root the word 'Dharma' is derived?
4. What is religion?
5. What are the three elements involved in religion?

II. Answer the following :

1. What are the characteristics of religion?
2. State Kant's definition of religion? What are its defects?
3. Write Hegel's definition of religion what is the basis of his definition?
4. Mention some points of similarity between religion and morality.
5. Mention some points of difference between religion and morality.
6. 'Religion is the source of morality'. – Discuss.
7. 'Morality is the source of religion' – Discuss.
8. Discuss the view that religion and morality are independent.
9. Explain the inter-dependence of religion and morality.