## STUDY SESSION 6

## LOGIC AND ITS IMPORTANCE

### 6.1  Introduction

This study session shall introduce you to the concept of Logic as a branch of philosophy, and as a tool for philosophizing. You will be acquainted with the meaning of logic, the place of logic in the advancement of philosophical ideals and thoughts, as well as the importance of logic. The study session shall be an introductory session to other aspects of logic which we will discuss in the study sessions that follow. Although a younger discipline when compared to Mathematics and Law, Logic as a systematic discipline dates as far back as half a millennium. This said, it is evident that logic, as a systematic discipline is much older than most recent academic fields, social constructs and institutions, and even religions.[1]

Though the field of logic might have existed far before the time of Aristotle and the Stoics, especially as regards the application of logical inferences, deductions and formal application of proofs, the field of logic has always existed in the application of reasoning and validity in various fields. As such, while one wonders if logic has any relevance to man, disciplines or even civilizations, one need only ask how and why the field of logic has stood the test of time and broadened its horizon past the fields of philosophy, mathematics and law alone; one need only question the validity of beliefs and notions held as truth; one need only apply logical reasoning to every sphere of human existence and endeavours.[2]

The motivational purpose of logic sees it as an organized common sense which everyone should have and be familiar with since logic is not an inborn skill but one that must be learnt

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[1] J. van Benthem, H. van Ditmarsch, J. van Eijck, J Jaspars, *Logic in Action* accessed from http://www.logicinaction.org/docs/lia.pdf retrieved on 06/12/2016 pp. 1-11

[2] Ibid pp 2-11

and practised, though some may be better at it than others (like games and languages), one cannot neglect or give up the need to be acquainted with it. Hence, the importance of logic and its significance in various sectors cannot be overemphasised.

People are basically overwhelmed daily with the decision of discerning between notions, facts, theories and beliefs that are assumed to be right, valid or logically correct. As a result of this, many who lack the necessary philosophical tool find it hard or next to impossible to rise above their pressured beliefs and social constructs. It is then unequivocally clear that the products of mental cognition are the effects of power which in turn forms social constructs; despite this observation, it is only one skilled with handling the tool of logic to their advantage who can find the flaws and limitations in these constructs, seeing them as fallacious and incorrect reasoning, thereby becoming subjugated knowledge. As Harvey Bluedorn rightly stated, in bid of preparing one's child for the various confrontations of life, a firm grasp of logical thinking skills is necessary. It is with this ability to reason correctly that one's thinking is firmly anchored on, to avoid being carried about by every wind of doctrine, making them hold fast to truth and be able to defend it throughout their lives.[3]

Having analysed what the field of logic entails, we are set to give a vivid analysis of the significance of logic; in other words, we deem it fit to show the importance of logic, as a field to be studied and applied as a tool of philosophy, and its relevance to education and our everyday lives. We will show the necessity of Logic in the analysis and understanding of one's views and beliefs and that of others.

### 6.1.1  Learning Outcomes for Study Session 6

When you have studied this session, you should be able to:

[3] Harvey Bluedorn, "Why Study Logic?" in *Trivium Pursuit*, 2002. Accessed from http://www.triviumpursuit.com/articles/why_study_logic.php retrieved on 11/23/2016

1. Define logic;
2. State how logic differs from psychological reasoning; and
3. List the importance of logic.

## 6.2 Definition of Logic?

The term "logic" came from the Greek word *logos*, which is sometimes translated as "sentence", "discourse", "reason", "rule", and "ratio". Of course, these translations are not enough to help us understand the more specialized meaning of "logic" as it is used today.

Alfred Taski was of the view that Logic is the name of a discipline which analyzes the meaning of the concepts common to all the sciences, and establishes the general laws governing the concepts.[4] For Frege, to discover truths is the task of all sciences; it falls to logic to discern the laws of truth. Therefore, he assigns to logic the task of discovering the laws of truth, not of assertion or thought.[5]

**Logic** is the study of correct and incorrect reasoning. Logicians want to understand what makes good reasoning good and what makes bad reasoning bad. Understanding this helps us to avoid making mistakes in our own reasoning, and it allows us to evaluate the reasoning of others. It makes us better thinkers.[6]

Logic is one of the traditional sub-disciplines of Philosophy and one of the seven traditional “liberal arts”, alongside arithmetic, geometry, astronomy, music, grammar, and rhetoric. Logic lies at the foundation of mathematics, where it allows us to provide a clear and rigorous account of mathematical proof. It also plays a central role in philosophy, where we use it to help reason as clearly and rigorously as possible about hard questions about

[4]Alfred Tarski (1901-1983). From his *Introduction to logic and to the methodology of deductive sciences*, Dover, page xi.
[5]GottlobFrege (1848-1925). From his 1956 paper "The Thought : A Logical Inquiry" in *Mind* Vol. 65.
[6] https://www.davidsanson.com/logic/supplements/0.1_what-is-logic.html

ourselves, about knowledge, reality, truth, and beauty, and about right and wrong, good and bad. It also lies at the foundation of computer science: a computer is a logic machine. And a mind is, at least in part, a logic machine too, so logic lies at the foundation of cognitive science and philosophy of mind. It also lies at the foundation of linguistics, providing the tools we use for thinking about linguistic structure (syntax) and linguistic meaning (semantics).[7]

For the purpose of this study, we agree with Irving Copi when he defines logic as the study of the methods and principles used to distinguish correct from incorrect reasoning.[8] When we reason about any matter, we produce arguments to support our conclusions. Our arguments include reasons that we think justify our beliefs. However, not all reasons are good reasons.[9]

**Logic is not the Psychology of Reasoning**

One thing you should note about this definition is that logic is concerned with the principles of *correct* reasoning. Studying the correct principles of reasoning is not the same as studying the *psychology* of reasoning. Logic is the former discipline, and it tells us how we *ought* to reason if we want to reason correctly. Whether people actually follow these rules of correct reasoning is an empirical matter, something that is not the concern of logic. The psychology of reasoning, on the other hand, is an empirical science. It tells us about the actual reasoning habits of people, including their mistakes. A psychologist studying reasoning might be interested in how people's ability to reason varies with age. But such empirical facts are of no concern to the logician.[10]

### 6.2.1  In-Text Questions (ITQs)

[7] Ibid.,
[8]Irving M. Copi, Carl Cohen and Kenneth McMahon, *Introduction to Logic*. (U S A: Pearson Education Limited, 2014) p. 2
[9] Ibid.,
[10]https://www.davidsanson.com/logic/supplements/0.1_what-is-logic.html

What is logic according to Irving Copi?

### 6.2.2 In-Text Answers (ITAs)

Logic is the study of the methods and principles used to distinguish correct from incorrect reasoning.

## 6.3 The Importance of Logic

Man, being a meaning making being is always faced with the endless quest to know. This continuous quest for knowledge goes beyond the ordinarily experienced realities to the point of reasoned knowing. Reasoned knowing here relates to the act of knowing that investigates into the essence of things, why this is so and not otherwise. As such, if questioned on why man must live in ooder to die, one gives answers that show reason for accepting the statement as true. It is based on this analysis that we agree with Jean Oesterle who states that "logic is nothing else than the art that guides us in coming to know something previously unknown to us. Logic, then, is an instrument for helping us to find out why things are as they are. The power of thinking is an instrument for knowing the why and wherefore of things, but thinking sharpened by skill in logic is an efficient instrument for scientific knowing. Based on the aforementioned, we can be said to have at least a preliminary answer to the question "what is logic, and why should we study it". If every human being wants to know, in some degree, and if logic is an indispensable means of obtaining knowledge more easily, more surely, and more efficiently, then the study of logic is of use to every human being."[11]

Logic is a major tool to discerning between good (correct) or bad (incorrect) reasoning; it deals with valid reasoning, its systematization and notions relevant to it. As a result of this, we can see its relevance as it helps to detect fallacies and technical errors in reasoning.

[11]Jean Oesterle, *What is Logic and why do Philosophers Study it?* Accessed on http://cas.umkc.edu/philosophy/vade-mecum/whylogic.htmretrieved on 11/23/2016

Without logic taking part in this act, we would be surrounded by irrelevant thoughts which would limit our understanding of reality, clouding our understanding with us forever falling in the pits and confusions of fallacies which make us oblivious of what actually is.

Logic helps the making of inferences, through observation, and enhances communication. It also helps to find paradoxes, create them for argument sake and to bring some to their logical conclusions. Without logic, inferences can always be made, but not all inferences can be logical or relevant at that point. But with the knowledge of logic as a tool, we are able to make deductions from all forms of arguments, whether deductive or inductive; with logic, we make inferences that are not even obvious, with it we can bring an end to paradoxes, understanding their places and roles.

Logic makes us more observant of language, language use, meanings and meaning of meaning. And with logic applied as desired to fields and sectors, it strengthens and advances all fields; art, religion, law, geography, science, technology, basic everyday reasoning and beliefs.

With logic, one can be sure of having series of orderly reasoning and thought, to which propositions can be inferred and judgements made; and how these judgements are either arrived at or derived. Logic will therefore reveal to us when and how reasoning, judgement and arguments are correct or wrong; valid or invalid. Logic comes to guide the philosopher in reasoning and investigation; it serves as a tool used for ratiocination. Logic in a lot of ways serves as an important tool for philosophizing, such that, it is in fact doubtful if the philosopher could conduct his enquiry without logic.[12]

### 6.3.1 In-Text Questions (ITQs)

[12]Oghenekaro Ogbinaka, "Logic: Its Nature and Scope" in E. K. Ogundowole (ed.) *Philosophy and Logic*. Lagos: Concept Publications (Press Division) pp. 186-187

Logic helps the making of inferences, through observation and____

### 6.3.2  In-Text Answers (ITAs)

Enhances communication.

## 6.4 The Place of Logic

It is assumed by a lot of persons that logic describes what people think about and how conclusions are made by the thoughts they have, but we disagree with that notion because logic is more concerned with how we ought to think if we so wish to reason correctly. Logic seeks to explain the rules necessary for reaching necessary conclusions and logical thinking and analysis. Consequently, it is seen to be more of arithmetic than history. Logic is not Psychology, Mathematics, Language, History, but it is concerned with all thoughts, as such, it is fundamental to all disciplines and institutions. Logic does not differ according to the disciplines, fields and institutions it is applied to; rather, the same rules and laws of thought apply to every sphere logic is applied to. While some scholars raise arguments for the place of special disciplines devoid of logic and advocate for the place of polylogism, we disagree with this claim on the ground that since reasoning and thinking is applied to discipline, so is logic. If there is more than one logic, then there must be other rules to be applied to the other kinds of logic; one who seeks to ridicule logic must do so using logic in their attack, as such, contradicting oneself.[13]

## LOGIC AND MORALITY

A good number of philosophers have shown endlessly, the strong relationship between reason and morality. It is in bid of this relationship that we can speak so boldly of a relationship

[13] John W. Robbins, "Why Study Logic" in *The Trinity Review.* Unicoi, Tennessee. Accessed onhttp://www.trinityfoundation.orgretrieved on 11/23/2016

between logic and morality as well. In the light of this claim, an attack on morality simply makes for an attack on the logic to such moral standard. The process to which logic is disparaged would only create a reality with no distinction between the good and the bad, right and wrong, just and unjust etc. It is pertinent to include at this point that understanding and reason begets morality insofar as logic is not rejected, if not, the end of morality awaits.

It is the existence and application of logic that makes for the numerous laws society holds in high regard today for its smooth running and effective management of persons, properties and natural wealth. These enacted laws are in turn existent as a result of logical rules of inference and laws of thoughts; the process of identifying a particular action as what it is (A as A – Law of Identity), not confusing an action with another or the punishment of one action with another (Law of contradiction) and understanding the likely ways to which a law can be applied, and how an action can be evaluated (based on the law of excluded middle), all show the relevance of logic to morality.

Although, as earlier stated, some persons may argue for the lack of logic in some fields, including morality, advocating views like "there's no good or evil, for all actions are a mixture of the good and evil", the end result of this thinking is the series of moral problems and constructs the society experiences today.

### 6.4.1  In-Text Questions (ITQs)

Logic does not differ according to the disciplines, fields and institutions it is applied to, rather_____

### 6.4.2  In-Text Answers (ITAs)

The same rules and laws of thought apply to every sphere that logic is applied to.

## 6.5 Logic and Other Disciplines

### Logic and Mathematics

The relationship between logic and mathematics was not clearly articulated until the closing decades of the nineteenth century. As understood by early philosophers, it was not delineated as a subject at the time. Although Plato had through his logic of universals created the World of Ideas in which mathematics played a prominent role, it was Aristotle who painstakingly and systematically delineated the subject matter of logic for the first time. Mathematics emerged subsequently, such that Euclid and Archimedes carried on their mathematical studies without venturing into detailed inquiry into logic.

Following investigations that reveal closeness between logic and mathematics, George Boole, a British mathematical logician, published his seminal work *Laws of Thought* in 1854 where he dealt with the calculus of class inclusion. Again, C. S. Pierce, whom we briefly discussed a moment ago, had developed a theory of relations, and Schroeder had produced a synthesis of the fundamental theories in mathematical logic. K. T. Weierstrass demonstrated how to establish the theory of calculus without infinitesimals. George Cantor, on his part, articulated a mathematical theory of infinite numbers and continuity and by doing so abolished a great deal of mysticism that had obfuscated mathematics. This accomplishment was furthered by Gottlob Frege, a German logician and philosopher of mathematics. Frege invented a definition of number which removed the logical mistakes of earlier definitions. He defined "number" as a plurality of pluralities of pluralities. His analysis of the key concepts in mathematics can be derived from the principles of deductive logic. The Italian mathematician, Guiseppe Peano, made some technical advances also in mathematical logic which was adumbrated by Frege and which proved decisive in shaping the theories of Russell. Russell believed that the relationship between logic and mathematics is like the one

between a boy and a man. In his view, logic is the boyhood of mathematics. There is no doubt that logic and mathematics are very related, although the logicist programme itself did not succeed in its primary objective of deducing pure mathematics completely from logic.

**Logic and Psychology**

Defining logic as the science of the laws of thought or the science of reasoning process, the definition gives a clue to what logic is all about, but does not accurately differentiate logic from psychology. Psychologists study the laws of thought as well. Thoughts may describe any process that takes place in the mind, but the logician is interested in the product of a special type of thinking, the end result of reasoning processes. A psychologist can properly investigate the reasoning process and discover that it is usually influenced by one's emotional make-up and complicated trial-and-error procedures. He could even unravel the biochemical and tiny electrical changes in the brain that accompany thought process.

The study of psychology reveals the way people actually think, the study of logic explicates the relation of implication between certain types or classes of propositions. In this sense, the former is descriptive whereas the latter is prescriptive. The analysis of emotions that accompany our thought processes – certainty, incredulity, indecision – properly belongs to psychology. Logic analyses the objective relations that hold between propositions. Psychology is an empirical science, its propositions and theories largely refer to observable entities. But logic is concerned with the correctness of reasoning, no matter its subject-matter. The canons of logical validity in logic can be used to evaluate the procedures of reasoning actually employed in any discipline.

**Logic and Natural Science**

Western philosophy has always been of the opinion that scientific knowledge can be obtained through reasoning. While rationalists share this view, empiricists insist that knowledge of the objective world is only possible through observation. The chequered history of scientific knowledge shows that reliable knowledge of the world cannot be acquired by sitting down and thinking alone.

To discern the relation between logic and sciences, it is important to examine what some philosophers of science have stated on scientific method. Inductivist philosophers of science have emphasized that inductive logic provides the framework for scientific reasoning. For example, Bacon, after criticizing induction by enumeration, recommended other kinds of inductive procedure for scientific discovery. These recommendations were given a systematic elaboration by another British philosopher. J. S. Mill. The methods proposed by Mill are basically intended to assist in the discovery of causal connections between phenomena in nature.

Mill's inductive logic, though illuminating and important, did not meet the exaggerated claims which Mill made for them. In contemporary philosophy, the theory of inductive logic for the sciences was emphasized by the logical positivists, notably Rudolf Carnap, in form of probabilistic theory.

A scientist employs the techniques of logic and mathematics to deduce empirical consequences which must be tested experimentally. Therefore, any theory accepted in the natural sciences must be backed by experimental findings. In logic, it is not necessary, since the subject inquires into the implications of our initial propositions without regard to their truth or whether their objects are real or imaginary. Simply put, logic is a tool of inference in the sciences for working out the implications of scientific hypotheses and theories, which are subjected to empirical corroboration or refutation.

### 6.5.1  In-Text Questions (ITQs)

List any three disciplines that logic has relations with.

### 6.5.2  In-Text Answers (ITAs)

Psychology, Mathematics and Natural Science

## 6.6  Summary of Study Session 6

In this study session, you have learnt what logic means, and have been introduced to some definitions of logic as stated by Copi, Frege and other philosophers. This study session has been able to acquaint you with what logic is concerned with as a discipline and a tool of philosophizing. It has also acquainted us with the difference between logical and psychological reasoning. In this study session, we have discussed the importance of logic to various fields, as well as the place of logic and its relationship to other disciplines.

### 6.6.1 References / Suggestions for Further Reading


Copi, I. M., Cohen, C. and McMahon, K. (2014). *Introduction to logic*. USA: Pearson Education.

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