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# An Introduction to Logic, Critical Thinking and Arguments in Philosophy

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Section G

AN INTRODUCTION TO LOGIC, CRITICAL THINKING  
& ARGUMENTS IN PHILOSOPHY

Wogu, I. A.

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## A. A GENERAL INTRODUCTION TO THE STUDY OF LOGIC

*Come now, and let us reason together, saith the LORD: though your sins be as scarlet, they shall be as white as snow; though they be red like crimson, they shall be as wool.*

ISAIAH 1:18<sup>(1)</sup>

### i. What Is The Study of Logic All About?

I was told of a story of a man called Ken who took his mowing machine one hot sunny day in spring. The most peculiar thing about ken on the day in question was that he was bare footed.

"Ken", my friend said, "how come you are on bare feet? Have you lost your mind?"

Ken had an Answer for him. "According to statistics", he said, "the overwhelming majority of Lawn mowing accidents involve people wearing shoes. Very few accidents involve people going on bare feet. So your chances of having an accident are statistically much greater if you wear shoes" he reasoned.

Ken is entitled to his opinion. We are all entitled to our opinions. But that does not mean that opinions are equally reasonable. Ken's opinion for example - and with all respect- could use a little fine tuning. We humans are clever enough to send space craft's beyond the solar system, combine genetic materials so as to alter the verities of life, and build machines that outplay grand masters in a game of chess- yet we frequently make mistakes in the area of our logic. In such, we find in most cases reasoning like our subject here Ken.

Despite the great and impressive human accomplishments of the human intellect, one frequently comes face to face with examples of faulty reasoning, errors and misjudgment. In a recent Gallup poll, 18 percent of those questioned (polled) thought that the sun revolves round the earth. A friend of mine recalls some time in 2006 with dismay, that over half of his students in a class of 240 students, still thinks that the first person to walk the surface of the moon was Lance Armstrong. Just the other day, I read about a student in a school I know that paid so little as \$25 for a pair of contact lens at a grocery store to match the colour of her tennis shoes. By the next morning she had developed a serious eye infection.

It is a safe bet that all of us from time to time make decisions like this- decisions that are uninformed, poorly reasoned, or otherwise defective. Occasionally such decisions are disastrous. The girl I told you bought a pair of contact lens from a grocery store now needs a year of treatment and a cornea transplant to save her vision.

### ii. Why Should I Pay A Closer Attention To Logic And Critical Thinking?

The fact remains that clear thinking requires an effort and doesn't always come naturally. But one can get better at it if one is willing to work a bit and accept guidance every now and then. The branch of philosophy that facilitates this kind of knowledge is what is known as Logic. The philosopher to this end will seek to define philosophy as the expression of the never ending, personal and critical inner reflections of issues that bothers man every day.

Logic is therefore a very important area of philosophy. The philosopher in this wise is most concerned with finding and establishing the truth in our daily activities, opinions, reasoning. Now to find and establish truths, philosophers construct arguments which are in turn subjected to certain laws of thoughts and reasoning before the case, event, argument, opinions are adjudged true, correct, valid, sound or invalid.

In this section therefore, we shall with the aid of opinions, arguments and statements, discuss the various laws and principles that logic and critical thinking employs in the bid to distinguish correct from incorrect, right from wrong and valid from invalid statements, propositions and arguments respectively as the case may be. Training in logic thus becomes very important to the student and the ordinary inquirer and for a society like ours, which is aspiring to democratic life. This is because in a democratic society, persuasion rather than coercion or force is the method of winning others to ones point of view. Now in the business of persuading others, arguments become very important tools through which an individual wins or makes known his case. From here, his state of mind is deduced- whether he is sound intellectually or whether his reasoning has traces of fallacious trends.

The quotation above in Isaiah 1:18 is therefore an acknowledgement by God of the so many limitations that often confronts man when it comes to reasoning and thinking critically. This call in our present dispensation becomes very crucial as not more than 5% of people in the world actually make use of their brains to think and reason. About 15 percent of the entire population go around with the notions and feeling that they are actually thinking or reasoning while they are not. The remaining 80% percent would rather not have anything to do with the act of thinking or reasoning. This greater majority believes they can do without the trouble of thinking and reasoning. Can you figure out the percentage that Nigeria occupies in the above data?

At Covenant University, a course in the science of reasoning (Logic) and philosophy is made compulsory to every student for two sessions. The University, in compliance with the NUC's directives to expose students to the basic rudiments of philosophy and logic, have taken a little step further to ensuring that every student in the University maximizes the benefits they school have come to

discover is contained in the study of philosophy and logic. The course among other things, have also been found to be very instrumental in igniting the fire in the students' thinking caps, a much needed tools every world changer must have, if they would make the much desired impact in the world. The call to come and reason with God at covenant University, is a call we take with all seriousness and with a sense of sanctity.

We therefore employ you to open up your mind as you read through these final pages of this book (the section on Logic and critical thinking) so that He that gives wisdom freely will endow your heart and mind with all you'll desire to achieve in life through the application of the laws and principles that are contained in this book.

### iii. Aims And Objectives Of Logic And Critical Thinking

The main aim and objectives of Logic and Critical thinking among other things, is to **aid the mind in arriving at the knowledge of the truth**. Logic lays down the rules which the mind must follow in order to arrive at the truth and thereby minimize errors. Although every person of ordinary intelligence learns by the experience of life (common sense), to appreciate the means of securing the ends in pursuit, one needs to know and understand the relation between means and end.

We need to also state here that appeal to common sense alone may not be enough. The relations must be formulated in rules by which a prudent person can regulate or order actions and things. In difficult situations, matters of circumstances, spontaneous, shrewd or clever judgments may be misleading. In such situations before decisions are taken, there will be the need for a pause and **reflection**; followed by analysis, reconstruction and review of the situation in a determined order, so as to find how best to act.

The art of **reflection** in this case is the deliberate formation of a body of rules which guides the mind. It is logic that formulate these rules for directing the operations of the mind. To put it simply, **true knowledge in terms of a proper arrangement, ordering and utilizing of the materials of thought is an important aim of Logic**. The first set of principles of reasoning are universal. These principles are valid for the whole of Human Knowledge, both philosophical and scientific, hence logic which deals with arguments, starts from these principles and deduce from them, the particulars which form the foundations of any other kind of knowledge.

It is for this reason that Aristotle, in Western European tradition, called Logic an **Organon**,<sup>2</sup> that is, the instrument for fitting the mind to acquire knowledge in any branch of learning, whether in the humanities or in the Science. Since the use of logic is unrestricted to a particular area of human activity, it qualifies to be

regarded as both an Art as well as a Science. As an art, it is the Arts **Artium**. As a science, it is the science of the sciences.

A summary of the aims and objectives of this section of our study is outlined below

1. To be able to identify and prove argumentative and none argumentative discuss.
2. Students are also expected to be able to state the relevance of logic to Nation Building;
3. They should also be able to identify the fallacies of relevance from those of Ambiguity.
4. Students are expected to be able to state and identify, with vivid examples, valid or invalid arguments, true or false propositions, etc.
5. Students are also expected to be able to identify all the laws of thought; they are also expected to be able to use these laws in the proof of truth tables.

### iv. The Relevance Of Logic And Critical Thinking To Nation Building

Indeed, to ask the question: has logic any use or relevance, is not a stupid question because some persons have questioned the idea of studying a subject that is of no practical use. Just as oxygen is indispensable to life, so also logic is indispensable to life, and in particular, human interaction and communication. The market woman, the farmer, (illiterate or literate in terms of the ability to read and write), the students and their teacher, the lawyer and the judge, the government official, the journalist, the military establishment, the police and other security agents, etc, all need logic in a way or the other.

A system of logic underlies any communicative effort it is inherent in. It presupposes human interactions in whatever manner it relies on. The person who communicates or argues well does so because that person has a good grip and mastery of the system of logic in his / her culture. The person who cannot communicate or argue well, probably have not got this grip and mastery. Life will be dull if there were no arguments between friends, family members, colleagues, traders, buyers and sellers of commodities, politicians, lawyers in court, students and teachers, etc. it is thus the function to bring order to these arguments no matter the sphere of the discourse or subject matter.

Life, according to Nietzsche, a German Philosopher, is at constant need to relieve oneself of tension if it is properly understand and used correctly. Even the person who consciously decides not to use logic is trapped because he actually needs logic to effect the decision. In other words, there is no escape from the use of logic whether or not one has studied it.

To be illogical in thought and in the corresponding action eminently needs logic. No one can be illogical without primarily being logical in the first place. To be

illogical may be a matter of choice but this depends on an earlier unconscious choice: that no one has a choice to be logical. Just as no one has a choice in terms of being what he or she is, so no one has a choice in terms of the use of logic.

Against this background, the following can be deduced from the foregoing analysis

1. Logic helps to implant consistency both in speaking and in writing. To argue inconsistently thus means to argue from contradictory positions.
2. Logic helps not only to bring order to thought, but also to speech and writing in order to gain clarity, precision and firmness. The lack of logic in these areas often results to vagueness, feebleness, tautology and wooliness of expression.
3. Logic also helps the mind to explore those laws or axioms or principles which underline all thinking processes while helping us to secure consistency in reasoning
4. Since logic tends to correct inadequacies in speech and writing, it drills the mind towards the attainment of precision, clarity and adds force to the argument.
5. Logic helps us to detect fallacies in reasoning and correct inaccuracies in the speaking and writing of others.
6. Like the study of any other exact science, the study of logic will increase ones proficiency in reasoning.
7. It helps to avoid blowing hot and cold about any matter or problem in life but rather enables people to be self confident, cool-headed and rational; and thus make room for weighing the pros and cons to shift the evidence available and not to split hairs unnecessarily.
8. Logic touched every other discipline, it does not only deals specifically with the special methods and rules of procedures of other sciences, but also brings to light those very general laws and canons to which reason must conform to, while laying down principles for the unification and the classification of all other sciences, and in short all human knowledge and action. [1]
9. Last but not the list, logic leads to the unity and continuity of education, to the approaches of culture, the definition, redefinition and refinement of public debates and to the cultivation of human gentility in both sexes. It is for this reason that logic transcends ordinary grammar and common sense, it reaches in the inner recesses of the natural, physical and biological science, and merges in philosophy, that is in knowledge itself.

## B. THINKING CRITICALLY

*Cogito ergo sum*, "I think, therefore I am"

Descartes (1595-1650)

Some of the best known arguments for skepticism were produced by the French Philosopher Rene Descartes. Descartes lifelong passion was to find certainty. To do this he saw a need to "Bracket" by this we mean to put away all the things and ideas he thought he knew about the foundations of things and the way things are. To find the truth to the foundation of all things, the need then to retreat and think more critically about all things became an issue that cannot be overemphasized. This was because he saw this method as the only way he could really arrive at the certainty about all things.

### I. What It Means To Think Critically

When the word '*to think*' or '*think*' is used in a context, it usually denotes a kind of *rational*: a scenario where an individual is capable of using the mind to *reason* or *reflect* on a matter at hand. From another perspective, being able to '*think*' entails the ability for an individual to use his mind to *form thoughts* on his own about a state of affairs [2] These thoughts lead the person to the point where he is now able to form an opinion or a conclusion about the issue at stake irrespective of the initial state of affairs. The Art of *thinking* thus involves the simple process of putting into motion, ones rational faculties and thought patterns with the view to making right deductions and decisions about whatever issue that is at stake.

To think '*Critically*' however involves a kind of attitude which occasionally requires one to have a disposition to finding fault with somebody's idea, action speech or any other state of affair or things in general. For A. F. Uduigwomen, to be critical simply means "fault finding" or forming and giving a judgment or opinion about someone else's work. [3] We can therefore deduce that when one is thinking critically, he or she is giving comments or judgments containing or involving comments and opinions that analyzes or judge something, especially in a detailed way.

As mentioned earlier in our introduction to this section, clear thinking requires an effort and it does not always come naturally. One only gets better at it if one is willing to work a bit at the art and accept guidance along the line as the need arise. Let us hasten to sound a note of caution about certain misconceptions about what thinking critically entails. Thinking critically is not about attacking people' thoughts, ideas or comments as some of my students where found doing the moment they first learnt they could be critical about almost anything. If you are reading this book as a course, the chances are that you will be expected to critique other people's ideas and they will be asked to critique yours. Doing this however does not mean putting people down. Every single one of us make

mistakes and it can be useful to have others help you see them. We appreciate it if someone notes that we have a low tire or that our shirt looks rumpled because it has not been ironed.

Likewise we can appreciate it when someone tells us that our position, theory or idea is incomplete, unclear and insufficiently supported, or in some other way not all it could be. And when we are on the other side, we can help others see the holes in their arguments. We will not be doing Ken- the Guy we talked about in the beginning of the introduction- a favour by pretending that his idea about mowing the lawn bare footed is a good one. Critical thinking is therefore more about helping them than attacking them, and to the extent that we are able to think critically about our own ideas, it is about helping our self. Our ultimate goal becomes knowledge and understanding, not winning or coming on top.

So you might say this is one of those self help books. But unlike self help books that tell you how to stay young or make a million Naira, this book and study will help you understand when books like those and others like it attempts to sell you onto something big.

Good reason does not happen in a vacuum, when we hear somebody express an opinion, we usually have information on the topic and can generally figure out where to find more if more is needed. Having both the desire and the ability to bring such information to bear on decisions is part of the critical-thinking process. Critical thinking involves a lot of skills: among them are the abilities to listen and read carefully and to stay informed.

## ii. Basic Critical Thinking Skills

At this point of our study, it becomes important to introduce us to the critical thinking skills that every student must have in order to properly analyze issues when the need arise. We will start by posing this question: What, concretely and specifically is critical thinking about?

When we take a position on an issue, we assert or claim something. The claim and the thinking on which it is based are subject to rational evaluation. When we do that evaluation, we are thinking critically. To think critically, we will need to know the following:

- When someone including ourselves is taking a position on an issue, what that issue is, and what the person is claiming relative to that issue- that is what the person's position is.
- What considerations are relevant to that issue?
- Whether the reasoning underlying the person's claims is good reasoning or not.
- And whether, everything considered, we should accept, reject or suspend judgments on what the person claimed. Finally,

- Doing all these requires us to be level headed and objective and not influenced by extraneous factors

These points mentioned here will receive considerable coverage in this section of the book as we progress in our study.

## iii. Factual Issues Versus None Factual Issues,

### a. What Are issues?

Whenever we want to think critically, the first item of business is to make what we are focusing on the correct issue. In the broadest sense, an issue is any matter of controversy or uncertainty. An issue is a point in dispute, in doubt, in question or simply up for discussion or consideration. Should Ken mow the lawn barefooted? This question raises an issue. Should we get a new car? Is George W. Bush taller than his father? Are Pit bulls more apt to bite than Golden retrievers? Should we purchase Oceanic Bank shares? As soon as we have asked one of these questions, we have raised an issue. **An issue is therefore raised when a claim is in question.** In fact, for our purpose, "questions" and "issues" can be very much used interchangeably.

Many issues can be posed beginning with the word "whether" for example. The issues raised by the question in the preceding paragraph can be posed as whether we should get a new car, whether George W. Bush is taller than his father and whether pit bull is more apt to bite than golden retrievers. But issues can be posed in other ways as well, for example we might wonder **how many** miles per gallon a car will get, **when** the train arrived who fired the shot, or what the root cause of terrorism are. All these become issues as soon as we consider them.

Please do note that we do not need a discussion or a dispute between parties to have an issue; an issue can be raised in a single person's thought. 'Did you turn off the Air Conditioner before you left the house this morning', you wonder? The issue here is whether you turned off the Air Conditioning; it is a question in your mind so it is an issue for you.

It is common these days to call psychological problems "issues" you hear people say things like "she has an issue with this class", or "He has an issue with Cats". These statements simply mean she doesn't like this class and that Cats upset him. A couple of years ago, there was a popular song titled "She's Got Issues", which employed the word in a similar vein. But as we use them, an issue is never **what** someone **has**, and it is certainly not something a person has **got**. There are a lot of things you can do with issues- you can raise them, discuss or debate them, try to settle them or ignore them. But one thing you simply can't do is to **have** them. In this book do note that we use the word "issue" in the good old fashioned way, as what is raised when you consider whether a claim is true.

Finally please do also notice that an issue is different from a topic for conversation. Pet care can be a topic for conversation, but not an issue. Whether you are taking proper care of your pet is an issue. Whether dogs or cats are easier to take care of is an issue. But Pet care is just a topic.

**b. Identifying Issues.**

If you listen to a group of people talking and discussing something, at some point in the conversation, you may hear something like this:

- **FIRST PERSON:** "Look. The issue is whether...."
- **SECOND PERSON:** "No, Actually, the issue is ...."
- **THIRD PERSON:** "What we really need to determine is...."

And so on....

Why do people have so many problems identifying issues? Discussions in the real world (including real life written essays such as might be found in letters on a newspaper opinion page) are spontaneous, freewheeling, none sequential, unorganized, haphazard, off the wall, and all over the map. Good writers and speakers try to be clear on what issues they are discussing as well as about their position on them. But in free-flow discussions and conversations (and in one person's own thinking) several issues can get attention more or less simultaneously; tangents will be followed without hesitation; irrelevances and asides will be everywhere; and the parties to the discussion will frequently make confusing statements about what the issues is.

Another problem is that sometimes people purposefully confuse issues in order to draw away attention from a claim they do not want to deal with or to make it look as though they have proved a point when they haven't, and still a further problem is that when in many conversations, different speakers will address entirely different issues without realizing they're doing so. Suppose you hear:

**FIRST PERSON:** School vouchers? They may be a good idea. They will give parents a good opportunity to get their kids out of bad schools.

**SECOND PERSON:** I think the people who want them are just a bunch of selfish of zealous who wants to send their kids to religious schools

What is the issue here? We can't identify the issue. The first persons point has to do with vouchers, and the second persons point has to do with the people who want vouchers. They are talking about entirely different issues. Consider another example:

**MR. X:** They shouldn't go building power plants in fault zones like that! What is the matter with people anyway?

**MR. Y:** What's the matter with you? If it wasn't for power plant, you wouldn't have enough lights to read about faults.

These two are not addressing the same issue either: Y's being right on his point won't help anyone know whether X is right on his.

So identifying issues can be confusing, still it helps to remember the following two points:

**Firstly**, since every argument addresses an issue, an excellent way to pin down some of the issues in a conversation of passage is to look for the conclusion of any argument that have been given. Let's say a friend tells you:

**You should donate your old car to united cerebral Palsy because doing so helps out a worthy cause and is tax deductible besides**

Your friend has argued that you should donate your old car to the United Cerebral Palsy. He or she is therefore taking a position on the issue of whether you should donate your old car to the United Cerebral Palsy. The issue addressed by an argument can **always** be stated by inserting a "**whether**" in front of the argument's conclusion.

**Secondly**, remember that in many conversations there is no such thing as **the** issue. So instead of trying to find what the issue is, just focus on the issue that has been addressed with an argument. In other words, look for arguments as guides to issues because in offering a conclusion, a speaker or a writer is always taking a position on an issue. This strategy nevertheless will not necessarily disclose what the most important issue is in a conversation or in a discussion; and it won't reveal every issue that has been raised because some issues are raised just by asking questions. But one thing sure is that it will at least tell you which issues are important enough to warrant somebody's providing an argument.

**c. (Factual) Issues Versus None Factual Issues**

Before we leave this subject of "issues", it is needful to call your attention to a most important distinction, the distinction between **factual and none factual issues / questions**. Whether George Bush is taller than his father is a factual issue but whether his is *better looking* than his father is not. Whether brilliant students can pass GST 211 & GST 311 exams is a factual issues. Whether dull students can pass GST 211 & GST 311 is not. People sometimes think that only factual issues are worth discussing, but that isn't so. Is it right to run medical experiments on animals? That isn't a factual question, but it is worth discussing. Should you contribute to the support of your aging parents? That isn't a factual question either but it is important.

People also speak of factual claims. When we take a position on a factual issue, we make a **factual claim**. For example, the claim that "Abacha is a cleverly disguised space alien" is a factual claim. That is not a misprint, *it is a factual claim*. It is *false claim* but yet indeed it is a factual claim, since the question of whether Abacha is a cleverly disguised space alien is a factual question / issue. **Saying that a claim is factual is not equivalent to saying that the claim is true**. At the risk of being repetitious, we must emphasize "factual claims" claims do not mean "true claims". A factual claim is simply a claim, whether true or false, that state a position on a factual issue.

Obviously, you need to be able to tell if an issue/ question is factual. **An issue is factual if there are established methods for settling it**- that is, if there are generally accepted criterion or standards on which the issue can be judged or if we can at least describe what kind of methods and criteria will apply even though it may be impractical or impossible to actually apply them.

We can determine whether George, W. Bush is taller than his father by placing the two Bushes side by side and observing them all at the same time. We could also come up with a criterion for settling whether Abacha is a space alien. But what could settle whether Bush senior or Bush junior is the better looking of the two?

Notice that there are no established methods of settling an issue, then if two people disagree on that issue, then there is no way of determining between the two who is mistaken, when this becomes the case, we then note that this is undeniably the mark of a Nonfactual issue, since, if an issue is factual, and two people disagree about it, then at least one of them must be mistaken. Thus if Taye and Keinde disagree about whether G. W. Bush is taller, one of them must be mistaken, but when the disagreement is to whether G. W. Bush is better looking than his father, we do not insist that one of them must be mistaken. In fact, it seems odd to say that either one of them is mistaken about a position such as this.

This is how we can boil this down: there are two criteria that sort issues into categories of factual and none factual. A factual issue must therefore meet the following criteria:

**There are established methods for settling the matter,**

**If two people disagree about the issue, at least one of them must be mistaken**

Any issue that fails these criteria is none factual.

Using these two indicators of when an issue is a factual one, we see that the following question all raise factual issues:

- Is there ice on the moon?
- Does poverty breed terrorism?
- Will I be hurting my eyes if I stick these cheapo green contact lens in them?
- What time is it right now in Singapore?
- Hey! How much do you think we can get away with charging for plain water if we put it in a nice bottle and give it a French sounding name?

On the contrary we see that the following questions raise none factual issues:

- Is it ok to break a promise to save someone's life?
- Does this sweater make me look funny?
- Is the Italian coat as beautiful as people say
- Does the death penalty give murder's what they deserve?
- Is it unwise to mow your lawn on your bare feet.?

Some people have the notion that "factual" somehow equates to "uncontroversial", that an issues becomes "factual" when it is no longer controversial. That is not correct. Does raising taxes cause recessions? Did humans evolve from more primitive primates? Does the death penalty deter murder? These questions all raise controversial issues but they are in each cases factual issues.

#### iv. Keeping A Clear Head

A Mothers' opinion is bound to carry extra weight with her kids. They may even carry more weight than the opinion of someone who is better qualified on the subject at hand; after all, she is 'Mom' it is a fact of life that we are influenced in our thinking by certain considerations that, logically, are besides the point. A speaker's relationship to us is a good example of such a consideration.

To take an example that works in the other direction, many persons attach less weight to what a speaker says if she or he (a) Hesitates or stumble over words (b) is reluctant to make eye contact, (c) is perspiring or is nervous. Such behaviour may enter into our evaluation of what the person said- which, of course, is why speaking coaches encourage speakers to make eye contact and practice smooth delivery. It can be really had to evaluate an argument or claim objectively if the speaker expresses mannerisms that are associated with evasiveness, insecurity and dishonesty.

Now one of the most serious and difficult obstacles to clear thinking is the tendency to confuse extraneous and irrelevant considerations with the merits of claims. The examples we have given earlier deals with such irrelevances as a speaker's accent, dress relationship to us, and mannerisms. Another and different obstacle is the psychological force of words which is easy to confuse with their logical force. Consider the different impact of these two statements:



### EVERYONE IS ENTITLED TO THEIR OPINION

At first glance, it seems obviously too well that someone is entitled to his or her opinion; yes, we have even stated it casually our self earlier in this text.

But the truth is that the statement requires qualification. The police do not force us to hold any particular opinion; and in that sense certainly everyone is entitled to his or her opinion. However, that doesn't seem to mean that all opinions are equally intelligent, practical or humane. Some opinion may be so bad, stupid or dangerous that it isn't really clear that one is entitled to hold them. Is one entitled to the opinion that it's ok to put out a dog's eye just for the fun of it? Or that Israel boomed the world trade center? It makes as much sense to say that someone who holds such views is entitled to an explanation of why he or she is mistaken.

The remark "everyone is entitled to his or her opinion" is often just a conversation stopper, a way of saying, "hey! I don't want to argue about this anymore". Now there are times when further discussions is useless, but that does not mean that every opinion is good- and is as "entitled" to be held- as every other. Giving equal worth to people in my opinion does not automatically require giving equal worth to their opinion.

1. The desperate attempts by the hawks in the bush administration to link Saddam Hussein to al-Qaeda, only highlights the obvious facts that an invasion of Iraq has not the slightest relationship to the so-called war on terrorism.
2. An invasion of Iraq is unrelated to the war on terrorism.

Logically these two statements say exactly the same thing, but the first statement has psychological impact. The fist statement is equivalent to the second statement with a little advertising thrown in. Being over alert to psychological or emotional or rhetorical force of word can help us respond objectively to assertions and not impulsively.

Earlier in this section we had drawn a distinction between arguments and persuasion while arguments try to prove a pint, persuasions attempt to win others to a point of view. It is a subtle distinction, but a very real one. Often people use arguments to persuade others, and there is nothing absolutely wrong with that. There is also nothing wrong with being persuaded by an argument if the argument is a good one. But attempts at persuasions often relies not so much on logic as on the psychological or rhetorical power of words, and one needs to be sensitive to the Psychological association of words to avoid being manipulated. We need to avoid being seduced by the emotional coloration of the language that surrounds a claim, proposal, theory, idea, or argument. Often, when persons used words that are very critical and extreme, such as traitor, treasonous etc, such words can inflame listeners' passion- and may make it difficult for them to evaluate ideas on their merits.

Demagogues rely on the emotional association of words to scare us, flatter us, and amuse us; to arouse jealousy, desire, and disgust; to make good things sound bad and bad things sound good; and to confuse, mislead and misinform us. Critical thinking therefore involves recognizing the rhetorical force of language, and trying not to be influenced by it. This very fact is important to us that is why we shall latter be devoting some chapters to it in this section of the book.

However, it is important to understand that psychological and emotional coloration is also present when good and decent people state their honest opinions; persuasion is therefore not just limited to Demagogues. There is nothing wrong with presenting one's view in the best and most favorable light or in trying to be as persuasive as possible. It just as consumers of thoughts and ideas, we must refine our ability to distinguish between the thought itself and the psychological packaging in which it is given to us.

Please note that none of this should be construed as implying that critical thinking rules out our feelings and emotions. Feelings and emotions can supply powerful and often perfectly safe motivations for doing things. But it is also important that we employ our ability to reason- to be swayed by good arguments and to ignore irrelevances- if we are to live up to our potential as reasonable creatures.

### LET'S SEE HOW MUCH THINKING YOU CAN NOW MUSTER!

Here is a 'weakest link' quiz for you to try your hands on

Here is a "weakest link" quiz that was circulating on the net a while back. It is a good test of your ability to read carefully and think clearly, two key components of critical thinking.

1. You are competing in a race and overtake the runner in second place. In which position are you now?  
Answer: if you said "first" then you are not reading carefully (or you are not thinking clearly). The correct answer, is "Second"
2. If you overtake the last runner, what position are you now?
3. Take 1,000 add 40, add another 1,000, add 30, add 1,000 again. Plus 20. Plus 1,000 and plus 10. What is the total?
4. Miriam's father has five daughters:
  - a. Cha Cha
  - b. Che Che
  - c. Chi Chi
  - d. Cho Cho
  - e. ??

What is the fifth daughter's Name?

## C. CRITICAL THINKING AND CLEAR WRITING SKILLS

### i. Introduction

Suddenly, there you are, with a key board, pen or pencil. And there it is, the enemy a blank screen or a piece of paper that you must somehow convert into an essay. If you are like many of the students we know, the kind of essay that causes you more trouble than the other variety is the argumentative essay in which the purpose is to support a position or an issue. Successful essays achieve their goal by offering good arguments for their author's position, and because arguments consist of claims, a good argumentative essay contains credible claims.

In the previous section we had discussed claims at length and introduced the basics of argument. In this chapter we want to show how to apply the basic principle of critical thinking to essay writing: How to organize your thought, state your claims clearly, and avoid ineffective and counterproductive language. Please note that the section is not a substitute for a course in composition or writing, but it provides information that will help you write strong essays based on clearly stated arguments and reasonable claims.

As you progress through this book you will acquire various principles by which you can evaluate claims and arguments and, accordingly, argumentative essays. You can also apply these principles of critical thinking to your own writing. So working on your critical thinking skills will help you get better at both appraising and writing argumentative essay. To be able to achieve all of this, two factors stand out in this section: **Organization** and **Focus**.

### ii. Organization & Focus

A good argumentative discuss must first of all be well organized. Every now and then, you encounter pieces of writings in which the words, claims and arguments are so strangely assembled that that the results is unintelligible. Let's just hope the pieces are nothing you yourself have written.

If you come across such argumentative essays that suffers from such organizational defects that it cannot be fully understood, then your only option is to suspend judgment on the unintelligible aspects. If however, your own writing suffers from such defects, then you can benefit from some simple principles of organization.

#### a. Principles of Organization

In an argumentative essay, the most natural and common organizational pattern is to state what you are trying to establish and then proceed to establishing it by setting forth the considerations that supports your position, adding explanations, illustrations or other elaborations as needed. Here are some guidelines to help you get organized:

1. **Focus:** Make clear at the outset what issues you intend to address and what you position on the issue will be. Of course nothing is quite as boring as an essay that begins, "In this essay I shall argue that..." and then goes on to itemize everything that is going to be said later. As a matter of style, you should let the reader know what to expect without using trite phrases and without going on at length.
  2. **Stick to the Issue.** All points you make in an essay should be connected to the issue under discussion and should always either (a) support, illustrate, explain, clarify, elaborate or emphasize your position on the issues or (b) serve as response to anticipated options. Rid the essays of irrelevances and dangling thoughts.
  3. **Arrange the components of the essay in a logical sequence.** This is just common sense. Make a point before you clarify it, e.g. not the other way round. Place support for item 'B' next to item 'B', not next to item 'G' or 'F'.  
When supporting you points, bring in examples, clarifications, and the likes in such a way that the reader knows what you are doing. Your reader should be able to discern the relationship between any given sentence and your ultimate objectives, and they should be able to move from sentence to sentence and from paragraph to paragraph without becoming lost or confused. If a reader cannot out line your essay with ease, you have not probably sequenced your materials properly.
  4. **Be Complete.** You do not have to be exhaustive in your treatment of the issues; many issues are in fact more too large to be treated exhaustively in a single sentence, remember, finally, these basic principles "the more limited you topic, the easier it is to be complete in your coverage. However, do accomplish what you set out to accomplish, support- fully and adequately whatever position you take on the issues, and anticipate and respond to the possible objections. Also, be ensured that there is closure at every level, sentences should be complete, paragraphs should be unified wholes, (and usually each should stick to a single point). And the essay should reach a conclusion. Reaching a conclusion and summarizing them are not the same, incidentally, short essays do not require summaries
- ### iii. Good Writing Practices
- Understanding these principles is one thing – actually employing them may be more difficult. Fortunately five practices are almost guaranteed to improve the organization of your essay and to help you avoid other problems.
1. At some stage after the first draft, outline what you have written. Then make certain that the outline is logical and that every sentence in the essay fixes into the outline as it should. Some writers create an informal

outline before they begin but many do not. Our advice, **Just start writing and worry about outlining later.**

2. Revise your work. Revising is the secret to good writing. Even major legend writers revise what they write, and they revise continuously. Unless you are even more gifted than the very best professional writers, then revise, revise, and revise. Don't think in terms of two or three drafts. Think in terms of innumerable drafts.
3. Have someone else read your essay and offer criticism of it. Revise as required
4. If you have problems with grammar or punctuations, reading your essay out loud may help you dictate problems that your eyes have missed.
5. After you are completely satisfied with your essay, put it aside. Then come back to it later for still another set of revisions.

#### a. Essay Types to Avoid

Seasoned instructors know that the first batch of essays they get from a class may most likely include several samples of such of the following types. At all cost, try to avoid these pitfalls.

- **The Windy Preamble.** Writers of this type of essay avoid getting to the issue and instead go on at length with introductory remarks, often about how important the issue is, how it has troubled thinkers for centuries, how opinions of the issues are many and various, and so on-and on.
- **The Stream of Consciousness Ramble.** This type of essay results when writers make an attempt to organize their thinking on the issue and instead simply list thought more or less in the order they come to mind.
- **The Knee Jerk Reaction.** In this type of essay, writers record their first reaction to an issue without considering the issue in any depth or detail.
- **The Glancing Blow.** Writers of this type of essay address the issue obliquely rather than straight on. If they are supposed to evaluate the health benefits of exercise, they will discuss the health benefits of using exercise equipment. If they are supposed to consider the health benefits of using exercise equipments, they will discuss the benefits of recycling.
- **Let The Reader Do The Work.** Writers of this type of essay expect the reader to follow them through non sequiturs, abrupt shifts in direction, and huge gaps in logic

#### iv. Clarity in Writing

In addition to being well organized, a good argumentative essay must be clearly written. If your objective is to support your position, you must write as clearly as possible. Likewise, before you accept what somebody else writes (or says) you should be sure you understand what is being expressed.

#### Consider these examples:

- When I was in the Marine Corps, I was plainly told that many good men died in the uniform that was giving to me.  
(From a letter to the editor)
- Not every Framistan has gusset  
I am glad to be an American and I appreciate our system of Government. Also, I am for a very strong defense. However, the people protesting the war on all sides are out there because they care about life. Now we are in an awful mess. Why? We need to put ourselves in the other guys' shoes. Going out and killing the other guy may be the way to preserve you own.  
(From a news paper call in column)
- Today, morals are breaking down everywhere. There are no longer any absolutes. This is why the boys scout should not permit gays to be scout leaders. The Boys scout stand for values that never change or go out of style.  
(From a student's Paper)  
I am 42 years old and I am conservative. I keep reading and hearing in the news that voters are in a bad mood. No, we are not. We are hopeful and uplifted, but we are mad as hell.  
(Reported by William Endicott)
- Legal Laws are fine, but illegal laws should be changed.  
(From a Student's Paper)

The first example does not mean what it first appears to mean; the second can be understood only by those familiar with framistams, whatever those are. The third examples are a set of claim that individually, mostly make sense, but the assembled package defiles comprehension. The fourth and fifth seem illogical and contradictory. (In the fourth, the second sentence asserts there are no longer any absolute; the last sentence imply they are. In the fifth, it is hard to see how voters can be mad as hell but not in a bad mood. And the last example is nonsensical. When we cannot tell what someone else is claiming or arguing, or when someone else cannot tell what we are claiming or arguing, any number of problems may be causing the difficulty. Here we consider ill-defined terms, poorly chosen words, unintentional ambiguity, vagueness, and faulty comparison.

#### v. Defining Terms

Any serious attempt to support or sustain a position requires a clear statement of what the issue is. Sometimes stating what is at issue involves a careful definition of key terms.

**Purpose and Types of Definitions:** Definitions can serve different purposes

- To introduce unusual or unfamiliar words, to coin new words or to introduce new meaning to a familiar word.
- To explain, illustrate or disclose important aspects of difficult concept (Explanatory Definition)
- To reduce vagueness and eliminate ambiguity (precising definition)
- To influence the attitude of the reader (rhetorical definition)

Sometime, definitions are intended to amuse. Whatever the purpose, most definitions take common forms. Three of the most common forms are definition by example, definition by synonym and analytical definition.

1. **Definitions by Example:** Pointing to, naming, or describing one or more examples of something to which the defined term applies. "By 'scripture' I mean books like the Koran" "By temperate climate" I mean weather in an area like the mid Atlantic state.
2. **Definitions by Synonyms:** giving another word or phrase that means the same thing. " 'Fastidious' means the same thing as 'fussy'" "prating is the same thing as 'chattering'" "Pulsatile" means the same thing as throbbing"; "to be 'lubricous' is to be 'slippery'".
3. **Analytic Definition:** specifically (a) a type of thing a term applies to and (b) the difference between the things the term applies to and other things of the same type. "A mongoose is a ferret-size mammal native to India that eats snakes and is related to civets" "A samovar is an urn with an apigot, used especially in Russia to boil water for tea."

Some terms, especially terms for abstractions (e.g.) "goodness" "truth" "knowledge", "beauty",) cannot be defined in any specific or complete way. So a writer may have to settle for providing mere hints of their subtle meanings. "By 'reality' I mean the things that most of us agreed have independent existence apart from our perception of them"

However when we define a term, we should be aware that most terms convey meanings beyond the literal sense of the written or spoken word. This meaning is a term's emotive, or rhetorical, force- its tendency to elicit certain feelings or attitudes. The word 'Dog', for example, has the same literal meaning as "pooch", "mutt", and "cur", but all these terms differ in their attitude they convey. Or consider the word "child", "dependent minor," "brat" and "little one" what associations do these terms have to you?

When people want to manipulate the emotive force of their message, the frequently substitute euphemism for more pointed terms. This is the origin of such substitutions as "urban camping", for "homelessness" and "food insecurity" for "starving". The emotive or rhetorical, force of a term, which is subjective and can vary considerably from one person to another, is usually not taken to be part of the literal meaning.

**Keeping Your Word Choice Simple:** Good writing is often simple writing: it avoids redundancy, unnecessary complexity, and prolixity (long windedness and wordiness). These written characteristics often confuse readers and listeners, and they sometimes make writers (or speakers) look silly. Why write an armed gunman? Gunmen are automatically armed. Why say that something is *completely* full. If it's full, it's completely full. Michael Jordan, it is often said, is a *famous* super star. The famous part is pointless, if a person is a super star. In fact, come to think of it, why say *superstar*?

Here is an example:

**They expressed their belief that at that point in time, it could accord with their desire not to delay their departure.**

But all that is necessary is:

**They said they wanted to leave.**

On the other hand, if the briefest way of making a point is to use words that a reader isn't likely to understand, it is probably better to avoid those words in favour of more familiar ones, even if it takes more of the letter to express the information. "His remarks were obfuscatory and dilatory" will be less clear to most readers than "his remarks confused the issue and was unnecessarily time consuming". Further, because the world is a complicated piece, the language we use to describe it often has to be correspondingly complicated. Sometimes it is necessary to be complicated to be clear. But in general, simplicity is the best policy.

**NOW TRY YOUR HANDS ON SOME OF THESE EXERCISE**

Determine what term in each case of the following is being defined and whether the definition is a definition by example or by synonym or an analytical definition. If it is difficult to tell which kind of definition is present, describe the difficulty.

1. A piano is a stringed instrument in which felt hammers are made to strike the strings by an arrangement of keys and lever.
2. "Decaffeinated" means without caffeine.
3. Steve Martin is my idea of a successful philosopher.
4. The red planet is Mars.
5. "UV" refers to Ultraviolet light.
6. The significant other can be taken to mean a persons' spouse, lover, long-term companion, or just boyfriend or girlfriend.

**vi. Persuasive Writing In Today's Society**

The primary aim of argumentation and an argumentative essay is to establish something, to support a position or an issue. Good writer, however, write for an audience and hope that their audience will find what they write persuasive. If you are writing for people who think critically, it helps to adhere to these principles:

1. Confine your discussions of your opponent's point of view to issues rather than personal considerations.
2. Anticipate and discuss what your opponents might say in criticism of your opinion.
3. When rebutting an opposing view point, avoid being strident or insulting. Don't call opposing arguments absurd or ridiculous.
4. If an opponent's argument is good, concede that it is good.
5. If space and time is limited, be sure to concentrate on your most important considerations. Do not become obsessive about refuting every criticism that your opponent makes.
6. Rebut objections to your position before presenting your own positive case for your side.
7. Present your strongest arguments first.

Please note that there is nothing wrong with trying to make a persuasive case for your position. However in this book, we place more emphasis on making and recognizing good arguments than simply on devising effective techniques of persuasion. Some people can be persuaded by poor argument and doubtful claims, and an argumentative essay can be effective as a piece of propaganda even when it is a rational and critical failure. One of the most difficult things you are called to do as a critical thinker is to construct and evaluate claims and arguments independent of their powers to win a following. Most of the remaining part of this book is devoted to this task.

#### vii. Writing In A Diverse Society

In closing this chapter that deals with writing essays, it is appropriate to mention how important it is to avoid writing in a manner that reinforces questionable assumptions and attitudes about people's gender, ethnic background and sexual orientation physical ability or disability, or other characteristics. This isn't just a matter of ethics; it is a matter of clarity and good sense. Careless word choices relative to such characteristics not only are imprecise and inaccurate but also may be viewed as biased even though they were not intended to be, and thus they may diminish the writers credibility.

Worse, using sexist or racist language may distort the writer's own perspective and keep him or her from viewing social issues clearly and objectively.

But language isn't entirely a not a matter of ethics either. We are a society that aspires to be just, a society that strives not to withhold its benefits from the individual on the basis of their ethnic or racial background, skin colour, religion, gender, or disability. As a people we try to end practices and change or remove institutions that are unjustly discriminatory. Some of this unfair practices and institutions are, unfortunately embedded into our language.

Some common ways of speaking and writing, for example, assume that "normal" people are all white males. It is still common practice, for instance, to mention a person's race, gender, or ethnic background if the person is not a white male, and not to do so if the person is. Thus if we are talking about a white male from Ohio, we are apt to say simply, "His from Ohio." But if the male is black, we might tend to mention that fact by saying person, "he is a black man from Ohio"—even when the person's ethnic background is irrelevant to whatever we are talking about. This practice assumes that the normal person is not a black man and by implication insinuates that if you are "different", and a deviation from the norm, an outsider. Of course it may be irrelevant to whatever you are writing about to state that this particular man is a black man from Ohio, and, if so there is nothing absolutely wrong with writing "He is a Black man from Ohio."

Some language practices are particularly unfair to women. Imagine a conversation among three people, you being one of them. Imagine the other two talk only to each other. When you speak they listen politely; but when you are finished, they continue as though you were not there and had never spoken. Even though what you've said is true and relevant to the discussion, the other two proceed as if you were invisible. Because you are not being taken seriously, you are at a considerable disadvantage. You have reason to be unhappy.

In an analogous way, women have been less visible in language than men and have thus been at a disadvantage. Another word for the human race is not "woman," but "man" or "Mankind." The generic human has always been referred to as "he". How do you run a project for instance? You *man* it. Who supervises the department or runs the meeting? The *chairman*. Who heads the crew? The *foreman*. But the fact is, women like men can be supervisors, professors, lawyers, scientists, poets and so forth. But a woman in such a profession is apt to be referred to as a "woman scientist" "women supervisors" "women Poets" (or whatever) the implication is that in their primary signification, words like supervisors and scientist refer to men.

Picture a research scientist to yourself, got the picture? Is it a picture of a woman? 'No'. That is because the standard picture or stereotype, of a research scientist is a picture of a man. Or, read this sentence "research scientist often put their work before their personal lives and neglect their husbands." Were you surprised by the last words? Again the stereotypical picture of a research scientist is the picture of a man.

A careful and a precise writer finds little need to converse in the lazy language of stereotypes, especially those that perpetuate prejudice. As long as the idea prevails that the "normal" research scientist is a man, women who are or who wish to become research scientist will be thought of as out of place. So they must carry an extra burden of showing that they are not out of place. That's unfair. If you

unthinkingly always write "the research scientist...he," you are perpetuating an image that places women at a disadvantage. Some research scientists are men and some are women. If you wish to make claims about male research scientist, do so. But if you wish to make claims about research scientist in general, do not write as though they were all males.

Most often the problem of unintentional gender discrimination arises in connection with pronouns. Note how the use of "he" and "his" in the following two sentences excludes females.

**As a student learns to read more critically, his writing, too, usually becomes clearer.**

Obviously, changing "his" and "he" to "her" and "she" would exclude males. If the writer means to include writers of both sexes, one solution is to use two pronouns: for instance "he or she" or "his or her"

**As a student learns to read more critically, she or he usually writes more clearly too.**

**As a student learns to read more critically, his or her writings, too, usually becomes clearer.**

However a usually less awkward remedy is to change from singular to plural (this is because plural pronouns in English do not show gender).

**As students learn to read more critically, they usually write more clearly, too.**

**As students learn to read more critically, their writing usually becomes clearer."**

Frequently, a pronoun can simply be deleted and replaced by another word usually "the" or "a":

**The student, who develops the habit of reading critically, will get more out of his college course.**

**The student, who develops the habit of reading critically, will get more out of college courses**

**The student who develops the habit of reading critically will get more out of a (or any) college course.**

The rule to follow in all cases is this: keep writing free of irrelevant implied evaluation of gender, race, ethnic background, religion or any other human attribute.

### Avoid Sexist Language

Here are some examples you may use to keep your speech free from sexist or racist language

Instead of	Use
• Actress	Actor
• Chairman	Chair, chair person, coordinator, head, leader, president, preside
• Congressman	Congressional representative, member of congress.
• Father (of industry and so on)	Founder, innovator, pioneer, trailblazers, etc.
• Man made	Artificial, fabricated, manufactured, synthetic, human-made.
• Weatherman	Weather reporter, weather forecaster

You can also refer to many of numerous references works on bias-free language. See, for example Marilyn Schwartz, *Guidelines for Bias-Free Writing*. (Bloomington: Indiana University Press, 1995).

### Recap of the Study So Far

An argumentative essay is intended to support a position on some issue. Principles of critical thinking can and should be applied both to essays written by others and to those we ourselves write. Such essays must be soundly organized and clearly written and must truly support the position taken by their author.

Writers can get into trouble by many ways, but you can avoid the most common pitfalls if you are willing to take care. To keep your essay organized, stay focused on your main points, use an outline, and be prepared to revise your work. To achieve clarity be sure to clearly define new terms, terms that are especially important to your arguments or terms you are using in an unusual way; and remember to pay attention to the emotive force of your words. Avoid redundancy and unnecessary complex language. Watch out also for ambiguous claims (claims that are insufficiently precise for the purpose at hand). Be exceptionally careful when writing or analyzing claims that make comparisons.

It is acceptable to use persuasive techniques to support a position in an argumentative essay, but don't use them instead of reasonable claims and well-constructed arguments. Be careful to avoid irrelevant (and unwanted) assumption about people, including those you want to overlook because they are embedded in our language. Remember, if you what you want to say is not clear to you; certainly will remain obscure to your readers.

Having read these chapters and the recap section, you are should begin to be able to:

- Create a clear and focused organization plan for an argumentative essay.
- Define terms in your essay clearly and chose the words that best suits your purpose
- Recognize different types of ambiguity, know the uses and abuses of vagueness, and analyze comparative claims
- Make a persuasive case for your position to an audience of people who can think critically.
- Avoid sexist, racist and other inappropriate writing practices.

#### ATTEMPT THESE EXERCISE:

Write each of the following claims in a gender neutral language.

##### Example

We have insufficient man power to complete this task.

##### Answer

We have sufficient personnel to complete this task.

#### Now Attempt To Find The Right Conversions For These Sentences

1. A student should choose his major with considerable care
2. When a student chooses his major, he must do so carefully
3. A true citizen understands his debt to his country
4. If a nurse can find nothing wrong with you in her preliminary examination, she will recommend a physician to you. However in this country, the physician will wish to protect himself by having you sign a waiver.
5. Language is nature greatest gift to mankind

## D.

### SIMPLE LOGIC

#### i. What Is Logic?

In our opening statements in the beginning of this section, we discussed briefly, some background information about logic and critical thinking and the role the study plays in the life of an individual. You may need to make reference to the discussions made earlier as this will further acquaint you with the trend of thoughts that we are about to delve into in this section. We shall in this section, pay a closer attention to the nature of the concept of logic as a course of study and to its role in the field of philosophy.

Etymologically speaking, the term logic is derived from the Greek word "Logos" which means "word". It thus could be interpreted as the study of words in

statements as found in conversations, dialogues and discussions. As we all know, words are vehicles through which ideas are communicated. We are said to be applying logic when we bring ideas together with the help of our mental apparatus, we move from one idea to another. It is logic then that stipulates the rules, principles and procedures which the mind must follow in order to arrive at the truth of every argument while avoiding all the errors that are possibly contained in an argument. This is why some canners have preferred to define logic as the practical science which directs the minds towards the discovery of the truth and validity of arguments.

Logic has also been defined as the science of true, good or valid reasoning. This definition tends to give us an insights and clues to the nature of logic and logical reasoning which also have been understood as (a kind of inference), that is, a special kind of thinking that guides us into drawing or deducing valid conclusions from the various premises that are given for or against an argument at every point in time. We may need to note that though this kind of reasoning is not exclusive to logic alone - having seen this kind of reasoning applied in Psychology; a disciple purely concerned with the actual processes of reasoning. - But in logic, the emphasis and concern is directed at the correctness of the complete processes of reasoning. Thus the questions that logic often asks is: "Do the premises in the argument provide enough grounds and reasons for the conclusions that have been offered for acceptance from the argument? Where we find that the premises in the argument provide enough reasons to justify the conclusions that have been offered, then we can proclaim that the conclusion is valid and correct. Where we do not find enough grounds to accept the conclusion as stated, we say the conclusion or argument is incorrect or invalid.

The truth is that in logic, we are primarily concerned with arguments. So when we say that logic is all about the nature, structure and the form of arguments, we are not far from the target. Do also note that the medium through which arguments are done is via words that are constructed into various sentences often called **propositions**.

#### ii. The Problem Of Definition

What Logic is, is most difficult to say especially for a beginner, and especially also at the beginning of a course. Copi defines Logic as "the methods and principles used in distinguishing correct from incorrect reasoning." Kahane defines logic as an attempt to distinguish between correct (valid) and incorrect (invalid) arguments. Hursel asserts that fundamentally, logic is a science of laws, the basis of rules which can be used in reasoning. By these definitions it means that logic is basically theoretical and a priori, that is, independent of human experience.

These definitions appear rather simple but some questions may be asked specifically on MI Copi's version of it, as regards the use of some terms. **Principles for instance;** it is not clear where Copi is using this word as a synonym for laws or rules or both. The question where Logic is a theoretical or practical science, descriptive or prescriptive, largely depends on this distinction. **Methods;** this belongs to methodology which is the science of the road to follow, and thus more specifically to the application of logic.

The definition as a whole, does it belong to logic? That is, does it explain the real meaning of logic? Talking about its use, Logic is not the description or explanation of how people reason, for then it will be reduced to Sociology, Psychoanalysis or psychology. Logic is therefore concerned with possible arguments whether or not people know or use them.

For **Otakpor**, He suggests that "logic is the systematic study of the structure of propositions and of the general conditions of valid inferences by a method which abstracts from their content or matter of the propositions and deals only with their logical form." "This distinction between matter and form is made whenever we distinguish between logical soundness or validity of a piece of reasoning and the truth of the premise from which it proceeds, and in this sense is familiar in every day usage.

This distinction suggests that logic is concerned with validation only, that is, judging whether a giving argument is valid or not. Yet there appears to be a room also for logic of discovery-logical interventions. The status of this kind of logic as well as its structure is, however, still a matter of controversy.

With "logic" Copi and most others mean "formal logic", that is, logic which is based on the application of words such as: *and, or, if...then, not, all, some*. The function of such words is to a scope of application or the truth value of their sentence, and as such they have fixed relations between one another. Words like love, remembering, person etc, have logical powers, that is, fixed relations with the meaning of other words, such that it will be logical to say some things at some point in time and illogical to say some other things at other times.

Informal logic is therefore the mapping of such relations, a grammar of what can be said sensibly. For example, is love a feeling? No because love can be put to the test but toothache cannot. Informal logic therefore is the whole of the rules governing such use of such content laden words. On the issue of correctness, the subtle distinction between truth and correctness is most essential for logic. The relation between both is however complicated. Against all these background, we may be able to make the following deductions about logic:

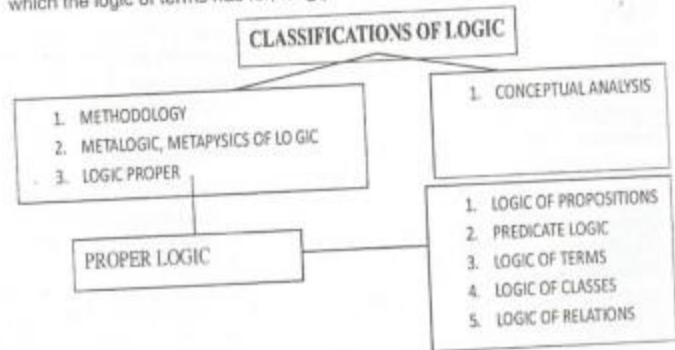
Logic in a broad sense is the theory of the most general and simple connections between all things and signs as spoken of, thought of or defined. For example:

your behaviour is not logical; it is rather logical that he gave this answer. If logic is understood or taken in this broad sense, it will make sense to divide it into **formal logic and informal logic** (conceptual analysis)

Formal logic either indicates the whole formed by Logic proper, general methodology and metalogic, or logic proper alone. Logic proper can be defined as Copi suggested, or to put it differently, as the science of the laws on the basis of which, from some things given, some things else follow by virtue of the given. Even so, this approach not only covers arguments, but also such relations as there are between **man and animal**, explaining why it is right (correct) to say that "Man is an Animal", and not that an "Animal is a Man"

Logic proper is divided in to logic of propositions, of terms, (predicate and classes) and of relations. However, whether logic serves for validation (Justification) or for (discovery) invention is a question of application that is of methodology. Nevertheless, the structure of logic proper might be determined or influenced by its aim. The logician therefore is interested in arguments and reasons which are, or might be presented in support of a hypothesis or conclusions.

Let us also add here that formal logic is not the same or identical with formalized logic which is the use of symbols without their reference to the meaning of their symbols in the sense of their reference. Yet it is opposed to material logic which is the theory of knowledge, and which in turn finishes or content for argument. In the section that will follow, discussions and emphasis will be on proper logic in which the logic of terms has for, long predominated.



### iii. Why Study Logic?

We have said quite a few things about the relevance of the study of logic and critical thinking in any society. In this section we want to reemphasize some of the points we have earlier stated in the beginning of this last section of this book.



There are verities of reasons for studying logic. It is a well-developed discipline that some find interesting in its own right, a discipline that includes a rich history and many current researches programs. Certainly anyone who plans to major in either philosophy or mathematics, or to do graduate work in either, needs to have a solid grounding work in symbolic logic. The study of formal logic also helps to develop the skills needed to present and evaluate argument.

Another reason for studying symbolic logic is that in learning to symbolize English sentences in a formal language, students become aware and more appreciative the importance and complexity of English. Precisely, what words are used often has a major bearing on whether an argument is valid or invalid, a piece of reasoning convincing or unconvincing. For example, distinguishing between '**Roberta will pass if she completes all her home work**' and '**Roberta will pass only if she completes all her home work**' is essential to anyone who wants to reason well about the prospects for Roberta' passing.

However, the focus of this text is not primarily on sharpening the critical and evaluative skills readers bring to bear on every day discourse, newspaper columns, and the rhetoric of politicians. The latter is the domain of texts on 'critical thinking' or 'informal logic', where the none formal techniques for identifying fallacies, figuring out puzzles and constructing persuasive arguments. Formal or persuasive logic which is the domain of this book, is a discipline with its own theory and results, just as in mathematics and physics. This text is an introduction to that discipline, a discipline whose principles underlie the techniques presented in formal logic texts.

This texts aims not only at allow the reader to identify good and bad arguments but also to understand why arguments are good arguments or bad arguments. Only the most devotees of formal systems will be constructing truth tables, truth trees, and derivations after completing this text. However, mastering these formal techniques is a way of coming to understanding the principles that underlie reasoning and the relations among sentences and sets of sentences.

There is yet another practical reason for studying symbolic logic. In most of the sections that will follow after now, the discussions will center on several concepts. These concepts are related from section to section. For example, the concept of truth-functional validity is one way of refining the concept of logical validity developed in a latter segment. All these concepts are abstract. They cannot be touched or weighed or examined under a microscope in a laboratory. Mastering these concepts and the relations among them is an exercise in abstract thinking. The skills involved are, we think, very important and will be very useful in a wide variety of theoretical and applied fields. For these reasons, the 'theory questions' found at the end of each sections are set in many important ways to achieve this aim.

#### iv. The Laws Of Thought

The various definition of logic we have considered so far tends to present the study and practice of logic as the discipline that is guided by principles and laws that must be strictly adhered to if valid and true deductions must be achieved.

Present research shows that in the field of logic, certain laws have been generally recognized as the **laws of thought** which have been designed to guide reasoning in the field of study.

The laws of thought are "those first principles or axioms which underlie all human thinking processes and discourses."<sup>14</sup> They have been called first principles because outside them, on other truths can be thought of or formulated. They are called laws because they constitute some kind of rules that must be obeyed if our thinking processes must be properly ordered. These laws have, at some other occasion, considered as **axioms** because they bare self evident truths which require no further proof or explanation. By this understanding, an axiom is considered to be a general proposition that is in no need of any kind of proof whatsoever. These three laws of thought put together are variously called **Axioms of Reasoning, Postulates of Reasoning, or A priori Laws of Thought**. These laws of thought include:

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

##### a. The Law of Identity

The law of identity simply states that everything is what it is, or a thing is what it is. Symbolically put, "P is P" or "Q=Q". By this understanding, "A man is A man" and nothing more or less. In like manner, "A chair is A chair. Where the subject in question is altered, reduced or modified to something else, it ceases to be the original thing that it was. In other words, it loses its identity. What this law upholds therefore is that all terms must have the same meaning to both speakers and listeners at all times.

##### b. The Law of Contradiction

The law of contradiction simply states that a thing cannot be and not be at the same time. By this statement, the law asserts that means that nothing for instance, can be both "A" and "-A". this laws obviously puts the Law of identity negatively; it puts negatively what the Law of identity puts positively. For example, when we have accepted that "A man is A man", it will be absurd and unreasonable to say or supposed that "A chair is not A chair." Another example, the same girl cannot both be ugly and beautiful, where such a statement is given, it is assumed that either of the statements contradicts the other, i.e., either "she is beautiful", is contradicting with "she is ugly."

### c. The Law of Excluded Middle

According to this law 'a thing either is or not'. Put simply, this law asserts that everything is either "P or is 'not P' or  $\neg P$ ". by this stand, it is clear that the law of the excluded middle, merely states the laws of identity and the laws of contradiction together. where both laws are taken together, the resultant law is what is known as the law of the excluded middle. This law further states that the meaning of a term is fixed and it remains the same in the same argument. There is therefore no mid way between "a car" and "a - car", or "not car."

From the above we can infer or deduce the following conclusions. The three laws stated here as some of the laws of thought concern things, relations and properties, etc, in the natural world. But because they are mostly formulated as truths about propositions, they are therefore regarded as tautologies. Thus when translated as propositions, they could be interpreted respectively as: "if a proposition is true, then it remains true", "No proposition is both 'true' and 'not true' at the same time," "Every proposition is either "true or false."

### v. Propositions

In the studies we have made so far about logic, we have come to the understanding that part of what logic does is to systematically study the structure of **propositions** with the view to attaining the general conditions of valid and invalid inferences made through methods of abstractions from their content. To advancing in this stage therefore requires us to critically study the meaning and nature of proposition with the view to understanding its operation, what distinguishes it from sentences, statements etc.

#### Definitions of Propositions

The under listed are some of the various ways in which the term proposition have been used

- ⊙ **Proposal:** an idea, offer, or plan put forward for consideration or discussion.
- ⊙ **Statement:** a statement of opinion or judgment.
- ⊙ **Private agreement:** a private deal or agreement.
- ⊙ **Somebody or something to be faced:** somebody or something to be dealt with. *(Informal) The news that he would be there certainly made the party a more attractive proposition.*
- ⊙ **Philosophy meaning of declarative sentence:** the meaning of a declarative sentence that expresses something that can be true or false
- ⊙ **Prop-o-si-tion U.S. law proposal for amendment to law:** a proposal for an amendment to the law that is set forth to be voted on *Propositions imposing term limits for politicians have been common recently*

From the above definitions, we find definitions "1", "2", "3", "5" and "6" to a large extent attempt to capture the sense in which propositions are referred to in logic. This notwithstanding, we can vividly say the following about propositions:

- i. **Propositions are simple or complex sentences or statements that can either be affirmed or falsified.**
- ii. **Propositions are known to have only two forms, that is, propositions that are 'TRUE' and propositions that are 'FALSE'**
- iii. **Thus, a proposition is said to be true when it corresponds to facts, that is, if it says things are the way they are. It is false when what it says does not correspond to facts.**

It is important to note that in logic, we are not concerned with the validity or invalidity of propositions that are made, but the 'truth content' or 'falsity' content that they bear at every point in time. In other words, the correctness or incorrectness of the state of a proposition is what logicians are interested in when they are considering propositions.

### vi. Statements And Sentences

As mentioned above, statements and sentences are various mediums through which ideas are communicated in logic. The kind of study we intend to do later on in this book demands that we have a proper understanding of the meaning, structure and nature of the various statements and sentences that are often used to convey the kind of ideas that are used in logic to make arguments.

#### Definitions of Statements

- ⊙ 1. Expression in words: the expression in spoken or written words of something such as a fact, intention, or policy, or an instance of this a *statement of intent*
- ⊙ 2. Something said: something that somebody says that is not a question or an exclamation and that expresses an idea or facts in definite terms. *"We were unable to verify the truth of that statement".*
- ⊙ 3. Specially prepared public announcement: a specially prepared announcement or reply that is made public. *"Has she made a statement to the press yet?"*
- ⊙ 4. Account of facts: an account of the facts relating to a crime or case given to the police or in a court of law, usually for use as evidence. *The police asked me if I wished to make a statement.*
- ⊙ 5. Wordless expression of idea: an expression of an idea, opinion, or concept made in a nonverbal way; *"Her art is a powerful statement of her political beliefs"*

**Definitions of Sentence**

- ⊙ 1. A sentence is a kind of grammar or a meaningful linguistic unit: a group of words or a single word that expresses a complete thought, feeling, or idea. It usually contains an explicit or implied subject and a predicate containing a finite verb.
- ⊙ 2. A sentence could be regarded as a kind of Logic, or a well-formed expression: a well-formed expression in a symbolic language.

**Nature of Statements and Sentences**

The most outstanding characteristic of a sentence is that it constitute of a subject, and a predicate often co-joined by a conjunct. An example of a simple statement and a sentence:

- ⊙ **Morenike is beautiful.**

"Morenike" is "THE SUBJECT", "IS" is "THE CONJUNCT", while "Beautiful" is "THE PREDICATE".

The smallest unit of a sentence is called ATOMIC. That is, where the sentence contain only one subject and one predicate.

A sentence is thus said to be **A compound sentence** if and only if it constituents contain more than one atomic sentence. For example, today is Monday and we are in Covenant University. In this case there is a subject which is "today", and two separate predicates "Monday" and "Covenant University" Let us also note that a sentence could either be affirmed or negated.

A **statement** is a combination of **atomic sentences** and **compound sentences** that is often not directed at attaining the truth value of their structure. Consider the example below:

- ⊙ **Morenike is intelligent and Beautiful.**

Thus phrases such as "stand up", "come in" are not sentences because they do not contain the constituents of a sentence.

**vii. Logical Constants**

Logical constants are some time called logical connectives; they are the elements in a statement or argument that provides the statement with its form and structure. These elements often vary from one statement to another or from one argument to another. Various research in history shows that logicians prefer to use lower case letters of the alphabet; such as *p, q, r, s, t*, etc. to represent these elements. These letters in most cases have been known as propositional variables. For our level of study, we will just restrict our focus to just five of such logical constants: (1) Negation, (2) Material Implication, (3) Conjunction, (4) Disjunction, (5) Material Equivalence. The chart below captures the usual English expressions of these constants and their logical symbols.

1	Negation	Not	- or ~ symbol
2	Material Implication	If... Then...	↓ or ⊃ or → sign
3	Conjunction	And	The dot symbol "."
4	Disjunction	Or	V or 'vel' sign
5	Material Equivalent	If ... and only if ...	Then three bar symbol ≡

It is important to note here that the main function of a logical constant is that they help to make a statement out of other statements. <sup>(1)</sup> All logical constants are logical connectives except (negation), because they help to form compound propositions from simple or elementary propositions; they also help to connect other compound propositions to another. The rule therefore exists that each logical connective must connect two and only two propositions-simple or compound. Consider the following example:

- "If you are a Medical Doctor, then you are wealthy"

Please do note that this is a compound sentence formed by means of the application of logical connective "If ... and Then ... from two individual statements /sentence

- **You are a Medical Doctor.**
- **You are Wealthy.**

You are advised to formulate further examples with all the other logical connectives in the chart above and submit them to your lecturer for assessment. It will interest you to note that our task can even be made easier when we choose to make use of propositional variables such as *p, q, r, s, t*, etc as discussed earlier, instead of using full sentences or writing out are statements in full. Thus instead of writing "if you are a Medical Doctor, then you are wealthy" in full we write 'p' for "You are Medical Doctor" and 'q' for "You are wealthy" the compound proposition, "if you are a Medical Doctor, Then you are wealthy" can now be symbolized simply as  $p \rightarrow q$ . let us now consider these logical constants in some details.

**1, NEGATION**

*Classical negation* is an operation on one logical value, typically the value of a proposition that produces a value of *true* when its operand is false and a value of *false* when its operand is true. So, if statement *A* is true, then  $\sim A$  (pronounced "not A") would therefore be false; and conversely, if  $\sim A$  is true, then *A* would be false.

Negation could also be called denial or contradiction. If we chose a sentence say:

- "Nelson Mandela is a South African"

to change or contradict the entire sentence such that it will bear the negative integer, all we could do is to place the word "Not" to the sentence in order to obtain a new sentence in the denial. When this is done, our new sentence will look like this:

- "Nelson Mandela 'is not' a South African"

There are other ways to also represent this sentence in the negative form. We could say: "it is false to say that Nelson Mandela is not a South African" or it is not true to say that Nelson Mandela is a south African. As discussed earlier, at this stage it becomes needful to represent these sentences using propositional values, Mandela is not a south African, can thus be represented as  $\sim p$ . Please do note that the negation of a true statement is false, while the negation of a false statement is true. This represented on a truth table looks thus

The truth table of  $\sim p$  is as follows:

p	$\sim p$
T	F
F	T

## 2. MATERIAL IMPLICATION

Material implication in logic, a relationship between two propositions in which the second is a logical consequence of the first. In most systems of formal logic, a broader relationship called material implication is employed, which is read "If A, then B," and is denoted by  $A \supset B$  or  $A \rightarrow B$ . The truth or falsity of the compound proposition  $A \supset B$  depends not on any relationship between the meanings of the propositions but only on the truth-values of A and B;  $A \supset B$  is false when A is true and B is false, etc. ... If we consider our initial example:

- "If you are a medical Doctor, then you are wealthy"

This compound statement above is called "**an implication**" "a conditional" or "a hypothetical statement". The components between "If" and "then" is called the "**antecedent**," while all the components which comes after the then is call the "**consequent**." By this the rules holds that if the antecedent is true, then the consequent is also true. This is so because a relationship of implication is said to exist between the antecedent and the consequent. By this implication therefore, a conditional which has a true antecedent and a false consequence is false. The material implication that is represented by the horse shoe or arrow sign can be represented thus: **if  $p \rightarrow q$**

p	q	$P \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

## 3. CONJUNCTION

**Logical conjunction** is an operation on two logical values, typically the values of two propositions, that produces a value of "**true**" if and only if both of its operands are true. Put in another way, a logical conjunction is a truth functional compound statement because its truth value is wholly determined by the truth value of its component parts. Thus given any two statements 'p and q', e.g. (**Morenike is bright and intelligent**), we can assign four possible sets of truth value to them. The resultant table is represented thus: **p . q**

p	q	P . q
T	T	T
T	F	F
F	T	F
F	F	F

## 4. DISJUNCTION

A logical disjunction could be describes as a truth functional sentence that is true only when one of its two components sentences is true, otherwise it is false. A disjunct is a compound sentence containing two sentences linked together by the word "**or**". Another name for this kind of disjunction is "**alternation**". The two sentences so linked together are called disjuncts. A disjunct is true only if one of its disjunct is true, otherwise it if false. A typical example in this class is: "You can either be served Chicken **or** Turkey in this dinner party that I am organizing."

In symbolic form or language, the symbol for disjunctions is "**v**" known as '**vee**' or '**vel**'. A compound sentence of the form **p v q** has only four possible distributions of the truth and falsity among its disjuncts.

1. When p is true and q is true,  $p \vee q$  is true.
2. When p is true and q is false,  $p \vee q$  is true.
3. Where p is false and q is true,  $p \vee q$  is true
4. When p is false and q is false,  $p \vee q$  is false.

Following the definition of a disjunction, it means that any compound sentence that is a disjunction is true In the first three cases, excluding the last one. The forgoing analysis can be represented in a table, thus:

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

The above truth table however does not say everything concerning disjunction. It only captures one sense of the word, "or," that is, the sense in which it is meant that one or the other or both of two sentences are true. There are however three senses of the word "or," each with its own truth table.

1. In sense number one for instance, let us consider an example: "Premiums will be waived in the event of sickness or unemployment". There are three interpretations to this statement:

- i. Premiums will be waived in the event of sickness
- ii. Premiums will be waived in the event of unemployment
- iii. Premiums will be waived in event of both sickness and unemployment.

The example just given here is in the weak or inclusive disjunction which is also called "logical sum."

2. In sense number two, let us consider another example; "A restaurant menu, tea or coffee may be listed. This means that only one of the two is offered for the price indicated. This is the strong or exclusive disjunction. The reason is because, in the first example, the statement can be reworded in line with the requirements of the second. Premium will be waived or they will not be paid.

3. In the third sense, from another example, Nosa can point to someone and say "she is a polish Nigerian." This can be interpreted as meaning that, the person in question is either polish or a Nigerian. That person could be neither but not both of them at the same time.

This example is known as the weak exclusion. Of all the three disjunctions mentioned here, the first sense of it, that is, the "logical sum" research shows that it is the most often used. The validity of most disjunctive arguments depends on this first sense of it, the "logical sum" regardless of the exclusive or inclusive interpretation which is most difficult to establish outside the context.

## 5. MATERIAL EQUIVALENT (ME)

Two sentences are materially equivalent if they both have the same truth value. This is why they are also known as "Biconditionals". It is therefore a true functional statement, which is true when its two component parts have the same truth value. The component parts are called 'equivalents'. Material equivalents are therefore double implications, and are often constructed in English language

by using phrases such as "if and only if", "iff". In symbolic language, Material equivalence (ME) is symbolized as  $(\leftrightarrow)$  or as  $(=)$ . When two statements are equivalent, the materially imply each other. Thus, to assert that "Accra is in Nigeria" and that "Lagos is in Ghana" is materially equivalent because both have the same truth value, which is that both "false." This is because both materially imply each other in terms of their falsehood. The sentences can be symbolized as " $A = L$ " where "A" stands for the first equivalent and "L" stands for the second equivalent part of the sentence. When we translate these two into symbolic language, it will look like this:  $p = q$ .

A truth functional sentence of the form  $p = q$  has four possible distributions of truth and falsity among its equivalent sentences.

- i. Where p is true and q is true,  $p = q$  is true
- ii. Where p is true and q is false,  $p = q$  is false.
- iii. Where p is false and q is true,  $p = q$  is false.
- iv. Where p is false and q is false,  $p = q$  is false.

The truth table below is an example typical of material equivalent alone.

p	q	$p = q$
T	T	T
T	F	F
F	T	F
F	F	F

In general,  $p = q$  which is called a biconditional is true when p and q have the same truth value and false when they have different truth values. The assertion  $p = q$  therefore means that if p is true the q is true, also if q is true then p is true. Therefore  $p = q$  means the same thing as "if and only if", that is, "p if and only if q". Please do note that  $p = q$  can also be symbolized as  $(p \rightarrow q) \cdot (q \rightarrow p)$  because both expressions are logically equivalent.

## viii. Use of Signs, Punctuations and Symbols in Logic

Punctuations marks are very import in ordinary language. Without them language is sloppy and meaning may be lost thereby making communication exceedingly difficult. Just as punctuation is essential for effective communication in ordinary language, so are parenthesis and brackets are required in symbolic logic. Punctuation symbols are needed in logic to take care of complicated compound statements, by this they help to remove ambiguity from the language of symbolic logic. Even in Arithmetic, parenthesis helps to determine a lot of things. In order to reduce the number of brackets and parenthesis, the following are conventional:

1. The negation sign - applies to the smallest proposition possible. In  $\neg p \vee q$ , the negation applies only to p, whereas in  $\neg (p \vee q)$ , the negation applies to the whole sum.

2. In  $\sim (p \cdot q) \vee (r \cdot s)$ , the negation sign applies to the first parenthesis only.
3. In  $\sim [(p \cdot q) \vee (r \cdot s)]$ , the negation sign applies to the whole sum.
4. The expression  $p \cdot q \vee r$  is ambiguous, since the product is the weakest of the dyadic factors, their scope goes over that of the product.  $p \cdot q \vee r$  means  $(p \cdot q) \rightarrow r$ .
5. Implications and equivalence are the strongest functions. In effect, the disjunctions are usually in the middle. For example:  $\sim p \cdot q \vee r \rightarrow s$ , means  $[(\sim p \cdot q) \vee r] \rightarrow s$ .

The statements symbolized as  $p \cdot q \rightarrow r$ , could either be a conjunction or an implication. If punctuated as  $(p \cdot q) \rightarrow r$ , it will be clear that it is an implication. But if it is punctuated as  $p \cdot (q \rightarrow r)$ , it will be clear that it is a conjunction. By these few examples, it can be seen that the lack of punctuation symbols could lead a statement ambiguous. Other punctuation symbols that are commonly used in logic and in mathematics are:

1. ( ), left and right parenthesis,
2. [ ], left and right square brackets,
3. { }, left and right braces

The brace covers a large scope than a bracket and parenthesis, while a bracket is wider in scope than a parenthesis.

When the need arise to symbolize categorical propositions, the following signs and symbols are conventional:

1. = means (Affirmation)
2.  $\neq$  this signs means, it is not or (a negation)
3. S this symbol in logic stands for all entities that have the same property designated by the subject in a sentence. 'S'
4. P this symbol in logic, as in all those other letters we have mention that could be used to denote 'predicates' or 'subjects'. In the same vein, 'P' is all the entities that contain the predicate class.

## E.

### ARGUMENTS

#### i. What Are Arguments?

In the previous section, we offered various definitions of what logic stands for. Some of them include:

- ⊙ That logic has been defined as the principle and techniques of distinguishing good arguments from bad arguments.
- ⊙ It is also the study of how to distinguish none argumentative discourse from argumentative discourse. We are thus said to be practicing logic when we are bringing ideas together with the help of our mental apparatus.

From the above conclusion, we have had some corners define logic as the science of true, good, or valid reasoning, by this we mean the kind of reasoning that cause us to draw conclusions from premises already given. The truth is that in logic, we are primarily concerned with **ARGUMENTS**. So when we say that logic is all about the nature, structure and form of "arguments", we are not far from the target.

It is important to note that the "argument" that we are refereeing to in this case, is quite different from our daily usage of the word 'arguments'. In the ordinary usage of the term, we often find people get in to physical conflicts that result in the exchange of blows among the parties concerned; all in the name of arguments. The argument that we refer to in logic is quite different from that.

#### ii. Meaning Of Arguments

An argument is a type of **inference**. We make inferences when lay **claim** to a new piece of evidence purely on the basis of something else we already know to be the case. As such an argument is not merely a collection of proposition, it has a standard form and in describing this form, the terms premises and conclusions are used. An argument therefore contains a set of one or more statements or propositions called premises from which a certain other statement or propositions called conclusions are drawn from. But in a nut shell, arguments as we have said above, is all about laying claims to new piece of evidence on the basis of something else we already know. eg:

- We infer the presence of fire when we see smoke.
- We infer that an unmarried man is a bachelor.

Do note that the reason for the first inference is that in majority of the time we had seen **smoke** coming out from somewhere, we tend to believe that there must have been a corresponding **fire** that started or generated the smoke even though our claims at that point in time may not be absolutely true.

In the second example, we find the general populace inferring that every **unmarried man is a bachelor**. These kind of claims are made based on some old evidence the people in question already have about a state of affairs. From this point of view, they people in question have strong reasons for holding to such claims, based on a new piece of evidence that in most case may not be true.

In the example we have here, it can be established that not every unmarried man is a bachelor as the persons in this argument are claiming. The man in question may be a self made eunuch or a priest whose religion does not permit marriage. Further analysis of the word '**bachelor**' shows that it is best suited for young men who are desirous of getting into the union of marriage but are for some reasons, not yet signing the dotted lines that commits them to their spouse, when they say "I do".

### iii. Nature Of Arguments

It is important to know that in arguments of this nature, all inferences consist of two parts:

1. A new piece of knowledge.
2. And that on which the new knowledge is being required.

We are therefore making a logical claim when we are laying claims to the truth of a proposition, a statement or an assertion; we know or accept as true. Let us at this point note that mere thinking about the case does not make it correct. This is why logic is the study of the principles and methods of deciding in which case, why we are right in thinking that one sentence follows from the other, or does not follow from the other.

From the analysis above it is obvious that an *inference* that is amenable to treatment in logic is technically called an "Argument". By this "an argument is any group of proposition, one of which is claimed (rightly or wrongly) to follow from others, while others (proposition) are regarded as providing evidence for the truth of that one.

The proposition that is claimed to follow from others is called the **CONCLUSION**. While the propositions that are regarded to provide the truth of the conclusion, are called **PREMISES** (singular premise).

By this it is clear that an argument has two parts, THE PREMISE PART and THE CONCLUSION PART e.g.

All men are Mortal.	[Proposition]
Tungi is a man.	[Proposition]
Therefore, Tungi is Mortal.	[Proposition] & [Conclusion]

### iv. Identifying Arguments

To engage in an argument means to marshal out the facts and figures in support of a certain view in an attempt to discredit another point of view opposed to your own. Research has shown that studies from various disciplines and some students of logic and philosophy tend to have problems when it comes to accurately identifying and distinguishing an argument in logic from an ordinary argument on the street, a quarrel, a misunderstanding, an announcement, a disagreement, a statement, etc.

The man who engages in a quarrel is usually so rigid and narrow minded in his reasoning. Such a person is said to always stick to his own point of view (or rather his sentiments) not because he has substantial evidence to back up his claims, but because the issue at stake compels him to take a certain stand. Such a person makes use of his heart and not his head as a result, his judgment is clouded by sentiments and not reason.

These factors we discover today, are some of the reasons why students and some individual fail to identify and argument when the need arise to do so in logic. Such people have as a result of some of the issues raised here, taken matters to the extreme when they disagree about certain opinions and issues in the field of learning and human endeavor. I know of one country where most of the people in the House of Representatives, take matters to the extreme whenever they have a conflict of opinions on state matters.

This section of or study is therefore designed to acquaint students and researchers with the rules and principles that will not only help them identify and distinguish arguments from none arguments, good argumentative discuss from bad argumentative discuss, but also with the skills that will empower the students and the researcher with what it takes to make and present good, convincing, valid and sound arguments whenever the need arise. Students and researchers are hereby advised to avoid all the pitfalls highlighted above and those we are about to discuss here later in this section as factors that hinders a proper understanding of what arguments in logic are all about.

While reasoning is often done informally, and on occasion perhaps even none verbally, it generally can be represented by explicit arguments. An argument in this case is not a disagreement, verbal or otherwise. Rather:

An argument we have said, is a set of sentences one of which (the *conclusion*) is taken to be supported by the remaining sentences. (The *premises*)

The arguments we have so far considered have been presented by listing the premises, followed by the conclusions. In English and in other natural languages, arguments or bits of reasoning can be reconstructed as one or more arguments which are not generally set off in this way from preceding discuss, nor are the premises always given first and the conclusion last. Consider the following examples:

- Michael will not get the job, for whoever gets the job will have strong references, and Michaels' references are not strong.

The single sentence can be recast as the following explicit argument:

- Whoever gets the job will have strong references.
- Michael references are not strong
- Michael will not get the job.

We say that arguments presented in this form - a list of premises followed by a horizontal line, followed by the conclusion - are presented in standard form. The first step in analyzing arguments is to present them in a standard form. But in ordinary conversation and writing, arguments are not generally presented in

anything close to this form. As we can see in the example above, the conclusion is sometimes given before the premise. In the next argument that we shall present below, the conclusion can also come between premises, with the whole argument being buried in an ongoing text:

I have got more relatives that I know what to do with; I have got relatives in Ibadan and in Abia state, in Abuja and in Israel. Among them are a couple of cousins, Tom and Fred Wogu. Both Tom and Fred are hard-working and tom is as tenacious as a bulldog. So tom is sure to be a success, for if there is one thing I have learned in life, it is that everyone who is both hard-working and tenacious succeeds. But I am sure success won't change Tom. He will work just as hard after he makes his first million as he does now. He is after all, a Wogu. And no one is as predictable as a Wogu', unless it's a Babatunde'. There are a lot of Babatunde's on my mother's side, but I haven't had much to do with them...

The following explicit argument can be extracted from the above passage:

- Tom and Fred are hard-working,
- Tom is tenacious,
- Everyone who is both tenacious and hard-working succeeds.
- Tom will succeed.

There are lots of information that are contained in the above passage that is not relevant to the specific argument we have extracted. This is frequently the case.

Extracting explicit arguments from textual materials requires practice. There are some clues, including the use of premise and / conclusion indicator words. Conclusion indicator words, that is, words that indicate that what follows is intended as the conclusion of an argument, include:

Premise indicator word; words whose use signals that what follows is intended as a premise of an argument, include:

*Therefore, Thus it follows, So, Hence, Consequently, As a result...*

Let us consider more examples of an argumentative and none argumentative passages:

### Example One

- ⊙ The golden rule (the rule of conduct; do unto others as you would have them do unto you) is basic to every system of ethics ever devised and everyone accepts it in some form or the other. It is therefore an undeniable sound moral principle.

To analyze the above passage with the view to finding first, whether the passage is indeed an argument, and if it is, what the premise and the conclusion of the passage, becomes a very important task that a student of logic and philosophy must get acquainted with. As mention above, it is necessary for such passages to be re-written in their standard form. Consider the analysis of the above passage:

- ⊙ **THE PREMISE:** the golden rule is basic to every system of ethics ever devised.
- ⊙ **THE CONCLUSIONS:** (The golden rule) is an undeniably sound moral principle.
- ⊙ **PREMISE:** 1, the golden rule is basic to every system.
- ⊙ **PREMISE:** 2, everyone accepts it in some form or the other.
- ⊙ **CONCLUSION:** The golden rule is an undeniably sound moral principle.

### Example Two

- ⊙ It is far from certain that the need of government among men rest solely on the "original sin" or mans inert criminality for no association, however, no association can exist without a regulatory force of some kind. Even societies of angels will still need some form of government if only to ensure that common task are assigned and coordinated.

The analysis of the above passage will appear thus:

- ⊙ **PREMISE:** No association however constituted can exist without a regulatory force of some sort. Even a society of angels still need some form of government if only to ensure common task are assigned and coordinated.
- ⊙ **CONCLUSION:** It is far from certain that the need for government among men rest solely on "original sin" or man's innate criminality.

It is important to note here that the passage starts with the conclusion of the passage.

### Example Three

- ⊙ All physicians are University graduates, so all members of the Nigerian Medical Association must be University graduates, since all members of the Nigerian Medical Association are physicians.



The analysis of the above passage will appear thus:

- ⊙ PREMISE. 1, All Physicians are University Graduates.
- ⊙ PREMISE. 2, All members of the Nigerian Medical Association are Physicians.
- ⊙ CONCLUSION, All members of the Nigerian Medical Association must be University Graduates.

Do also note that in this second passage, the conclusion of the argument and the passage is sandwiched in the middle of the argument.

**v. Further Rules For Identifying Arguments And None Arguments**

It is important that you note that the presences of these conclusion indicators are not sufficient conditions for a passage to be called an argument.

S/N	CONCLUSION INDICATORS	PREMISE INDICATORS
1	Therefore	Since
2	Hence	For
3	Thus	Because
4	So	In as much
5	Consequently	For the reason that
6	It follows that	As shown
7	We may include that	Follows from
8	We may infer that	As

Consider the following **Examples example four:**

- ⊙ House flies, for example have become resistance to DDT. Because of random mutation of genes that affect the sensitivity of flies to insecticides, some flies were more resistant and some less. When DDT was widely applied, the sensitive flies were killed and their genes were lost, while the resistant flies survived and reproduced, so there genes were passed on to the feature generations. Thus the species as a whole became resistant to DDT.

Analysis of the above passage:

- ⊙ The truth is that the passage contains conclusion and premise indicators but the fact remains that the passage is not an argument.
- ⊙ The passage is only giving us information on the nature and the resistance of house flies to DDT. It is therefore not an argument

If the above be the case, the very important question that we need to ask now is "How then do we determine a passage with an argument?"

- ⊙ Here are some possible steps you may need to take
  1. Ask the following questions
    - a. What is being argued for?

- b. What claims are we being asked to accept?
- c. From the first two questions, whatever answer you come up with, if you are correct, is the conclusion of the passage and the arguments.
- d. If you do not find an answer to the first two questions and you are correct about not finding any, then the passage does not contain an argument.

Where you have been able to establish the status of the passage, i.e. whether it is an argument or not, you may need to proceed to find out what the major premises and minor premises are, that is where the passage have been proven to be an argument. To do this, you may need to do the under listed:

**2. Secondly ask yourself the following questions**

- a. What is being offered in support of the conclusion? Such proposition if any, will constitute the premises of the argument.
- b. In determining the premise or conclusion as the case may be, you may also resort to using the old method of first circling the premise and conclusion indicators in the passage.

At this juncture, it is very important to let us know that there are some arguments in certain passages that do not contain both premise and conclusion indicators. Consider the following example, **Example Five:**

- ⊙ The presumption that the creation of state automatically means the creation of development is wrong. There are many areas in the state that has seen no progress even though they have been affected by many state creation exercise.

**Analysis of the above passage:**

- ⊙ Let us here note that although the passage contains no conclusion and premise indicators, it is still obvious that the first sentence is the conclusion. The argument can be analyzed thus:
- ⊙ PREMISE: There are many areas in this country that has seen no progress even though they have been affected by state creation exercise.
- ⊙ CONCLUSION: The presumptions that the creation of states automatically means the creation of development are wrong.

Such arguments that lack premise and conclusion indicators are said to be **elliptical or enthymematical.**

In concluding this section on argumentative and none argumentative discuss, we want to state here that how the premise of a given argument support the conclusion is not always obvious. In fact, the technique of formal logic are often

most useful in cases where the premises do not support the conclusion but it is not obvious how they do so; that is, where the reasoning processes that lead from the premise to the conclusion has not been spelled out. Consider this final argument, **Example Six**:

- ⊙ Everyone loves a lover. Tom loves Alice. Therefore, everyone loves everyone.

**Analysis of the above argument:**

If by "lover" we mean 'someone who loves someone', then the conclusion does follow, but not obviously. The missing reasoning is this: if Tom loves Alice, then Tom is a lover. It follows from the first premise, 'Everyone loves a lover', that everyone loves Tom. And if a lover is someone who loves someone, it further follows that everyone is a lover, (because everyone loves Tom). And if everyone is a lover and everyone loves a lover, it follows finally that everyone loves everyone. Of course this reasoning does not work if "love" is not being used in the same way in all its occurrences in the original argument, and it probably isn't. (Everyone loves a lover is probably being used in some sense like 'Everybody is fond of a person who is in love')

We will therefore count as argument all groups of sentences where one member of the group can be identified as a claim supported or purportedly supported by the others, including cases where the purported support is solid but not none obvious, weak, or in the extreme case, although lacking.

Finally all students of logic must make great efforts not to confuse arguments with explanations. You use an argument to show that a claim is true while in an explanation, you show what cause something, or what is, or how it works or what purpose it serves.

- ⊙ The reason I believe in God is because the Universe did not just happen by chance.  
⊙ The reason I believe in God is because by parents are devout Christians who took great pains to instill this belief in me.

Notice that these two statements have similar wordings, but the first one argues that God exist, the second, one explains the cause of my beliefs in God. Arguments and explanations often use exactly the same words as such we are to be careful not to confuse them.

**ATTEMPT THESE EXERCISES AND SUBMIT THEM TO YOUR TUTOR FOR ASSESSMENT.**

1. For each of the following, indicate whether it is the kind of sentence that falls within the scope of this text (is either true or not true) if it is not explain why not.

- a. George Washington was the first president of the United States.  
b. Will the next president of Nigeria be from PDP?  
c. Turn in your home work on time or not at all  
d. Would that Kennedy had not been assassinated  
e. Two is the smallest prime number  
f. Only Covenant University students understand Logic  
g. May you live long and prosper  
h. Beware of Greeks bearing gifts  
i. This sentence is false.

2. Determine which of the following passages are best construed as expressing arguments. For those that are, express the arguments in standard form. For those that are not, explain why not.

- a. Sarah, Salisu, Bimpe, and Emeka have all worked hard and are deserving promotions. But the company is having a cash flow problem and is offering those over 55 years old #50,000.00 bonus if they retire at the end of this year. Sarah, Salisu, and Emeka are all over 55 years old and will have to take early retirement. So Bimpe will be promoted.  
b. Everyone from everywhere who's anyone knows Dora. All those who know her respect her and like her. Ya'Aduwa is from Katsina and Dora is from Abia, Ya'Aduwa does not like anyone from Abia, therefore either Ya'Aduwa is 'a nobody' or Katsina is a no where.  
c. I am not going to die today. I didn't die yesterday and I didn't even die the day before that, nor the day before that, and so on back some 50 years.  
d. Having cancer is a good, for whatever is required by something that is good is itself a good, being cured of cancer is a good, and being cured of cancer requires having cancer.  
e. The Soviet Union disintegrated because the perceived need for the military security offered by the Union disappeared by the end of the cold war and because over 70 years of Unionism had produced few economic benefits. Moreover, the Soviet Union never successfully addressed the problem of how to inspire loyalty to a single state by people with vastly different cultures and histories.  
f. Only two-party system is compatible both with effective governance and with the presenting and contesting of dissenting views, for where there are more than two political parties, support tend to split among the political parties with no party receiving the support of a majority of voters. And no party can govern without a majority support. When there is only one political party, dissenting views are either presented or contested. Where there are two or more viable political parties, dissenting views are presented and contested.

- g. Humpty Dumpty sat on the wall. Humpty Dumpty had a great fall. All the Kings horses and all the Kings men couldn't put Humpty Dumpty back to gather again. So they made him into a great omelet and had a great lunch.

3. Identify the premise and conclusions in each of the following arguments.

- a. Since all Communist are Marxist, all Marxist are Communist  
b. That Cat is used to Dogs. Probably she won't be upset if you bring home a new Dog for a pet.  
c. Presbyterians are not fundamentalist, but all born again Christians are. So no born-again Christian is a Presbyterian.  
d. If she is interested in me, she would have called, but she didn't.

vi. Types Of Arguments

1. Good and Bad Arguments / Strong Arguments

When we say that an argument is 'a **good argument**', we are saying that it (the argument) gives us grounds for accepting its conclusion. "Good" and "Bad" are relative terms: arguments can be better or worse depending on the degree to which they furnish support for their conclusion.

There is more than one way in which an argument can qualify as "Good" before we explain them; however, we need to describe some important technical distinctions.

- ⊙ An argument whose premise provides absolute conclusive support for the conclusion is "valid". In other words, *A valid argument has this characteristics: it is necessary, on the assumption the assumption that the premises are true, that the conclusion be true.*

There is merely a precise way of saying that the premise of a valid argument, if true, absolutely guarantees a true conclusion. Consider this example:

- ⊙ [Premise] Every Philosopher is a good mechanic, and [Premise] Emily is a philosopher. So, [Conclusion] Emily is a good mechanic.

Valid? Yes, these premise, if true, guarantees that the conclusion is true. But notice this; although the argument about Emily is valid, it so happens that the premises aren't true. Not every philosopher is a good mechanic, and Emily is no Philosopher; she is Parker's Cat. So the argument is not a **good one**, from the stand point of offering us justifications for accepting the claims that Emily is a good mechanic. However, the argument is valid nonetheless; because the conclusion must follow from the premise. Thus an argument being valid does not depend on its premise being true. What determines whether an argument is valid is whether the conclusion absolutely follows from the premises. (Once again: when we say that a conclusions absolutely follows from the premise, we

mean that, if the premise where true, the conclusion will then have to be true as well). If the conclusion absolutely follows from the premise, the argument is valid, whether or not the premises are true.

Now, a valid argument whose premises are true is called a "sound" argument:

- ⊙ A sound argument has these two characteristics: it is valid, and its premises are all true.

Let us consider another example:

- ⊙ [Premise] some pesticides are toxic for human, and [premise] anything that is toxic for humans is unsafe for most humans to consume. Therefore, [conclusion] some pesticides are unsafe for most humans to consume.  
⊙ This is a sound argument: it is valid, because the conclusion absolutely follows from the premises and its premises (and hence its conclusion) are true.

It should then be clear that, an argument can be valid without necessarily being a good argument. The argument about Emily isn't a good one because even though it's valid, it doesn't justify accepting the conclusion: its conclusions are false.

A sound argument, by contrast, normally does justify accepting the conclusion. We say "normally" because cases can arise in which even sound arguments aren't particularly good. Arguments that beg the question, as explained earlier, falls in this category. Consider another argument:

- ⊙ If a person travels in the same direction far enough he or she will arrive back at the same place he or she started from. Therefore, if Kemi travels in the same direction far enough, she will arrive back at the place he started from.

This example is a typical example of a sound argument. But if Kemi happens to live in the middle of Europe in the in the tenth century, it seems odd to suppose he would have been justified in believing that if she travelled far enough in the same direction, he will arrive back where he started from.

Arguments can be useful- they can qualify as good arguments- even though we don't intend them to be valid or sound. Let us consider another example in which Moore says to Parker:

- ⊙ [Premise] Every year as far back as I can remember my roses have developed mildew in the spring. [Conclusion] therefore my rose will develop mildew this spring.

Analysis of The Argument

- ⊙ Note that this argument does not qualify as valid (or sound) because it is possible that the conclusion is false even assuming that the premise

is true. (It just might be an incredibly dry winter). Nevertheless, this isn't a bad argument, in fact it is really a quite good argument: it may not be absolutely impossible that Moore's roses won't get mildew this spring, but, but given the premise, it is very, very, likely that they will. Moore is certainly justified in believing his conclusion.

- ⊙ Arguments like this which only show that the conclusion is *probably* true, are said to be relatively strong.
- ⊙ Note therefore that a strong argument has this distinguishing characteristics: **It is *unlikely* on the assumptions that the premises are true, that the conclusion is false**

Again let us notice that the premise doesn't actually have to be true for the argument to be strong.

When someone advances an argument like Moore's, an argument that he or she intends only to be a strong argument, it is somewhat inappropriate to discuss whether it is valid. Yes technically, Moore's argument is invalid, but because Moore is only trying to demonstrate that the conclusion is likely, the criticisms don't amount to much-he never intended that the argument was valid.

#### Let us do a recap of our studies so far

1. A **good** argument justifies acceptance of the conclusion
2. A **valid** argument has this defining characteristics: it is necessary that on the assumption that the premise are true, that the conclusion be true
3. A valid argument whose premises are all true is called a **sound** argument
4. A strong argument has this defining character: it is unlikely, on the assumption that the premises are true, that the conclusion is false.
5. Normally sound arguments and strong arguments with true premises are good arguments.
6. The best policy is not to speak of valid arguments as strong or weak; speak of them as sound or unsound. Likewise, the best policy is not to speak of strong or weak arguments as valid or invalid, it is safer to just refer to them as strong or weak arguments.

#### 2. Valid and Invalid Arguments

Let us start this section by noting that the relation between the truth (of a proposition) and the validity (of arguments) is a complex one. It really makes no much sense to speak of a valid or invalid sentence or of truth and falsehood in terms of arguments. This is because validity and invalidity are inherent properties of arguments. Valid arguments may contain false propositions, while invalid ones may consist of true propositions. Hence the truth or falsehood of a conclusion is no indication of the validity or invalidity of an argument.

An argument is said to be valid if the conclusion would have to be true and if the premises were all true; but whether in fact are is not a concern of logic. The reason for this is fairly obvious: logic is primarily concerned with argument forms and not with the content of the arguments. **An argument is thus valid because of its form and not because of its content.** Let us consider some examples:

#### Examples of valid arguments:

##### A, True Premises and True Conclusion

Let us note again that when deductive arguments are valid, it will be impossible for the premise to be true and the conclusions false.

- ⊙ **What this amounts to is that, 'it is possible to have a valid deductive argument all of whose premise and conclusion are in fact true'.**
- ⊙ **All human beings are mortal T**
- ⊙ **All Nigerians are human beings T**
- ⊙ **Therefore all Nigerians are mortal T**

B, Is it possible to have to have valid arguments with True premise and false conclusion?

##### Example Two

Please note that this cannot be the case, because an argument with true premise with true premise and false conclusion must be invalid.

C, It is possible to have a valid argument with false proposition and true conclusion.

##### Example Three

- ⊙ **All Nigerians are Ugandans...F**
- ⊙ **Idi-Amin is a Nigerian. F**
- ⊙ **Therefore Idi-Amin is an Ugandan T**

D, It is possible to have a valid argument with a false premise and a false conclusion.

##### Example Four

- ⊙ **All Nigerians are Europeans F**
- ⊙ **All Europeans are Greeks F**
- ⊙ **Therefore all Nigerians are Greeks. F**

#### Examples of invalid arguments

A, It is possible to have an invalid argument with true premise and true conclusions.

##### Example One

- ⊙ **All Nigerians are Africans T**
- ⊙ **All indigenes of Oyo State are Africans T**
- ⊙ **Therefore all indigenes of Oyo state are Nigerians T**