Lecture Note on GSP2205 (Logic and Philosophy)

Module 8: Logic as a Method of Reasoning, Inductive and Deductive Methods of Reasoning

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(1) Definitions of Logic

The Book of Proof by Richard Hammack defines logic as a systematic way of thinking that allows us to deduce new information from old information. ***The New Webster's Dictionary of English Language*** defines logic as the study of reasoning by formal methods. ***Encyclopedia Americana*** defines logic as the field of study dealing with the criteria for evaluation of arguments.

There are things we have to note from the above definition:

- Logical is not an empirical science (i.e., experimental or observational) like physics, biology or psychology.
- The task on logic is to distinguish correct reasoning from incorrect reasoning.
- Logic is not concerned with the actual mental (or physical) process employed by thinking being when it is reasoning.

(2) Inference

Reasoning is a special mental activity called inference which is also called making inference. To infer means to draw conclusions from premise(s).

Note :

Premise means data, information or fact.

Example of inference

- You see smoke and infer that there is fire.
- You heard a voice and infer that is your brother.
- You noticed a change in the weather and infer that it is going to rain.
- You count 29 students in a group that is originally 35 and infer that 6 students are missing.

Remark

- There is a difference between infer and imply which are sometimes confused.
- We infer rain on the basis of the change of weather, but we do not imply it.
- Reasoning process begin with input (premise(s)) is correct or not.
- In inferring a conclusion, you may need more than one premise.
- Logic is mainly concerned whether the inference on the basis of the premise(s) is correct or not.

(3) Statement

Definition: A Statement is a declarative sentence, i.e., a sentence that is capable of being true or false.

Examples of statement

1. It is raining.
2. I am going to school.
3. The president is out of the country
4. $2 + 6 = 7$
5. Nigeria is part of Europe
6. Dala is in Imo state

Example of sentences that are not statements

1. The computer is
2. Open the door, please.
3. Can you assist me?
4. Come here!

Observation

Question and commands are not statement because they are not capable of being true or false.

(4) Argument

Definition: An argument is a collection of statements, one of which is the conclusion and the remainder of which are premise(s).

Usually, premise(s) of an argument are intended to justify the conclusion of the argument. Inferences can be represented as arguments.

Examples

1. There is smoke (premise)
   therefore, there is fire (Conclusion)
   This argument has only one premise.
2. There were 35 students initially (premise)
   there are 29 students currently (premise)
   therefore, 6 students are missing (conclusion)
   Sometimes argument can be rephrased in such a way that conclusion comes before premise(s). For example
   a. There is fire (conclusion),
      for there is smoke (premise)
   b. 6 students are missing (conclusion),
      for there are 29 students currently out of 35 students initially in the group (premise)

(5) Inductive Reasoning/Logic

Definition: Inductive reasoning is a method of drawing conclusions base upon limited information. Inductive reasoning in other words means guessing and is often called statistical

(or probabilistic) reasoning. While inductive logic investigates arguments in which the truth of the premise(s) makes likely the truth of the conclusion.

Note: Induction reasoning forms the basis of the experimental science

Examples

a. There is smoke, therefore there is fire
b. The weather has changed, therefore it is going to rain
c. All men are mortal,
   Cabaye is mortal ,
   Therefore, cabaye is a man

(6) Deductive Reasoning/Logic

Definition: Deductive reasoning is a method of drawing conclusions base upon fact. While deductive logic is investigates arguments in which the truth of the premise(s) necessitates the truth of the conclusion.

Examples

(a) There were 35 students initially,
   there are 29 students currently,
   therefore, 6 students are missing.
(b) All men are mortal
   Cabaye is man,
   Therefore, Cabaye is mortal

Remark

- If an argument is judged to be deductively correct, then it is also judged to be inductively correct, then it is also judged to be inductively correct.
- But the converse is not true, i.e., not every inductively correct argument is also deductively correct as well.