



School Mate®

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40  
LEAVES

1. Define the following terms: Law, Theory and Hypothesis.
2. State clearly the differences among them.
3. Discuss briefly the following terms: Parsimony, Conservatism and Testability.
4. Identify and explain the various types of induction with ~~and~~ examples.
5. What is the concern of philosophy of science?
6. Define epistemology and indicate how it relates to philosophy of science.
7. Appraise the heated debate among philosophers concerning the boundaries between science and non-science.
8. Evaluate Karl Popper's reservation with the verificationist procedure.

1. Define the following terms:- Law, Theory and hypothesis  
1b Clearly state the difference among them.

### LAW

Law is a declarative statement about behaviour or occurrences of things in the universe based on several experiments.

It can also be defined as the description of natural phenomenon which invariably holds to be true under specific conditions and still occur under certain conditions.

In a strict sense "Law predicts what will happen". Law can predict what will happen under certain conditions. For example: Law can predict the hair colors of an unborn child.

A practical example of law is found on one of the natural sciences: Chemistry. In Chemistry we are taught about the Boyle's law which states that the pressure exerted by a gas is inversely proportional to the volume it occupies provided it is maintained at a constant temperature. It has a formula  $P_1 V_1 = P_2 V_2$ . Other examples of law are Laws of Gravity,

## Law of thermodynamics.

Laws differ from scientific theories in that they do not posit a mechanism of explanation of phenomena; they are merely distillations of the results of repeated observation.

## THEORY.

A theory is a confirmed hypothesis. It is defined as a result of hypothesis; that is confirmed to be true after it has undergone several experiments.

To a scientist, a theory is a coherent explanation for a large number of facts and observations about the natural world.

Theory is also defined as a statement of fact about natural phenomena. The strength of a scientific theory is related to the diversity of phenomena it can explain, which is measured by its ability to make falsifiable predictions with respect to those phenomena.

- The following are some of the features of theory
1. It is more certain than hypothesis but less specific than law.

2. It proposes what happens.
3. It is tested against wide range of phenomena.
4. It is firmly grounded and based upon wide evidence or evidence.
5. It is demonstratively effective in problem.

### HYPOTHESIS.

Hypothesis can be defined as a "Gentleman's Guess". It implies that, it is an assumption. Hypothesis is an idea or proposition that can be tested by observation or experiments, about the natural world. It is a proposed explanation for a phenomenon.

For a hypothesis to be considered scientific, hypotheses are subjected to scientific evaluation and must be falsifiable, which implies that they are structured and worded in such a way that they can be proven to be incorrect.

There are two kinds of hypothesis; a working hypothesis and ordinary hypothesis.

B.

Below are the differences between Law Theory and Hypothesis

LAW	THEORY	HYPOTHESES
1. Law is authoritative in nature	It is more certain than hypothesis but less specific than law.	It is a gentlemen's guess - "Assumption"
2. It is based on repeated experiments	It proposes what happens	It is yet to be proven unlike law that is a product of several experiments
3. It predicts what will happen	It must not necessarily grow into law.	or declarative or non-authoritative
4) Law gives a declarative statement on natural phenomenon or occurrences in the universe	or declarative like law.	

Define the following terms "Parsimony, Conservatism and Testability.

### PARSIMONY

#### The principle

This is a principle in philosophy which suggests that suppose there are two explanations for an occurrence the simplex one is usually preferable.

Another way of explaining this is that, the more assumptions you have to make, the more unlikely an explanation is said to be correct. This, it simply means sticking to the simplest method or terms.

Parsimony means "Theory of Simplicity". Also it means "Ockham's Razor". Razor refers to distinguishing between two hypothesis either by shoving away unnecessary assumptions or cutting apart two similar conclusions.

The principle of parsimony suggests that all other things being equal, we should prefer a simpler explanation over more complex ones.

## CONSERVATISM.

The degree of "Fit" with existing recognised knowledge systems.

It implies that, for any new theory or hypothesis not minding how new, the theory must be connected to a traditional theory.

## TESTABILITY

This is also known as "falsifiability." It is what philosophers carry out in verification and falsification theories.

Testability simply means that, for every theory or hypothesis to be scientific, such theory has to be structured in such a way that, it is proven to be false or true. That it openness to experimentation or testing.

Thus, if it cannot be experimented on, it is not scientific. A good example is the paternity of a child.

It is important to note that testability is empirical and not rational in nature.

### QUESTION 8.

Identify and explain the various

#### Introduction

In order to give a clearer explanation of the types of induction, it is important to explain what induction itself is all about.

#### DEFINITION OF INDUCTION

Induction is a specific form of reasoning, which the premise of an argument supports a conclusion, but also does not ensure it. It simply means the procedure of reasoning in which we take a particular fact towards common conclusion, but it does not guarantee that the ground of intellectual argument hold the truth or correctness of a conclusion.

#### TYPES OF INDUCTION

1. Enumerative & Strong & Weak Induction
2. Mathematical Induction.

## ENUMERATIVE INDUCTION

This induction in the real sense of the word. It concerns matters of empirical facts. It is the kind of induction that philosophers are interested in.

It comes in two forms:

### STRONG INDUCTION

Here, induction is classified according to the strength of its output. It has a form like this:

A<sub>1</sub> is B<sub>1</sub>

A<sub>2</sub> is B<sub>2</sub>

A<sub>3</sub> is B<sub>3</sub>

Therefore All A's are B's.

John went to Bigard, John is a priest

Dennis went to Bigard, Dennis is a priest

Therefore all who went to Bigard are priests.

The implication about strong induction is that, the stronger it is, the closer it is to being false. In strong induction, the morality or notes of the assumptions can make us feel sure that the conclusion will be based on truth, but still there is no guarantee it will be 100%.

## WEAK INDUCTION.

This is closer to mathematical induction because the probability/possibility is shrink, hence it is closer to the truth. It is also in this form

$A_1 \in B_1$  &  $A_2 \in B_2$  &  $\dots$  &  $A_n \in B_n$  &  $\dots$

$A_1 \in B_1$  &  $A_2 \in B_2$  &  $\dots$  &  $A_n \in B_n$  &  $\dots$

$A_1 \in B_1$

Therefore the next A will be B.

Observed carefully, the tendency of over exaggerate conclusion drawn from particular instance is minimized.

## MATHEMATICAL INDUCTION.

This concerns matters of mathematical fact. Specifically, mathematical induction is what mathematicians use to make claims about an infinite set of mathematical objects. It guarantees the truth of its calculations even though these inductions are <sup>inductive</sup> deductive in nature, their conclusions are deductive in nature. For example:

A is the set of : 2, 4, 6, 8, 10, 12, 14, 16

written mathematically results to :-

$$A = \{2, 4, 6, 8, 10, 12, 14, 16\}$$

The above immediately indicates to one that  $A$  is a set which contains even numbers and the members of the set are infinite even though only eight (8) numbers are listed on the set.

Every even number ad infinitum falls within the set "A" hence mathematical induction guarantees the truth of its conclusion.

- A. What is the concern of philosophy of science.
- B. Define epistemology and indicate how it relates to philosophy of Science.

#### A. OUTLINE.

Introduction

Etymology of philosophy

Definition of philosophy

Definition of Science

Branches of Science.

The Concern of Philosophy with science.

#### INTRODUCTION

The discussion of the concern of philosophy with science is a broad discussion in philosophy of science.

However it is pertinent that the idea of philosophy and science are independently exposed in order to have grasp of what they entail and enable the discussion of philosophy with science easier.

However, we will expose these terms and discuss them adequately.

## ETYMOLOGY OF PHILOSOPHY.

According to Socrates, in order to have a true knowledge of a thing, it should be defined. Thus for philosophy to be understood it is necessary to know its root meaning.

Etymologically, philosophy is coined from two Greek words; *philos* meaning love and *sophia* meaning wisdom or knowledge. Hence philosophy is the "love of knowledge".

The term philosophy was first used by the ancient Greek philosopher Pythagoras' in the 6th century BC. However, philosophy has been defined by different philosopher and we shall look at them.

## DEFINITION OF PHILOSOPHY.

From a layman point of view, philosophy would be an endeavour. It implies a person's rational view about life. This is a broad definition of philosophy.

In a strict sense, although philosophy does not have a generally accepted definition, some scholars have provided their own definition of philosophy. However, according to Prof. Joseph Omorogbe "philosophy

is a rational search for answers to questions that come to us in our mind when we reflect on human experiences.

Thus philosophy is about searching to know the truth about nature and existence of reality. . .

### OBJECT OF PHILOSOPHY

Just like every other enterprise, philosophy has its own object. They are.

1. Material Object :- Here philosophy is interested with beings like God, Man, nature and creation at large. It refers to philosophy studies in a general sense.
2. Formal Object :- The interests of philosophy is to know through reasoning about the truth of reality. Formal object refers to the specific area that interests philosophy.

### DEFINITION OF SCIENCE

When we talk about science, various things comes into the picture. For some it only the technological advances that we see in our daily lives or the various formulas encounter on schools.

Nevertheless, Science can be defined as a systematic

endeavour which builds and organizes knowledge in a testable explanation and prediction about the universe. Science deals with discovering what's in the universe and how those work today, how they worked in the past and how they are likely to work in the future.

Therefore, science is a systematic process of knowing which involves scientific explanation, observation and investigation about the material world.

### BRANCHES OF SCIENCE.

The branches of science includes -

1. Natural Science - We see courses like Chemistry, Physics and Biology.
2. Social Sciences - Here we have psychology, sociology and economics.
3. Formal Science - Here lies, Mathematics, logic etc.

### THE CONCERN OF PHILOSOPHY OF SCIENCE

Philosophy of Science as a subfield of philosophy is concerned with all the assumptions, foundations, methods and implications of science and the rise and merit of science. Its central questions concern what

qualifies as science, that is the reliability of scientific theories and the ultimate purpose of science.

While science is a project whose goal is to obtain knowledge of the natural world, philosophy of science on the other hand is a discipline that deals with the system of science itself. It examines science's structure, components, techniques, assumptions, limitations and so forth.

## Conclusion.

Define Epistemology and indicate how it relates to philosophy of science.

### Definition of Epistemology.

The term epistemology is from two Greek words "epistemē" which means knowledge and "egos" which means a study of something. Hence, epistemology means the study of knowledge.

The term epistemology was first used by a Scottish philosopher, James Frederick Ferrier in 1854 to designate the branch of philosophy concerned with the discovery of the meaning of knowledge. He called it the "true beginning of philosophy".

Epistemology was motivated originally by the Sophist and skeptics. It is however, the study of human knowledge which is believed to be true or reliable. It specifically studies what we know or claim to know and how we know it.

How Epistemology is related to Philosophy of Science.

Philosophy of science is a branch of philosophy

that seeks scientific knowledge. It is thus related to epistemology which is the study of knowledge.

In epistemology there are two major schools which are the rationalist and the empiricist. The rationalist argue that knowledge is arrived at only through reason while the empiricist argue that it is through experience that we arrive at knowledge. Since philosophy of science deals with scientific knowledge that involve experimentation and demonstration, philosophy of science is related to the empiricist school of epistemology.

The major areas of relation between epistemology and philosophy of science includes:

1. Both philosophy of science and epistemology seeks knowledge. It is an underlying relationship.
2. Epistemology becomes a tool of excavation of scientific knowledge by philosophy of science.
3. Epistemology seeks the knowledge all including nature and the material world. and philosophy of science also seeks the same knowledge.
4. Philosophy of science deals with empirical knowledge which is one of the schools of epistemology.