

DEPARTMENT OF PHILOSOPHY
FACULTY OF ARTS
NATIONAL OPEN UNIVERSITY OF NIGERIA

Course Guide for PHL 152: Introduction to Logic II

Course Code	PHL 152
Course Title	Introduction to Logic II
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Course Guide

Course Guide

Introduction

Welcome to **PHL 152: Introduction to Logic II** PHL 152 is a three-credit unit course with a minimum duration of one semester. It is a compulsory course for Philosophy Major (degree) students in the university. The course is a continuation of PHL 105. It studies the nature of truth and validity; induction and analogy; the nature of fallacies and psychological pitfalls in thinking; modern scientific method of inquiry with reference to Mill's method, etc.

In this Course Material, effort is made to be as simple as possible in the writing and presentation of this study material for the purpose of leading readers to effective grasping of its contents. The attempt to simplify the texts is with the realization that logic as a subject is not taught at secondary school level. This means that the university beginners are just coming in close contact with it. Thus it becomes imperative to sectionalise the course outline to modules and unit. Each module comprises a number of planned units under which pedagogy takes place.

However what is practically impossible is to avoid the technical nature of the subject. The language of the subject is technical and it cannot be otherwise. So, to some people who have phobia for high web technicalities or calculation, logic is to such people a seemingly difficult enterprise. A conscious effort is therefore made to avoid the use of strictly mathematical jargons. Even though logic is very much akin to mathematics its subject-matter can be understood without any strong background in mathematics. Readers are therefore enjoined to go through this study material without any bias of the mind. It is lucidly written with local examples and clear illustrations. The aim is to equip students with logical skill that will enhance their reasoning ability.

Course Objectives

By the end of the course you will be able to:

- ❖ Learn about the history of logic.
- ❖ Acquire knowledge of laws of thought
- ❖ Explain the importance of logic.
- ❖ Explain the meaning of fallacy and types of fallacies.
- ❖ Differentiate between Formal and Informal Fallacies.
- ❖ Know what logical puzzle is.
- ❖ Explain Categorical Syllogism.

- ❖ Determine the validity and invalidity of Categorical Syllogism.
- ❖ Understand a rational proposition.
- ❖ Discuss the concept of 'Definition'.
- ❖ Explain types of definitions and their values
- ❖ Explain the rules for definitions by Genus and Difference

Working Through the Course

To complete this course of study successfully, you are expected to read the study units, do all the assignments, open the links and read, participate in discussion forums, read the recommended books and other materials provided, prepare your portfolios, and participate in the online facilitation.

Each study unit has introduction, intended learning outcomes, the main content, conclusion, summary and references/further readings. The introduction will tell you the expectations in the study unit. Read and note the intended learning outcomes (ILOs). The intended learning outcomes tell you what you should be able to do at the completion of each study unit. So, you can evaluate your learning at the end of each unit to ensure you have achieved the intended learning outcomes. You may wish to either print or download the text and save in your computer. The conclusion gives you the theme of the knowledge you are taking away from the unit. Unit summaries are presented in downloadable audios and videos.

There are two main forms of assessment—the formative and the summative. The formative assessment will help you monitor your learning. This is presented as in-text questions, discussion forums and self-Assessment Exercises. The summative assessments would be used by the university to evaluate your academic performance. This will be given as Computer Based Test (CBT) which serves as continuous assessment and final examinations. A minimum of two or a maximum of three computer-based tests will be given with only one final examination at the end of the semester. You are required to take all the computer-based tests and the final examination.

Study Units

There are 18 study units in this course divided into Four modules. The modules and units are presented as follows:-

Module 1 Introduction to logic

Unit 1: Meaning and Nature of logic

Unit 2: A brief History of logic

Unit 3: Laws of Thought

Unit 4: Meaning and Nature of Arguments

Unit 5: Importance of logic

Module 2

Unit 1: The Meaning and Types of Arguments

Unit 2: Structure of Arguments

Unit 3: Informal Fallacies

Unit 4: Informal Fallacies (Fallacies of Ambiguity)

Unit 5: Informal Fallacies (Fallacies of Presumption)

Unit 6: Exercise in Reason (Logical Puzzles)

Module 3:

Unit 1: Categorical Propositions

Unit 2: Immediate Inference

Unit 3: Categorical Syllogism

Unit 4: Validity and Invalidity of Categorical Syllogism

Unit 5: Rational Proposition

Module 4

Unit 1: Disputes and Definitions

Unit 2: Types of Definitions and their uses

Unit 3: Rules for definitions by GENUS and Difference

References and Books for further reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
2. Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).
3. Ofor, Francis. *Essentials of Logic* (Ibadan: Book Wright Nigeria Publishers, 2010).
4. Oke, Moses and Amodu, Akeem. *Argument and Evidence: An Introduction to Critical Thinking* (Ibadan: Hope Publications, 2006).
5. Bello, A.G.A. *Introduction to Logic* (Ibadan: University Press Ltd., 2007)
6. Copi, I.M., Cohen C. *Introduction to Logic* (London: Prentice-Hall, 1998)
7. Dauer, F.W. *Critical Thinking: An Introduction to Reasoning* (Oxford: Oxford University Press, 1989).
8. Kalish, D., Montague, R., Mar G. *Logic: Techniques of Formal Reasoning* (New York: Harcourt Brace Jonanich, 1980).
9. Lemmon, E.J. *Beginning Logic* (Ontario: Thomas Nelson, 1965)
10. Thomas, S.T. *Practical Reasoning in Natural Language* (New Jersey: Prentice Hall Inc., 1997)

MODULE 1: INTRODUCTION TO LOGIC

Unit 1 Meaning and Subject Matter of Logic

Contents

- 1.0 Introduction**
- 2.0 Intended Learning Outcomes (ILO's)**
- 3.0 Main Contents**
 - 3.1 Meaning and Nature of Logic**
 - 3.2 Types of Logic**
- 4.0 Conclusion**
- 5.0 Summary**
- 6.0 Tutor Marked Assignment**
- 7.0 References/Further Reading**

1.0 Introduction

This introductory course in logic is aimed at exposing the student-philosopher to the world of logical thinking and equipping him/her with the tools s/he would need in life. It would attempt defining logic, explaining its nature, discussing its types, delineating its history, and treating some of the key terms that have been the centerpiece of logical reasoning from antiquity. The three laws of thought would also be the focus here. Afterwards, emphasis would be placed on the relevance of logic, also known as the science of argumentation. In all, efforts would be made to explain the meaning, nature and types of arguments, including with the value and importance of logic in our everyday activities.

2.0 Intended Learning Outcomes

By the end of this course, students should be able to:

- i. Explain the meaning and nature of logic;
- ii. Discuss the types of logic;
- iii. Carefully distinguish between the types of logic that you have studied

3.0 Content

3.1 THE MEANING, NATURE AND TYPES OF LOGIC

Logic is the branch of philosophy which investigates the art and science of reasoning. All the departments in the university employ logic in one way or the other. This is because logic includes all the laws guiding the various disciplines and areas of human inquiry. Logic never excludes any of the laws in the sciences, arts or humanities. These laws guide human thought and reasoning in everyday life. Logic in this sense is reducible to the commonplace logic of the marketplace, which buyers and sellers of different goods and services deploy in entering into a deal or transacting a business. It includes the linguistic manipulation of the many men and women walking into the theatre to watch a dramatic show or a musical performance. It does not disregard the logic of the banking and insurance companies, the logic of the hospitals, clinics and health centres. It does not undervalue the logic of all socio-politico-economic activities. It does not turn the logic of the court room into the logic of arguing implausibly or unreasonably. We cannot forget the logic behind the different religions in the world. Logic has not been an exclusive term and a core branch of philosophy. It is, however, not only the body or set of principles or ideas guiding a system of thought or idea. It is not only, as Francis Offor (2010: 3) describes, “the principles guiding the operation of a mechanism.” A system, a school of thought, mechanism, a person or a gadget is “guided by certain principles which can be referred to as the inner ‘logic’ of that mechanism.” This idea of inner logic does not fully capture the philosophical definition or technical sense of logic as defined in philosophy. Basically, in philosophy logic as the laws of human thought is established on three basic laws of thought. This would soon be explained, as the first point of concern should be defining the nature of logic from the philosophical sense.

As one of the core branches of philosophy, Logic can be defined as the science of distinguishing good reasoning from bad reasoning. It is “the study of the basic principles, techniques, or methods for evaluating arguments” (Offor 2010: 3). The distinction of arguments into valid and invalid forms, sound and unsound, deductive and inductive, has been the preoccupation of logicians for centuries. The Logic of Aristotle, the student of Plato and founder of the Lyceum, is seen as the earliest in the history of the science of inference. The Fregean

notions of quantifiers, variables and functions and his evaluations about logic as a system of abstract mathematical system made the German logician, Gottlob Frege, the Father of Modern Logic.

3.2 Types of Logic

Logic is divided into two broad types which are informal and formal logic.

1. **Informal Logic:** This is the type of logic which deals with the analysis and evaluation of good and bad reasoning in everyday life. It probes the meaning and nature of argument in ordinary discourse, evaluates the informal fallacies of relevance, ambiguity, presumption and evidence. Logical puzzles are also discussed as aspects of informal logic.
2. **Formal Logic:** This is the type of logic that is primarily concerned with analysis and evaluation of the structures of statements and arguments in natural and artificial languages. While formal arguments in natural language include Categorical Syllogisms and Relational Arguments, formal statements and arguments in artificial language are part and parcel of Symbolic Logic. Formal errors in reasoning are called formal fallacies.
3. Other types of logic aside the two, i.e. Formal logic and Informal logic that are commonly known are: Boolean logic, Mathematical logic, Dialectical logic etc.

4.0 Conclusion

Logic is has not been an exclusive term and a core branch of philosophy. It is, however, not only the body or set of principles or ideas guiding a system of thought or idea.

5.0 Summary

In this unit, you have studied logic as a branch of philosophy which investigates the art and science of reasoning. It is one of core branches of philosophy, defined as the science of distinguishing good reasoning from bad reasoning.

6.0 Tutor Marked Assignment

1. Define logic.
2. List the types of logic known to you.

3. Distinguish between Informal and Formal logic

7.0 References/Further Reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
2. Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).
3. Ofor, Francis. *Essentials of Logic* (Ibadan: Book Wright Nigeria Publishers, 2010).
4. Oke, Moses and Amodu, Akeem. *Argument and Evidence: An Introduction to Critical Thinking* (Ibadan: Hope Publications, 2006).
5. Bello, A.G.A. *Introduction to Logic* (Ibadan: University Press Ltd., 2007)
6. Copi, I.M., Cohen C. *Introduction to Logic* (London: Prentice-Hall, 1998)
7. Dauer, F.W. *Critical Thinking: An Introduction to Reasoning* (Oxford: Oxford University Press, 1989).
8. Kalish, D., Montague, R., Mar G. *Logic: Techniques of Formal Reasoning* (New York: Harcourt Brace Jonanich, 1980).
9. Lemmon, E.J. *Beginning Logic* (Ontario: Thomas Nelson, 1965)
10. Thomas, S.T. *Practical Reasoning in Natural Language* (New Jersey: Prentice Hall Inc., 1997)

UNIT 2: A BRIEF HISTORY OF LOGIC

Contents

- 3.0 Introduction**
- 4.0 Intended Learning Outcomes (ILO's)**
- 3.0 Main Contents**
 - 3.1 Meaning and Nature of Logic**
 - 3.2 Types of Logic**
- 4.0 Conclusion**
- 5.0 Summary**
- 6.0 Tutor Marked Assignment**
- 7.0 References/Further Reading**

1.0 Introduction

This unit introduce you to a short history of logic. You will study the history of logic from the Pre-Socratic, Medieval era to Modern age of Francis Bacon's logic of inductive reasoning, Peirce theorem of the propositional calculus and many others.

2.0 Intended Learning Outcomes

By the end of this unit, students should be able to

- i. Narrate the history of logical inquiry
- ii. Distinguish the ages of the history of logic

3.0 Content

3.1 A brief history of logic

The science of correct and incorrect reasoning is traced back to the Pre-Socratic era when the atomists differentiated the quantitative qualities of atoms from the qualitative qualities. The Pythagorean mathematical model has some affinities with Logic but the beginning of classical logic is associated with the logical works of Aristotle namely *Prior Analytics*, *Posterior*

Analytics, Categories, On Interpretation, Sophistical Refutations and *Topics* where we can delineate his categorical syllogism. Aristotle is regarded as the Father of Classical Logic. The most important contributions to Logic after Aristotle was the detailed and original logical inputs of the Stoics which was about the logic of propositions which foregrounded modern propositional logic (Lawhead 2002: 94).

In the medieval era, the French philosopher, Roscelin de Compiègne, was known as a teacher of logic. William of Ockham, an English philosopher who wrote the *Summa Logicae* (Sum of Logic) argued that logic could only give us the forms of propositions we assert about reality but it cannot explain reality. The contributions of George Bull, the English mathematician culminated into what we refer to as the Boolean logic which shares some affinity with Boolean algebra. Bacon's inductivism, Mill's inductive principles, Leibniz's search for a universal, logically perfect language, Peirce's theorem of the propositional calculus, Russell's logical atomism, G. E. Moore's paradox, Goodman's paradox, Hempel's paradox, Popper's hypothetico-deductivism and the logical works of the logical positivists are references for us to interact with and come about a philosophical perspective which takes logic as crucial for analyses and evaluations.

4.0 Conclusion

The history of logic present to us the various stages of development of philosophical inquiries. Through it, we are able to notice the different types of logic that was developed by various philosophers

5.0 Summary

The history of logic is an age long history. Logic grew along with the various schools of thoughts in philosophy and has remained the tools by which philosophers carries out their activities.

6.0 Tutor Marked Assignment

i Outline the history of logic.

7.0 References/Further Reading

Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).

Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).

Offor, Francis. *Essentials of Logic* (Ibadan: Book Wright Nigeria Publishers, 2010).

Oke, Moses and Amodu, Akeem. *Argument and Evidence: An Introduction to Critical Thinking* (Ibadan: Hope Publications, 2006).

Bello, A.G.A. *Introduction to Logic* (Ibadan: University Press Ltd., 2007)

Copi, I.M., Cohen C. *Introduction to Logic* (London: Prentice-Hall, 1998)

Dauer, F.W. *Critical Thinking: An Introduction to Reasoning* (Oxford: Oxford University Press, 1989).

UNIT 3: THE LAWS OF THOUGHT

Contents

8.0 Introduction

9.0 Intended Learning Outcomes (ILO's)

3.0 Main Contents

3.1 Laws of thought

3.1.2 The Law of Identity

3.1.3 The Law of Excluded Middle

3.1.4 The Law of Non-Contradiction

4.0 Conclusion

5.0 Summary

6.0 Tutor Marked Assignment

7.0 References/Further Reading

1.0 Introduction

In this unit, you shall be introduced to the various laws of thought guiding the different areas of knowledge. These are Law of identity, The Law of Excluded Middle and the Law of Non-Contradiction.

3.0 Intended Learning Outcome

By the end of this unit, students should be able to;

- i. Explain what the laws of thought is
- ii. Discuss the law, of identity: The law of Excluded Middle and The law of Non-Contradiction
- iii. Give relevant examples of each of the laws of thought studied

3.0 Content

3.1 THE LAWS OF THOUGHT

The history of human inquiry is the history of humankind's quest for meaning. There cannot be any meaning-creating action without an idea, a principle or thought. All the ideas, concepts, precepts, notions, principles and rules of the different areas of knowledge must not be contrary to any of the three laws of thought, which are also known as the primary laws of thought. There is no discipline whose basic, underlying principles are opposed to the primary laws of thought. An explanation cannot be given in defence of a branch of learning whose system of rules are not according to the basic laws serving as the basis of all knowledge. These three laws are listed below:

1. The Law of Identity
2. The Law of Excluded Middle
3. The Law of Non-Contradiction

These fundamental laws must be understood in connection to all the forms of inquiry in the world operating according to a two-value logic system. We must further know the logical forms of the three laws for easy correlation of ideas.

3.1.2 The Law of Identity:

This states that if any statement is true, then it is true. A true statement *is*. This implies, for example that, something cannot be in existence and not in existence at the same time. *Being* cannot misidentify itself. *Being* is identical with itself. The Law of Identity can be schematically represented as P is P.

3.1.3 The Law of Excluded Middle:

This simply states that a statement is either true or false. It also means that a statement cannot be both true and false. The value of a statement cannot be indifferent to any quality. There cannot be a true and false answer to the same question with the same signification. A statement or an answer is either affirmative or negative. It is either an affirmation or a negation.

3.1.4 The Law of Contradiction or Non-Contradiction:

This states that a statement cannot be both true and false at the same time. What this self-contradictory statement implies is that every statement that is both true and false is false. A mango tree cannot be a cashew tree. It is either a mango tree or a cashew tree and not both. Human experience has not given us an instance. To say that a tree can bear mango fruits as well as cashew fruits is to think or imagine such a possibility outside the confines of human experience.

4.0 Conclusion

The underlying idea is that all discipline are not opposed to the primary laws of thought.

5.0 Summary

The study of the laws of thought i.e. Law of identity, Law of Excluded middle, Law of Non-Contradiction in this unit shows that every discipline exhibits principles that obeys these laws. These fundamental laws must be understood in connection to all the forms of inquiry in the world operating according to a two-value logic system.

6.0 Tutor Marked Assignment

- i. With relevant examples explain
 - a) The law of identity
 - b) The law of Excluded Middle
 - c) The law of Non-Contradiction

7.0 References/Further Reading

Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).

Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).

Offor, Francis. *Essentials of Logic* (Ibadan: Book Wright Nigeria Publishers, 2010).

Oke, Moses and Amodu, Akeem. *Argument and Evidence: An Introduction to Critical Thinking* (Ibadan: Hope Publications, 2006).

Bello, A.G.A. *Introduction to Logic* (Ibadan: University Press Ltd., 2007)

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Kalish, D., Montague, R., Mar G. *Logic: Techniques of Formal Reasoning* (New York: Harcourt Brace Jonanich, 1980).

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Thomas, S.T. *Practical Reasoning in Natural Language* (New Jersey: Prentice Hall Inc., 1997)

UNIT 4: THE MEANING, NATURE AND NATURE OF ARGUMENT

Contents

- 10.0 Introduction
- 11.0 Intended Learning Outcomes (ILO's)
- 3.0 Main Contents
 - 3.1 Meaning and Nature of argument
 - 3.2 Types of Logic
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

1.0 Introduction

In this unit, we shall discuss the meaning and nature of argument. You shall also be introduced to the various types of argument i.e. Inductive and Deductive arguments. You shall also learn the distinctions between the two types of arguments that shall be studied.

2.0 Intended Learning Outcomes

At the end of this unit, students should be able to:

- i. Explain the term argument
- ii. Discuss inductive and deductive types of argument in logic

- iii. Distinguish between Inductive and Deductive argument

3.0 Content

3.1 The meaning and nature of argument

The term argument is etymologically derived from a Latin word, “*arguo*” which means to prove or to make clear. It is a term which has occupied a central position in both professional and unprofessional parlances. It is the word used by the couple quarreling or fighting over who is to prepare supper. Imagine this conversation between a couple:

“I have a backlog of work in the office and though I am your wife, you should not dare touch me again.” the wife said.

“I would not only touch you. I would rather make you disfigured and unrecognizable by your boss if you do not consider changing your job.” The husband sneezed and the next second was the minute of insults.

Like the husband and wife insulting each other because of an evening meal which was supposed to be the time of meeting, eating, drinking and examining all the frowns and smiles of the day but has been turned into a moment of quarrelling, the meaning of argument can be because of a minor error, a slip of the tongue or a slip of the pen.

The science of argumentation goes beyond the popular connotation of quarrelling, disagreeing and fighting. An argument can simply be defined as a group or set of statements in which one, the conclusion is inferred from other statements known as premises. An argument shows the structure or pattern of an inference. It is either a proof or a refutation. It is a proof when it demonstrates the truth of a proposed conclusion from a group of premises. It is a refutation when it demonstrates the falsity of a proposed conclusion from a group of premises accepted as true. Although proofs and refutations can sometimes be discussed as types of argument, there are mainly two types of arguments. Before we explain the types of argument, we should note that an argument is an effort to state reasons why a statement should be accepted as true or rejected as false.

In every argument, there are three elements which include the person making the argument/claim, a premise or a reason justifying the acceptance or rejection of the claim, and a conclusion of the claim. An argument is not about sentences but statements. While a sentence can be without any truth-value, a statement is a sentence that is either true or false. The link from the premises to the conclusion is the inference or logical connection between the premises and the conclusion. The conclusion and premises of a claim are oftentimes indicated through what are called conclusion and premise indicators. However, there is also the need to note that this is not always the case in presentation of argument or claims. In other words, an argument may still be obtainable even in the absence of such indicators, and this would be mainly discovered through drawing inferences from the statement or propositions. Conclusion indicators include *consequently, it follows that, it implies that, hence, so, therefore, that's why* and *this entails that*. Premise indicators such as *granted that, in view of, in as much as, because, since* and *this is true because* among many others make us recognize the premises of a given argument.

3.2 Types of Argument

There are two main types of arguments namely deductive argument and inductive argument. These are forms of reasoning we often make use of in the different areas of human thought. A deductive argument is an argument in which the premises do not only support but also guarantee the conclusion. Put differently, the conclusion of a deductive argument is directly inferred from its premises. If the conclusion of an argument is directly inferred from its premises, it follows therefore, that there can be nothing contained in the conclusion, which is not already contained in the premises. On the other hand, an argument is said to be inductive if its premise(s) only support but do not guarantee its conclusion. This kind of argument do not claim that their premises, even if true, support their conclusions with certainty. Inductive arguments make weaker but nonetheless, important claims that their premises support their conclusion with probability, which always falls short of certainty. It is also noted in inductive mode of reasoning, that the conclusion logically implies an item of information not necessarily implied by the premises; “and that which can be confirmed or refuted only on the basis of evidence drawn from sense experience” (Ade-Ali, 2000:265) A tabular presentation as seen below would further make this distinction between a deductive and an inductive argument clearer:

3.3 DIFFERENCES BETWEEN A DEDUCTIVE AND AN INDUCTIVE ARGUMENT

S/NO	DEDUCTIVE ARGUMENT	INDUCTIVE ARGUMENT
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1.	A deductive argument can either be valid or invalid.	An inductive argument can either be more or less probable.
2.	If the premises provide conclusive support for the truth of the conclusion, then it is said to be valid.	Premises cannot provide conclusive support for the conclusion, hence cannot be said to be valid.
3.	It is impossible for the premises to be true and conclusion to be false, if it is valid.	It is possible for the premises to be true, and the conclusion to be false.
4.	A deductive argument is analytic.	An inductive argument is empirical.

4.0 Conclusion

Not every discussion can be referred to as argument. All forms of arguments must have premises and conclusion.

5.0 Summary

In this unit, you have been introduced to the meaning and nature of argument. Two types of argument were discussed, which are Inductive argument and Deductive argument. While all inductive argument are considered to be invalid and unsound, some deductive argument are valid and sound.

i.0 Tutor Marked Assignment

- i. What is argument?
- ii. What is an argument?
- iii. List and explain the two types of argument.
- iv. Mention 2 differences between deductive and inductive arguments.
- v. List 2 premise indicators and 2 conclusion indicators.

7.0 References/Further Reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
2. Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).
3. Ofor, Francis. *Essentials of Logic* (Ibadan: Book Wright Nigeria Publishers, 2010).
4. Oke, Moses and Amodu, Akeem. *Argument and Evidence: An Introduction to Critical Thinking* (Ibadan: Hope Publications, 2006).
5. Bello, A.G.A. *Introduction to Logic* (Ibadan: University Press Ltd., 2007)
6. Copi, I.M., Cohen C. *Introduction to Logic* (London: Prentice-Hall, 1998)
7. Dauer, F.W. *Critical Thinking: An Introduction to Reasoning* (Oxford: Oxford University Press, 1989).
8. Kalish, D., Montague, R., Mar G. *Logic: Techniques of Formal Reasoning* (New York: Harcourt Brace Jonanich, 1980).

UNIT 5: THE IMPORTANCE OF LOGIC

Contents

1. Introduction
2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 The importance of logic to character development
 - 3.2 The importance of logic to discovery and rediscovery of truth
 - 3.3 The importance of logic to resolution of disputes
 - 3.4 The importance of logic to the development of rational conviction
 - 3.5 The importance of logic to behavioural inspiration and motivation
4. Conclusion
5. Summary
6. Tutor Marked Assignment
7. References/Further Reading

1.0 Introduction

Logic is the branch of philosophy which all other branches of philosophy and indeed all other departments of knowledge production, application and consumption cannot be divorced from in order to create meaning in life. The appreciation of logic may not be the topic of discussion in the church, in the mosque, in the shrine, in the marketplace, in the hotel, in the

town hall or even in the court of law where logic is applied in the prosecution and defence of accused persons. Some of the importance of logic in life are outlined below:

2.0 Intended Learning Outcomes

At the end of this unit, students should be able to:

- i. Explain the relevance of logic to human beings and their environment

3.0 Content

3.1 Character Development

The formulation of arguments may not instantly make any man or woman see how the formation of a moral character follows the laws of logic. The way we feel, think, speak and act distinguishes the logical from the illogical, the rational from the irrational, the good from the bad. It is not always the case that we are as our thoughts, words and actions present us to the world but living against good reasoning and appearing to be reasonable disconnects the person from himself/herself. There is no way an individual's thought, words and actions would reveal the good when the person is indeed bad. If there is no co-relationship between the feelings, thoughts, words and actions of a person, then we should be diagnosing a self-alienated personality, going about his or her activities with the fear of the truth that would ultimately be seen lying at the bottom of the well. The morally upright person may not know the categories of thought but the life of such a person would be according to the logic of morality which cannot be contradicted by the science of logic.

- 3.2 **The Discovery and Rediscovery of Truth:** The knowledge of the correct and incorrect ways of reasoning helps the seeker of truth to discover and rediscover the truth on the road of life. Truth and falsehood are terms we can relate with on a daily basis. There is hardly any day when a lie or a truth is not said or heard. Grasping the tools of logic would lead to the truth not merely according to the logical structure or the mere formulation of arguments but according to the desire to attain a life of order, happy ending and meaning.

- 3.3 **The Resolution of Disputes:** The tools of logic have been used in different law courts and tribunals all over the world to resolve issues in the society which range from family to office matters, religious to political cases, issues concerning property acquisition and other sundry problems plaguing the human society. The court of law has been the best application of logic to argue cases not necessarily to win the opponent but to bring about justice which cannot be achieved in the absence of truth.
- 3.4 **The Development of Rational Conviction:** The idea or belief we live by invites or attracts critics who are not always keen in knowing why an idea should guide us. What is this thing called idea or belief? We go to the Church without conviction. We go to the mosque without conviction. We go into different relationships without conviction and end up with self-deceit, hypocrisy, bad faith and inauthenticity as byproducts of our reckless convictions. Logic makes us rationally convinced of what idea we cling tenaciously to and whether or not we live with people having a mutual idea, we would not easily be dissuaded or discouraged or persuaded only if the truth is what we are discovering and what we have always agreed to has been a lie.
- 3.5 **Behavioural Inspiration and Motivation:** As we are distinguishing good from bad arguments, explaining and discouraging ourselves from wrongs forms of thinking, we are inspired and motivated to live the good life.

4.0 Conclusion

The relevance of logic may not be the topic of discussion among men, disciplines, in the town hall or even in the court of law where logic is applied in the prosecution and defence of accused persons. But its importance cannot be undermined in any form.

5.0 Summary

In this lecture, you have been introduced briefly to the nature and meaning of logic, the three laws of thought, the nature and types of argument, as well as the distinction between deductive and inductive arguments, and the value or relevance of logic in everyday life and human thought. This brief introduction is mainly to serve as an eye-opener to the world of logic, especially as conceived in the philosophical enterprise. In the following modules, you

would be taken through detailed explanations, illustrations, and samples of deductive and inductive, valid and invalid, sound and unsound arguments, as well as the nature of formal and informal logic, meaning and definitions.

Post-test:

1. What is Logic?
2. How can you differentiate informal logic from formal logic?
3. Who is the Father of Classical Logic?
4. Who is the Father of Modern Logic?
5. List 4 other logicians you know.
6. Would you want to become a logician? Defend your answer.
7. State some usefulness of logic.

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MODULE 2: INFORMAL LOGIC

UNIT 1: THE MEANING AND TYPES OF ARGUMENT

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 - 3.1 Propositions
 - 3.2 Arguments
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1.0 Introduction

In this unit, we shall begin by looking at one basic concept concerning arguments, that is, proposition. After that, we would look at arguments. This opening lecture is quite important because our understanding of these concept will aid our grasping the substance of this lecture. We shall also be looking at how to analyse arguments, premise-indicators and conclusion-indicators.

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

- (1) Understand the meaning of a proposition and distinguish between simple and compound propositions.
- (2) Define what an argument is.

3.0 Content

3.1 Propositions

A proposition can be used to refer to the content of a meaningful declarative sentence or the pattern of symbols, marks or sounds that make up a meaningful declarative sentence. It “asserts that something is (or is not) the case; any proposition may be affirmed or denied” (Copi & Cohen 2006: 2). A proposition has the quality or property of being true or false, implying that every proposition must be either true or false. This is why propositions are sometimes referred to as “truthbearers”. Truth and falsity therefore apply always to propositions. Copi & Cohen distinguish between propositions and sentences. They point out that sentences are the means by which propositions are asserted. Put differently, “Two different sentences, consisting of different words differently arranged, may have the same meaning and be used to assert the same proposition” (Copi & Cohen 2006: 2). For instance, the following are two different sentences that make the same assertion: “Muhammadu Buhari won the 2015 Presidential Election in Nigeria” and “The 2015 Presidential Election was won by Muhammadu Buhari.”

We must add here that the terms “proposition” and “statement” have been used interchangeably by some logicians. Therefore, the term “statement”, though not an exact synonym of proposition, “is used in logic in much the same sense. Some logicians prefer statement to propositions, although the latter has been more common in the history of logic” (Copi & Cohen 2006: 2).

There are simple as well as compound propositions. A simple proposition makes only one assertion, while a compound proposition contains two or more simple propositions. In other words, you assert more than one proposition in a compound proposition. For example:

- (i) The largest country in the world is the third most populous country in the world.
- (ii) The man who won the 2011 Presidential Election is the President of Nigeria.
- (iii) By the 1830s the white men were the dominant race in the Hunter Valley. Most of the prime land along the main river frontages had been taken up for crops and cattle and settlers were moving into the back country north and west of the Hunter. After 1830 most resistance by the Kooris was passive, although there were spasmodic outbreaks of violence. Nevertheless, the two races could not live completely apart and growing contact was inevitable (cited in Copi & Cohen 2006).

(iv) Turning local government areas to development areas will maximise growth. We say this because turning local government areas into development areas will depoliticise development, as suspicions of neglect due to fears of ethnic domination in various states will diminish and support for the party at the helm of affairs at the state capital or centre will also cease to be the basis for the provision of amenities in local government areas. (Adapted from *African Guardian*).

Examples (i) and (ii) are simple propositions, while (iii) and (iv) are examples of compound propositions.

3.2 Arguments

According to Copi & Cohen (2006: 4):

Propositions are the building blocks of which arguments are made. When we reach or affirm one proposition on the basis of other propositions, we say that an inference has been drawn. Inference is process that may tie a cluster of propositions together. Some inferences are warranted or correct, others are not. To determine whether an inference is correct, the logician examines the propositions with which the process begins and ends, and the relations between those propositions. This cluster of propositions constitutes an *argument*. Arguments are the chief concern to logic.

The term ‘argument’ can have a dual meaning. In ordinary discourse, it connotes a quarrel or disagreement, whereas in logic – that is, in the technical sense – an argument is a sequence of statements, ‘declarative sentences’ or propositions, in which one part known as the conclusion is claimed to follow from the others called the premises. In clear terms, therefore, an argument is any group of propositions of which one is claimed to follow from the others, which are regarded as providing support or grounds for the truth of that one. That means that an argument is not just a mere collection of statements. An argument has a structure which is defined by the terms ‘premises’ and ‘conclusion’ and the nature of the relationship between them.

The conclusion of an argument is that proposition which is affirmed on the basis of some other propositions, which serve as justification for the acceptance of the conclusion. These other propositions, which go by various names such as evidence, grounds, or reasons, are more technically called premises. In an argument, therefore, the premises are intended to provide sufficient grounds for the acceptance of the conclusion. For an argument to be present, “there must be some structure within the cluster of propositions, a structure that captures or exhibits some inference. This structure we describe using the terms *premise* and *conclusion*” (Copi & Cohen 2006: 4). Thus, the premise is a proposition used in an argument to support some other proposition, while the conclusion is the proposition in an argument which the other propositions (that is, the premises) support. Where there is no relationship whatsoever between the putative claim or conclusion and the reasons given for its acceptance, then there is no argument.

An argument may have two sentences where the first sentence serves as the basis for accepting the other which is the conclusion. In other words, the premise and the conclusion may be stated separately, each in a separate sentence. For example:

- (i) Ole Farmer has not been convicted of the crime of murder. Therefore, any statement indicting him of the murder should be jettisoned as mere insinuation.

- (ii) Okon is a politician who has recorded great success at the state level. Therefore, he will win the presidential election in 2015.

Sometimes, both the premise and the conclusion may be stated in the same sentence. For example:

- (i) Since it turns out that all humans are descended from a small number of African ancestors in our recent evolutionary past, believing in profound differences between the races is as ridiculous as believing in a flat earth (Copi & Cohen 2006: 4).

- (ii) Since it was clear that Daryll was not in London when her husband died, it would be wrong to bring her to court for questioning.

- (iii) Large numbers of people in this country have never had to deal with the criminal justice system, thus they are unaware of how it works and of the extraordinary detrimental impact it has upon many people's lives.

- (iv) Human brains have the same kind of chemistry and cell receptors as rats regarding glucocorticoids, so, it seems possible that our response to being handled as infants is similar.

In an argument with two separate sentences (one the premise and the other the conclusion), the statement of the conclusion may be stated first before the statement of its premise. For example:

- (i) Smoking in public places should be banned immediately. After all, passive smoking can cause cancer in non-smokers (Copi & Cohen 2006: 5).

- (ii) Corrupt politicians should be banned from holding public offices. After all, statistics has shown that corrupt politicians who hold public offices are responsible for our economic problem. It is also the case that, even when premise and conclusion are united in one sentence, the conclusion of an argument may be stated first before its single premise. Let's take, for example, a statement made by Malcolm X in 1965:

You can't separate peace from freedom because no one can be at peace unless he has freedom.

The above examples of simple arguments remind us that, in some arguments, the premises of the argument are stated first and the conclusion last. In some others, the conclusion is either stated first or is sandwiched in-between different premises offered in its support.

Just as we drew a distinction between simple and compound propositions, it must be stated that most arguments are more complicated than the ones we used as examples. In other words, “some arguments contain compound propositions with their several components related intricately” (Copi & Cohen 2006: 5). This means that we have cases where an argument has two or more propositions (premises) supporting a proposition (conclusion). We must be warned however that some compound propositions may resemble arguments; to determine whether a group of propositions or statements is an argument or not, therefore, we should ensure that (1) an inference is drawn and (2) a conclusion should be claimed to be true. For example:

It is likely that life evolved on countless other planets that scientists now believe exist in our galaxy, because life very probably evolved on Mars during an early period in its history when it had an atmosphere and climate similar to Earth’s (cited in Copi et al 2006).

In the above argument, an inference is drawn and a conclusion is claimed to be true. The proposition “life very probably evolved on Mars during an early period in its history” is asserted as a premise and the proposition “life likely evolved on countless other planets” is here claimed to follow from that premise and to be true.

3.3 Recognizing Arguments

- (i) An argument may have two sentences where the first sentence serves as the basis for accepting the other which is the conclusion. In other words, the premise and the conclusion may be stated separately, each in a separate sentence.
- (ii) Sometimes, both the premise and the conclusion may be stated in the same sentence.
- (iii) In an argument with two separate sentences (one the premise and the other the conclusion), the statement of the conclusion may be stated first before the statement of its premise.
- (iv) It is also the case that, even when premise and conclusion are united in one sentence, the conclusion of an argument may be stated first before its single premise.

The inference from this is that, in some arguments, the premises of the argument are stated first and the conclusion last. In some others, the conclusion is either stated first or is sandwiched in-between different premises offered in its support. To arrange such arguments into their premises and conclusions, we use words and phrases that are referred to variously as conclusion-indicators and premise-indicators.

The following is a list of some conclusion-indicators:

Therefore, Hence, So, Accordingly, In consequence, Consequently, Proves that, As a result, Thus, For this reason which points to the conclusion that, For these reasons, It follows that, I conclude that, Which shows that, Which means that, Which entails that, Which implies that, Which follows that, We may infer that.

The following is a list of premise-indicators:

Since, For, As, Because, Follows from, As shown by, In as much as, The reason is that, For the reason that, As indicated by, May be inferred from, May be derived from, May be deduced from, In view of the fact that.

Let us rely on these indicators to identify the premises and conclusions in the following arguments:

(i) What science cannot know; mankind cannot know. Therefore, all knowledge comes from science.

(ii) Abortion is evil not only to the victim but also to our sense of justice. Hence, it should be abolished.

(iii) Inasmuch as man is created first, man should be the master of all creatures (Offor 2012: 16).

In (i) and (ii), the indicators “therefore” and “hence” help to identify the conclusions which affirm that “... all knowledge comes from science” and that abortion “... should be abolished” respectively. In (iii), the indicator “inasmuch as” helps to identify the premise which gives support to the claim (conclusion) that “man should be the master of all creatures”. It must be stated, however, that “the words and phrases listed above may help to recognize the presence of an argument or identify its premises or conclusion, but such indicators do not necessarily appear. Sometimes it is just the meaning of the passage, or its setting, that indicates the presence of an argument” (Copi & Cohen 2006: 28). Thus, if an argument does not have premise or conclusion indicators, we are required “to identify the claim the person presenting the argument is trying to make. This is the conclusion of the argument, while the reasons given in support of such a claim are the premises of the argument” (Offor 2012: 17).

Sample Excises: (see Copi & Cohen 2006: 6 – 9)

Identify the premises and conclusions in the following passages, each of which contains only one argument:

(i) “Untouchability” is abolished and its practice in any form is forbidden. The enforcement of any disability arising out of “Untouchability” shall be an offence punishable in accordance with law.

Solution:

Premise: “Untouchability” is abolished and its practice in any form is forbidden.

Conclusion: The enforcement of any disability arising out of “Untouchability” shall be an offence punishable in accordance with law.

(ii) Because light moves at a finite speed, looking at objects that are millions of miles away is actually at light that was emitted many years ago.

Solution:

Premise: Light moves at a finite speed

Conclusion: Looking at objects that are millions of miles away is actually looking a light that was emitted many years ago.

(iii) Because the education of parents directly impacts the ability of their children to succeed in school, it is an urgent necessity that this generation of Nigerian youth is properly educated.

Solution:

Premise: The education of parents directly impacts the ability of their children to succeed in school.

Conclusion: It is an urgent necessity that this generation of Nigerian youth is properly educated.

(iv) Unquestionably, no more important goal exists in medical research today than the development of an AIDS vaccine. Last year ... AIDS, caused by HIV (Human Immunodeficiency Virus) was the infection disease that killed the most people around the world, and the epidemic is not abating.

Solution:

Premise I: In 1988 AIDS was the infectious disease that killed most people around the world.

Premise II: The AIDS epidemic is not abating.

Conclusion: Unquestionably, no more important goal exists in medical research today than the development of an AIDS vaccine.

4.0 Conclusion

Although, in logic, the term “statement” is not synonymous with “proposition”, however, it is used in much the same sense. Also, arguments in logic consist of two sentences. The first sentence serve as the basis for accepting the other, which is the conclusion.

5.0 Summary

In this unit, we looked at the basic concepts that are most central to this course, Introduction to logic II, namely, logic, propositions and arguments. We defined logic as the study of the methods and principles used to distinguish correct from incorrect reasoning. We gave an account of propositions and distinguished them from the sentences in which they may be expressed. We gave an account of the concept of an argument and defined an argument as a cluster of propositions of which one is the conclusion and the other(s) are premises offered in its support. Finally, in the lecture, we looked at ways

of recognizing arguments through phrases and words we call conclusion-indicators and premise-indicators.

6.0 Tutored Marked Assignment

- i. What is a proposition?
- ii. Construct three arguments from typical texts in a newspaper or law report.
- iii. Do you think that an argument is different from a quarrel?
- iv. Indicate which of the following statements are true or false:
 - a. Logic deals only with deductive arguments.
 - b. An argument refers to a group of statements in which one part known as the premise(s) follows from the other part called the conclusion.
- v. Is there any difference between a proposition and a statement?
- vi. Give two examples of a simple proposition; Give two examples of a compound proposition.
- vii. Do you agree that not all propositions are arguments? Justify your answer.
- viii. Identify the premise(s) and the conclusion in each of the following passages:
 - a. People who smoke cigarettes should be forced to pay for their own health insurance. They know that smoking is bad for their health. They have no right to expect others to pay for their addiction.
 - b. Put off thy shoes from thy feet, for the place whereon thou standest is holy ground.
 - c. According to law, a man is innocent until proved guilty. So Mr Larry must be innocent of the charge of murder, since he has not yet been proved guilty.
 - d. Capital punishment should not be permitted because it consists of killing of human beings, and killing of human beings should never be permitted by society.
 - e. It is likely that innocent Americans have been executed in recent past. During the past 25 years, 78 innocent men and women have been released from death row as a result of evidence that turned up after they were convicted.

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UNIT 2: THE STRUCTURE OF ARGUMENTS

Contents

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3. Main Contents
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 - 3.2 Truth, Validity and Soundness
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1.0 Introduction

In the unit 1, we pointed out that a proposition may not necessarily qualify as an argument; to determine whether a group of propositions or statements is an argument or not, therefore, we should ensure that an inference is drawn, and a conclusion should be claimed to be true. But there are basically two different ways in which a conclusion of an argument may be supported by its premises,

namely, (i) the premises may give total support to the conclusion of an argument and (ii) the premises may support the conclusion only with some degree of probability. This distinction informs why arguments are categorized into two: Deductive and Inductive.

2.0 Intended Learning Outcomes (ILO's)

At the end of this unit, you should be able to:

- (1) Distinguish between deductive and inductive arguments.
- (2) Give examples of both deductive and inductive arguments.
- (3) Understand valid and invalid arguments.
- (4) Know the relation that exists between truth and validity of an argument.

3.0 Content

3.1 Deductive and Inductive Arguments

Historically speaking, deductive reasoning can be traced back to the ancient Greek philosopher, Aristotle. Inductive reasoning, on the other hand, was developed by the famous British philosopher, Francis Bacon and his successor, J.S. Mill. It is important to note that:

A deductive argument makes the claim that its conclusion is supported by its premises conclusively. An inductive argument, in contrast, does not make such a claim. Therefore, if we judge that in some passage a claim or conclusiveness is being made, we treat the argument as deductive; if we judge that such a claim is not being made, we treat it as inductive. Since every argument either makes this claim of conclusiveness (explicitly or implicitly) or does not make it, every argument is either deductive or inductive (Copi & Cohen 2006: 9).

There are distinguishing features between deductive and inductive arguments. If we are confronted with an argument whose truth of its premises guarantees the truth of its conclusion, then that argument is said to involve in a deductive inference. In other words, “a deductive inference succeeds only if its premises provide such absolute and complete support for its conclusion that it would be utterly inconsistent to suppose that the premises are true but the conclusion false” (Offor 2012: 22). On the other hand, an argument is said to involve an inductive inference if it “claims merely that the truth of its premises make it likely or probable that its conclusion is also true” (Ibid.) This means that in an inductive argument the premises do not give total support to the conclusion but merely provide some grounds for the truth of their conclusions. The foregoing can be termed as the distinguishing features between deductive and inductive arguments. These features can be summarised thus:

1. In a deductive argument, the premises conclusively or logically imply the conclusion; in an inductive argument, the premises only provide some probable grounds for the acceptance of the conclusion.

2. If the premises of a deductive argument provide conclusive grounds for the truth of the conclusion, then the argument is said to be valid; inductive arguments cannot be valid but can be strengthened or weakened by additional premises.
3. If a deductive argument is valid, then it is impossible for its premises to be true and its conclusion false; it is possible for the conclusion of an inductive argument to be false even when the premises are true (Offor 2012: 23).

Examples of deductive argument are:

- (i) All humans are mortal
Aristotle is human

Therefore, Aristotle is mortal.

- (ii) All humans are animals
All animals are mortal
Therefore, all humans are mortal.

- (iii) All Nigerians are Africans
All Africans are coloured
Therefore, all Nigerians are coloured.

- (iv) In order to study in the United Kingdom, you have to develop yourself in the field of philosophy, and in order to develop yourself in the field of philosophy, you have to read the works of Plato and Aristotle. Therefore, in order to study in the United Kingdom you have to read the works of Plato and Aristotle.

Examples of inductive argument are:

- (i) John is human and is mortal
Peter is human and is mortal

James is human and is mortal

Therefore, all humans are mortal.

- (ii) Kennedy was an orator and was a good leader.
Churchill was an orator and was a good leader.
Babangida was an orator.
Therefore, Babangida will be a good leader.

- (iii) The cows have kidneys and have lungs.
All horses have kidneys and have lungs.

All human beings have kidneys and have lungs.
Therefore, all animals with kidneys have lungs.

- (iv) All politicians are criminals and will eventually die
All soldiers are criminals and will eventually die
Therefore, all men are criminals and will eventually die.

3.2 Truth, Validity and Soundness

Earlier in this unit, we pointed out that, in deductive arguments, the premises provide conclusive grounds for the truth of the conclusion. A statement or proposition is said to be true if it expresses what really the case is and is false if it does not conform with the situation it expresses. More lucidly, truth is the attribute of a statement or proposition that asserts what really is the case. Therefore, when the premises provide conclusive or incontrovertible grounds for the truth of the conclusion, the argument is said to be valid. This shows that there is some connection between truth and validity of an argument. However, the term *validity* is applicable only to deductive arguments and to say that a deductive argument is valid is to say that it is not possible for its conclusion to be false if its premises are true. Thus, “a deductive argument is *valid* when, if its premises are true, its conclusion *must* be true” (Copi & Cohen 2006: 9). But if the premises of a deductive argument fail to guarantee the truth of its conclusion, the argument is said to be invalid. Here, it is instructive to show the contrast between truth and validity. If, for instance, I assert that Nigeria’s premier university is situated in Ibadan, the capital of Oyo State, I assert what really is the case, what is true. If I had claimed that the premier university is in Abuja, my assertion would not be in accord with the real world; therefore, it would be false. It can be gleaned, therefore, that “truth and falsity are attributes of individual propositions or statements; validity and invalidity are attributes of arguments” (Copi & Cohen 2006: 12).

Copi & Cohen (2006: 12) explicate further on the relations between truth and validity by pointing out that:

Just as the concept of validity cannot apply to single propositions, the concept of truth cannot apply to arguments. Of the several propositions in an argument, some (or all) may be true and some (or all) may be false. But the argument as a whole is neither *true* nor *false*. Propositions, which are statements about the world, may be true or false; deductive arguments, which consist of inferences from one set of propositions to other propositions, may be *valid or invalid*.

With seven illustrative arguments, Copi & Cohen (2006: 13 – 14) show that there are many possible combinations of true and false premises and conclusions in both valid and invalid arguments, implying that (1) an argument may be valid even when its conclusion and one or more of its premises are false and (2) the validity of an argument depends only on the relation of the premises to the conclusion. In other words, the truth or falsity of an argument’s conclusion does not by itself determine the validity or invalidity of that argument and, also, the fact that an argument is valid does not guarantee the truth of its conclusion. The illustrative arguments can be represented thus:

I. Some *valid* arguments contain *only true* propositions – true premises and a true conclusion:

All terrestrial beings live on earth.

All humans are terrestrial beings.

Therefore, all humans live on earth.

II. Some *valid* arguments contain *only false* propositions – false premises and a false conclusion:

All Cyclops have dark skin.

All flying horses are Cyclops.

Therefore, all flying horses have dark skin.

This argument is valid because, if its premises were true, its conclusion would have to be true also, though, we know that in fact both the premises *and* the conclusion of this argument are false.

III. Some *invalid* arguments contain *only true* propositions – all their premises are true, and their conclusions are true as well:

If I bagged a bachelor's degree from the University of Ibadan, then I would be a graduate.

I do not have a degree from the University of Ibadan.

Therefore, I am not a graduate.

The true conclusion of this argument does not follow from its true premises. The fact that I do not have a degree from the University of Ibadan does not presuppose that I am not a graduate.

IV. Some *invalid* arguments contain *only true premises* and have a *false conclusion*. This is illustrated by an argument exactly like the previous example (III) in form, changed only enough to make the conclusion false.

If Ade Babangida bagged a bachelor's degree from the University of Ibadan, then he would be a graduate.

He does not have a degree from the University of Ibadan.

Therefore, he is not a graduate.

The premises of this argument are true, but its conclusion is false. This above example underscores our point that it is impossible for the premises of a valid argument to be true and its conclusion to be false.

V. Some *valid* arguments have *false premises and a true conclusion*:

All spiders belong to the cat family.

All tigers are spiders.

Therefore, tigers belong to the cat family.

The conclusion of this argument is true and may be validly inferred from these two premises, both of which are wildly false.

VI. Some *invalid* arguments also have *false premises and a true conclusion*:

All arachnids have wings.

All scorpions have wings.

Therefore, all scorpions are arachnids.

From examples V and VI taken together, it can be inferred that the validity or invalidity an argument does not depend on whether it has false premises and a true conclusion.

VII. Some *invalid* arguments, of course, contain *all false* propositions – false premises and a false conclusion:

All arachnids have wings.

All scorpions have wings.

Therefore, all arachnids are scorpions.

An argument is said to be sound if that argument is valid and has all its premises and conclusion as true. On the contrary, an argument is unsound if though valid, the premises fail to establish the truth of its conclusion. Thus, “the conclusion of a sound argument obviously must be true – and only a sound argument can establish the truth of its conclusion. If a deductive argument is not sound – that is, if the argument is not valid *or* if not all its premises are true – it fails to establish the truth of its conclusion even if in fact the conclusion is true” (Copi & Cohen 2006: 15). Let’s illustrate the difference between sound and unsound arguments with examples:

(i) All elephants are herbivores
All herbivores live on land
Therefore, all elephants live on land.

(ii) All university graduates are lawyers
All lawyers are soothsayers
Therefore, all university graduates are soothsayers.

The first example is a sound argument, while the second is unsound because all the statements in the argument are false, though the argument is valid.

Sample Exercises: (see Copi & Cohen 2006: 16)

Construct a series of deductive arguments, on any subject of your choosing, each with only two premises, having the following characteristics:

- (i) A valid argument with one true premise, one false premise, and a false conclusion:

Solution:

Premise: Of all the rivers in the world, the Ganges is the largest. [False]

Premise: Varanasi is on the banks of the Ganges River. [True]

Conclusion: Therefore Varanasi is on the banks of the largest river in the world [False]

- (ii) A valid argument with two false premises and a true conclusion:

Solution:

Premise: In all countries of the world, the largest city is the capital. [False]

Premise: Canberra is the largest city in Australia. [False]

Conclusion: Therefore Canberra is the capital of Australia. [True]

4.0 Conclusion

There are mainly two forms of arguments and these are deductive and inductive. Deductive argument has its premises supporting the conclusion while an inductive argument is one that the conclusion is made probable. A deductive argument can be valid, sound and unsound. All inductive arguments are both invalid and unsound.

5.0 Summary

In this unit, we pointed out that there are distinguishing features between deductive and inductive arguments. We explained that if we are confronted with an argument whose truth of its premises guarantees the truth of its conclusion, then that argument is said to involve in a deductive inference. In other words, the conclusion of a deductive argument is claimed to follow from the premises with necessity, and a valid deductive argument is one in which conclusion is necessarily true if the premises are true. An inductive argument, on the other hand, is an argument whose conclusion has some degree of probability but for which the claim of necessity is not made. We went on to discuss the relations between the validity (or invalidity) of deductive arguments and the truth (or falsity) of their constituents propositions.

6.0 Tutors Marked Assignment

- (1) What is deductive argument?

- (2) What is inductive argument?
- (3) State the features of both deductive and inductive arguments.
- (4) Construct three deductive arguments.
- (5) Construct three inductive arguments.
- (6) State the distinguishing features of deductive and inductive arguments.
- (7) Indicate which of the following statements are true or false:
 - a. In a deductive argument, the premises logically imply the conclusion.
 - b. It is possible for the conclusion of an inductive argument to be false even when the premises are true.
- (8) Identify each of the following arguments by stating whether it is deductive or inductive:
 - a. Kennedy was an orator and was a good leader. Churchill was an orator and was a good leader. Babangida was an orator. Therefore, Babangida will probably be a good leader.
 - b. Hunting, particularly the hunting of large animals, is so complicated, difficult and hazardous that the cooperation of numerous individuals is needed. It can be inferred, therefore, that Peking man was more likely to have been living in a group than in solitude when he began to hunt deer.
 - c. All the Cows have kidneys and have lungs. All horses have kidneys and have lungs. All human beings have kidneys and have lungs. Therefore, all animals with kidneys have lungs.
 - d. In order to study in the United Kingdom, you have to develop yourself in the field of philosophy, and in order to develop yourself in the field of philosophy, you have to read the works of Plato and Aristotle. Therefore, in order to study in the United Kingdom you have to read the works of Plato and Aristotle.
 - e. All London-based businessmen are graduates from Boston. William Crain is a London-based businessman. Therefore, William Crain is a graduate from Boston.
- (9) Discuss the relation between validity and truth.
- (10) State one feature of a sound argument.
- (11) Construct a series of deductive arguments, each with only two premises and having the following characteristics:
 - a. a valid argument with one true premise, one false premise, and a true conclusion.
 - b. An invalid argument with two true premises and a false conclusion.
 - c. An invalid argument with two true premises and a true conclusion.
 - d. An invalid argument with two false premises and a true conclusion.
 - e. An invalid argument with one true premise, one false premise and a true conclusion.
 - f. A valid argument with two true premises and a true conclusion.

7.0 References/Further Reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
2. Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).

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UNT 3: INFORMAL FALLACIES I (FALLACIES OF RELEVANCE)

Contents

1. Introduction
2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 Fallacy
 - 3.2 Informal Fallacy – The Fallacies of Relevance
 - 3.2.1 Appeal to Force (*argumentum ad baculum*)
 - 3.2.2 The Appeal to Pity (*argumentum ad misericordiam*)
 - 3.2.3 The Appeal to Emotion (*argumentum ad populum*)
 - 3.2.4 The Appeal to Inappropriate Authority (*argumentum ad veracundiam*)
 - 3.2.5 Argument against the Man or Person (*argumentum ad hominem*)
 - 3.2.6 Appeal to Ignorance (*argumentum ad ignorantiam*)

3.2.7 Irrelevant Conclusion (*ignoratio elenchi*)

3.2.8 Black-or-White Fallacy

4. Conclusion

5. Summary

6. Tutor Marked Assignment

7. References/Further Reading

Introduction

In our previous units, we have been able to show that, for us to have a good argument, the premises must support the conclusion. If otherwise, the argument is considered fallacious. Thus in this unit, we shall examine Informal Fallacy. We shall focus on a particular kinds of informal fallacies, The fallacies of relevance that are often unnoticed committed by some individuals.

2.0 Intended Learning Outcomes

At the end of this unit you should be able to:

- (1) Define the term “fallacy”
- (2) Distinguish between “formal” and “informal” fallacies.
- (3) State at least one defining characteristic of fallacies of relevance.

3.0 Content

3.1 Fallacy

When the premises of an argument fail to support its conclusion, the argument is said to be bad or, more technically, fallacious. When an argument exhibits a certain kind of mistake in reasoning, that argument is said to be fallacious, implying that a fallacy is any error we commit in reasoning. It should be added, however, that the term “designates not only any errors in reasoning, but *typical* errors – mistakes in reasoning whose common pattern can be detected” (Copi & Cohen 2006:357). A fallacy is, therefore, “a type of argument that may seem to be correct but that proves, on examination, not to be so” (Ibid). From the foregoing, it is clear that “a fallacy has two features: first, it is an argument; second, its premises provide no support to the conclusion though they appear to do so, because the argument is psychologically persuasive” (Bello 2007:41). There are the ‘Formal’ and ‘Informal’ fallacies. Formal fallacies are the types of mistakes we make in our attempt to construct syllogisms (deductive reasoning/a logical argument with two premises and a conclusion) or in using logical symbols. Informal fallacies, on the other hand, are the types of errors in reasoning that occur as a result of carelessness or inattention to

the content of the propositions constituting an argument. At this level, we shall focus on Informal Fallacies which can be classified into three broad categories, namely, fallacies of relevance, fallacies of ambiguity, and fallacies of presumption. In this lecture, we shall engage ourselves with Fallacies of Relevance.

3.2 Informal Fallacies (The fallacies of relevance)

This is concern those arguments whose premises appear to be relevant to the conclusion drawn but, on close examination, are simply not relevant. These fallacies will now be examined.

3.2.1. The Appeal to Force (*argumentum ad baculum*)

This fallacy is committed when one resorts to the use of threat to cause the acceptance of a conclusion, especially when evidence or rational methods fail. In other words, this fallacy is committed when an argument relies on the threat of force, though the threat may be veiled and may not necessarily be physical. For instance, I'll be committing this fallacy if I threaten to fail students who disagree with my political ideology. This means that the fallacy can be committed by someone in a position of power if he uses threat to coerce his opponents to accept his proffered proposition. The following are examples of arguments that commit this fallacy:

- (i) All fresh students in the Department of Philosophy should attend my wedding if they want me to be lenient in assessing their exam scripts.
- (ii) If you do not agree with my political opinions, you will not graduate from this university.

3.2.2. The Appeal to Pity (*argumentum ad misericordiam*)

Literally, *misericiordiam* means “a pitying heart”. Thus, this fallacy occurs when the premises of an argument plainly relies on mercy, generosity, altruism, and so on. For instance, a lawyer might use the special circumstances of his client (an offender) to justify leniency in punishment. In short, when the lawyer emphasizes the unfortunate consequences that will befall his client instead of looking at the overwhelming proof of his guilt, he has committed this fallacy. The following passages commit this fallacy:

- (i) I am a single parent, solely responsible for the financial support of my children. If you give me this traffic ticket, I will lose my license and be unable to drive to work. If I cannot work, my children and I will become homeless and may starve to death. Therefore, you should not give me this traffic ticket (Offor 2012: 42).

(ii) I implore the jury to temper justice by mercy. Though my client, barely eighteen, is accused of killing his mother and father with an axe, I plead for leniency on the grounds that he is an orphan.

3.2.3. The Appeal to popular feeling/Mob appeal (*argumentum ad populum*)

This fallacy is committed when, instead of using evidence and rational argument, you appeal to the emotion of the people to win their assent to a conclusion. The appeal to emotion, therefore, relies on expressive language and other devices to arouse strong feelings that may lead an audience to accept its conclusion. This fallacy is a device often used by politicians, propagandists, is common in commercial advertising. The following example explains this fallacy:

(i) The wisest men and women in Yoruba history have all been interested in *Ifa*. Obas, queens and regents of all epochs in Yoruba land have believed in it and have guided the affairs of their people by it. Therefore those who say that *Ifa* is not a science are mistaken (Bello 2007: 53).

(ii) In the last presidential campaign, a mammoth crowd welcomed Goodluck Jonathan in each of the northern zones. In the last election, he led the other presidential candidates with very wide margins and became president. Therefore, those who accuse Jonathan of financial misappropriation are not sincere.

3.2.4. The Appeal to Inappropriate Authority (*argumentum ad verecundiam*)

This fallacy arises when we appeal to the opinions of someone who in fact does not have any legitimate claim to authority in the matter at hand. In other words, it “involves the mistaken supposition that there is some connection between the truth of a proposition and some feature of the person who asserts or denies it” (Offor 2012: 42). For instance, it would be fallacious to appeal to the opinions of a movie star on whether taking a brand of beer is good for the body or not. Someone with expertise in food nutrition would be the appropriate authority. Thus, “when the truth of some proposition is asserted on the basis of the authority of one who has no special competence in that sphere, the appeal to inappropriate authority is the fallacy committed” (Copi et al 2006: 374). Consider these examples:

(i) Pato Ogundeji, a Professor of Linguistics and African Languages at the University of Ibadan, believes that the stars revolve round the earth in a perfect circle. Therefore, the stars revolve round the earth in a perfect circle.

- (ii) But can you doubt that air has weight when you have the clear testimony of Aristotle affirming that all the elements have weight including air, and excepting only fire?

3.2.5. Argument against the Man or Person (*argumentum ad hominem*)

This is a fallacy in which the argument relies on an attack against the person taking a position. In other words, when the thrust of an argument is directed at someone who is defending a conclusion in dispute (and not the conclusion itself), the fallacy committed is *ad hominem*. There are two major forms of the *ad hominem* argument, namely, the ‘abusive’ and the ‘circumstantial’. The ‘abusive’ variety of *ad hominem* is committed when one attacks the person who made an assertion, instead of giving reasons why the assertion should not be accepted. The ‘circumstantial’ occurs when one argues against the circumstance of the opponent, instead of assessing the dispute in question. Consider the following examples:

Abusive

- (i) Mr. Brown’s arguments for pre-marital sex should be dropped because he is a womanizer.
- (ii) Darwin’s thesis of natural selection should be discarded as a work of fiction because he is a racist.

Circumstantial

- (i) Rev. Father John should accept my position that abortion should be abolished because this is compatible with his faith as a Catholic.
- (ii) Former President Bush wouldn’t approve of President Obama’s economic policies because he is a Republican.

3.2.6. Appeal to Ignorance (*argumentum ad ignorantiam*)

This fallacy is committed when one posits that a proposition is true simply because it has not been proved false or that it is false because it has not been proved true. Bello (2007: 52) adds that “this mode of argument is commonly used to argue against the existence of witches, spirits, and other forms of ‘extraordinary’ phenomena”. The following passages commit this fallacy:

- (i) No one has conclusively proven that there is no intelligent life on the moons of Jupiter. Therefore, there is intelligent life on the moons of Jupiter (Offor 2012: 43).
- (ii) The alarmists have not succeeded in proving that the toxic and radioactive materials dumped at Koko (Delta state) are dangerously harmful to human life. The materials are therefore perfectly safe (Bello 2007: 52).

3.2.7. Irrelevant Conclusion (*ignoratio elenchi*)

Ignoratio elenchi translates to “mistaken proof” and is a type of fallacy in which the premises provide justification or grounds for a different conclusion than the one that is proposed. It tries to establish the truth of a proposition with premises which actually provide support for an entirely different conclusion. The following are examples of this fallacy:

- (i) The Golden rule is basic to every system of ethics ever devised. Everyone accepts it in some form or other. Therefore, people’s lives are guided by legislations (Offor 2012: 43)
- (ii) Capitalism is desirable. For at one time all utilities were state-owned; now more and more of them are being commercialised or privatised. The Structural Adjustment Programme (SAP), moreover, is based on capitalist principles. We are well on our way to full-blown capitalism and its complete triumph is inevitable (Bello 2007: 51).

3.2.8. Black-or-White Fallacy

Also referred to as *Fallacy of False Alternatives*, this fallacy is committed when it is falsely assumed in an argument that only two alternatives or positions are possible with regard to a certain issue or when the possibility of a third alternative to the two already allowed is ignored (Bello, 2000). For example:

- (i) He who is not a PDP member is against Jonathan’s regime Oshiomole is not a PDP member
He is therefore against Jonathan’s regime.
- (ii) He who does not preach the Word of God is an anti-Christ Bisala does not preach the Word of God.
Therefore, he is an anti-Christ.

Exercises: (see Copi & Cohen 2006: 367 – 370)

Identify the fallacies of relevance in the following passages:

- (i) ICICI, a premier financial institution in the country is offering best financial product with value added services. It is not just finance but it is love and affection, which is being transacted. Most personalized service at your doorstep offered by the ICICI for housing finance seekers. Like a family member and a good friend ICICI fulfils your needs to have your sweet home.

Solution:

Appeal to Emotion is not (*argumentum ad populum*). The fallacy is quite common in advertisements. The uses of words like “love”, “affection” and “family” are used as such words are not usually associated with banks and it is an appeal to the emotions of people to try to tell them that ICICI is a friendly bank.

(ii) When we had got to this point in the argument and everyone saw that the definition of justice had been completely upset, Thrasymachus, instead of replying me, said: “Tell me, Socrates, have you got a nurse?”

“Why do you ask such a question,” I said, “when you ought rather to be answering?”

“Because she leaves you to snivel, and never wipes your nose; she has not even taught you to know the shepherd from the sheep.”

Solution:

Argument Against the Person (*argumentum ad hominem*), ‘Abusive’.

4.0 Conclusion

All forms of the fallacies of relevance are incorrect way of reasoning because they violate the logical principles of thought.

5.0 Summary

In this unit, we defined the term “fallacy” as any error we commit in reasoning. We pointed out that Informal Fallacy can be classified into three broad categories, namely, fallacies of relevance, fallacies of ambiguity, and fallacies of presumption. This unit was devoted to fallacies of relevance, whose premises appear to be relevant to the conclusion drawn but, on close examination, are simply not relevant. Under fallacies of relevance, we discussed **The Appeal to Force** (*argumentum ad baculum*) which is committed when one resorts to the use of threat to cause the acceptance of a conclusion, especially when evidence or rational methods fail. **The Appeal to Pity** (*argumentum ad misericordiam*) occurs when the premises of an argument plainly relies on mercy, generosity, altruism, and so on. You also read that **The Appeal to Emotion** (*argumentum ad populum*) relies on expressive language and other devices to arouse strong feelings that may lead an audience to accept its conclusion The unit also made you to understand that **The Appeal to Inappropriate Authority** (*argumentum ad verecundiam*) which arises when we appeal to the opinions of someone who in fact does not have any legitimate claim to authority in the matter at hand. **Argument Against the Man or Person** (*argumentum ad hominem*), a fallacy in which the argument relies on an attack against the person taking a position and there are two types, abusive or circumstantial. **Appeal to Ignorance** (*argumentum ad ignorantiam*) which is committed when one posits that a proposition is true simply because it has not been proved false or that it is false because it has not been proved true; **Irrelevant Conclusion** (*ignoratio elenchi*), a type of fallacy in which the premises provide justification or grounds for a different conclusion than the one that is proposed; **Black-or-White Fallacy** which is committed when it is falsely assumed in an argument that only two alternatives or positions are possible in regards with a certain issue or when the possibility of a third alternative to the two already allowed is ignored.

6.0 Tutored Marked Assignment

- (1) How would you define a fallacy if you had not the opportunity of offering this course?
- (2) Give two reasons why lawyers and politicians may deliberately commit fallacies.
- (3) Name at least three categories of fallacies.
- (4) With two examples each, discuss the following fallacies of relevance:
 - a. Irrelevant conclusion
 - b. Appeal to force
 - c. Appeal to pity
 - d. Appeal to authority
 - e. Argument against the man
 - f. Black-or-white fallacy

7.0 References/Further Reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
2. Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).
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UNIT 4: INFORMAL FALLACIES II (FALLACIES OF AMBIGUITY)

Contents

1. Introduction
2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 Fallacy of Ambiguity
 - 3.1.2 Fallacy of Equivocation
 - 3.1.3 Fallacy of Division
 - 3.1.4 Fallacy of Composition
 - 3.1.5 Fallacy of Accent

3.1.6. Fallacy of Amphiboly

4. Conclusion

5. Summary

6. Tutor Marked Assignment

7. References/Further Reading

1.0 Introduction

In this unit, we shall continue our discussion of informal fallacies by looking at fallacies of ambiguity which, as the name implies, arise from the imprecise use of language.

2,0 Intended Learning Outcomes

At the end of this unit, you should be able to:

- (1) Distinguish between fallacies of relevance and fallacies of ambiguity.
- (2) Identify the various fallacies under fallacies of ambiguity.

3.0 Content

3.1 Fallacy of Ambiguity

These fallacies arise “from *the equivocal use of words or phrases* in the premises or in the conclusion of an argument” (Copi & Cohen 2006: 358). This means that, in fallacies of ambiguity, an important term may have two or more distinct meanings. Thus when we notice a shift or confusion of meanings within an argument, a fallacy of ambiguity is committed.

3.1.2. Fallacy of Equivocation

This fallacy is committed when two or more meanings of a word or phrase are used in different parts of an argument. Since most words have more than one literal meaning, we often consider the contexts in which they are used to differentiate those meanings. However, we often confuse the meanings of a word or phrase and when this occurs we are guilty of using the word equivocally, thereby committing the fallacy of equivocation. An equivocation, therefore, “trades upon the use of an ambiguous word or phrase in one of its meanings in one of the propositions of an argument and also in another of its meanings in a second proposition” (Offor 2012: 44). The following are examples of this fallacy:

- (i) Only man is rational
No woman is a man

Therefore, no woman is rational (Offor 2012: 44).

The word 'man' in the argument above is used in different senses in the two premises of the argument, showing no link between the terms of the conclusion.

- (ii) Andrew has faith in the president
He also has faith in telepathy

Therefore, Andrew has faith in both the president and science.

In the above argument the word "faith" is used equivocally in the two premises. In the first premise, the word "faith" is used by Andrew to assert his confidence that the president will do good work during his tenure; in the second premise, however, Andrew is not saying that he has confidence in telepathy but, rather, saying that he believes that some people are capable of using telepathy as an extra-sensory activity. Therefore, there is no link between the use of the term "faith" in the two premises and the conclusion.

3.1.3. Fallacy of Division

This is a fallacy in which "a mistaken inference is drawn from the attributes of a whole to the attributes of the parts of the whole" Copi & Cohen (2006: 391). There are two varieties of this fallacy and they occur: (1) when you argue fallaciously that what is true of a whole must also be true of its part; (2) when you argue from the attributes of a collection of elements to the attributes of the elements themselves. An example of the first kind of this fallacy is:

- (i) Nigeria is a rich and great country.
Dani is a Nigerian.

Therefore, Dani is rich and great.

An example of the second variety of this fallacy is:

- (ii) University students study law, physics, commerce, social work and philosophy
Therefore, each university student studies law, physics, commerce, social work and philosophy.

3.1.4. Fallacy of Composition

This fallacy is the reverse of the fallacy of division and it occurs when an inference is mistakenly drawn from the attributes of the parts of a whole to the attributes of the whole. Thus, it "involves an inference from the attribution of some features of every individual member of a class, to the possession of the same feature by the entire class" (Offor 2012: 45). For example, you commit this fallacy when you argue that:

- (i) Every part of the new war plane is light in weight

Therefore, the new war plane is light in weight.

- (ii) Each departmental library in the university is worth a million dollars

Therefore, the university library is worth a million dollars.

3.1.5. Fallacy of Accent

The fallacy of accent is committed when “a phrase is used to convey two different meanings within an argument, and the difference is based on changes in emphasis given to words within the phrase” (Copi & Cohen 2006: 388). In other words, this fallacy occurs when there is a shift of meaning within an argument arising from changes in the emphasis given to its words or parts. Thus, “the way in which the meaning shifts in the fallacy of accent depends upon which parts of it may be emphasized or accented” (Offor 2012: 45). For example:

- (i) Alice was happy and friendly today
Therefore, Alice usually is sad and unfriendly.
- (ii) Okey will win the Olympic championship!
Therefore, Okey has won several other championships except the Olympic championship.

In each of the two examples above, the stress or emphasis on certain words (that is, the accented part) in the premise shifts or changes the meaning of the argument.

3.1.6. Fallacy of Amphiboly

The word “amphiboly” connotes an ambiguity of expression due to grammatical construction. The fallacy of amphiboly occurs, therefore, when we argue from premises whose formulations are ambiguous because of their grammatical construction. It is a fallacy “in which a loose or awkward combination of words can be interpreted more than one way; the argument contains a premise based on one interpretation while the conclusion relies on a different interpretation” (Copi & Cohen 2006: 387). This implies that a statement may be true on one interpretation and false on another. The argument becomes fallacious “When such a statement is stated as a premise on the interpretation that makes it true and a conclusion is drawn from it on the interpretation that makes it false” (Ibid.). For example:

- (i) The philanthropist donated, along with his ex-wife, Jane, two million Naira to the university.
- (ii) Women prefer Democrats to men (Copi & Cohen 2006: 388).

Sample Exercises: (see Copi & Cohen 2006: 394 – 395)

Identify the fallacies of ambiguity that appear in the following passages:

(i) ... the universe is spherical in form ... because all the constituent parts of the universe, that is the sun, moon, and the planets, appear in the form.

Solution:

3.1.7 Fallacy of Composition; It cannot be inferred from the fact that the parts have a specified shape that the whole has that same shape.

(ii) As such, it often struck me as extremely odd that critics of beauty pageants in India would criticize them as “Western.” After an entire lifetime spent in a place discursively constructed as “the West,” I have a difficult time remembering if I have even actually seen a beauty pageant there. True, they have originated in the West. However, today in the West they do not carry the kind of status and clout they have come to acquire in South Asia. Indeed, the concept of objectively judging beauty is as widespread in South Asia as it is in the West.

Solution:

Equivocation. The words “West” and “Western” are being used differently in different statements.

5.0 Conclusion

Like the fallacies of relevance that we discussed in the last unit, all forms of fallacy of ambiguity also defy logical reasoning and are invalid.

5.0 Summary

In this unit, we looked at the fallacies of ambiguity. We explained that these fallacies arise from the imprecise use of language. The fallacies discussed under fallacies of ambiguity are **Fallacy of Equivocation** which is committed when two or more meanings of a word or phrase are used in different parts of an argument; **Fallacy of Division**, a fallacy in which a mistaken inference is drawn from the attributes of a whole to the attributes of parts of the whole; **Fallacy of Composition** which occurs when an inference is mistakenly drawn from the attributes of the parts of a whole to the attributes of the whole; **Fallacy of Accent** which occurs when there is a shift of meaning within an argument arising from changes in the emphasis given to its words or parts; **Fallacy of Amphiboly** which occurs when we argue from premises whose formulations are ambiguous because of their grammatical construction. It is a fallacy which shows that a statement may be true on one interpretation and false on another.

6.0 Tutored Marked Assignment

- (1) Give the dictionary meanings of the following:
 - a. ambiguity
 - b. equivocation
 - c. accent
 - d. amphiboly

- (2) Construct two ambiguous expressions.
- (3) Explain the difference between fallacy of division and fallacy of composition.
- (4) Give two examples of each of the following fallacies of ambiguity:
 - a. Equivocation
 - b. Division
 - c. Composition
 - d. Accent
 - e. Amphiboly

7.0 References/Further Reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
2. Lawhead, William F. *The Voyage of Discovery: A Historical Introduction to Philosophy* (London: Wadsworth Group, 2002).
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UNIT 5: INFORMAL FALLACIES III (FALLACIES OF PRESUMPTION)

Contents

1. Introduction
2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 Fallacies of Presumption
 - 3.1.2 Fallacy of Accident
 - 3.1.3 Converse Accident or Hasty Generalization
 - 3.1.4 False Cause

3.1.5 Begging the Question (*Petitio Principii*)

3.1.6 Complex Question

4. Conclusion

5. Summary

6. Tutor Marked Assignment

7. References/Further Reading

1.0 Introduction

We have looked at some incorrect patterns of reasoning in our discussion of fallacies of relevance and fallacies of ambiguity. In this unit, we shall end our discussion of informal fallacies by looking at Fallacies of Presumption.

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

- (1) State at least one defining feature of fallacies of presumption.
- (2) Give at least two examples of each of the fallacies of presumption.

3.0 Content

3.1 Fallacy of Presumption

We commit these fallacies when, in an argument, we infer our conclusion from premises whose truth is uncertain or assumed. In these fallacies, “the conclusion depends on a tacit assumption that is dubious, unwarranted, or false” (Copi & Cohen 2006:379).

3.1.2. Fallacy of Accident

This fallacy is committed when “a generalization is wrongly applied to a particular case” (Copi & Cohen 2006: 380). Hence, fallacy of accident “begins with the statement of some principle that is true as a general rule, but then errs by applying this principle to a specific case that is unusual, atypical and whose accidental circumstances render the rule inapplicable” (Offor 2012: 46). We commit this fallacy when we appear to be oblivious of the fact that even general rules or principles do have plausible exceptions. In other words, it would be fallacious argue a case based on the assumption that some rule or generalization applies universally.

3.1.3. Converse Accident or Hasty Generalization

This fallacy occurs when individual cases are generalized. Put differently, this fallacy is committed “when we draw conclusions about all the persons or things in a given class on the basis of our knowledge about only one (or only a very few) of the members of that class” (Copi & Cohen 2006: 378). For example:

- (i) Ayoola hails from Oyo and is a good drummer
Therefore, people who hail from Oyo are good drummers.

- (ii) General Babangida, whose birthday fell within the Leo period, possessed great power of dominating his associates.

Therefore, those who are born within the Leo period dominate their associates.

3.1.4. False Cause

This fallacy mainly has to do with the relation of cause and effect, the nature of the connection between cause and effect and how the presence or absence of the connection is determined. This fallacy is committed when something, say X, that is not really a cause, is treated as the cause of another, say Y. There are two strands of this fallacy:

- a. *Non causa pro causa*: This fallacy occurs when we presume the reality of a causal connection, say between X and Y, that does not really exist.

- b. *Post hoc ergo propter hoc*: This fallacy occurs when we presume that an event X is caused by another event Y that occurred immediately before it.

The following examples represent the two strands of false cause fallacy:

- (i) The moon was full on Thursday evening.
On Friday morning I overslept.

Therefore, the full moon caused me to oversleep.

- (ii) Who will doubt that the witch who shrieked yesterday is responsible for the death of this child?

3.1.5. Begging the Question (*Petitio Principii*)

This fallacy is also referred to as *circular argument* and is committed when the conclusion of an argument is stated in one of the premises. If the truth of what one seeks to prove is already stated or assumed in the premises, then begging the question is the fallacy involved. In other words, “if one assumes as a premise for an argument the conclusion one intends to prove, then one commits this fallacy” (Offor 2012: 47). The following are examples of begging the question:

- (i) It is best to have government of the people, for the people and by the people because democracy is the best form of government (Offor 2012: 47).
- (ii) To allow every man unbounded freedom of speech must always be, on the whole, advantageous to the state; for it is highly conducive to the interests of the community that each individual should enjoy a liberty perfectly unlimited, of expressing his sentiments (Copi & Cohen 2006: 382).

3.1.6. Complex Question

Complex question occurs when we ask a question in such a way as to presuppose the truth of the conclusion irrespective of “whether the obvious question is answered in the affirmative or in the negative” (Bello 2007: 49). Most times, complex question is couched so rhetorically that the speaker seeks no genuine answer. As a deceitful device, especially in dialogues, complex question is posed to suggest the truth of unstated assumptions on which it is built. Let’s take the following examples offered by Bello (2007: 49 – 50):

- (i) Have you stopped beating your wife?
- (ii) Did your sales increase as a result of your misleading advertisement?

If you answer “yes” to the question in example (i), then you admit that you are fond of beating your wife; if your answer is “no”, then you still admit that you beat your wife. Also, in example (ii), if you give an affirmative answer to the question, then you admit that your advertisement was misleading. If your answer is in the negative, then you still admit that you practice misleading advertisement. We are warned, therefore, that “the best way to handle a complex question is not to answer it all; simply insist that the questions be separated” (Bello 2007: 50).

Sample Exercises: (see Copi & Cohen 2006: 385 – 386).

Identify the fallacies of presumption that appear in the following passages:

- (i) In a motion picture featuring the famous French comedian Sacha Guitry, some thieves are arguing over division of seven pearls worth a king’s ransom. One of them hands two to the man on his right, then two to the man on his left. “I,” he says, “will keep three.” The man on his right says, “How come you keep three?” “Because I am the leader.” “Oh. But how come you are the leader?” “Because I have more pearls.”

Solution:

Begging the question (*Petito principia*)

(ii) Which is more useful, the Sun or the Moon? The Moon is more useful since it gives us light during the night, when it is dark, whereas the sun shines only in the daytime, when it is light anyway.

Solution:

A fallacy of false cause lies behind the humor in this passage. The answer to the query supposes, mistakenly that the light in the daytime is caused by something other than the sun!

4.0 Conclusion

The fallacies of presumption like the other two fallacies that we have discussed in the previous units are not correct as they negate the processes of logical reasoning.

5.0 Summary

In this lecture, we have looked at the fallacies of presumption. We commit these fallacies when, in an argument, we infer our conclusion from premises whose truth is uncertain or assumed. Thus, we discussed **Fallacy of Accident** which occurs when we appear to be oblivious of the fact that even general rules or principles do have plausible exceptions. **Converse Accident or Hasty Generalization** which occurs when we draw conclusions about all the persons or things in a given class on the basis of our knowledge about only one (or only a very few) of the members of that class. **False Cause** which mainly has to do with cause and effect relation, the nature of the connection between cause and effect and how the presence or absence of the connection is determined. We also looked at the two strands of this fallacy. **Begging the Question (*Petitio Principii*)** which is committed when the conclusion of an argument is stated in one of the premises. That is, if the truth of what one seeks to prove is already stated or assumed in the premises, then begging the question is the fallacy involved. **Complex Question**, the fallacy which occurs when we ask a question in such a way as to presuppose the truth of the conclusion irrespective of whether the obvious question is answered in the affirmative or in the negative.

No doubt, our discussion on informal fallacies have helped us to understand that fallacies are deceptive and can garble good arguments and critical thinking. Thus, “whether they are committed inadvertently in the course of an individual’s own thinking or deliberately employed in an effort to manipulate others, each tends not to provide legitimate grounds for the truth of its conclusion” (Offor 2012: 48).

6.0 Tutored Marked Assignments

- (1) What do you understand by “complex question”?
- (2) What do you understand by “false cause”?
- (3) State one feature of fallacies of presumption.
- (4) Give two examples of each of the following fallacies of presumption:
 - a. False cause
 - b. Converse accident

- c. Begging the question
- d. Complex question

7.0 References/Further Reading

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UNIT 6: EXERCISES IN REASONING (LOGICAL PUZZLES)

Contents

1. Introduction
2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 Exercises in Reasoning (Logical Puzzles)
4. Conclusion

- 5. Summary
- 6. Tutor Marked Assignment
- 7. References/Further Reading

1.0 Introduction

In this unit you shall be introduced to different exercises in reasoning (Logical puzzles)

2.0 Objectives

At the end of this unit, you should be able to:

- (1) Understand puzzles as a form of entertainment.
- (2) Distinguish between a puzzle and a riddle.
- (3) Appreciate puzzles as exercises that strengthen our natural ability to reason.

3.0 Content

3.1 Logical Puzzles

Logical puzzles are exercises in reasoning. A puzzle is a problem that requires skill or ingenuity for its solution. In this sense, a puzzle can be regarded as a problem or an enigma that tests the ingenuity of a solver. Although puzzles are often contrived as a form of entertainment, they also help greatly in developing our natural ability to use good arguments in resolving our problems. In this unit, we shall be looking at a number of logical puzzles with a view to sharpening further our natural ability to use good arguments in resolving our problems.

According to Bello (2007: 64):

A logical puzzle consists of a specific question or a series of questions, accompanied by a mass of information or propositions given as true in the statement of the puzzle. The solution to a logical puzzle consists in finding answers to the questions posed, and proffering arguments whose premises are contained in the statement of the puzzle, and whose conclusions are the answers to the questions.

As a matter of fact, successful resolution of puzzles can be a significant contribution to research, especially in the field of sciences. This is why it is appropriate to say that “the process of attempting to solve a logical puzzle resembles the scientific process” (Bello 2007: 65). Bello offers a “rough” idea of this process thus:

One is confronted with a mass of data. From these data one can perhaps draw a few elementary inferences immediately. Usually, however, it is necessary to formulate tentative or working hypotheses to guide the search for a solution. The appropriateness or correctness of these hypotheses must then be carefully checked by testing their consequences for consistency with the original data. If inconsistencies appear, the tentative assumptions must be rejected and others put in their place, until finally a

consistent set of conclusions emerges. These conclusions must then be tested for uniqueness to determine whether there are others equally acceptable (Bello 2007: 65).

The import of Bello’s assertion is that solutions to puzzles often require that we recognize patterns and create a particular order. Let us look at a few examples of logical puzzles to corroborate the foregoing.

Puzzle 1: In a certain bank the positions of accountant, manager and cashier are held by Aderupoko, Fayombo and Gesinwale, though not necessarily in that order. The following facts are known about them: the cashier who was an only child, earns the least; Gesinwale, who married Fayombo’s sister earns more than the manager. What position does each man hold? (Bello 2007: 66).

Solution: In attempting to solve this puzzle, we can draw some inferences from the clues given above:

1. Since Gesinwale earns more than the manager, Gesinwale cannot be the manager. And since Gesinwale earns more than the manager, he cannot be the cashier either, for the cashier earns the least; therefore Gesinwale is the accountant.
2. Next, we can infer that since Fayombo has a sister, Fayombo is not an only child. Therefore, Fayombo is not the cashier either. Since Fayombo is not the accountant either (from 1), Fayombo is the manager.

By elimination, Aderupoko is the cashier.

The above puzzle is no doubt an easy one to solve. Let us look at other ones that require greater skills.

Puzzle 2: Ademola, Adeyinka, Adeola and Adeolu are all lecturers in the same university. One is a specialist in Philosophy, one a specialist in Mathematics, one a Law specialist, and one a Medical scientist, though not necessarily in that order. The following facts are known about them:

- (a) Ademola and Adeola once had an argument with the Law specialist.
- (b) Adeyinka and the Medical scientist have been to the house of the Mathematician.
- (c) The Medical scientist who once treated Adeola in his private clinic is also having an appointment with Ademola.
- (d) Ademola has never seen Adeolu before.

What is each man’s area of specialization?

Solution: The first step in solving this puzzle is to set out the information in an array, as follows:

	Specialist in philosophy	Law specialist	Medical specialist	Mathematician
Ademola				

Adeyinka				
Adeola				
Adeolu				

In the above puzzle, the following inferences can be drawn to help solve the puzzle: for each inference drawn, we then fill in the spaces by elimination, using ‘Y’ to indicate ‘YES’ and ‘N’ to indicate ‘NO’, as follows:

- i. Neither Adeola nor Ademola can be the law specialist since they once had an argument with the law specialist [from (a)];

	Specialist in philosophy	Law specialist	Medical specialist	Mathematician
Ademola		N		
Adeyinka				
Adeola		N		
Adeolu				

- ii. Adeyinka is not the medical scientist and is not the mathematician [from (b)];

	Specialist in philosophy	Law specialist	Medical specialist	Mathematician
Ademola		N		
Adeyinka			N	N
Adeola		N		
Adeolu				

- iii. Neither Adeola nor Ademola is the medical scientist [from (c)]. Since Adeyinka also is not the medical scientist [from inference (ii)], then it follows that Adeolu is the medical scientist;

	Specialist in philosophy	Law specialist	Medical specialist	Mathematician
Ademola		N	N	
Adeyinka			N	N
Adeola		N	N	
Adeolu	N	N	Y	N

iv. Adeyinka is the law specialist, drawing from inferences (i) and (iii);

	Specialist in philosophy	Law specialist	Medical specialist	Mathematician
Ademola		N	N	
Adeyinka	N	Y	N	N
Adeola		N	N	
Adeolu	N	N	Y	N

v. Ademola is not the mathematician because Adeyinka (the law specialist) and Adeolu (the medical scientist) have been to the house of the mathematician before and Ademola has never seen Adeolu before. Therefore, Ademola is the specialist in philosophy. By elimination, Adeola is the mathematician.

	Specialist in Philosophy	Law specialist	Medical specialist	Mathematician
Ademola	Y	N	N	N
Adeyinka	N	Y	N	N
Adeola	N	N	N	Y
Adeolu	N	N	Y	N

From the above, it is clear that Ademola is the specialist in Philosophy, Adeyinka is Law specialist, Adeola is the Mathematician and Adeolu is the Medical specialist. To save time and space, however, it must be stated that drawing a chart might as well take care of the above array of information. Once you

draw the chart, you can use the information provided in the puzzle to guide the search for solution. This means that your inferences can come after the spaces on the chart have been completed by method of elimination and serve as your justification for each of the steps taken in the process. Let's look at the following example to drive home our point:

Puzzle 3: In a certain supermarket the position of buyer, cashier, clerk, porter and manager are held, though not necessarily respectively, by Miss. Adire, Miss. Bobo, Mr. Dayus, Mr. Kayode and Mr. Manua. The following facts are known about them:

1. The cashier and the manager were room-mates in a secondary school.
2. The buyer is a bachelor.
3. Mr. Manua and Miss. Adire have had only business contacts with each other.
4. Mrs. Dayus was greatly disappointed when her husband told her that the manager had refused to give him a raise.
5. Mr. Kayode is going to be the best man when the clerk and the cashier are married.

What position does each person hold? (Bello 2007: 70-72)

Solution: Let us set out the information in array, using 'N' for 'NO' and 'Y' for 'YES' as follows:

	Buyer	Cashier	Clerk	Porter	Manager
Miss Adire	N	N	N	N	Y
Miss Bobo	N	Y	N	N	N
Mr. Dayus	N	N	N	Y	N
Mr. Kayode	Y	N	N	N	N
Mr. Manua	N	N	Y	N	N

From the chart, we know that Miss Adire is the manager, Miss Bobo is the cashier, Mr. Dayus is the porter, Mr. Kayode is the buyer, and Mr. Manua is the clerk. Having completed the chart we now produce the following arguments to justify our answers:

6. From the information given, we can make the following immediate inferences:
 - (i) There are three males and two females.
 - (ii) The buyer is a man, being a bachelor.
 - (iii) Either the cashier or the clerk is a man.

(iv) The cashier and the manager are either both men or both women.

Now, to the other arguments:

1. If the cashier is a man, then the manager must be a man. If the manager is a man, then it is either Mr. Dayus, or Mr. Kayode, or Mr. Manua. It cannot be Mr. Dayus because of statement (4). It can neither be Mr. Kayode nor Mr. Manua since one of them has to be the buyer (2), and the other has to be the clerk or the cashier (5). Since the manager is neither Mr. Dayus nor Mr. Kayode nor Mr Manua, it follows that the manager is not a man. The manager is therefore a woman, from which it follows that the cashier is also a woman. Therefore, the clerk is a man.
2. Since the clerk is a man, then it is either Mr. Dayus, or Mr. Kayode or Mr. Manua. It cannot be Mr. Dayus, who is married (4). It cannot be Mr. Kayode either, for he is going to be the bestman when the clerk and the cashier are married (5). Therefore, the clerk is Mr. Manua.
3. The cashier is a woman, but it cannot be Miss Adire, because she has only business contacts with Mr. Manua (3). Therefore, the cashier is Miss Bobo.
4. The buyer is a man, but it cannot be Mr. Dayus (2) and (4), or Mr. Manua (8). Therefore, the buyer is Mr. Kayode.
5. The manager is not Mr. Dayus (7), or Mr. Manua (7) and (8), or Mr. Kayode (7) and (10), or Miss Bobo (9). Therefore, the manager is Miss Adire.
6. By elimination, the porter is Mr. Dayus.

4.0 Conclusion

Generally, puzzles help human being in the development of their natural ability to employ good arguments in resolving their problems.

5.0 Summary

In this unit, we defined a puzzle as a problem that requires skill or ingenuity for its solution. We added that, although puzzles are often contrived as a form of entertainment, they also help greatly in developing our natural ability to use good arguments in resolving our problems. We looked at a number of logical puzzles and proffered solutions to them. During the exercise, it was clear that we arrived at each of the solutions through reasoning, not through guessing.

6.0 Tutored Marked Assignments

- (1) In what way is it appropriate to refer to puzzles as “brain food”?
- (2) Construct three different puzzles and provide answers to them.

(3) Each of the following is an exercise in reasoning. You are to concern yourself, not only with finding an answer to the question, but also with constructing arguments to prove the correctness of your answer.

1. In a certain flight, the position of pilot, co-pilot and flight engineer are held by Nat, Giwa, and Tam, though not necessarily in that order. We have the following facts about them: the co-pilot, who was an only child, earns the least. Tam, who is married to Giwa's sister, earns more than the pilot.

What position does each person hold?

2. On a certain train, the crew consists of the brakeman, the fireman, and the engineer. Their names listed alphabetically are Aderupoko, Ijimere, and Obotunde. On the train are also three passengers with corresponding names: Mr. Aderupoko, Mr. Ijimere and Mr. Obotunde. The following facts are known about them:

- i) Mr. Ijimere lives in Ibadan.
- ii) The brakeman lives halfway between Ibadan and Lagos.
- iii) Mr. Aderupoko earns exactly N20,000.00 a year.
- iv) Obotunde once beat the fireman at *ayo*.
- v) The brakeman's next-door neighbor, one of the three passengers mentioned, earns exactly three times as much as the brakeman.
- vi) The passenger living in Lagos has the same name as the brakeman.

What was the engineer's name?

3. The employees of a small finance company are Mr. Gbada, Mr. Danjuma, Mrs. Taiwo, Miss Bridget, Mr. Idowu, and Miss Aishat. The positions they occupy are manager, assistant manager, cashier, stenographer, book-keeper and clerk, though not necessarily in that order. We have the following information about them:

- i) The assistant manager is the manager's grandson.
- ii) The cashier is the stenographer's son-in-law.
- iii) Mr. Gbada is a bachelor.
- iv) Mr. Danjuma is twenty-two years old.
- v) Miss Bridget is the book-keeper's step-sister.
- vi) Mr. Idowu is the manager's neighbour.

Who holds each position?

4. In a certain small secondary school, the subjects of Biology, Economics, English, French, History, and Mathematics are taught by just three men, Memedu, Ahmadu, and Obaro, each of whom teaches two subjects. The Following details are also true of them:

- i) The Economics teacher and the French teacher are next-door neighbours.
- ii) Memedu is the youngest of the three.

- iii) The men ride to and from school together; Obaro, the Biology teacher, and the French teacher each driving one week out of three.
- iv) The Biology teacher is older than the mathematics teacher.
- v) When they can find a fourth person, the English teacher, the Mathematics teacher and Memedu usually spend their lunch hour playing ludo.

What subjects does each man teach?

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MODULE 3: FORMAL LOGIC

Formal Arguments in Natural Language

What we have discussed so far in the last two unit of this course falls under the aspect of Logic called Informal Logic. Informal logic is concerned mainly with our everyday activities of making and evaluating claims, as well as detecting errors in reasoning. Formal logic, which is our main focus in this unit, deals with the logical or formal structures of statements and arguments. These statements or arguments may be either in natural language or in artificial language. Formal arguments in natural language are many and they go by various names. Amongst them are Categorical Syllogism and Relational argument. The part of formal logic that deals with formal arguments in artificial language is called symbolic logic.

This unit introduces us to analysis of statements that make up Categorical Syllogism. These statements are called Categorical Propositions. A categorical syllogism is an argument that has three statements or propositions, two of which are premises and the last, the conclusion.

Categorical syllogism is about the oldest and most popular form of arguments in natural language. It was indeed one of the earliest approaches to evaluating formal arguments. It was originally developed by Aristotle, codified in greater detail by medieval logicians and then interpreted mathematically by George Boole and John Venn in the 19th century. A categorical syllogism is a form of formal argument made up of three categorical propositions. What then are categorical propositions?

UNIT 1: CATEGORICAL PROPOSITIONS

Contents

1. Introduction
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3. Main Contents
 - 3.1 Categorical Propositions
 - 3.2 The Nature of Categorical Propositions
 - 3.2.1 Quantity
 - 3.2.2 Quality
 - 3.2.3 Distribution
4. Conclusion
5. Summary
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7. References/Further Reading

1.0 Introduction

Formal logic deals with the logical or formal structure of statements and arguments. These statements or arguments may be either in natural language or in artificial language. Formal arguments in natural language are many and they go by various names. One of such arguments is called Categorical Syllogism. This lecture introduces us to analysis of statements that make up Categorical Syllogism. These statements are called Categorical Propositions.

2.0 Intended Learning Outcomes

At the end of this unit, you will be able to:

1. State the quantity and quality of Categorical Propositions; and
2. Identify whenever a Categorical Proposition distributes a term.

3.1 Categorical Propositions

Categorical propositions are propositions of certain kind. They are about classes. We say they are about classes because they either affirm or deny that one class is included in another, either partially or wholly. There are four of such propositions represented by the following examples:

1. All men are politicians
2. No men are politicians.
3. Some men are politicians.
4. Some men are not politicians.

The above propositions either affirm that one class is included in another like 1 above or deny that one class is included in another like 2 above, or affirm that some members of a particular class are members of another class like 3 above or that some members of a particular class are not members of another class like 4 above.

These propositions have been given names for ease of reference. Proposition 1 above is an ‘A’ proposition and can be reduced to skeletal form as ‘All S is P’. Proposition 2 is an ‘E’ proposition and is of the form ‘No S is P’. Propositions 3 and 4 are called I and O propositions and are skeletally represented as ‘Some S is P’ and ‘Some S is not P’ respectively. Every categorical proposition has a recognisable form made up of four parts; namely, ‘quantifier-word’, ‘subject-term’, ‘copula’ and ‘predicate-term’. Using these terms, we can analyse the four categorical propositions as follows:

Quantifier-word	Subject-term	Copula	Predicate-term
All	men	are	politicians
No	men	are	politicians.
Some	men	are	politicians.
Some	men	are not	politicians.

3.2 The Nature of Categorical Propositions

The following notions should be understood, in order to be able to analyse categorical propositions. These are ‘Quantity’, ‘Quality’ and ‘Distribution’.

3.2.1 Quantity

Every categorical proposition has a quantity. The quantity of a categorical proposition is either universal or particular, depending on whether or not the proposition refers to all or some of the members of the class designated by the subject term. For example, the A and E propositions refer to all the members of their subject class and are therefore universal in quantity. On the other hand, the I and O propositions are particular in quantity because both refer to part of the members of the class designated by their subject terms.

3.2.2 Quality:

The quality of a categorical proposition is either affirmative or negative, depending on whether or not the proposition affirms that one class is included in another, either partially or wholly. For example, the A proposition above affirms that ‘all’ men are included wholly in the political class. Also, the I proposition above affirms that part of the class of men are included in the political class. Both propositions are therefore affirmative in quality. On the other hand, the E and O proposition both deny that all or part of their subject class are included in their predicates. Therefore, they are negative in quality.

3.2.3 Distribution

This is a technical term that is used to describe the ways terms occur in categorical propositions. A categorical proposition is said to either distribute or not distribute its terms. Since every categorical proposition has a subject-term and a predicate-term, a proposition may either distribute or not distribute its subject-term or predicate-term. A categorical proposition distributes a term if it refers to all the members of the class designated by that term.

Consider the following proposition: *All Nigerians are Africans*. It is clear here that the intention is to talk about every Nigerian. Therefore, we say that the subject term is distributed. However, the predicate does not refer to all or every African. It refers only to these Africans that are Nigerians. Thus, we say that the predicate-term is not distributed.

But the E proposition, *No Nigerians are Africans*, asserts of each and every Nigerian that he or she is not an African. The whole of the class of Nigerians is said to be excluded from the class of Africans. The subject-term is therefore distributed since it refers to the whole of the class of Nigerians. In asserting that the whole class of Nigerians is excluded from the class of Africans, the proposition is also asserting that the whole class of Africans is excluded from the class of Nigerians. The ‘E’ proposition therefore refers to all members of the class designated by its predicate-term and is said to distribute its predicate-term.

In the I proposition: *Some Nigerians are Africans*, the reference in the subject-term is to ‘some’ and not ‘all’, and as such, the subject-term is not distributed. Also, the predicate-term does not refer to all members of that class and is therefore not distributed.

Lastly, in the O proposition, *Some Nigerians are not Africans*, the subject-term refers to some members of the class and is therefore not distributed. What the proposition is saying is that part of the class of subject (Nigerians) is excluded from the class of predicate (Africans). When something is said to be excluded from a class, the whole of that class is referred to. Therefore, the O proposition distributes its predicate-term.

Summarising the proposition, we may say that:

1. The A proposition is a universal affirmative proposition that distributes its subject-term but does not distribute its predicate-term.
2. The E proposition is a universal negative proposition that distributes both its subject-term and predicate-term.
3. The I proposition is a particular affirmative proposition that distributes neither its subject-term predicate-term.
4. The O proposition is a particular negative proposition that does not distribute its subject-term but distributes its predicate term.

4.0 Conclusion

Categorical propositions are said to be about classes because they somehow, either affirm or deny that one class is included in another, either partially or wholly.

5.0 Summary

In this unit, we have looked at the nature of categorical propositions. Categorical propositions, we explained, are about classes because they either affirm or deny that one class is included in another either partially or wholly. We examined the notions of ‘quantity’, ‘quality’ and distribution as they relate to categorical propositions. The quantity of a categorical proposition is either universal or particular, depending on whether or not the proposition refers to all or some of the members of the class described by the subject term. The quality of a categorical proposition is either affirmative or negative, depending on whether or not the proposition affirms that one class is included in another, either partially or wholly. A categorical proposition distributes a term if it refers to all the members of the class designated by that term.

6.0 Tutored Marked Assignment

1. Write out three statements, beginning with each of the following words: ‘All’, ‘No’, and ‘Some’. Identify the two major parts (that is, the ‘subject’ and the ‘predicate’) of each of the statements.
2. Examine each of the statements carefully and state for which of them you think reference was made to all the members of the class designated by the subject and/or predicate term.
3. For each of the following categorical propositions, identify their subject and predicate terms, name their quantity and quality and state also, whether or not their subject and predicate terms are distributed:
 - i. Some members of families that are rich and famous are not persons of either wealth or distinction.
 - ii. No people who have not themselves done creative work in the arts are responsible critics on whose judgement we can rely.

- iii. All drivers of automobiles which are not safe are desperadoes who threaten the lives of their fellows.
- iv. No people who are considerate of others are reckless drivers who pay no attention to traffic regulations
- v. Some professional wrestlers are elderly persons who are incapable of doing an honest day's job

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UNIT 2: IMMEDIATE INFERENCES

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 - 3.2 The Notion of Opposition
 - 3.3 Further Inferences
 - 3.3.1 Conversion
 - 3.3.2 Obversion
 - 3.3.3 Contrapositive
4. Conclusion
5. Summary
6. Tutor Marked Assignment
7. References/Further Reading

1.0 Introduction

In this unit, we shall discuss the nature of relationships that exist among the four categorical propositions. Each of the categorical propositions has a relationship to at least one of the other propositions. Based on the relationship, one can easily determine the value of other propositions once the value of the one to which they are related is given. Eight of such relationships will be examined in this unit.

Intended Learning Outcomes

At the end of this unit, you should be able to:

1. Explain the nature of relationships that exist among the four categorical propositions; and
2. Determine the value of other categorical propositions once the value of the one to which they are related is given.

3.0 Content

3.1 Mediate and Immediate Inferences

An inference is the process by which one proposition is arrived at and affirmed, on the basis of one or more other propositions accepted as the starting point of the process. What distinguishes an argument from a mere collection of statements is the inference that is supposed to hold between them. An inference is either mediate or immediate. A mediate inference proceeds from two premises to a conclusion in such a way that the propositions together represent a complete

argument. An inference is immediate if it proceeds from only one premise to the conclusion. Some of these inferences can be demonstrated by using what is called the traditional square of opposition.

3.2 The Notion of Opposition

The notion of opposition here describes the relationship between two categorical propositions which have the same subject and predicate terms but differ in their quality or in their quantity. Let us now discuss some of these oppositions.

1. **Contradictoriness**

When two propositions are contradictories, one is a denial of the other. This means that if one is true, the other will be false and if one is false, the other will be true. In other words, they cannot both be true, and they cannot both be false.

For example:

The **A** proposition. ‘All politicians are liars’ and the **O** proposition. ‘Some politicians are not liars’ are contradictories.

Similarly, the **E** proposition, ‘No politicians are liars’ and the **I** proposition, ‘Some politicians are liars’ are contradictories.

2. **Contrariety**

Two propositions are contraries if they cannot both be true, that is, if the truth of either one entails that the other is false. But it is possible for both of them to be false.

The **A** proposition, ‘All humans are animals’ and the **E** proposition, ‘No humans are animals’ are contraries.

3. **Sub-Contrariety**

Two propositions are sub-contraries if they cannot both be false, though they might both be true. The **I** proposition, ‘Some men are Nigerians’ and the **O** proposition, ‘Some men are not Nigerians’ are sub-contraries.

4. **Super-alternation**

If a proposition is the super-altern of another, it means from the truth of that proposition, you can derive the truth of the other. For example:

The **A** proposition ‘All men are politicians’ is the super-altern of the **I** proposition ‘Some men are politicians’.

Similarly, the **E** proposition ‘No men are politician’ is the super-altern of the **O** proposition: ‘Some men are not politicians’.

5. **Sub-alternation**

If a proposition is the sub-altern of another, it means from the falsity of that proposition, you can derive the falsity of the other.

For example:

The **I** proposition ‘Some men are angels’ is the sub-altern of the **A** proposition ‘All men are angels’.

Similarly, the **O** proposition ‘Some men are not angels’ are the sub-altern of the **E** proposition: ‘No men are angels’.

The immediate inferences from the various oppositions we have discussed so far, can be summarised as follows:

1. If the **A** proposition is true, then **E** is false, **I** is true and **O** is false.
2. If the **E** proposition is true, then **A** is false, **I** is false and **O** is true.
3. If the **I** proposition is true, then **E** is false while **A** and **O** are undetermined.
4. If the **O** proposition is true, then **A** is false, while **E** and **I** are undetermined.
5. If **A** is false, then **O** is true while **E** and **I** are undetermined.
6. If **E** is false, then **I** is true while **A** and **O** are undetermined.
7. If **I** is false, then **A** will be false, **E** will be true and **O** will be true.
8. If **O** is false, then **A** is true, **E** is false and **I** is true.

3.3 Further Immediate Inferences

Apart from the foregoing inferences that are drawn from the traditional square of opposition, the following immediate inferences could also be drawn:

3.3.1. Conversion

The process of conversion is when the subject-term replaces the predicate-term and the predicate-term replaces the subject-term. In other words, a categorical proposition undergoes conversion by interchanging the subject and predicate terms. The original proposition is called the convertend, while the new proposition is called the converse. The conversion of the four categorical propositions will therefore proceed as follows:

‘A’	proposition:	
	Convertend:	All men are politicians
	Converse:	All politicians are men.
‘E’	proposition:	
	Convertend:	No men are politicians
	Converse:	No politicians are men
‘I’	proposition:	
	Convertend:	Some men are politicians
	Converse:	Some politicians are men
‘O’	proposition:	
	Convertend:	Some men are not politicians
	Converse:	Some politicians are not men.

Now, if each set of the above propositions is taken to represent a complete argument, for which of them can we say that the inference is valid?

Conversion is not valid for the ‘A’ proposition (except by limitation). The process of limitation involves only universal propositions, and it consists in reducing such propositions to particular propositions. Conversion by limitation for the ‘A’ proposition proceeds by interchanging the subject-term with the predicate-term and then changing the quantity of the proposition from universal to particular. Thus, from the proposition ‘All dogs are animals’, the conclusion ‘some animals are dogs’ could be validly inferred, the inference being through conversion by limitation.

Conversion however, yields or result in a valid inference when applied to ‘E’ and ‘I’ propositions, but not valid for the ‘O’ proposition.

3.3.2 Obversion

In obverting a proposition, the subject term remains unchanged, and so does the quantity of the proposition being obverted. In obverting a proposition, we change the quality of the proposition and then replace the predicate-term by its complement. To obtain the complement of a term, simply add the prefix ‘non’- to it, or if the expression already contains ‘non’ then delete the ‘non’- from the expression to obtain its complement. The obversion of the four categorical propositions will be as follows:

‘A’	proposition	
	Obvertend:	All men are politicians
	Obverse:	No men are non-politicians
‘E’	proposition	
	Obvertend:	No men are politicians
	Obverse:	All men are non-politicians
‘I’	proposition	
	Obvertend:	Some men are politicians
	Obverse:	Some men are not non-politicians
‘O’	proposition	
	Obvertend:	Some men are not politicians
	Obverse:	Some men are non-politicians

The original proposition is called the obvertend, while the new one is called the obverse. Obversion is a valid form of inference for all the categorical propositions.

3.3.3 Contrapositive

To obtain the contrapositive of a given proposition, we replace its subject-term by the complement of its predicate-term and replace its predicate-term by the complement of its subject-term. The contrapositive of the four categorical propositions will proceed as follows:

‘A’	proposition	
	Premise:	All men are politicians
	Contrapositive:	All non-politicians are non-men

‘E’	proposition	
	Premise:	No men are politicians
	Contrapositive:	No non-politicians are non-men
‘I’	proposition	
	Premise:	Some men are politicians
	Contrapositive:	Some non-politicians are non-men
‘O’	proposition	
	Premise:	Some men are not politicians
	Contrapositive:	Some non-politicians are not non-men.

Contrapositive is a valid form of inference for ‘A’ and ‘O’ propositions but not valid for ‘E’ and ‘I’ propositions. Contrapositive is only valid for E proposition by limitation. Thus from the expression: ‘No men are politicians’, the conclusion ‘some non-politician are not non-men’ could be validly inferred through contraposition by limitation.

4.0 Conclusion

Every categorical proposition has a relationship to at least one of other propositions. Given this relationship, the value of other propositions can be determined.

5.0 Summary

There are broadly two types of inferences involving categorical propositions. They are mediate and immediate inferences. A mediate inference proceeds from two premises to a conclusion, whereas an immediate inference proceeds from only one premise to the conclusion. We have looked at the various relationships that exist among the four categorical propositions, following the traditional square of opposition. We have learnt also to determine the value of other categorical propositions once the value of the one to which they are related is given. We concluded by looking at other immediate inferences that can be drawn using the notions of conversion, obversion and contraposition, as well as the issue of the validity of inferences resulting from these relationships.

6.0 Tutored Marked Assignment

1. If the statement ‘All students of NOUN are members of the National Association of Nigerian Students’ is given as true, what in your opinion will be the truth value of a statement like ‘Some students of NOUN are not members of the National Association of Nigerian Students’. Give reasons for your answer.
2. Is it possible for statements like ‘Some Africans are black’ and ‘Some Africans are not black’ to be both true? Support your answer with reasons.
3. What is the difference between a mediate and an immediate inference?

4. What can be inferred about the truth or falsehood of the remaining propositions in each of the following sets, if we assume the first to be true? And if we assume it to be false?
 - I.
 - a. Some uranium isotopes are highly unstable substances.
 - b. Some uranium isotopes are not highly unstable substances.
 - c. All uranium isotopes are highly unstable substances.
 - d. No uranium isotopes are highly unstable substances.
 - II.
 - a. No animals with horns are carnivores.
 - b. Some animals with horns are carnivores.
 - c. Some animals with horns are not carnivores.
 - d. All animals with horns are carnivores.
5. State the converse, obverse and contrapositive of the following propositions and indicate which of the resulting inference is valid:
 - i. No non-socialist are pacifists.
 - ii. Some scientists are non-philosophers.
 - i. Some martyrs were not saints.
6. If 'Some merchant are not pirates' is true, what may be inferred about the truth or falsehood of the following propositions?
 - i. Some merchants are non-pirates.
 - ii. All merchants are pirates.
 - iii. Some non-pirates are not non-merchants.
 - iv. No merchants are pirates.
 - v. Some pirates are not merchants.

7.0 References/Further Reading

1. Ade-Ali, Samuel and Fadahunsi, Ayo, *Introduction to Philosophy and Logic* (Ibadan: Hope Publication, 1999).
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UNT 3: CATEGORICAL SYLLOGISM

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 - 3.1 Features of a Categorical Syllogism
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1.0 Introduction

As stated in the last unit, a categorical syllogism is a type of argument made up of three categorical propositions, two of which are premises and the last, the conclusion. One of the features of a categorical syllogism is that it has three terms. These are the major term, the minor term and the middle term. Also, every categorical syllogism has a mood and a figure. The mood of a categorical syllogism is named by looking at the types of categorical propositions it contains, while the figure is determined by the position of the middle term in the premises of the argument. The complete form of a categorical syllogism is described by naming its mood and figure.

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

1. identify the major, the minor and the middle terms of categorical syllogisms;
2. write a categorical syllogism in standard form; and
3. name the mood and the figure of categorical syllogisms.

3.0 Content

3.1 Features of a Categorical Syllogism

As stated earlier, a syllogism is a deductive argument in which the conclusion is drawn from two premises. A categorical syllogism, therefore, is an argument in which the conclusion (which

itself is a categorical proposition) is drawn from two categorical propositions. A standard form categorical syllogism has the following features:

1. It must have only three terms. These are known as the major term, the minor term and the middle term. The major term is the predicate term of the conclusion of the argument. The minor term is the subject term of the conclusion of the argument. The middle term is that term that appears in both premises of the argument but not in the conclusion.
2. We can also classify the premises of a categorical syllogism into the major and minor premises. The major premise contains the major term, while the minor premise contains the minor term.
3. In writing a categorical syllogism in standard form, the major premise is written first, followed by the minor premise and then the conclusion.

3.2 The Mood of a Categorical Syllogism

Every categorical syllogism has a mood which is determined by the types of categorical propositions which it contains. It is usually represented by three letters, each standing for the form of each of the propositions which the syllogism contains. For example, in the argument: “No heroes are cowards; some soldiers are cowards; therefore, some soldiers are not heroes”. The mood will be E, I, O.

However, the mood of a categorical syllogism does not completely characterise its form. Consider the following two syllogisms:

1. All great physicians are university graduates
Some clinic owners are university graduates
Therefore some clinic owners are great physicians
2. All swimmers are egoists
Some swimmers are paupers
Therefore some paupers are egoists.

Both arguments are of the mood. ‘A I I’, but they are different in form. We can bring out this difference most clearly by displaying their logical skeleton. Let us represent the major term with ‘P’, the minor term with ‘S’ and the middle term with ‘M’. For both arguments, we then have the following schematisation:

Argument 1:

All P is M
Some S is M
Therefore, some S is P

Argument 2:

All M is P
Some M is S
Therefore, some S is P.

In the first argument, whereas the middle term (M) occupies the predicate position of both premises, in the second argument, the middle term occupies the subject position of both premises. This explains the reason for their difference in form. The correct form of a categorical syllogism is identified by naming its mood and figure.

3.3 The Figure of a Categorical Syllogism

The figure of a categorical syllogism is determined by the position of the middle term in the premises of the argument. There are four possible figures a syllogism may have. They are the following:

Figure 1: This is when the middle term occupies the subject position of the major premise and the predicate position of the minor premise.

Figure 2: This is when the middle term occupies the predicate position of both premises.

Figure 3: This is when the middle term occupies the subject position of both premises

Figure 4: This is when the middle term occupies the predicate position of the major premise and the subject position of the minor premise.

Going by our earlier representations of the terms, with letters of the alphabet, we can then present the different figures in the following schema:

Figure 1:

M is P
S is M
∴ S is P

Figure 2:

P is M
S is M
∴ S is P

Figure 3:

M is P
M is S
∴ S is P

Figure 4:

P is M
M is S
∴ S is P

We can only give a complete description of the form of any standard categorical syllogism by naming its mood and figure.

4.0 Conclusion

Every categorical syllogism are identified to have three terms and these are, major term, minor term and middle term. Categorical syllogism also has a mood and a figure and these two describes the form of categorical syllogism

5.0 Summary

A categorical syllogism is an argument made up of three categorical propositions, two of which are premises and the last, the conclusion. A categorical syllogism has three terms. These are the major term, the minor term and the middle term. The major term is the predicate term of the conclusion of the argument. The minor term is the subject term of the conclusion of the argument. The middle term is that term that appears in both premises of the argument but not in the conclusion.

Also, every categorical syllogism has a mood and a figure. The mood of a categorical syllogism is determined by the types of categorical propositions which it contains. It is usually represented by three letters, each standing for the type of propositions, which the syllogism contains. The figure of a categorical syllogism is determined by the position of the middle term in the premises of the argument. There are four possible figures a syllogism might have. The complete form of a categorical syllogism is described by naming its mood and figure.

6.0 Tutored Marked Assignment

1. Examine the following argument carefully and attempt the questions that follow:
Some evergreens are objects of worship, because all fir trees are evergreens, and some objects of worship are fir trees.
 - i. Write out the premises and conclusion of the argument
 - ii. Write out the terms that occupy the subject and predicate positions of the conclusion.
 - iii. The predicate term of the conclusion is contained in only one of the premises. Write out that premise anew as the first premise.
 - iv. Write out the remaining premise that has the subject term of the conclusion as the second premise.
 - v. Finally, write out the conclusion.
 - vi. Look at the argument in its new form. There is a term that appears in both premises but does not appear in the conclusion of the argument. Write out the term.

2. For each of the following arguments, identify its major, minor and middle terms:
 - i. Some evergreens are objects of worship, because all fir trees are evergreens, and some objects of worship are fir trees.
 - ii. No television stars are certified public accountants but all certified public accountants are people of good business sense; it follows that no television stars are people of good business sense.

- iii. All proteins are organic compounds whence all enzymes are proteins, as all enzymes are organic compounds.
 - iv. All hi-fi sets are expensive and delicate mechanisms, but no expensive and delicate mechanisms are suitable toys for children; consequently, no hi-fi sets are suitable toys for children.
3. Rewrite each of the following syllogisms in standard form and name its mood and figure:
- i. All chocolates éclairs are fattening foods, because all chocolate éclairs are rich desserts, and some fattening foods are not rich desserts.
 - ii. Some snakes are not dangerous animals, but all snakes are reptiles; therefore, some dangerous animals are not reptiles.
 - iii. No coal-tar derivatives are nourishing foods, because no coal-tar derivatives are natural grain products and all natural grain products are nourishing foods.
 - iv. All persecution for murder are wicked deeds, because all criminal actions are wicked deeds and all persecution for murder are criminal actions

7.0 References/Further Reading

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UNIT 4: VALIDITY/INVALIDITY OF THE CATEGORICAL SYLLOGISM

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 - 3.2 Rules Test for Categorical Syllogisms
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1.0 Introduction

As stated in our last unit, the form of a categorical syllogism is completely specified by naming its mood and figure. There are 256 possible forms a categorical syllogism might have. This is obtained by multiplying the number of moods (which is 64) by the number of figures (which is 4). Unfortunately, however, of these 256 forms of categorical syllogisms, only a few are valid. Precisely, only 15 of them are valid. It becomes necessary, therefore, to develop techniques and rules for distinguishing valid syllogisms from invalid ones. This is our focus in this unit

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to determine the validity or invalidity of categorical syllogism by using the rules test.

3.0 Content

3.1 Validity/Invalidity

The validity or invalidity of categorical syllogisms can be determined in several ways. First, the form of a syllogism may help us to determine whether or not the argument is valid (Bello, 2000). If an argument is valid, then any argument having that form will be valid and if an argument-form is invalid, then any argument having that form will also be invalid. Again, there is the method of using diagram to determine the validity or invalidity of categorical syllogisms. Two of such methods were developed by John Venn and the Swiss mathematician, Leonhard Euler (Copi, 1978; Bello, 2000). Finally, there is the Rules Test for determining the validity or invalidity of categorical syllogisms. Our main concern in this lecture is with this last method, that is, the Rules Test for determining the validity or invalidity of categorical syllogism.

3.2 Rules Test for Categorical Syllogisms

There are six rules, which a standard-form categorical syllogism must not violate for it to be valid. Any argument that violates one of such rules is invalid and is said to commit a formal fallacy. Let us now examine the rules and fallacies one after the other.

Rule 1

A standard-form categorical syllogism must contain exactly three terms, each of which must be used in the same sense throughout the argument. If a syllogism has more than three terms, it breaks Rule 1 and commits the fallacy of Four Terms or what in Latin is called '*Quaternio Terminorum*'. If a term is used in different senses in the same argument, the argument also breaks Rule 1 and commits the *Fallacy of Equivocation*. Consider the following argument:

No wealthy men are social critics, because no wealthy men are antagonists and all labour leaders are antagonists

The above argument breaks Rule 1 because it contains more than three terms. Precisely, it contains exactly four terms, to wit: wealthy men, social critics, antagonists and labour leaders. The argument is therefore invalid.

Rule 2

In a valid standard form categorical syllogism, the middle term must be distributed in at least one of the premises. Any syllogism whose middle term is not distributed in at least one premise breaks Rule 2 and is said to commit the fallacy of undistributed middle term. The following argument is invalid because the middle term (militants) is not distributed in any of the premises:

All indigenes of River State are militants

All Bayelsians are militants

Therefore, all indigenes of River State are Bayelsians

Rule 3

In a standard-form categorical syllogism, if any term is distributed in the conclusion of the argument, such a term must be distributed in the relevant premise. There are two different ways in which Rule 3 may be broken.

- a. In a syllogism, if the major term is distributed in the conclusion but the same term is not distributed in the major premise, the syllogism is invalid, because it breaks Rule 3 and commits the *Fallacy of Illicit Major*. The following argument breaks Rule 3 and commits the fallacy just mentioned:

Some men are good politician

No criminals are men

No criminals are good politicians

- b. If the minor term of a syllogism is distributed in the conclusion of the argument but the same term is not distributed in the minor premise, then the syllogism violates Rule 3 and commits the 'Fallacy of Illicit Minor'. The following argument breaks Rule 3 and commits the fallacy of illicit minor:

All good politicians are men

Some criminals are not men
No criminals are good politicians

Rule 4

No standard-form categorical syllogism with two negative premises can be valid. Any categorical syllogism with two negative premises is invalid and breaks Rule 4. Such a syllogism is said to commit the *Fallacy of Exclusive Premises*. The following argument breaks Rule 4 and commits the *Fallacy of Exclusive Premises*:

Some men are not good politicians
No criminals are men.
No criminals are good politicians

Rule 5

If any of the premises of a categorical syllogism is negative, the conclusion must be negative for the syllogism to be valid. Any argument that breaks this rule commits the *Fallacy of Drawing an Affirmative Conclusion from a Negative Premise*. The following argument breaks Rule 5 and commits the fallacy just mentioned:

Some men are not good politicians
Some criminals are men.
All criminals are good politicians.

Rule 6

No valid standard-form categorical syllogism with a particular conclusion can have two universal premises. In other words, if the conclusion of a valid categorical syllogism is a particular proposition, one of the premises must be particular. Any syllogism, which violates Rule 6, is said to commit the *Existential Fallacy*. The following argument breaks Rule 6 and commits the 'Existential Fallacy:

All men are good politicians
No criminals are men.
Some criminals are not good politicians.

In conclusion, to test the validity or invalidity of categorical syllogisms by using the rules, what we do is to write the argument in standard form by writing the major premise first, followed by the minor premise and then the conclusion. After this, we apply the rules to the argument one after the other. If the argument passes all the rules, then it is valid, but if an argument fails any (at least one) of the rules, then the argument is invalid.

4.0 Conclusion

The need to develop techniques and rules for distinguishing valid syllogism from invalid ones is necessitated by the fact that out of the 256 possible forms of categorical syllogisms only 15 of them are considered valid.

5.0 Summary

In this unit, we have treated the six rules, which a standard-form categorical syllogism must not violate for it to be valid. Any syllogism that violates one of such rules is invalid and is said to commit a corresponding fallacy. To test whether or not a categorical syllogism is valid, what we do is to first write the argument in standard form by writing the major premise first, followed by the minor premise and then the conclusion. After this, we apply the rules to the argument one after the other. If the argument passes all the rules, then it is valid, but if an argument fails any (at least one) of the rules, then the argument is invalid.

6.0 Tutored Marked Assignment

1. Examine the following arguments. For which of them do you think it will be possible to accept the conclusion as false, after accepting the premises as true?
2. All snakes are reptiles. Some snakes are not dangerous animals.
Therefore, some dangerous animals are not reptiles.
3. All persons who try heroin are persons who become hopelessly addicted to it. All persons who smoke marijuana are persons who go on to try heroin. Therefore, All persons who smoke marijuana are persons who become hopelessly addicted to it.
4. All new cars are status symbols and all new cars are economical means of transportation.
Therefore, some economical means of transportation are status symbols
5. Name the rules broken and the fallacies committed by the following syllogisms which are invalid:
 - i. All chocolates éclairs are fattening foods, because all chocolate éclairs are rich desserts, and some fattening foods are not rich desserts.
 - ii. Some snakes are not dangerous animals, but all snakes are reptiles; therefore, some dangerous animals are not reptiles.
 - iii. No coal-tar derivatives are nourishing foods because some coal-tar derivatives are natural grain products and all-natural grain products are nourishing foods.
 - iv. All persecutions for murder are wicked deeds because all wicked deeds are criminal actions and all persecutions for murder are criminal actions

7.0 References/Further Reading

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UNIT 5: RELATIONAL PROPOSITION

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 - 3.2 Attributes of Relations
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1.0 Introduction

Relational statements are statements that contain terms that express a relation. A term is said to express a relation if such a term requires more than one individual, object or entity, to make complete sense. When an argument contains relational propositions or statements, such an argument is called a relational argument. There are certain attributes of relations that help to describe the way relational terms should behave, and the way relational terms behave enables us to determine the validity or invalidity of arguments involving relational propositions. In this unit, we shall examine the attributes of relations and how this information can be used to determine the validity or invalidity of arguments involving relational propositions.

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

1. Define relational propositions and explain the different attributes of relation; and
2. Determine the validity or invalidity of arguments involving relational propositions or statements.

3.0 Content

3.1 Relational Propositions or Statements

Relational propositions are propositions or statements that employ terms that express a relation. A term is said to express a relation if such a term requires more than one individual, object or entity, to make complete sense (though it is possible for an entity to express a relation to itself). The following are examples of words and phrases that express relations: father, brother, cousin, sister, married to, lover of, enemy, teacher, equal to, has the same weight as, bigger than, is the mate of, and richer than.

A relational term may express a one-place relation, or it may be two-place, three-place, or four-place, depending on the number of individuals required for the sentence expressing the relation to make sense. For example, the proposition, 'Adebayo is snub-nosed', expresses a one-place relation, while the proposition, 'Bello is the teacher of Offor', expresses a two-place relation because it requires two individuals to make complete sense. Propositions like 'Cameroun is between Nigeria and Ghana' and 'The landlord traded his house rent to the tenants for second-hand clothes' express a three-place and four-place relation respectively. A proposition that expresses a one-place relation is said to be 'monadic' (Bello, 2000). Where a proposition expresses a relation between two or more entities, such a proposition is said to be polyadic (Bello, 2000). If it expresses a two-place relation, it is (binary), three-place (triadic), or four-place (tetradic). A polyadic relation also has a direction. It is either uni-directional and therefore irreversible or bi-directional and reversible. An example of a uni-directional proposition is 'Bayo is the father of Bimpe'. On the other hand, the proposition 'Babaginda is the same age as Obasanjo' is bi-directional.

3.2 Validity/Invalidity of Arguments Involving Relational Propositions

Attributes of relations help to describe the way relational terms behave in propositions, and the way relational terms behave enables us to determine the validity or invalidity of arguments involving relational propositions. To properly understand the way relational terms behave, let us learn a little more about some attributes of relation.

1. A relation between two entities may be symmetrical, asymmetrical or non-symmetrical. When a relation is symmetrical, it means that if one entity 'A' has the relation to another 'B', 'B' must also have the same relation to 'A'. For example, if Peter is married to Jane, it follows that Jane must be married to Peter. Similarly, If Peter is the same age as Andrew, it follows that Andrew must be the same age as Peter.

On the other hand, when it is the case that an entity 'A' has a relation to another 'B', but 'B' cannot have the same relation to 'A', then such a relation is asymmetrical. If, for example, Peter is the father of Matthew, it follows that Matthew cannot at the same time have the relation (of being father of) to Peter. All such relations as expressed by phrases like 'the husband of', 'is taller than' are said to be asymmetrical.

However, if the situation is such that an entity 'A' has a relation to another 'B', but 'B' may or may not have the same relation to 'A', then the relation is said to be non-symmetrical. For instance, if a person 'A' is the brother of another person 'B', 'B' may or may not be the brother of 'A' 'B' may be the sister.

2. Again, a relation may be transitive, intransitive or non-transitive. A transitive relation is such that if an entity 'A' has that relation to another 'B' and 'B' has the same relation to yet another 'C', then 'A' must have the same relation to 'C'. In the expression, 'Andy is taller than John and John is taller than Patrick, then Andy is taller than Patrick expresses a transitive relation, the relation is taller than is transitive.

On the other hand, where an entity 'A' has a relation to another 'B' and 'B' has the same relation to 'C', but 'A' cannot have the same relation to 'C', then the relation is intransitive. For example, a proposition like 'Ibadan is five miles to the south of Lagos and Lagos is five miles to the south of Ijebu-Ode' is intransitive.

However, when a relation is such that if one thing 'A' has that relation to another 'B' and 'B' has the same relation to 'C', but 'A' may or may not have the same relation to 'C', then the relation is said to be non-transitive. Examples of phrases that express non-transitive relations are 'friend of' and 'enemy of'.

3. Finally, a relation may either be reflexive, irreflexive or non-reflexive. When a relation is reflexive, it means that a thing can have such a relation to itself. For example, everyone is to be the same age as himself or has the same weight as herself. However, when it is not possible for an entity to have a particular relation to itself, that relation is said to be irreflexive. No one, for instance, can be said to be his own father or to be richer than himself.

But, when a relation is such that an individual may or may not have such a relation to himself or itself, then such a relation is said to be non-reflexive. For instance, somebody may or may not love or admire himself.

3.3 Validity/Invalidity of Arguments Involving Relations

We have seen how relational terms behave in propositions. Therefore, when we are faced with the task of determining the validity or invalidity of arguments involving relational propositions, we have to be careful enough to remind ourselves of the following questions:

1. What is the relational term involved in the argument?
2. What is the attribute of such term?
3. Has the relational term behaved the way it ought to behave in the argument under consideration?

If the answer to question 3 above is yes, then the argument in question is valid, if no, then the argument is invalid.

Consider the following argument:

Francis is the same weight as Florence
Florence is the same weight as Mercy
Therefore, Francis is the same weight as Mercy.

In this example, the relational term is 'has the same weight as'. It is a transitive relation which says that if an entity 'A' has a relation to another 'B' and 'B' has the same relation to 'C', then 'A' must have the same relation to 'C'. The relational term in the argument has behaved to type and the argument is therefore valid. Consider, however, this other argument:

Adebanjo is taller than Saheed
Therefore, Saheed is taller than Adebanjo.

In this second argument, the relational term 'taller than' is asymmetrical. A relation is asymmetrical if it is such that if one entity 'A' has that relation to another 'B', 'B' cannot have the same relation to 'A'. In the above argument, however, the relational term is used as if it is symmetrical. In other words, the relational term 'taller than' has not behaved in the usual manner in the argument under consideration. The argument is therefore invalid.

4.0 Conclusion

A relational argument is one that has relational propositions or statements and the validity or invalidity of such arguments can be determined.

5.0 Summary

Relational propositions are statements which contain terms that express a relation. A term is said to express a relation if such a term requires more than one individual, object or entity, to make complete sense (though it is possible for an entity to express a relation to itself). When an argument contains relational propositions or statements, such an argument is called a relational argument. There are certain attributes of relations that help to describe the way relational terms should behave, and the way relational terms behave enables us to determine the validity or invalidity of arguments involving relational propositions. A relation can be:

1. symmetrical, asymmetrical or non-symmetrical
2. transitive, intransitive or non-transitive and
3. reflexive, irreflexive or non-reflexive.

In any argument involving relational propositions, if the relational term behaves the way it ought to behave (that is, following its attribute), then the argument is valid, otherwise, such an argument would be invalid.

6.0 Tutored Marked Assignment

1. Write out five statements expressing a relationship between 'Peter' and 'Paul', in each case, using each of the following phrases:
 - i. Taller than
 - ii. Brother of
 - iii. Same age as
 - iv. Richer than
 - v. Stronger than
2. For which of the statements do you think the relationship is symmetrical or mutual? Give reason(s) for your answer.
3. identify the relational term in the following propositions:
 - i. A pathfinder is more expensive than any low-priced car.
 - ii. Every girl at the party danced with every boy who was there
 - iii. Caleb is the ancestor of Ezra.
 - iv. The teacher is in front of the class.
4. Determine the validity or invalidity of each of the following relational arguments. Give reasons for your answer:
 1. Agnes is shorter than Mary

- Mary is shorter than Helen
Therefore, Agnes is shorter than Helen
2. Segun is married to Bola
Therefore, Bola is married to Segun.
3. Andrew is older than James
Therefore, James is older than Andrew.
4. Nkem is the mother of Ngozi.
Ngozi is the mother of Onyeka.
Therefore, Nkem is the mother of Onyeka.
5. Tolu is the friend of Tobi.
Tobi is the friend of Tomi.
Therefore, Tolu is the friend of Tomi.

7.0 References/Further Reading

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MODULE 4: FORMAL LOGIC

UNIT 1: DISPUTES AND DEFINITIONS

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1. Introduction
2. Intended Learning Outcomes (ILO's)
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1.0 Introduction

In this unit, we shall look at the relation between disputes and definitions.

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

- (1) Understand the relation between disputes and definitions.
- (2) Know the three major categories of disputes.

3.0 Content

3.1 Definitions and Disputes

We cannot overemphasize the fact that definitions aid human understanding. Let us explain this with an example. If I make the statement that Mr. Olawale is a wise old bird, I may need to define what I mean by the word "bird". Is it that I am describing Mr.

Olawale as a winged flying animal with feathers or I mean something else? Or do I mean to say that Mr. Olawale is a particular kind of person? In order to be able to determine what I am saying, I may need to define the sense of the word “bird” that I mean. This goes to show that definition is the pivot of human understanding.

In philosophical circles, the issue of definition is taken very seriously. In fact, it is popularly believed that most philosophical analysis and deliberations begin with the definition of terms. Philosophical concepts, ideas, ideologies are effectively communicated through the medium of definition. From one philosophical tradition to another, definitions have been used to explain one philosophical position or the other and many disputes have evolved from such definitions. Sometimes, the disagreement may lead to the abandonment of one philosophical position or the other while in some other cases, it may further strengthen the definition which was originally the basis for the disagreement. In a sense, the issue of definitions is inextricably tied with the notion of disputes. In this unit, we shall focus on the issue of disputes and how it is related to the issue of definitions.

Disputes are often likened to controversies. A controversy is a state of prolonged public dispute or debate, usually concerning a matter of conflicting opinions or points of view. When people genuinely disagree, whether about beliefs or attitudes, language is the instrument with which that disagreement is normally expressed. But there are some other disputes which we can call merely verbal; they arise only as a result of some linguistic misunderstanding, often because disputants differ in their uses of words. Oftentimes, good definitions are needed to resolve disputes.

3.2 Categories of Disputes

We shall distinguish three categories of disputes in what follows, namely, obvious genuine dispute, merely verbal disputes and apparently verbal but really genuine disputes (Copi & Cohen 2006).

3.2.1. Obvious Genuine Dispute:

This is a type of dispute in which the parties involved unambiguously disagree, either in belief or attitude. For instance, if person A’s favourite football team is Manchester United and person B’s favourite football team is Chelsea Football Club, nothing is likely to resolve their disagreement. This implies that the two individuals (A and B) hold two sets of beliefs that are genuinely dissimilar and as such it might be difficult trying to bridge the divide between them.

3.2.2. Merely Verbal Dispute:

This is the category of disputes in which the apparent differences between two or more individuals are not genuine: it refers to conflicts that can be resolved simply by coming to agreement on how some word or phrase is to be used. If, for instance, Tolani and Jude are having a controversy on the nature of philosophy as an inquiry that involves critical analysis, and Jude claims that it is critical analysis that makes philosophy a negative discipline, while Tolani asserts that critical analysis does not make philosophy a negative discipline, then we can assert that they are having a kind of dispute known as **merely verbal dispute**. The merely verbal dispute they are having is on “critical analysis”. This presupposes that the dispute between the two is due to the misuse of language by one or both of the disputants.

3.2.3. Apparently Verbal but Really Genuine Dispute:

This type of dispute refers to misunderstandings about the use of terms which may be involved in controversies. However, when those misunderstandings are cleared up, it often turns out that there remains a disagreement that goes well beyond the use of words. At times, resolving the ambiguities of terms in such circumstances may help to clarify what is at issue, but will not settle a dispute that really concerns more than language. Let us illustrate it with an example: suppose person A describes the female university undergraduate students as prostitutes just because they wear skimpy clothes and person B disputes this because, for person B, female university undergraduate students are not prostitutes but are only being trendy and fashionable in line with the prevalent times. At first glance, this dispute between person A and B may seem as an apparently verbal dispute but upon closer look, one would see that the disagreement is based on what the individuals genuinely believe to be the appropriate *criteria* for describing “female undergraduate students”. This explains why this form of dispute is also known as *Criteria Dispute*. Disputes of this kind are called criteria dispute because there is an underlying disagreement about the criteria for the application of some key term of approval or disapproval; and regarding the wisdom or the correctness of the alternative criteria they have in mind, their conflict is genuine.

Exercises: (see Copi & Cohen 2006: 434)

Discuss each of the following disputes. If it is obviously genuine, indicate each of the disputers’ positions with respect to the proposition at issue. If it is merely verbal, resolve it by explaining the different senses attached by the disputers to the key word or phrase that is used ambiguously. If it is an apparently verbal dispute that is really genuine, locate the ambiguity and explain the real disagreement involved:

(1) DEEPAK: Business continues to be good for food exporters. Their exports so far this year are 25 percent higher than they were this time last year.

NISHA: No, their business is not so good now. Their profits so far this year are 30 percent lower than they were last year at this time.

Solution:

A merely verbal dispute. The ambiguous phrase “business... good” is used by Deepak in the sense of increased *sales*, and by Nisha in the sense of increased *profit*. There may be disagreement in attitude towards fruit exporters, Deepak approving and Nisha disapproving, but this is not at all clear from their words.

(2) DEEPAK: Dev finally got rid of that old Ambassador of his and bought himself a new car. He’s driving a Honda now.

NISHA: No, Dev didn’t buy himself a new car. It’s his neighbour’s new Honda that he’s driving.

Solution:

An obviously genuine dispute. Deepak affirms and Nisha denies that *Dev bought himself a new car*.

4.0 Conclusion

Definition is a crucial feature of human expression and communication because it is the means by which we make clear our intentions, ideas and the point of view which we try express to others. The term “definition” may be regarded as any brief or precise statement that describes what a word means or what an expression means. In another light, definition is considered as that which entails the act of describing or stating something clearly, lucidly or unambiguously. Disputes are some sorts of controversies and the three categories of disputes are obvious genuine dispute, merely verbal disputes and apparently verbal but really genuine disputes.

5.0 Summary

In this unit, we have explored the term “dispute” and its relation to definition. We pointed out that the term “definition” may be regarded as any brief or precise statement that describes what a word means or what an expression means; disputes, on the other hand, are often likened to controversies. We also distinguished three categories of disputes, namely, **obvious genuine dispute**, **merely verbal disputes** and **apparently verbal but really genuine disputes**. The first is a type of dispute in which the parties involved

unambiguously disagree, either in belief or attitude. The second is the category of disputes in which the apparent differences between two or more individuals are not genuine: it refers to conflicts that can be resolved simply by coming to agreement on how some word or phrase is to be used. The third category of dispute refers to misunderstandings about the use of terms which may be involved in controversies.

6.0 Tutored Marked Assignment

I. Discuss each of the following disputes. Indicate if it is obviously genuine, merely verbal, or apparently verbal but genuine disputes:

a. **JOHN:** Despite their great age, the plays of Sophocles are enormously relevant today. They deal with eternally recurring problems and values such as love and sacrifice, the conflict of generations, life and death – as central today as they were over two thousand years ago.

PAUL: I don't agree with you at all. Sophocles has nothing to say about the pressing and immediate issues of our time: inflation, unemployment, the population explosion, and the energy crisis. His plays have no relevance to today.

b. **JOHN:** Smith is an excellent student. He takes a lively interest in everything and asks very intelligent questions in class.

PAUL: Smith is one of the worst students I have ever seen. She never gets her assignments in on time.

c. **JOHN:** Professor Owolabi is one of the most productive scholars at the University of Ibadan. The bibliography of his publications is longer than that of any of his colleagues.

PAUL: I wouldn't call him a productive scholar. He is a great teacher, but he has never produced any new ideas or discoveries in his entire career.

2. What do you understand by the term “dispute”?
3. Construct one example of a dispute between two persons.

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UNIT 2: TYPES OF DEFINITIONS AND THEIR USES

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2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 Types of Definitions
 - 3.1.2 Stipulative Definitions
 - 3.1.3 Lexical Definitions
 - 3.1.4 Precising Definitions
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 - 3.1.6 Persuasive Definitions
 - 3.1.7 Ostensive Definitions
 - 3.2 Purposes of Definitions
4. Conclusion
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1.0 Introduction

There are many uses of definitions. A definition can be used to espouse an idea, communicate an idea clearly or even help to eliminate conversational disputes. A good definition is also capable of supporting an individual's good reasoning process in a variety of ways. Before attending to the various uses of definitions, one essential feature of all definitions must be emphasized: definitions are always definitions of symbols, because only symbols have meanings or definitions. In understanding the uses of definition, we need to get clear on two commonly used technical terms about definition: *definiendum* and *definiens*. The object/symbol being defined is called the *definiendum*; while the symbol (or group of symbols) that has the same meaning as the *definiendum* or

used to explain or describe the meaning of the *definiendum* is called the *definiens*. In this unit, we shall discuss six types of definition.

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

- (1) State at least one feature of all definitions.
- (2) Distinguish between the terms *definiendum* and *definiens*.
- (3) Explain the types of definitions we have.

3.0 Content

3.1 Types of Definition

3.1.1 Stipulative Definitions

Stipulative definitions are sometimes referred to as nominal or verbal definitions. A stipulative definition is that which has a meaning that is deliberately assigned to some symbol. It follows, therefore, that anyone “who introduces a new symbol is free to assign or stipulate whatever meaning he cares to. Even an old term in a new context may also have its present meaning stipulated” (Copi & Cohen 2006: 436). It is important to note that terms are introduced by stipulation for the following reasons:

(1) convenience: stipulation helps to reduce the use of many words in conveying a message because a single word may stand for many words in a message.

(2) secrecy: some words or terms may not be understood or used by the general public since only the sender and receiver of the message (who are socialized in the same system) can understand the stipulation.

(3) economy of expression: through stipulation, a long sequence of familiar words that would be cumbersome to write are replaced by new symbols, thereby saving time and increasing intelligibility. For example, the number equal to a billion trillion is called “zetta” (Copi & Cohen 2006: 437).

(4) to facilitate discussion: new terms are sometimes introduced to facilitate discussion. The origin of the term “pragmaticism”, which has no dictionary meaning before its coinage, serves as a good example here. Charles Sanders Peirce was a founding member of the pragmatic movement and is said to have introduced the term “pragmatism”. Peirce’s pragmatism did not receive much attention until William James, a member of

this movement, popularized it in a series of lectures by adding the practical, humanist perspectives. But Peirce felt that James had distorted his thought by adding new perspectives. Consequently, Peirce abandoned the term “pragmatism” and coined the term “pragmaticism” to describe his own position, saying that this new term “is ugly enough to be safe from kidnappers” (Lawhead 2002: 467).

One important thing to note about a stipulative definition is that it is neither true nor false. It cannot be said to be accurate or inaccurate, simply because “a symbol defined by a stipulative definition did not have that meaning before it was given that meaning by the definition, so the definition cannot be a report of the term’s meaning” (Copi & Cohen 2006: 437). From the foregoing, therefore, a stipulative definition can best be regarded as “a proposal (or a resolution or a request, or an instruction) to use the *definiendum* to mean what is meant by the *definiens*” (Ibid.).

3.1.2 Lexical Definitions

A lexical definition is that whose purpose is to explain the use of a definition in order to eliminate ambiguity. A lexical definition is identical with a dictionary definition. Another way to put it is that a lexical definition “reports a meaning the *definiendum* already has” (Copi & Cohen 2006: 437). In other words, one can qualify lexical definitions as dictionary meanings. Unlike stipulative definitions, therefore, a lexical definition may be either true or false. For instance, the definition “the word ‘bird’ may mean any warm-blooded vertebrate with feathers” is true because it is a correct report of how the word “bird” is generally used by speakers of English. The definition is false if we consider “the word ‘bird’ means any two-footed mammal” (Copi & Cohen 2006: 438). This brings out the major difference between lexical and stipulative definitions: while truth or falsity may apply to lexical definitions, stipulative definitions are neither true nor false.

3.1.3. Precising Definitions

By précising definitions, we mean definitions that are used to eliminate ambiguity or vagueness. In most human conversations, there are some terms that are ambiguous or vague. What does it mean for a term to be ambiguous? A term is ambiguous when it has more than one distinct meaning, vague when there are borderline cases to which the term might or might not apply. Let us look at the following examples:

- (i) Persons with disabilities are not expected at the stadium for the gymnastics.
- (ii) The chairman will hold a meeting with all the adults in the community.

In (i), the term “disabilities” in the sentence is vague since we are not sure whether albinos, those who use glasses, and so on, can be subsumed under the term. The term “adults” in (ii) also faces the same problem: at what age do we refer to someone as “adult”?

A précising definition differs from stipulative definitions “in that its *definiendum* is not a new term, but one whose usage is known, although unhappily vague” (Copi & Cohen 2006: 440). It also differs from lexical definitions because, in resolving borderline cases, a précising definition “goes beyond the report of normal usage with the definition given” (Copi & Cohen 2006: 440).

3.1.4 Theoretical Definitions

This type of definition applies to the formulation of an idea or belief about something arrived at through speculation or conjecture. Thus, a theoretical definition of a term “attempts to formulate a theoretically adequate or scientifically useful description of the objects to which the term applies” (Copi & Cohen 2006:442). Theoretical definitions aim for theoretical truth and that is why scientists or philosophers criticize one another’s definitions in order to establish which of the various definitions in context is most satisfactory.

It must be stated that a theoretical definition of a term is not the final word. In other words, “as the knowledge about some subject matter increases, one theoretical definition may be replaced by another” (Ibid.). For instance, Socrates contested the theoretical definition of the term “justice” offered by Thrasymachus who, in Plato’s *Republic*, defined justice as “the interests of the stronger”. Today, we have different theoretical definitions of “justice”, implying that theoretical definitions often change with increase in knowledge about some subject matter.

3.1.5 Persuasive Definitions

A persuasive definition is a type of definition that is intended to influence attitudes and stir emotions. Thus, its concern is different from the four previous definitions whose main concern has to do with the informative use of language. Persuasive definitions “are commonly used in the fields of politics, religion, advertisement and even law” (Offor 2012: 59). For instance, politicians often use emotive language, especially during campaigns, with a view to stirring the emotions of their listeners. We are warned, however, to be on guard against persuasive definitions because “emotive colouration may ... be injected subtly into wording that purports to be a correct lexical definition, and appears on the surface to be that” (Copi & Cohen 2006:443).

3.1.6. Ostensive Definitions

When a term is difficult to define verbally, speakers often resort to the use of ostensive definitions. An ostensive definition conveys the meaning of a term by pointing out instances of the term, either because the term will not be understood (as with children and new speakers of a language) or because of the nature of the term (such as colours or sensations). It is also referred to as “definition by pointing” because it is usually accompanied with gestures. For example, when defining “red” by pointing out red objects like roses, the use of ostensive definition is involved. It must be added that ostensive definition assumes the questioner has sufficient understanding to recognize the type of information being given. Thus, Ludwig Wittgenstein asserts that “ostensive definition explains the use – the meaning – of the word when the overall role of the word in language is clear.”

3.2. Purposes of Definitions

Definitions of terms are sought for many reasons or purposes. The purposes of definitions can be appreciated by looking at the various definitions that we have discussed in this unit. In our discussion of **stipulative definitions**, for instance, we can draw such purposes as convenience, secrecy, economy of expression and even increase in vocabulary; **lexical definitions** mainly help to increase our vocabulary; **precising definitions** serve the purposes of eliminating ambiguity, reducing vagueness and helping to resolve our differences; in **theoretical definitions**, we learn to explain theoretically by giving a theoretically adequate characterization of the object being defined; **persuasive definitions** are mostly employed to influence attitudes by “eliciting positive or negative feelings in the minds of our hearers” (Offor 2012: 61); **an ostensive definition** is employed when it is difficult to define a term verbally.

4.0 Conclusion

The various types of definitions that we have discussed reveals the uses or purposes of the idea of definition.

5.0 Summary

In this unit, we started by looking at the two commonly used technical terms about definition: *definiendum* and *definiens*. We explained that the object/symbol being defined is called the *definiendum*; while the symbol (or group of symbols) that has the same meaning as the *definiendum* or used to explain or describe the meaning of the *definiendum* is called the *definiens*. We went on to discuss six types of definitions,

namely, stipulative, lexical, précising, theoretical, persuasive and ostensive definitions. We explained that: a **stipulative definition** is that which has a meaning that is deliberately assigned to some symbol; **lexical definition**, a report – which may be either true or false – of the meaning a *definiendum* already has in actual language use; **précising definitions** are used to eliminate ambiguity or vagueness; a **theoretical definition** applies to the formulation of an idea or belief about something arrived at through speculation or conjecture; a **persuasive definition** is a type of definition that is intended to influence attitudes and stir emotions; an **ostensive definition** conveys the meaning of a term by pointing out instances of the term, either because the term will not be understood or because of the nature of the term.

6.0 Tutored Marked Assignment

- (1) Why do you keep a dictionary?
- (2) Discuss at least two senses in which the word “act” can be used.
- (3) Give three reasons why terms are introduced by stipulation.
- (4) State one central difference between lexical and stipulative definitions.
- (5) State one purpose précising definitions serve.
- (6) What definition do such terms as “yotta”, “g factor”, Charles Pierce’s “pragmaticism” exemplify?
- (7) Which of the definitions help to resolve borderline cases by going beyond the report of normal usage?
- (8) We have discussed six types of definitions above. Find an example of each type and explain, in each case, the purpose it is intended to serve.

7.0 References/Further Reading

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UNIT 3: RULES FOR DEFINITION BY GENUS AND DIFFERENCE

Contents

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2. Intended Learning Outcomes (ILO's)
3. Main Contents
 - 3.1 Rules for Definition by Genus and Difference
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1.0 Introduction

There are five rules that have been traditionally laid down for constructing good definitions. These rules are to guide us in defining a term and show whether the definition given to the term is good or bad. A good definition, therefore, “requires the thoughtful selection of the most appropriate genus for the term in question, as well as the identification of the most helpful specific difference for that term” (Copi & Cohen 2006: 453).

2.0 Intended Learning Outcomes

At the end of this unit, you should be able to:

- (1) Appreciate the importance of the rules for definition by genus and difference.
- (2) Know when a definition is good or bad.

3.0 Content

3.1 Rules for Definitions by Genus and Difference

Rule 1: A definition should state the essential attributes of the species.

By essential attributes of the species, we mean those attributes which constitute the conventional criterion of defining a term or species. In other words, if the essential attributes of a species are absent in the definition that we give to the species, then such a species is not properly defined. Also, we violate this rule if we “define a term using, as its specific difference, some attribute that is not normally recognized as its attribute, though it may be part of that term’s objective intension” (Copi & Cohen 2006: 453). This means that a definition should state the conventional intension of or the set of characteristics that belong to the term being defined. Let us consider the following definitions:

- (i) Father is “the head of a family”.
- (ii) Man is “a being that moves about in search of food, water and shelter” (Offor 2012: 61).

A look at the two definitions above will reveal that, in each case, the *definiens* is not stating the essential or conventional attributes of the *definiendum*. In other words, in defining the term “father”, for instance, one expects the conventional attributes like “male”, “parent” to feature in the *definiens*.

Rule 2: A definition must not be circular.

A circular definition is “a faulty definition that relies on the knowledge of what is being defined” (Copi & Cohen 2006: 453). This implies that a definition must not be repetitive. If, for instance, the *definiendum* itself appears in the *definiens*, then the definition is said to be circular because it is not explaining the meaning of the *definiendum* and therefore fails in its purpose. As a matter of fact, you’ll be breaking this rule if you use any of the synonyms of the *definiendum* in the *definiens*. Consider the following definitions:

- (i) Teacher is “a person who teaches in a school”.
- (ii) Calculator is “a machine used in calculating mathematical operations”.

In each of the two definitions above, the *definiendum* appears in the *definiens*, thereby violating Rule 2 and rendering the definition “circular”.

Rule 3: A definition must be neither too broad nor too narrow.

When in a definition the *definiens* denotes more things or fewer things than are denoted by the *definiendum*, then the definition is either too broad or too narrow. A historical violation of this rule was recorded in Plato’s Academy at Athens. Plato’s successors in the Academy at Athens once settled on the definition of “man” as “featherless biped”. To

show that the *definiens* was too broad, their critic, Diogenes, plucked a chicken and threw it over the wall into the Academy. Of course, there was a featherless biped – but no man! (Copi & Cohen 2006: 454). What this suggests is that a definition ought to be precise in order not to confuse people about the information it is trying to convey. This rule is violated in the following definitions:

- (i) Bird is “any two-footed vertebrate”.
- (ii) Cat is “any flesh-eating mammal”.

Rule 4: Ambiguous, obscure, or figurative language must not be used in a definition

Ambiguous definitions do not allow for clear communication of ideas. In our last unit, we pointed out that an ambiguous word or expression is capable of more than one interpretation. It can also be vague, indistinct or difficult to classify. Therefore, ambiguous terms should be avoided in the *definiens* in order to allow the definition to explain the *definiendum*. In other words, if the *definiens* is itself ambiguous the purpose of the definition is defeated, though one may not rule out the fact that what is obscure to amateurs may be perfectly familiar to professionals. It is instructive to state here that the use of metaphors in the *definiens* may also lead to obscurity and garble the meaning of the *definiendum*. This rule is violated in the following definitions offered by Copi & Cohen (2006):

- (i) Net is “anything reticulated or decussated at equal distances with interstices between the intersections”.
- (ii) Oratory is “a conspiracy between speech and action to cheat the understanding”.

Rule 5: A definition should not be negative where it can be affirmative.

This refers to the fact that we should not use language to obfuscate the facts because it is what a term does mean, rather than what it does not mean, that the definition seeks to provide. A definition is supposed to explain what a term or the *definiendum* means, rather than what it does not. Thus, a definition should not be negative where it can be affirmative. This implies the awareness that there are some terms whose definitions are essentially negative. For instance, employing the affirmative definition will not help in explaining the term “orphan”; rather the term is best defined as “a child who does not have parents”. The foregoing is clearly suggesting that we should endeavour to “identify the attributes that the *definiendum* has, rather than those that it does not have” (Copi et al 2006: 455). The following definitions violate this rule:

- (i) Couch is “a piece of furniture that is not a bed or a chair or a stool or a bench” (Copi & Cohen 2006: 454).
- (ii) Lion is “a cat that is not a tiger or a leopard”.

Sample Exercises: (see Copi & Cohen 2006: 455 – 456)

Criticize the following in terms of the rules for definition by genus and difference. After identifying the difficulty (difficulties), state the rule (or rules) violated. If the definition is either too narrow or too broad, explain why.

- (i) Number is category of the human mind which is applicable only to the finite beings of the world.

Solution:

The definition violates Rule 1 as it does not state the essential characteristic of “number”, as it says what number is applicable to, not what it essentially is. It also violates Rule 3, as it is too broad, since there may be many other categories of the human mind that are applicable only to the finite beings of the world. It may even be too narrow as there are infinite numbers, both denumerable and non-denumerable.

- (ii) Alteration is combination of contradictorily opposed determinations in the existence of one and the same thing

Solution:

The definition is obscure and violates Rule 4. Also it fails to state the essence of alteration, which is *changing over time*, and thus it violates Rule 1.

- (iii) “Cause” means something that produces an effect.

Solution:

The definition is circular, since “produces” is synonymous with “causes”. It violates Rule 2.

4.0 Conclusion

The traditional rules for constructing good definitions are to guide us in defining a term and show whether the definition given to the term is good or bad.

5.0 Summary

In this unit, we looked at Rules for Definition by Genus and Difference with a view to showing thoughtful selection of the most appropriate genus for any term to be defined. We identified five rules that have been traditionally laid down for constructing good definitions and explained them one after the other thus: **Rule 1** suggests that a definition should state the conventional intension of or the set of characteristics that belong to the term being defined; **Rule 2** states that a definition must not be circular. If, for instance, the *definiendum* itself appears in the *definiens*, then the definition is said to be circular because it is not explaining the meaning of the *definiendum* and therefore fails in its purpose; in **Rule 3** we showed that a definition is too broad or too narrow when the *definiens* denotes more things or fewer things than are denoted by the *definiendum*; **Rule 4** states that the use of ambiguous terms, obscure, figurative, or metaphorical language in the *definiens* may lead to obscurity and garble the meaning of the *definiendum*; finally, **Rule 5** states that a definition is supposed to explain what a term or the *definiendum* means, rather than what it does not.

6.0 Tutored Marked Assignment

1. Without looking at your dictionary define the following:

Bird
Chair
Murder
Knife

2. Criticize the following in terms of the rules for definition by genus and difference. After identifying the difficulty (difficulties), state the rule (or rules) violated. If the definition is either too narrow or too broad, explain why.

- (i) Knowledge is true opinion.
- (ii) Life is the art of drawing sufficient conclusions from insufficient premises.
- (iii) “Base” means that which serves as a base.
- (iv) Youth is the springtime of love.
- (v) Noise is any unwanted signal.
- (vi) Tiger is “any cat that is not a lion or a leopard”.

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