INTRODUCTION

What is Logic?

Everyone thinks. Everyone reasons. Everyone argues. And everyone is subject to the reasoning and arguing of other. We are bombarded daily with reasoning from many sources: books, speeches, radio, TV, newspapers, employers, friends and family. The study of logic is to learn strategies to think well, reason well and argue well and develop effective techniques for evaluating arguments. Hence, Logic is a branch of philosophy which studies about correct reasoning.

Logic is the study of what makes reasoning good reasoning, i.e., reasoning which helps us discover truths. It provides techniques for establishing whether claims of any sort are true. It is the study of arguments or reasons given for people's answers to the aforementioned questions. Logicians ask such questions as: What constitutes "good" or "bad" reasoning? How do we determine whether a given piece of reasoning is good or bad? Can we prove that our methods of reasoning are correct? What is it for something to be possible or impossible or necessary?

Understanding the term Logic

We employ the word logic in our day to day conversations as well as in academic discourses. For example, someone may say "I am logical or what I am telling you is logical"-to mean that my view or standing point is, reasonable, acceptable and believable   or something that is free from defect.

Etymological and Technical definition of logic

It is derived from the Greek word *"logos"* which means discourse, thought, principle, word (the word that has the power to do something), reason etc. The relevant word for the subject matter of logic is the term reason. *This* implies that logic is the science of reasoning. Its focus is on methods and principles in which correct reasoning could be established. Hence, logic is a science that evaluates arguments. It is a discipline that investigates, develops and systematizes principles and methods that could be used to distinguish between good and bad reasoning. The study of logic is aimed at the construction, evaluation and analysis of arguments. The primary task of logic is to set up criteria for distinguishing good argument from bad argument.

CHAPTER ONE

THE NATURE OF ARGUMENTS

1. What is an Argument?

Argument is a formal statement over an issue, topic or subject using the information that helps the arguer as a reason or evidence to justify or prove the truth and correctness of the conclusion. In short, argument means an attempt to bring evidence in support of a conclusion. Or argument is a process of arriving at a certain conclusion on the basis of evidences (premises). **Etymologically,** the word **"Argument"** is derived from the Latin word called **"Arguo"** which means **"to make clear"** or **"to prove".**

Arguments are usually stated by statements (collection of sentences) and they are connected series of statements (propositions), some of which are intended to offer support for another statement which is the conclusion. In short, *argument is any group of propositions of which one is claimed to follow from others, which are regarded as providing support or grounds for the truth of that one.*

If a claim or position is being set forth and no other explicit or implicit statement is used to support it, then the spoken or written material in question is not an argument. It may express an opinion or take a position on an issue, but it is not an argument unless that opinion is defended with at least one reason or a piece of evidence, or some statement of support.

Premises and Conclusion

Arguments always consist of two inseparable components: the premise and conclusion.

A.   **Premise-** is part of an argument offered or stated as a reason or evidence for the conclusion. It is a justification and support provided by the arguer for showing the truth and acceptability of the conclusion.
B.   **Conclusion-** It is part of an argument that is claimed to be drawn, followed or inferred from the premises. It is the logical implication of the premises and it is also the final establishment, main point or inferential assertion of the argument.

Inferential Claim- is a claim that a reasoning process is expressed in the argument. *The term inference refers to the process by which one proposition is arrived at and affirmed on the basis of one or more other propositions accepted as the starting point of the process.* By an inference logicians mean that you were lead **to accept as true a particular belief based on another belief accepted as true**. When we deal with arguments, we should give much emphasis to the inferential relationship between the premises and the conclusion rather than to their truth and falsity.

In dealing with arguments we have to **ask "Is the premise relevant for the conclusion?** But **do not ask "Is the premise present actual (true) evidence that makes the conclusion true?** Because Logic is not the science of facts rather it is the science of correct reasoning. We should be concerned with whether the premises support the conclusion.

EXAMPLE
(Premise) Only people who believe in the Christian God are moral.
(Premise) Challa is moral.
(Conclusion) Therefore, Challa must believe in the Christian God.

Most of the students may respond that it is invalid. Did you make the same mistake? This argument is valid. If it is true that only people who believe in the Christian God are moral, that is, if it is really true that all people who are good, kind, don't steal, and so on must believe in the Christian God, and Challa is good, kind, and so on, then it must be also true that Challa believes in the Christian God. Essentially this argument says that if you are moral, you must believe in the Christian God; Challa is moral, so he must believe in the Christian God. **What students should have said is that this argument is indeed valid, but based on their beliefs it is not sound. It is an objective logical fact that the reasoning is valid, but the content is another matter. Most of students do not agree that to be moral one has to be a Christian; they believed that people can be good to each other and have other religious beliefs, or none at all for that matter.**

Detecting Premise and Conclusion

Way of distinguishing whether a claim is a premise or conclusion.

Premise Indicators: A statement that comes after the following words is the premise of an argument. These are:

-Since   -Because   -For
-In view of   -Owing to   -as   -etc

Conclusion Indicators: The following list of words indicates that a statement is a conclusion.

-As a result   - Therefore   -Accordingly
-Proves that   -This shows that   -Hence
-Thus   -Consequently   -It follows that, etc.

Example: *Since it's wrong to kill a human being, it follows that abortion is wrong, because abortion takes the life of (kills) a human being.*

The word "***Since*** and ***because***", in one hand, and the word "***it follows that***" are premise *and* conclusion *indicators respectively.* When we put it into textbook form, the argument reads,

P1. It's wrong to kill a human being.
P2. Abortion takes the life of (kills) a human being.
C ∴ 3. Abortion is wrong

1.1 Recognizing Arguments

Not all passages contain arguments. Because logic deals with arguments, it is important to be able to distinguish passages that contain arguments from those that do not.

In general, a passage contains an argument if it purports to prove something; if it does not do so, it does not contain an argument. Two conditions must be fulfilled for a passage to purport to prove something:

1. At least one of the statements must claim to present evidence or reasons.
2. There must be a claim that the alleged evidence supports or implies something— that is, a claim that something follows from the alleged evidence or reasons.

As we have seen the statements that claim to present the evidence or reasons are the premises and the statement that the evidence is claimed to support or imply is the conclusion. It is not necessary that the premises present actual evidence or true reasons nor that the premises actually support the conclusion. But at least the premises must *claim* to present evidence or reasons, and there must be a *claim* that the evidence or reasons support or imply something. The first condition expresses a **factual claim,** and deciding whether it is fulfilled often falls outside the domain of logic. Thus, most of our attention will be concentrated on whether the second condition is fulfilled. This second condition expresses what is called an **inferential claim.** The inferential claim is simply the claim that the passage expresses a certain kind of reasoning process—that something supports or implies something or that something follows from something. Also, you should recognize that this claim is not equitable with the intentions of the

arguer. Intentions are subjective and, as such, are usually not accessible to the evaluator. Rather, the inferential claim is an objective feature of an argument grounded in its language or structure. **An inferential claim can be either explicit or implicit**. An *explicit* inferential claim is usually asserted by premise or conclusion indicator words ("thus," "since," "because," "hence," "therefore," and so on). Example:

Mad cow disease is spread by feeding parts of infected animals to cows, and this practice has yet to be completely eradicated. Thus, mad cow disease continues to pose a threat to people who eat beef.

The word "thus" expresses the claim that something is being inferred, so the passage is an argument. An *implicit* inferential claim exists if there is an inferential relationship between the statements in a passage, but the passage contains no indicator words. Example:

   Profit serves a very crucial function in a free enterprise economy, such as our own. High profits are the signal that consumers want more of the output of the industry. High profits provide the incentive for firms to expand output and for more firms to enter the industry in the long run. For a firm of above average efficiency, profits represent the reward for greater efficiency.

The inferential relationship between the first statement and the other two constitutes an implicit claim that evidence supports something, so we are justified in calling the passage an argument. The first statement is the conclusion, and the other two are the premises.

Simple Non-Inferential Passages

Simple non inferential passages are unproblematic passages that lack a claim that anything is being proved. Such passages contain statements that could be premises or conclusions (or both), but what is missing is a claim that any potential premise supports a conclusion or that any potential conclusion is supported by premises. Passages of this sort include warnings, pieces of advice, statements of belief or opinion, loosely associated statements, illustration, expository passage and reports.

A **warning** is a form of expression that is intended to put someone on guard against a dangerous or detrimental situation. Examples:

Example: Watch out that you don't slip on the ice.
Whatever you do, never confide personal secrets to Blabbermouth Bob.

If no evidence is given to prove that such statements are true, then there is no argument.

A **piece of advice** is a form of expression that makes a recommendation about some future decision or course of conduct. Examples:

Example: *You should keep a few things in mind before buying a used car. Test drive the car at varying speeds and conditions, examine the oil in the crankcase, ask to see service records, and, if possible, have the engine and power train checked by a mechanic.*

Before accepting a job after class hours, I would suggest that you give careful consideration to your course load. Will you have sufficient time to prepare for classes and tests, and will the job produce an excessive drain on your energies?

As with warnings, if there is no evidence that is intended to prove anything, then there is no argument.

A **statement of belief** or **opinion** is an expression about what someone happens to believe or think about something. Examples:
We believe that our company must develop and produce outstanding products that will perform a great service or fulfill a need for our customers. We believe that our business must be run at an adequate profit and that the services and products we offer must be better than those offered by competitors. (Robert D. Hay and Edmund R. Gray, "Introduction to Social Responsibility")

Because the author makes no claim that his or her belief or opinion is supported by evidence, or that it supports some conclusion, there is no argument.

Loosely associated statements may be about the same general subject, but they lack a claim that one of them is proved by the others. Example:
Not to honor men of worth will keep the people from contention; not to value goods that are hard to come by will keep them from theft; not to display what is desirable will keep them from being unsettled of mind. (Lao-Tzu, *Thoughts from the Tao Te Ching*)

Because there is no claim that any of these statements provides evidence or reasons for believing another, there is no argument.

A **report** consists of a group of statements that convey information about some topic or event. Example:
The period of 1648–1789 was one of competition among the primary monarchs of Europe. Wars among the great powers were frequent but limited. France made major efforts to become paramount, but the balance of power operated to block French expansion. (Steven L. Spiegel, *World Politics in a New Era*)

These statements could serve as the premises of an argument, but because the author makes no claim that they support or imply anything, there is no argument.

Another type of report is the **news report:**

Witnesses said they heard a loud crack before a balcony gave way at a popular nightspot, dropping dozens of screaming people fourteen feet. At least eighty people were injured at the Diamond Horseshoe casino when they fell onto broken glass and splintered wood. Investigators are waiting for an engineer's report on the deck's occupancy load.

Again, because the reporter makes no claim that these statements imply anything, there is no argument.

Expository Passages
An expository passage is a kind of discourse that begins with a topic sentence followed by one or more sentences that develop the topic sentence. If the objective is not to prove the topic sentence but only to expand it or elaborate it, then there is no argument.

Examples:

There are three familiar states of matter: solid, liquid, and gas. Solid objects ordinarily maintain their shape and volume regardless of their location. A liquid occupies a definite volume, but assumes the shape of the occupied portion of its container. A gas maintains neither shape nor volume. It expands to fill completely whatever container it is in. (John W. Hill and Doris K. Kolb, *Chemistry for Changing Times,* 7th ed.)

In each passage the topic sentence is stated first, and the remaining sentences merely develop and flesh out this topic sentence. This passage is not argument, because it lacks an inferential claim. However, expository passages differ from simple non inferential passages (such as warnings and pieces of advice) in that many of them can also be taken as arguments. If the purpose of the subsequent sentences in the passage is not only to flesh out the topic sentence but also to prove it, then the passage is an argument.

Illustrations

An illustration is an expression involving one or more examples that is intended to show what something means or how it is done. Illustrations are often confused with arguments because many illustrations contain indicator words such as "thus."

Examples:
Chemical elements, as well as compounds, can be represented by molecular formulas. Thus, oxygen is represented by "O2," water by "H2O," and sodium chloride by "NaCl.".

These selections are not arguments, because they make no claim that anything is being proved. In the first selection, the word "thus" indicates how something is done— namely, how chemical elements and compounds can be represented by formulas.

However, as with expository passages, many illustrations can be taken as arguments. Such arguments are often called **arguments from example.** Here is an instance of one:

Although most forms of cancer, if untreated, can cause death, not all cancers are life-threatening. For example, basal cell carcinoma, the most common of all skin cancers, can produce disfigurement, but it almost never results in death.

In this passage the example given is intended to prove the truth of "Not all cancers are life-threatening." Thus, the passage is best interpreted as an argument. In deciding whether an illustration should be interpreted as an argument, determine whether the passage merely shows how something is done or what something means, or whether it also purports to prove something. In borderline cases it helps to note whether the claim being illustrated is one that practically everyone accepts or agrees with. If it is, the passage is probably not an argument. As already noted, in real life situations authors rarely attempt to prove what everyone already accepts. But if the claim being illustrated is one that many people do not accept or have never thought about, then the passage may be interpreted as an argument.

Thus, in reference to the first two examples we considered, most people are aware that elements and compounds can be expressed by formulas—practically everyone knows that water is H2O—and most people have at least a vague idea of what a deciduous tree is. But they may not have ever considered whether some forms of cancer are not life-threatening. This is one of the reasons for evaluating the first two examples as mere illustrations and the last one as an argument.

Explanations
One of the most important kinds of non-argument is the explanation. An explanation is an expression that purports to shed light on some event or phenomenon. The event or phenomenon in question is usually accepted as a matter of fact. Examples:

The sky appears blue from the earth's surface because light rays from the sun are scattered by particles in the atmosphere.

Every explanation is composed of two distinct components: the explanandum and explanans. The **explanandum** is the statement that describes the event or phenomenon to be explained, and the **explanans** is the statement or group of statements that purports to do the explaining. In the first example, the explanandum is the statement "The sky appears blue from the earth's surface" and the explanans is "Light rays from the sun are scattered by particles in the atmosphere. In the above example given, the fact that the sky is blue is readily apparent to everyone. The statement that light rays from the sun are scattered by particles in the atmosphere is not intended to prove *that* the sky is blue, but rather to show *why* it is blue.

Conditional Statements

A conditional statement is an "if . . . then . . ." statement; for example:

If professional football games incite violence in the home, then the widespread approval given to this sport should be reconsidered.

If Roger Federer has won more Grand Slams than any other contender, then he rightfully deserves the title of world's greatest tennis player.

Every conditional statement is made up of two component statements. The component statement immediately following the "if" is called the **antecedent,** and the one following the "then" is called the **consequent.** (Occasionally, the word "then" is left out and occasionally the order of antecedent and consequent is reversed.)

2.2. Types of Arguments

Arguments can be divided into two based on the difference in the **strength of inferential claim** and the way in which the premise relate with the conclusion, or based how strongly the conclusion is claimed to follow from the premise: **Deductive & Inductive Arguments**

A. Deductive Arguments

A deductive argument is the one in which the conclusion is claimed to follow from the premise with the **force of certainty** or it is an argument in which the conclusion follows with logical necessity or certainty from the premises. A deductive argument is one in which the premises are *intended* to guarantee the conclusion. One can intend to do something without actually doing it, so does deductive argument. A **valid deductive argument** is one in which the premise succeeds in guaranteeing the conclusion. It is necessary that if the premises are true, then the conclusion is true. It is absolutely impossible for the premise to be true while the conclusion is false. It does not mean that the premises and conclusion of valid argument are in fact true; rather if the premises are assumed true, it is necessary for the conclusion to be true. A deductive argument succeeds only if its premises provide an **absolute and complete** support for its conclusion. An **invalid argument** is one in which the premises fail to guarantee the conclusion. It is possible for the premises to be true and the conclusion false. To determine whether or not an argument is valid, we should check that if it is possible for the conclusion to be false assuming the premises are true. If it is possible, then the argument is invalid; if it is not the argument is valid.

The actual truth and falsity of the premise and the conclusion is not always decisive in evaluating arguments as valid or invalid; except that the conclusion of valid argument is impossible to be false and the premise to be true; an argument has actually true premise and actually false conclusion is automatically invalid. *This is the only combination of truth and falsity that forces us to determine the validity and invalidity of deductive arguments by referring their truth values.* In a valid argument if the premises are true, then it is certain that the conclusion is also true. . How such certainty is attained? It is because, in deductive arguments the claim stated in the conclusion is already implicitly (indirectly) stated in the premise. What the conclusion does is that it makes simply explicit what was implicit in the premise.

Example1: All European countries are developed

France belongs to European continent

So France is a developed country.

On the above example, it is clear that the premise provide support for the conclusion to be arrived with certainty or absoluteness.

Example 2: 1.All wars are started by miscalculation.

2. The Ethio-Eritrea conflict was a war.

∴ 3. The Ethio-Eritrea conflict was started by miscalculation.

Having said in the first premise that all wars are started by miscalculation and in the second that the Ethio-Eritrea conflict was a war, we have implicitly said that the Ethio-Eritrea conflict was started by miscalculation. And this is what is asserted by the argument's conclusion. Hence, A *valid deductive argument* is one in which *it is not possible to have true premises and a false conclusion.* Notice some important implications that follow from this definition. It is not true, as some students interpret this to mean, that given any argument with true premises and a true conclusion that argument must be valid. Furthermore, to say that in a valid argument, it is impossible to have true premises and a false conclusion is not the same as saying that valid arguments always must have true premises and a true conclusion. At this point it is natural to be a little confused, because this definition implies we can have valid arguments with false premises and even a false conclusion, and that we can have arguments with true premises and a true conclusion and the reasoning not be valid.

In evaluating deductive arguments what matters is the inferential claim. This means, either both the premise and the conclusion are true or both the premise and the conclusion are false, the argument has the possibility of being valid or invalid in all cases. If the inferential claim is good it will be definitely valid, even if it has false premise and false conclusion. On the contrary, if the inferential claim is bad, the argument could be termed as invalid whether it has true premise and true conclusion.

Possibilities of the validity and invalidity of deductive arguments

Premise	Conclusion	Evaluation	
True	True	Valid or invalid	
True	False	Invalid	Unsound
False	True	Valid or invalid	Unsound
False	False	Valid or invalid	Unsound

Case 1. An argument having true premises and true conclusion could be either valid or invalid depending upon the reasoning process.

If the truth of the premise supports (become relevant) to the truth of the conclusion then the argument is valid, if not it is invalid.

Eg. True Premise and True Conclusion but Invalid

All women are mammals.   All students are mortal. Hence, all women are mortal

The above argument is invalid. Because there is no evidence that indicates all women are mortal; the two premises assert about different things; they don't help each other to prove the truth of the conclusion.

True Premise and True Conclusion and valid

All women are humans. All human are mortal. So, all women are mortal

Case 2. An argument with true premise and false conclusion

It is always invalid, because in a correctly formed deductive argument if the premise is true then it is impossible for the conclusion to be false.

All men are mammals .All dogs are mammals. So, all men are dogs.

Case 3. An argument having false premise and true conclusion could be either valid or invalid. **Examples:**

False premise and true Conclusion but valid

All babies are cattle. All cattle are humans. Therefore, all babies are humans

False premise and true Conclusion but invalid

All human do not have necks. A dog does not have neck. So, a dog is not a human.

Case 4. Arguments having false premise and false conclusion could be valid or invalid

False premise and false conclusion but valid

All birds are politicians. All politicians are liars. Therefore, all birds are liars.

False premise and false conclusion but invalid

All cows are musicians. All humans are musicians. Hence, all cows are humans.

All the above cases imply that false evidence can support both true and false conclusion; validity and invalidity are determined by their reasoning process, not by truth/falsity with exception of having actually true premise and false conclusion.

Being logical does not guarantee truth or being right all the time, and ***rational people can still disagree*** -- two people can disagree over a belief but each have logically valid reasons for holding their respective beliefs. Examples:
A. (Premise) If the Ethiopian Constitution implies that each person has a right to self-determination concerning matters of a person's physical body, then abortion should be legal.
(Premise) The Ethiopian Constitution does imply this.
(Conclusion) Therefore, abortion should be legal.
B. (Premise) If the Ethiopian Constitution grants every person the right to self-determination, then the involuntary termination of the life of unborn human is wrong.
(Premise) If the involuntary termination of the life of unborn human is wrong, then abortion should not be legal.
(Premise) The Ethiopian Constitution does grant every person the right to self-determination.
(Conclusion) So, abortion should not be legal.

Both of these arguments are valid. The reasoning is not the cause of the disagreement shown in the conclusions. The problem is in the premises and the disagreement over the implications of the Ethiopian Constitution in the case of abortion -- whether an absolute right of self-determination should be given to a woman for control of what takes place in her body or whether this normal right should be limited because

the fetus is also a person with a right to self-determination. The acceptance or rejection of these premises is not an easy matter, but at least both arguments follow a valid reasoning trail.

A. Sound and Unsound Arguments

To determine a deductive argument as sound or unsound one should inspect both the truth value and validity of the argument. In discussing the evaluation of arguments, there are valid arguments which have false premise and true conclusion as well as both the premise and the conclusion are false. For these reason, we can say that for an argument, being valid cannot be guarantee for the perfectness of an argument.

Sound Argument: is a deductive argument having *true premise and valid* in reasoning. A sound argument has no false statement either in the premise or in the conclusion and it is also valid.

Sound =Valid +actually true premise

❖ **Unsound Argument is that is either** valid but having false premise or conclusion, or invalid .All invalid arguments are unsound.

All Dogs are mammals .All mammals are animals. Therefore, all dogs are animals.(sound)

B. Inductive argument

It is an argument in which the conclusion is claimed to follow from the premises **only probably**. Inductive arguments do not claim that their premises, even if true, support their conclusions with certainty. Their premises support their conclusions with probability, which falls short of certainty. In inductive argument we might **have sufficient evidences**, but we cannot be absolutely sure about the truth of the conclusion. But, this does not mean the conclusion is wrong or unacceptable; it could be accepted **only probably or plausibly**. In a deductive argument the truth of the conclusion is contained in the premise while inductive argument the truth of the conclusion is not wholly contained in the premises, that is, the truth of the conclusion goes beyond what is asserted in the conclusion. The conclusion of an inductive argument does not follow with logical necessity or certainty from the premise. Inductive arguments can be evaluated as **Strong, Weak, Cogent and Uncogent**

According to the amount of evidences offered in the premises that support the conclusion and the link between the premise and the conclusion, inductive could be strong or weak. To evaluate an argument as strong or weak, we should ask two major questions.

☞**Are the premises relevant for the conclusion or are they related?**
☞**Do the premises present sufficient evidences to make the conclusion more probably true?**
☞**On the basis of the premises (&background knowledge) is the conclusion plausibly or probably true?**

If your answer **"yes",** then it is strong; if your answer is **"No",** then it is weak.

Strong argument is an argument in which it is improbable that the conclusion be false given the premises true. If the premises are assumed as true, it is probable for the conclusion to be true. The premises provide **sufficient amount of evidence** to make the truth of the conclusion more probable or plausible. Inductive strength is a matter of the degree of probability. The larger the sample/evidences, the stronger the argument. If an argument is not strong, then it is weak.

Weak argument is one in which the conclusion does not follow probably from the premise, even if it is claimed to. It is not probable for the conclusion to be true assuming the premise as true; it is more probable for the conclusion to be false given the premises true.

The evaluation of inductive argument as strong or weak is irrespective of the actual truth/ falsity of the premises and the conclusion, except that in strong argument it is it is improbable to be true in the premise and probably false in the conclusion. Because of this an inductive argument having true premise and probably false conclusion is always weak.

Note that except the differences in the nature of the argument and terminology of evaluation, the rules of truth- value applicable for deductive arguments are also applicable for inductive arguments

Premise	Conclusion	Evaluation	
True	Probably True	Strong or weak	
True	Probably False	weak	Uncogent
False	Probably True	Strong or weak	Uncogent
False	Probably False	Strong or weak	Uncogent

E.g.1. This barrel contains 100 apples. 80 apples at random were found to be ripe. Therefore, probably all 100 apples are ripe.

Eg.2. This barrel contains 100 apples. Only 2 apples at random were found to be ripe.   Therefore, probably all 100 apples are ripe.

Eg.3. This bag has100 marbles in it.80 of them are black. 20 of them are white. So the next marble I will pick will be black.

Eg.4. This bag has100 marbles in it.10 of them are black. 90 of them are white. So the next marble I will pick will be black.

Example 1&3 are strong while 2&4 are weak arguments.

An inductive argument is **cogent (convincing, satisfactory)** when its premises are all true and strong in reasoning. The conclusion of a cogent argument is **satisfactorily** supported by true premises and it follows that the conclusion of every cogent argument is probably true.

Cogent =strong +actually true premise

Uncogent argument is an argument which is strong but having false premises or weak argument. All weak arguments are uncogent.

All previous presidents of Ethiopia were men. So the next president of Ethiopia will be a man. (Strong and cogent)

All previous presidents of Ethiopia were men. So, the next president of Ethiopia will be a woman. (Weak and Uncogent); the premise and conclusion are unrelated.

All or nearly all lemons that have been tasted were sour. So the next lemon you taste will be sour. (Strong and cogent)

All of the birds that have been observed in the entire history of the world can fly. Therefore, all birds that will be hatched can fly. (Strong and uncogent); the premise is actually false; it excludes ostriches, penguins and Qui.

Most humans fear death. Teddy Afro is a human. Teddy Afro fears death. (Strong and cogent)

98% of St.George foot club fans hate Mekelakeya football club. Hagos is a St.George fan. Therefore, Hagos hates Mekelakeya: (strong)

Challa's horse is similar in its colour and height to Taddle's horse. Taddle's horse is able to jump a fence. Hence, Challa's horse is able to jump a fence also. (Weak and uncogent); similarity is not identity; two triangles may be similar without being congruent.

Criteria to determine Deductive and Inductive Arguments

There are **three** methods that help us to distinguish arguments as Deductive and Inductive argument, these are:

1. The existence of special indicator words
2. Examining the nature of inferential link
3. The character (form) of argumentation

1. Using indicator words

Deductive argument indicators: Certainly, surely, absolutely, definitely, necessarily.

E.G. X is a member of A. All members of A are C. It is necessary that X is a member of C.

 Inductive argument indicators: Probably/improbably, likely/unlikely, plausibly/implausibly.

 E.G. M is closely is related to S.S eats bread. So it is probable that M eats bread.

2. The nature of inferential link between the premise and conclusion

- **The nature of inferential link between the premise and conclusion in deductive argument**

If the conclusion follows with logical necessity or certainty from the premises the argument is said to be deductive. In this argument there is a force of necessity or the conclusion is the absolute implication of the premise or the conclusion is the absolute, final establishment based on the premises. Because of that if the premise is true, it is impossible for the conclusion to be false.

- **The nature of inferential link between the premise and the conclusion in inductive argument**

If the conclusion does not follow with strict necessity but if it follows likely or probably the argument is said to be inductive argument.

In inductive argument there is no force of necessity rather it is the force of likelihood or probability. Hence, if the premise is true, it is improbable that the conclusion is false.

3. Character (form) of argumentation

There are various forms of arguments that deal with various issues, subjects or cases. And it is possible to categorize the argument as deductive or inductive by examining the content of the issue or the subject and the way they reason out.

I. Deductive argument forms
❖   **Argument based on mathematics**

We know that deductive arguments are always reached with certainty. Because numerical expressions are accurate in defining the nature and reality of things and they can provide trustworthy evidences that enables us to reach at true conclusion which is the basic aspect of deductive arguments.

Example: The normal body temperature of a healthy person is 37°c. Mamo's father body temperature has reached 40°c. Hence, Mamo's father health condition is not good.

Exception: Statistical reasoning: Statistical reasoning is mathematical but it is not deductive because statistical conclusions are formed from data (evidences) which are gathered through random sampling techniques. This random sampling method does not show the exact number. So, they are probabilistic and they tend to be inductive than deductive.

❖   **Argument from definition** is one in which the conclusion is arrived by defining the fundamental/basic word in the premise or when the premise already defines the truth of the conclusion.
God is omniscient. So he must know everything.
Since she had engaged in sexual intercourse for payment, John's wife must be a   prostitute.
Megerssa is mendacious, it follows that he tells lies.
 Since Easter is always on Sunday, it follows that the day after Easter is Monday.
❖   **Syllogistic arguments: Syllogistic** arguments are deductive arguments having two premises and one conclusion. There are three types of syllogistic arguments: **Categorical syllogism, Hypothetical syllogism and Disjunctive syllogism.**

Categorical syllogism: It is a syllogism formed from categorical statements beginning with the word "all", "no" and "some".

E.g. all medical Doctors are graduates of medical schools.
Some medical doctors are unethical persons.
Therefore, some unethical persons are graduates of medical schools.
Hypothetical syllogism: It is formed from conditional statements

E.g. If we eat a variety of food items, then we would be healthy. If we are healthy, then we would be productive. Therefore, if we eat variety of food items, we would be productive.

E.g. If ENA news is a propaganda machine, then it misleads its viewers. It is a propaganda machine. Therefore, it misleads its viewers.

Disjunctive syllogism: It is formed by "either …or…" statements.

Eg1. Either Natnael or Daniel wants to date Sophia.
   Natnael does not want to date Sophia.
      Therefore, Daniel wants to date Sophia.
Eg2. Either Abebe or Kebede killed Bekele
      Abebe did not kill Bekele. So Kebede killed Bekele

Argument that moves from general claims to particular (individual) realities

Most deductive arguments proceeds from premises having general truths, laws, theories or principles, which are accepted by all, and arrives at true conclusion.

E.g. All articles stated in the FDRE constitution are ratified by the constitutional Assembly. Article 39 is one of the articles in the FDRE constitution. As a result, Article 39 is ratified by the constitutional assembly.

Exception: There are deductive arguments which go from particular to general.

E.g. 3 is a prime number.
   5 is a prime number.
   7 is a prime number.
   Therefore, all odd numbers between 2 and 8 are prime numbers.

I.   **Inductive argument forms**
a.   **Argument based on prediction**

Reaching the conclusion about the future based on past and present available evidences. The premise provides evidence for the occurrence or happening of the conclusion but it may happen or not.

E.g. The former governments of Ethiopia were dictators. Most probably, the future government of Ethiopia will also be dictator.

E.g. Because certain fluctuations occurred in the prime interest on Friday, the value of dollar will decrease against foreign currencies on Monday**.**

b. Argument from Authority

It is an argument formed from some one's information, such as witness accounts, interview, citing authorized persons, etc.

We can gather evidence from these individuals and use it as a premise of our argument and draw our own conclusion. But the conclusion would not be certain enough because the evidences that we use as a premise are not ours.

E.g. According to Ato Markos, who is a lecturer in Yared music school and an expert in Ethiopian traditional music, the quality of traditional music of Ethiopia has been declining. Therefore, based on the account of Ato Markos, the Ethiopian traditional music is deteriorating.

c. Causal inference (Argument based on causation): Established based on cause and effect

→Causes as premises
→Effects as conclusion   **E.g.** the cloud is becoming darker and the thunder is roaming. So, the rainfall seems inevitable, let us go home quickly.

d. Argument based on sign

It is drawing or inferring a conclusion by using signs, such as traffic signs, trademarks, cautionary marks, symbols, etc as a premise.

E.g. This package material has a cautionary mark that indicates that there are fragile materials in it. Hence, the package has to be hold carefully; the fragile materials must be there.

e. Argument from Analogy

It is based on similarity between two things. It means two or more things are similar in some respect and it is expecting further similar features in other respect to draw conclusion. The better known situation affects the lesser known situation.

Eg. Tamrat and Ayelle are friends. They use to go library, class and cafeteria all the time together. Tamrat likes to watch DSTV. It must be the case that Ayelle also likes to watch DSTV.

E.G. A has quality x, y, and z

    B has quality x, y and z

    C has quality x, y and z

    D has quality x and y   Therefore, D has quality z

f.   **Inductive Generalization**

It proceeds from the knowledge of a selected sample, case or instances to some claim   about general truths. It is a belief that the whole members have the characteristics of the selected ones. **Eg.** In a basket containing 100 balls, I selected 5 balls that were found to be red. Therefore, all 100 balls are red.

E.G. There are 60 students in this classroom. I have completed evaluating the answer sheets of 8 students and all of them scored 85% and above. It must be the case that almost all students of this classroom must be smart students.

CHAPTER TWO

Language and Logic

Emotive Vs Cognitive meanings of terms

Language is the vehicle through which the ideas and concepts of philosophy are transmitted. A basic question in philosophy is "What do we mean by...?" which asks for more than a definition - it seeks to relate the thing we are interested in to the rest of our ideas and language. The language we use therefore colours the way in which we think, reason and experience the world. It is thus most unwise to philosophise without being aware of the role played by language. Language plays a paramount role in logical discourse and therefore logic requires the proper use of language. Committing linguistic error in an argument leads to committing logical mistakes or fallacies. Logic deals with the analysis and evaluation of arguments. Since arguments are expressed in language, the study of arguments requires that we should pay carefully attention to language in which arguments are expressed. Language has a variety of functions. By using language we do various things like stating facts, reporting events giving orders, singing songs, praying God, making requests, cutting jokes, asking questions, making promises, greeting friends and so on. These are wide varieties of language uses. We will not make any attempt to provide an exhaustive list of language uses. Rather we shall discuss here a broad classification of some of the important uses of language. There are two important uses of language. These are:

(a) **Descriptive (literal) uses of language**: Language is often used to convey information or describe something or to give information about something. So the descriptive use of language is also called *informative use of language*. Example: 1. Birds have feather.2. Birds are not mammals.3 Logic is the study of correct reasoning4. A spider has eight legs.

When language functions informatively we can sensibly ask whether what is asserted is true or false. In other words, the question "Is it true?" can be meaningfully asked of all such instances. When language is used to affirm or deny any proposition, its function is informative**; Language used to present arguments serves informative function.**

> **(b) Emotive Use of Language:** Language is often used to express or evoke our feelings, emotions or favorable or unfavorable, our liking and disliking attitudes and beliefs. An expressive use of language intends only to vent some feeling, or perhaps to evoke some feeling from other people. When I say, "**Friday afternoons are dreary**," **it's disgusting! Cheers!** Or **it's wonderful**! I am using language expressively. Although such uses don't convey any information, they do serve an important function in everyday life, since how we feel sometimes matters as much as—or more than—what we hold to be true. Emotive or expressive discourse is neither true nor false. When language is used emotively, it cannot be characterized as true or false. We can, however, respond to it by asking questions such as "Is the person sincere?" and "How should I feel?" Expressive use of language is also different from directive use of language.

However, even single words or short phrases can exhibit the distinction between purely informative and partially expressive uses of language. The terminology or term that tries to convey information is said to have **cognitive meaning**, and the terminology that elicits or evokes feelings is said to have **Emotive meaning.** Examples:

1. There are approximately 20 homicides in Ethiopia each year, with handguns being the most frequent instrument of death.
2. The 1991 Ethio-Eritrea war was a bloody and horrifying war in which millions of innocent people slaughtered and unlucky soldiers cut into pieces and remained in the sands of the desert to satiate the vested interests of bloodsucker politicians' .Indeed, it was the horror of horrors that the earth has ever experienced.
3. State Farm Insurance is "**Like a good neighbor**." A good neighbor is a person who is always there in time of need, which is exactly what everybody wants from an insurance company. The first example tries to transmit information, while the last two examples try to evoke our feelings.

Logic is concerned with cognitive meaning. Logic attempts to avoid emotively charged languages or emotionally loaded words for the reason that they can cloud our critical thinking and thus blind our judgments, and make us easily believe statements made by others without evidence or sufficient reasons. Therefore, in our evaluation or construction of an argument we should use *Emotively Neutral Language* whenever we can.
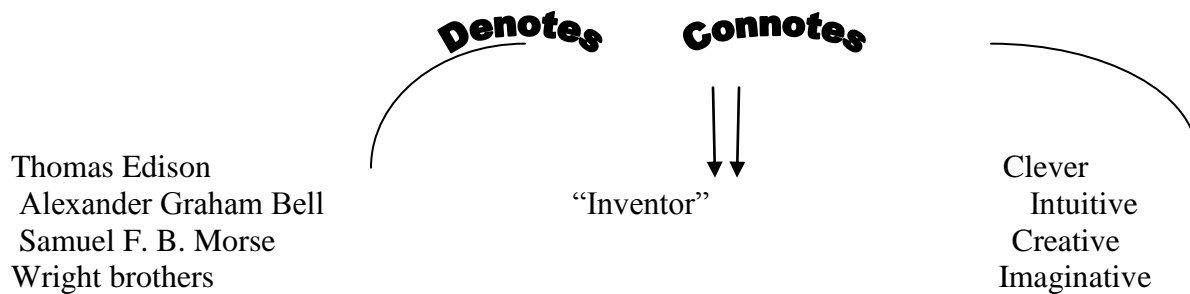
Intensional Vs Extensional meanings of terms

A term is any word or a group of words that may serve as the subject of a statement such as proper names, common names and descriptive phrases. Napoleon, The House of peoples Representative of Ethiopia, animal, restitution, house , the first prime minister of Ethiopia, author of *Love up to Funeral,* blue things, those who study hard ,etc are terms. Therefore, all terms are words, but all words are not terms because there are words that are not terms like verbs, non-substantive adjectives, adverbs, prepositions, conjunctions and all non-syntactic arrangements of words. Dictatorial, runs quickly, above and beyond, moreover, craves, cabbages into again the forest etc. are non-terms. Words are usually considered to be symbols, and the entities they symbolize are usually called **meanings.** Terms, being made up of words, are also symbols, but the meanings they symbolize are of two kinds: Intensional and extensional.

The **Intensional meaning of a term** consists of the quality and attributes of things that the term connotes/represents. The intension of a general term, on the other hand, is the set of features which are shared by everything to which it applies. The **extensional meaning of term** consists of the class or a set of individual things that the term denotes/refers**.** The extension of a term is just the collection of individual things to which it is correctly applied. Thus the intensional meaning of the term ''cat'' consists of the attributes of being furry, of having four legs, of moving in a certain way, of emitting certain sounds, and so on, while the extensional meaning consists of cats themselves—all the cats in the universe, or includes every cat that is (or ever has been or ever will be) in the world. Similarly, the intension of "bachelor" is an unmarried man, while its extension is the set of all bachelors in the world. The intensional meaning of a term is otherwise known as the **intension,** or **connotation,** and the extensional meaning is known as the **extension,** or **denotation.** The intension of **terms** (or their connotation) is their meaning, and their extension (or their denotation) is the set of objects they refer to.

Class members   **Attributes**
(Extension)   (Intension)

Note that not all terms have extensional meaning; there are terms which do not have individual things living in the universe. The term "unicorn", "dragon" ''leprechaun,'' ''gnome,'' ''elf,'' ''griffin'', and ''current king of Ethiopia'' are said to denote the empty (or ''null'') class, the class that has no members. After all, they don't succeed in picking out any objects in our world. Accordingly, these terms now have what is called **empty extension.** They are, nonetheless, referring expressions and connote a variety of intelligible attributes.

The fact that some terms have empty extension leads us to an important connection between extension and intension—namely, that *intension determines extension*. The intensional meaning of a term serves as the criterion for deciding what the extension consists of. Because we know the attributes connoted by the term ''unicorn,'' for example, we know that the term has empty extension. That is, we know that there are no four-legged mammals having a single straight horn projecting from their forehead. Similarly, the intension of the word ''cat'' serves as the criterion for determining what is and what is not a member of the class of cats. When we list words in order of increasing intension we are also normally listing them in order of decreasing extension. That is to say, as words get more complex in meaning, they tend to refer to fewer objects. Thus, the list of terms, "bachelor," "fat bachelor," and "fat happy bachelor," is a list both in order of increasing intension and decreasing extension.

- A series of terms is in the order of **increasing intension** when each term in the series connotes more attribute than the term preceding it. In other words, each term in the series (except the first) is *more specific* than the one preceding it. (A term is specific to the degree that it connotes more attributes.) The order of **decreasing intension** is the reverse of that of increasing intension
- A series of terms is in the order of **increasing extension** when each term in the series (except the first) denotes a class having more members than the class denoted by the term preceding it. In other words, the class size gets larger with each successive term. **Decreasing extension** is, of course, the reverse of increasing extension. Examples:

Animal, mammal, feline, tiger-increasing intension

Tiger, feline, mammal, animal-increasing extension

Tiger, feline, mammal, animal-decreasing intension

Animal, mammal, feline, tiger-decreasing extension

NB. The intensional meaning determines the extensional meaning because terms that have not extensional meaning (empty extension) have intensional meaning of connotation. Usually increasing intension and decreasing extension are the same and decreasing extension and decreasing intension are the same.

Definitions and their purposes

Definition is a group of words that assigns a meaning to some word/a group of words. Mainly, a definition has two components, **the definiendum and the definiens**. Definiendum is the word/a group of words that is supposed to be defined. Definiens is the word/a group of words that does the defining. It is a word/ a group of words that symbolizes /supposed to symbolize the same meaning as the definiendum, but not itself the meaning of the definiendum. Therefore, definitions explicate the meaning of words.

Example: Anchorite means a person who retired or renounced from the world and lives alone. The word "**anchorite**" is definiendum and the phrase (a person who retired or renounced from the world and lives alone) that comes that after the word "means" is the definiens.

Many logicians take a pragmatic approach and begin with a survey of the various kinds of definitions that are actually used and of the functions that they actually serve.

A Stipulative Definition

It is the assigning of a meaning to a word for the first time either by coining a new word or by giving a new meaning to an old one by creating a completely new term or a usage that had never previously existed. Stipulative definitions are frequently provided when we need to refer to a complex idea, but there simply is no word for that idea. The need for this definition is often occasioned by some new developments such as science, military codes, crossbreeding and new creations.
Purpose;

- to replace a more complex expression with simpler one

E.g. when the offspring of lion and tiger were born, they named as ''tigon'' and ''liger''. ''Tigon'' was taken to mean the offspring of a male tiger and a female lion, and ''liger'' the offspring of a male lion and a female tiger. Rather than writing in this manner "10 x10x10x10" it is better to write as 10^4. Similarly, any number greater than 17 but less than 36 can be named as a **blue number**"

- to setup secret codes

E.g. Operation Barbarossa the code name Germany used during the invasion of Russia. Operation Desert Storm-the code name given to the military invasion of Iraq
NB. A stipulative definition cannot be valued as true or false and furthermore it cannot provide any new information about the subject matter of the definiendum because it gives a meaning to a word for the first time in complete arbitral manner.

B Précising Definition

Précising definitions attempt to reduce the vagueness of a term by sharpening its boundaries.

We often encounter précising definitions in the law and in the sciences. It defines a term by introducing additional criterion or limit .The purpose of this definition is to reduce the vagueness of a word. Whenever words are taken from ordinary usage and employed in a highly systematic context they must always be clarified by means of a précising definition by specific discipline. This definition differs from a stipulative definition in that the latter involves a purely arbitrary assignment of meaning, whereas the assignment of meaning in a précising definition is not at all arbitrary. That means, a précising definition is appropriate and legitimate for the context within which the term is to be used. Examples:

1 "Blind" means, for federal income tax purpose, either inability to see better than 20/200 in the better eye with glasses or having a field of vision of 20 degrees or less.

2. "Bachelor" means an unmarried man who is at least 21 years old.

C Theoretical Definition

Theoretical definitions are designed to explain a theory. This definition provides a way of viewing /conceiving different entities. It provides theoretical picture or characterization of the entity. It defines a term within the context of a broader intellectual framework. This definition does more than merely assigning a meaning to a word; it provides a way of conceiving the physical phenomenon in science and other field of studies such as philosophy in relation to concepts such as substance, form, change, idea, mind, good, cause, and the like. Newton's famous formula "F = ma" (i.e., Force = mass x acceleration),, and "Sound" means a compression wave in air or some other elastic medium having a frequency ranging (for humans) from 20 to 20,000 vibrations per second are a good examples of such a definition.

NB. Like stipulative definition, theoretical definition is neither true nor false in strictly speaking, but it may be more or less interesting/fruitful depending the deductive consequences it entails and on the outcome of the experiment it suggests.

D Persuasive Definition

It is an attempt to attach emotive meaning to the use of a term. The purpose of this definition is to influence the attitude of the reader/listener specifically in the political speeches, and editorial columns, or to convince us to believe that something is the case and to get us to act accordingly. It is assigning of an emotionally charged/value laden meaning to a word while making it appears that the word really has/out to have that meaning in the language in which it is used.

NB. Persuasive definitions can be evaluated as either true or false; the primary issue is on the effectiveness of the persuasion.

E.g. Abortion means the ruthless murdering of an innocent human being

Abortion means a safe and established surgical procedure whereby a woman is relived of an unwanted burden.

Taxation is the means by which bureaucrats rip off the people who have elected them

''Smoker'' means a rude and disgusting individual who callously emits noxious tobacco fumes into the air, threatening the health and comfort of everyone in the vicinity.

E Lexical Definition

A lexical definition lists and/or reports the various meanings that a word has or can have in a certain language so as to avoid ambiguous constructions and to detect. This definition has the purpose of eliminating the **ambiguity**. Unlike stipulative definitions, lexical definitions do attempt to capture the real meaning of a word and so can be either correct or incorrect. Roughly, lexical definitions are the kinds of definitions found in dictionaries and repot the conventional definition of a term.

- **Vague**; a word is a vague when there are borderline cases such that it is impossible to tell whether the word applies to them or not. Words such as *love, happiness, peace*, etc, are vague because they can be expressed in different degrees subjectively.

- **Ambiguous**; a word is an ambiguous when a word can be interpreted as having two/more relatively precise meanings. Words such as bank, light, race have two and more than two relatively precise meanings. Examples:

"Intractable" means not easily governed, or obstinate

"Light" means either something that is easy to carry (to lift) or radiance created by sun rays

Definitional Techniques

The definitional techniques of intentional and extensional meanings

A Extensional Definitions

A denotative or extensional definition tries to identify the extension of the term in question. It assigns a meaning to a term by listing the individual members of the class denoted by the term. **There are at least three ways of indicating the members of a class.**

a. **Demonstrative (ostensive**) _ pointing to the individual thing itself.

E.g. "Chair" means "this" and "this"

This definition differs from others as it, at least in part, uses gesture. The obvious limitation of this definition is that the required objects should be available for being pointed at. This definition may be partial or complete.

b.   **Enumerative Definition**; the assigning of a meaning to a term by naming or counting the members of the class the term denotes, partially or completely.
E.g. "Professional football player" means a person such as Messi, Rolando, Torres, or Rooney
c. **Definition by subclass**; the assigning of a meaning to a term by naming subclass of the class denoted by the term, partially or completely. A class X is a **subclass** of another class Y given that every a member of

X is a member of Y. For terms whose members have no names are denoted by demonstrative or subclass definition.

E.g. Tree means an oak, pine, maple and the like.

''Fictional work'' means either a poem, a play, a novel, or a short story.

''Plant'' means something such as a tree, a flower, a vine, or a cactus.

NB. Extensional definitions are chiefly used as techniques for producing lexical and stipulative (for all three kinds of extensional definitions), theoretical and persuasive definitions, but not for précising definitions because the aim of précising definition is to clarify vague words and vagueness is the problem of intensional definition. Extensional definitions can suggest intensional definitions, but they cannot determine them

B Intensional (Connotative) Definitions

An **intensional definition** is one that assigns a meaning to a word by indicating the qualities or attributes that the word connotes. There are at least four strategies to indicate the attributes of a word connotes.

a. **Synonymous**; is one in which the definiens is a single word that connotes the same attribute with the definiendum.

E.g. "physician" means doctor   "Neophyte'' means beginner.
   "Observe" means see   "Inevitable" means unavoidable

NB. There are words that are not connoted by any other word such as sense, wisdom, envious, etc. This definition may use to produce lexical definitions only.

d.   **Etymological Definition**; is the assigning of a meaning to a word by disclosing the word's ancestry in both its own language and in another language.

e.g. ''Universe'' originates from the Latin word *universus,* which means whole or entire.

          ''Angel'' is a word that originates from the Greek word *Angelos,* which means messenger.

This definition has special importance for at least two reasons;

- It conveys the word's root meaning or seminal meaning from which all other associated meanings are derived.

- It has access to the meaning of an entire constellation of related words.

b.   **An operational Definition**; is the assigning of a meaning to a word by specifying certain experimental procedures that determine whether or not the word applies to a certain thing. It defines a term by positing certain conditionality to be fulfilled for the definition of that term to work properly; **operational definition**s prescribe (command) an operation to be performed. This definition was invented for the purpose of tying down (joining) relatively abstract concepts to the solid ground of empirical reality. Operational definition usually conveys only part of the intensional meaning of a term and it is applied in the framework of science. This definition used to produce stipulative, précising, persuasive, and partial lexical definitions. **E.G.**

- A solution is an ''acid'' if and only if litmus paper turns red when dipped into it

- One substance is ''harder than'' another if and only if one scratches the other when the two are rubbed together.
- A substance is ''translucent'' if and only if when held up to a strong light some of the light comes through.
- An ''electric current'' flows in a circuit if and only if an ammeter connected in series with the circuit shows a reading.

d. **Definition by Genus and Difference**; is the assigning of a meaning to a word by identifying a genus term and one or more difference words, that is , when genus and difference combined, they convey the meaning of the term being defined. The **species (in logic)** is simply a proper subclass of the genus. For example, we may speak of the genus dog and the species puppy, of the genus animal and the species dog. **The difference** (or specific difference) is the attribute that distinguishes the various species within a genus or an attribute that distinguishes he members of a given species from the members of other species in the same genus. In logic, Genus is relatively a larger class and species is relatively a smaller class.

E.g. Species		Difference	Genus
Ice	means	frozen	water
Daughter	means	female	offspring
Skyscraper	means	very tall	building
Puppy	means	young	dog

In the last example, the difference is the attribute of being young which distinguishes from other species in the same genus-e.g. adult dogs.

NB. This definition is the most effective of intensional definitions for producing all stipulative, précising, lexical, theoretical, and persuasive definitions.

Criteria for lexical Definitions

I. **Should conform to the standard of proper grammar**; lexical definition should follows the rule of proper grammar.
   E.g. Vacation is when you do not have to go to work or school. (Incorrect)
      Vacation means a period during which activity is suspended from work. (Correct)
      ''Semantics'' is when somebody studies words. (Incorrect)
      "Semantics'' is the study of words. (Correct)
II. **Should convey the essential(conventional) meaning of the word being defined**
   E.g. Human means featherless biped (incorrect)
    Human means a rational animal capable of language and reason. (Correct)
III. **Should be neither broad nor narrow**.

Lexical definition should capture the correct extension. A good definition will apply to exactly the same things as the term being defined, no more and no less. A definition is too broad (wide) when it includes objects in its definiens that it excludes from its definiendum and a definition is too narrow when the definiens excludes objects included in the definiendum. If the definition is too broad it includes from outside and if it is too narrow it excludes from inside.

E.g. Bird means any warm blooded animal having wings-too broad -it includes bats, grasshopper and flies from outside.

Bird means any warm blooded, feathered animal that can fly _narrow- it does not include ostriches, penguins and Qui.

IV.   **Should not be circular**; A definition is circular when we use, in the definiens, the term we are trying to define in the definiendum
Mostly appears in connection with pairs of definitions
E.g. Silence means the state of being silent
     Scientist means anyone who engages in science.
 Metaphysics means the systematic study of metaphysical issues.
NB. Synonymous, operational and definition by genus and difference are affected.
 V. **Should not be negative when it can be affirmative**: Whenever possible, we should not define by saying what something isn't but by saying what it is.
E.g. Concord means the absences of discord. Incorrect
     Concord means harmony. Correct
 An organic substance is any substance that is not inorganic.
NB. Some words are intrinsically negative, however.
 E.g. Bold means lacking hair
      Darkness means the absence of light.
VI**. Should not be expressed in figurative, obscure, vague or ambiguous language**: A definition should be clear and precise,

Figurative when the meaning tends to paint a picture

E.g. Architecture means frozen music
Camel means a ship of the desert
Satire is a kind of glass, wherein beholders do generally discover every body's face but their own.
Jesus means the Lamb of God
Obscure if the meaning is hidden as a result of defective/inappropriate language due to over technical and/or needlessly technical language.Examples:

-A radio is an electronic device consisting of an antenna, variable-frequency   oscillator, and mixer circuitry   operating in conjunction with RF, IF, and AFamplification stages, the last of which feeds an AF transducer.

''Bunny'' means a mammalian of the family Leporidae of the order Lagomorpha whose young are born furless and blind. (Incorrect)   Bunny means rabbit (correct)

Vague --if the meaning lacks precision/blurred/if there is no way telling exactly what the class of things the definition refers.

E.g. Democracy means a kind of government where the people are in control. It fails to identify the people, who are in control, how exercise their control, and what they are in control.
Ambiguous--if the meaning lends itself to more than one distinct interpretation.

E.g. Triangle means a figure composed of three straight lines in which all the angles are equal to 180^0.
VII. **Should avoid affective terminology and metaphor**

An affective terminology any kind word usage that plays upon the emotion of the reader or listener.
E.g. Theism means belief in the great Santa Claus in the sky
''Anchor person'' means an electronic media guru who has great looks but less than average intelligence and who brings canned news to people incapable of reading a newspaper.
''Faith'' means reason succumbing to insecurity.
VIII. **Should indicate the contextual meaning of the term**

A good definition should provide a contextual reference that specifies to which situation or context the term is applicable. It is applicable to any definition
E.g. strike means (in baseball) a pitch at which a batter swings and misses
      Strike means (in fishing) a pull on a line made by a fish in taking the bait.
Right means (in utilitarian Ethics) is an action that promotes the highest happiness for the most people.
Right means (in law) a privilege that a person has by nature or by constitution.

Chapter Three: Informal Fallacies

*The word "fallacy" is related with the Latin word **fallere** meaning, "to deceive, to trip, to lead into error or to trick." The word is also related with the Greek **phelos**, meaning "deceitful**.** A fallacy is, very generally, an error or defect in reasoning; an often plausible argument using **false or invalid inferences**. This differs from a factual error, which is simply being wrong about the facts. It is the creation of an illusion that makes a bad argument appears good. Fallacies like men are pretenders. They have deceptive nature because*
- *They are presented not by exposing their weaknesses that the unwary reader or listener could not detect them.*
- *They extensively employ **emotive words** that substitute logical evidences which good arguments use as premises; Emotive words hide (conceal) the logical mistakes and influences audiences psychologically.*
- *Sometimes **very persuasive**; hard to identify; Logical fallacies are often used to strengthen an argument, but if the reader detects them the argument can backfire, and damage the writer's credibility.*

*To be more specific, a fallacy is an "argument" in which the premises given for the conclusion do not provide the needed degree of support. Fallacies are of two types: **Formal and informal**. Formal fallacies are fallacies that are committed in deductive arguments and can be identified by mere inspection of the form or structure of argument. A deductive fallacy is a deductive argument that is invalid (it is such that it could have all true premises and still have a false conclusion).*

Example

All tigers are animal

All mammals are animal   undistributed middle fallacy

Therefore all tigers are mammal

Informal fallacies *are fallacies which are committed in inductive arguments and do not involve explicit use of invalid form, and thus can be detected only by analyzing their content. They are simply "arguments" which appear to be inductive arguments, but the premises do not provided enough support for the conclusion. In such cases, even if the premises were true, the conclusion would not be more likely to be true. Examples:* **1**.*Everything that runs has feet. The Nile River runs swiftly. Therefore, the Nile River has feet.*

2. *A chess player is a person. Therefore, a bad chess player is a bad person.*

<p align="center">Classification of informal Fallacies</p>

A.   *fallacies of Relevance*

B.   *fallacies of Weak induction*

C.   *fallacies of presumption*

D.   *Fallacies of ambiguity   Linguistic*

E.   *fallacies of grammatical analogy   fallacies*

A. **Fallacies of Relevance:** *their conclusion is based on logically irrelevant (unnecessary) premises containing emotionally loaded words and, therefore, only psychologically relevant. They are based on emotional appeal and the connection between the premise and the conclusion is emotional, but not logical. Arguments with irrelevant premises are often known as "**non-sequitures**", which mean that the conclusion does not seem to follow from the premises. They are also called "**argumentative leaps**", which suggests that since no connection is seen between the premises and the conclusion, a huge leap would be required to move from one to another*

1. Appeal to Force (Argumentum ad Baculum: Appeal to the ''Stick'') or Threat

*It is also called appeal to **Fear or scare tactics**. It replaces reason with stick; Force replaces reason. The conclusion is based on either physical or psychological intimidation. It is committed when the arguer threatens (even implicitly) that someone may harm the person unless she/ he accepts the conclusion ;if you do not accept my conclusion, there will come some harm upon you. General pattern:*

1) Y is presented (a claim that is intended to produce fear).

2) Therefore claim X is true (a claim that is generally, but need not be, related to Y in some manner). This line of "reasoning" is fallacious because creating fear in people does not constitute evidence for a claim.

Example #1:

Father to son: *my boy, you must study hard, if not you will be either a criminal or a beggar. In this fallacy, if the father creates fear in the boy, the boy will study hard.*

Example #2:

Child to playmate: "Kassa show'' is the best show on EBSTV; and if you don't believe it, I'm going to call my big brother over here and he's going to beat you up. This argument has the intention that If my brother forces you to admit that "Kassa show'''' is the best show on EBS TV, then "Kassa show'''' is in fact the best show.

Example #3:

Priest to unbeliever: You must believe that God exists. After all, if you do not accept the existence of God, then you will face the horrors of hell.

2. Appeal to Pity (Argumentum ad Misericordiam)

The conclusion is based on the hard-luck story of the arguer, or based on inciting pity or sympathy by mentioning one's pathetic (sad) circumstances from the reader or listener. One who appeals to pity is actually exploiting **emotional sensitivity** rather than presenting convincing evidences that a claim is true or that an action has a merit. The form of the "argument" is as follows:

1. P is presented, with the intent to create pity.
2. Therefore claim C is true.

This line of "reasoning" is fallacious because pity does not serve as evidence for a claim. This is extremely clear in the following case: "You must accept that 1+1=46, after all I'm dying…" While you may pity me because I am dying, it would hardly make my claim true. Examples:

Example #1:

Speeding motorist to police officer: "Officer*,* I don't deserve a ticket*.* After all, if you give me a ticket, that will be my third ticket this month, and I'll lose my license. And then I won't be able to drive to get the medicine for my ailing mother. Clearly, I don't deserve to get a speeding ticket*."*

Example #2:

Taxpayer to judge: Your Honor, I admit that I declared thirteen children as dependents on my tax return, even though I have only two. But if you find me guilty of tax evasion, my reputation will be ruined. I'll probably lose my job, my poor wife will not be able to have the operation that she desperately needs, and my kids will starve. Surely I am not guilty.

Example #3:

Student to Instructor: I know that I have not done very good work in your course, Instructor, but if you don't give me a C^+ grade, there is no way that I can get into graduation. Graduation means a lot to me. After all, I came from a distant area and poor family for whom I am the only child. Certainly, I deserve C^+ from your   course.

3. Appeal to the People (Argumentum ad Populum)

It is an Argument based on the exploitation of people's strong emotions and feelings such as anger, fear, love, admiration etc. It consists in urging the acceptance of the conclusion based on the idea that because many people accept it or distinguished personalities and popular ones used it, it is true or it is good. **Ad Populum fallacy is of two types: The direct appeal to the people and indirect appeal to the people.**

Direct appeal to the people fallacy is committed when the arguer is addressing a large group or crowd, or arguer tries to whip up (provoke) the emotions of the crowd to get them to accept the conclusion by

referring to mass belief, mass sentiment or mass commitment. The purpose is to win acceptance of one's conclusion by manipulating (influencing) mob mentality or instinct.

Example #1:
*"**All Americans should stand up and oppose this threat to our freedom! We are the oldest freedom-loving country on the face of the earth**!" There are no direct reasons given why this particular threat should be opposed. Instead, the argument plays on the love of freedom of the audience.*

*Example #2: **EPRDF is a defender of the working man! Really you would rather vote for it**! No reason is offered why we deserve to vote for EPRDF.*

Indirect appeal to the people fallacy: the arguer aims his or her appeal not at the crowd as a whole but <u>at one or more individuals separately</u>, focusing on some aspect of their relationship to the crowd or making themselves relate with the group. The arguer tries to get individuals to accept a conclusion by appealing to emotions of identification:

- *Bandwagon (popular appeal)*
- *Vanity (flattery)*
- *Snobbery*

Bandwagon (popular appeal)** is based on the assumption that because many people or a group do or accept X, then X is good or true. **General pattern:
    1) Most people do or approve of X.
    2) So, you should do or approve of X, too.
    3) Since you do or approve of X, X must be true.

Example #1:
***Of course you want to buy Zest toothpaste. Why, 90 percent of America brushes with Zest.** The idea is that you will be left behind or left out of the group if you do not use the product.*

Example #2:
*"**Join the Pepsi generation!**" Note that this in fact tells you nothing about the qualities of that soft drink but only asserting that everyone is drinking it.*

Example #3:
*"**May you want to drink? Enjoy Amber beer; the first choice of the majority.**" Nothing is told why the majority chose it and about its quality and contents. The idea behind the above examples is that you will be left behind or left out of the group if you do not use the product.*

*The **appeal to vanity (flattery)** often associates the product with someone who is admired, pursued, the idea being that you, too, will be admired and pursued if you use it.*

Example #1:
That was a singularly brilliant idea. I have never seen such a clear and eloquent defense of the late PM Meles' position on climate change. If you do not mind, I'll base my paper on it, Provided that you allow me a little extra time past the deadline to work on it.

Example #2 who is going to buy this new fashion jean, which is the first choice of famous Teddy Afro? The message is that if you buy that fashion jeans, then you, too, will be admired and respected, just like Teddy.

Appeal to snobbery associates the product with people of high social position such as royal families (kings, queens and princes), leaders of nations etc.

Example #1:

LIFAN automobile is not for everyone. If you qualify as one of the select few, this distinguished classic may be seen and driven at Mesfen Industrial Engineering company, Ltd. (By appointment only, please.)

Example #2:

Do want to flight to Canada? Ethiopian Dreamliner is awaiting you and you would better buy first level ticket. But, note that Dreamliner is only for respected customers and distinguished personalities. (Hurry up!)

Both the direct and indirect approaches of the ad populum fallacy have the same basic structure: ***You want to be accepted/included-in-the-group/loved/ esteemed. . . . Therefore, you should accept XYZ as true.***

4. Argument against the Person (*Argumentum ad Hominem*

This fallacy always involves two arguers, one of them advances a certain argument and the other then responds by directing his or her attention not to the first person's argument but to the first person himself. A claim or argument is rejected on the basis of some irrelevant fact about the author of or the person presenting the claim or argument. Typically, this fallacy involves two steps. First, an attack against the character of person making the claim, her circumstances, or her actions is made (or the character, circumstances, or actions of the person reporting the claim). Second, this attack is taken to be evidence against the claim or argument the person in question is making (or presenting). This type of "argument" has the following form:

1. Person A makes claim X.
2. Person B makes an attack on person A.
3. Therefore A's claim is false.

The reason why an ad Hominem (of any kind) is a fallacy is that the character, circumstances, or actions of a person do not (in most cases) have a bearing on the truth or falsity of the claim being made (or the quality of the argument being made).

The argument against the person occurs in three forms: the *ad hominem* abusive, the *ad hominem* circumstantial, and the *tu quoque*.

   Ad hominem abusive: the second person responds to the first person's argument by verbally abusing the first person; the respondent refutes an argument by attacking the arguer's personal character instead of attacking the details of the argument itself. But, no matter how repugnant an individual might be, he or she can still make true claims.

   Example #1:

   Her idea that environmental protection needs to be given priority is nonsense. I don't have a problem to find evidence against her opinion. Just look at her face, she looks like a hungry dog. How this noble idea can be suggested by such an awful faced woman**.**

 Example #2:

"That claim cannot be true. Alex believes it, and we know how morally repulsive he is."

Example #3: Before he died, poet Allen Ginsberg argued in favor of legalizing pornography. But Ginsberg's arguments are nothing but trash. Ginsberg was a marijuana-smoking homosexual and a thoroughgoing advocate of the drug culture.

***Ad hominem* circumstantial:** the respondent attempts to discredit an argument by attacking the arguer's circumstances (such as the person's religion, political affiliation, ethnic background, position or interest etc.) instead of attacking the details of the argument itself. The fallacy has the following forms:

1. Person A makes claim X.
2. Person B asserts that A makes claim X because it is in A's interest to claim X.
3. Therefore claim X is false.
   OR
1. Person A makes claim X.
2. Person B makes an attack on A's circumstances.
3. Therefore X is false.

Example #1: Messay argues strongly in favor of increasing the minimum wage. But, this is exactly what you would expect. Messay is just one of the persons paid minimum wage, and if the minimum wage is increased, then his own salary will go up. Obviously, Messay's arguments are worthless.

Example #2: "I think that we should reject what Father Jones has to say about the ethical issues of abortion because he is a Catholic priest. After all, Father Jones is required to hold such views."

Example #3: "Moges claims that tax breaks for corporations increases development. Of course, Moges is the CEO of a corporation.

***Tu quoque* (''you too'') fallacy:** committed when a respondent concluded that a person's claim is false because 1) it is inconsistent with something else a person has said or 2) what a person says is inconsistent with her actions. It has the following form:

1. Person A makes claim X.
2. Person B asserts that A's actions or past claims are inconsistent with the truth of claim X.
3. Therefore X is false.

The respondent tells his opponent that what you are saying is contrary with what you have done before; so how dare you argue that I should stop doing X, why you yourself did it. The fact that a person's claims are not consistent with his actions might indicate that the person is a hypocrite but this does not prove his claims are false.

Example #1:"My dad says that I shouldn't drink beer, but he was having a Meta beer at the picnic last week, so there's nothing wrong with my having a beer."

Example #2:

Alex: "Smoking is very unhealthy and leads to all sorts of problems. So take my advice and never start."

Bini: "Well, I certainly don't want to get cancer."

Alex: "I'm going to get a smoke. Want to join me Dave?"

Bini: "Well, I guess smoking can't be that bad. After all, Alex smokes."

Example #3:

Gebre: you should stop bribing your customers.

Challa: what do you say my lord? You too were running after money bribing those contrabandists and now you became advisor of me. It is better to stop you mouth, okay!

Example #4: *Child to parent:* Your argument that I should stop stealing candy from the corner store is no good. You told me yourself just a week ago that you, too, stole candy when you were a kid.

5. Accident

The fallacy of **accident** is committed when a general rule or principle is applied to a specific case it was not intended to cover. Typically, the general rule is cited in the premises and then misapplied to the specific case mentioned in the conclusion. However, the accidental feature of the specific case makes it an exception to the rule; the exceptional character of the specific case is ignored.

N.B**: the term accident is not related to disaster, but refers to the mistaken application of general principle to particular situation**.

Example #1: Freedom of speech is a constitutionally guaranteed right. Therefore, Mr. X should not be arrested for his speech that incited the riot (unrest) last week.

Example #2: Property should be returned to its rightful owner. That drunken trader who is starting a fight with his opponents at the pool table lent you his **45-caliber** pistol, and now he wants it back. Therefore, you should return it to him now.

Example #3: Whoever thrusts a knife into another person should be arrested. But, surgeons do precisely this when operating. Therefore, surgeons should be arrested.

6. Straw Man

It is committed when an arguer distorts or misrepresents the opponent's exact words used in the original statement by equating or associating them with other issue, and then attacks the distorted argument which the opponent does not really hold and concludes about the original argument. **Deliberate misrepresentation of an opposing viewpoint; distorts or caricatures for ease of refutation;** a person simply ignores a person's actual position and substitutes a distorted, exaggerated or misrepresented version of that position. This sort of "reasoning" has the following pattern:

1. Person A has position X.
2. Person B presents position Y (which is a distorted version of X).
3. Person B attacks position Y.
4. Therefore X is false/incorrect/flawed.

Example #1: Mr. Goldberg has argued against prayer in the public schools. Obviously Mr. Goldberg advocates atheism. But atheism is what they used to have in Russia. Atheism leads to the suppression of all religions and the replacement of God by an omnipotent state. Is that what we want for this country? I hardly think so.

Clearly Mr. Goldberg's argument is nonsense. **Here the speaker claims to have refuted Mr. Goldberg's position when in fact he has only refuted the straw man.**

Example #2: The student status committee has presented us with an argument favoring alcohol privileges on campus. What do the students want? Is it their intention to stay boozed up from the day they enter as freshmen till the day they graduate? Do they expect us to open a bar for them? Or maybe a chain of bars all over campus? Such a proposal is ridiculous!

The arguer distorts the request for alcohol privileges to mean a chain of bars all over campus. Such an idea is so patently outlandish that no further argument is necessary.

Example #3: Dave and Bini are arguing about cleaning out their closets:

Bini: "We should clean out the closets. They are getting a bit messy."

Dave: "Why, we just go through those closets last week. Do we have to clean them out every day?"

Bini: I never said anything about cleaning them out every day. You just want to keep all your garbage forever, which is just ridiculous."

7. Missing the Point (*Ignoratio Elenchi*) or Ignorance of the proof

This fallacy occurs when the premises of an argument support one particular conclusion, but then a different conclusion, often vaguely related to the correct conclusion, is drawn. In other word, it committed when the arguers draws a conclusion which is logically inappropriate or totally different from the logical implication of the premises. The arguer is ignorant or unaware of the logical implication of his /her own premise and, thus, draws a conclusion that entirely misses the point.

Example #1: Crimes of theft and robbery have been increasing at an alarming rate lately. The conclusion is obvious: we must reinstate the death penalty immediately.

Example #2: Abuse of the welfare system is rampant nowadays. Our only alternative is to abolish the system altogether.

Example #3: Something is seriously wrong with higher education these days. After several years of decline, Logic and Reasoning skills scores are still extremely low, and higher education graduates are practically incapable of thinking well, reasoning well and writing well-crafted arguments and forwarding good criticisms. The obvious conclusion is that we should ban Logic and Reasoning skills course from higher education program.

8. Red Herring

It is committed when the arguer diverts(changes the attention of the reader or listener by changing the original subject to a different subject or issue, and draws a conclusion about this new issue or lets it without conclusion. The basic idea is to "win" an argument by leading attention away from the argument and to another an irrelevant topic. General form:

1. Topic A is under discussion.
2. Topic B is introduced under the guise of being relevant to topic A (when topic   B is actually not relevant to topic A).
3. Topic A is abandoned or draws a new conclusion.

Example #1: Environmentalists are continually harping about the dangers of nuclear power. Unfortunately, electricity is dangerous no matter where it comes from. Every year hundreds of people are electrocuted by accident. Since most of these accidents are caused by carelessness, they could be avoided if people would just exercise greater caution.

Example #2: There is a good deal of talk these days about the need to eliminate pesticides from our fruits and vegetables. But many of these foods are essential to our health. Carrots are an excellent source of vitamin A, broccoli is rich in iron, and oranges and grapefruits have lots of vitamin C.

Example #3:"Argument" for making graduate school requirements stricter:

"I think there is great merit in making the requirements stricter for the graduate students. I recommend that you support it, too. After all, we are in a budget crisis and we do not want our salaries affected."

The Original issue of example 1=dangers of nuclear weapon; newly introduced topic=dangers of electricity. The Original issue of example 2: elimination of pesticides from fruits and vegetables; newly introduced topic= the value of fruits and vegetables in one's diet. The Original issue of example 3=graduate school requirements; newly introduced topic=budgets and salary.

B. Fallacies of Weak Induction

The **fallacies of weak induction** occur not because the premises are logically irrelevant to the conclusion, but because the connection between premises and conclusion is not strong enough to support the conclusion. They are fallacious arguments based on insufficient ground or evidences. Their conclusions are based on either little evidence or biased evidence that does not make a reasonable person believe or accept it. Like the fallacies of relevance, however, the fallacies of weak induction often involve emotional grounds for believing the conclusion.

9. Appeal to Unqualified Authority (*Argumentum ad Verecundiam*)

It is known as Misuse of Authority, Irrelevant Authority, Questionable (Untrustworthy) Authority, and Inappropriate Authority. It is committed in attempting to support a claim by quoting the judgment of one who is not an authority in the field, the judgment of an unidentified authority, or the judgment of an authority with likely to be biased. In other word it occurs when the Cited authority or witness lacks credibility – the authority may lack the requisite expertise, or may be biased or prejudiced or may have the motive to lie or to disseminate misinformation.

An Appeal to Authority is a fallacy with the following form:

1) Person A is (claimed to be) an authority on subject S.
2) Person A makes claim C about subject S.
3) Therefore, C is true

This fallacy is committed when the person in question is not a legitimate authority or not an expert on the subject. More formally, if person A is not qualified to make reliable claims in subject S, then the argument will be fallacious.

Note that no one can be an authority in the area of <u>politics, religion and morality</u>.

An authority may be reliable when

- The person has sufficient expertise in the subject matter in question
- The claim being made by the person is within her area(s) of expertise
- There is an adequate degree of agreement among the other experts in the subject in question.
- The person in question is not significantly biased
- The area of expertise is a legitimate area or discipline.
  - The authority in question must be identified.

Example #1:

David Duke, former Grand Wizard of the Ku Klux Klan, has stated, ''Jews are not good Americans. They have no understanding of what America is.'' On the basis of Duke's authority, we must therefore conclude that the Jews in this country are un-American.

Example #1: Television evangelist Pat Robertson has said that there is no constitutional basis for separation of church and state. In view of Robertson's expertise, we have no alternative but to abandon this longstanding principle of government.

Example #3: I am not a doctor, but I used parastamol 500 g when I caught headache. You can take it from me that when you need a fast acting, effective and safe pain killer there is nothing better than parastamol 500 g. That is my considered medical opinion.

10. Appeal to Ignorance (*Argumentum ad Ignorantiam*)

It occurs when the premises of an argument state that nothing has been proved one way or the other about something and the conclusion then makes a definite assertion about that thing. The absence or the presence of evidence or proof   is taken to make something true or false. General pattern:

1) Nobody proved that X is false
2)   Therefore, X is true
              OR

1)   Nobody proved that X is true
2)   Therefore, X is false

Example #1: There is life after death because no one has proved that there is no such a thing as life after death.

Example #2: She has never shown me a sign of hatred; it implies that she likes me.

Example #3: No one has ever been able to prove the existence of extrasensory perception. We must therefore conclude that extrasensory perception is a myth.

11. Hasty Generalization (Converse Accident)

It is also known as Fallacy of Insufficient Sample. This fallacy is committed when a person draws conclusion about a population based on a sample that is not large enough, from very limited information or exceptional cases or unrepresentative data or inappropriate sample (too small sample or not randomly selected). It has the following form:

   1. Sample S, which is too small, is taken from population P.

   2. Conclusion C is drawn about Population P based on S.   **OR**

   1. X% of all observed A's are B's.

   2. Therefore X% of all A's are B's.

 The fallacy is committed when not enough A's are observed to warrant the conclusion.

Example #1:   Melkamu, who is from Gondar, decides to attend undergraduate school at Mizan-Tepi University. He has never been to the Mizan-Tepi before. The day after he arrives, he is walking back from an orientation session and sees two Indian instructors talking each other around a corridor. In his next letter home, he tells his friends that most of Mizan-Tepi University instructors are Indians.

 Example #2: Six Arab fundamentalists were convicted of bombing the World Trade Center in New York City. The message is clear: Arabs are nothing but a pack of religious fanatics prone to violence.

N.B The mere fact that a sample is too small does not necessarily imply that the argument is fallacious nor does the existence of large sample guarantee that the argument is not fallacious.

Example: Ten milligrams of substance Z was fed to four mice and within two minutes all four went into shock and died. Probably substance Z, in this amount, is fatal to the average mouse. (Non-fallacious)

In this argument the fact that the mice died in only two minutes suggests the existence of a causal connection between eating substance Z and death. If there is such a connection, it would hold for other mice as well.

12. False Cause

It occurs whenever a conclusion is drawn from some imagined causal connection that probably does not exist. The conclusion depends on the supposition that *X* causes *Y*, whereas *X* probably does not cause *Y* at all.

A. *Post hoc ergo propter hoc* ("after this, therefore on account of this"): based on the assumption that because one event precedes another, the first event causes the second event .However there is mere temporal sequence between those events.
Post Hoc is a fallacy with the following form:

1) A occurs before B.
2) Therefore A is the cause of B.
Example #1: During the past two months, every time that the cheerleaders have worn blue ribbons in their hair, the basketball team has been defeated. Therefore, to prevent defeats in the future, the cheerleaders should get rid of those blue ribbons.
Example #2: I had been doing pretty poorly this season. Then my girlfriend gave me this neon laces for my spikes and I won my next three races. Those laces must be good luck…if I keep on wearing them I can't help but win!

B. Non causa pro causa fallacy ("not the cause for the cause") :committed when what is taken to be the cause of something is not really the cause really at all, or one event causes another because they occur in regular basis. This fallacy is committed when a person assumes that one event must cause another just because the events occur together. More formally, this fallacy involves drawing the conclusion that A is the cause of B simply because A and B are in regular conjunction but without adequate justification. The relation between the two events is only coincidental or concurrent one. Confusing Cause and Effect is a fallacy that has the following general form:
1) A and B regularly occur together.
2) Therefore A is the cause of B
Example #1: There are more laws on the books today than ever before, and more crimes are being committed than ever before. Therefore, to reduce crime we must eliminate the laws.
Example #2: we don't work because we are poor.

Example #3: Successful business executives are paid salaries in excess of $50,000. Therefore, the best way to ensure that Ferguson will become a successful executive is to raise his salary to at least $50,000.

C. *Oversimplified cause*: takes place occurs when a multitude of causes is responsible for a certain effect but the arguer selects just one of these causes and represents it as if it were the sole cause. Here the arguer presents a single minor case making it accountable for the occurrence of something.
Example #1: The quality of education in our grade schools and high schools has been declining for years. Clearly, our teachers just aren't doing their job these days.

Example #3: Today, all of us can look forward to a longer life span than our parents and grandparents. Obviously, we owe our thanks to the millions of dedicated doctors who expend every effort to ensure our health.

In the first argument, the decline in the quality of education is caused by many factors, including lack of discipline in the home, parental noninvolvement, too much television, and drug use by students. Poor teacher performance is only one of these factors and probably a minor one at that. In the second argument, the efforts of doctors are only one among many factors responsible for our longer life span. Other, more important factors include a better diet, more exercise, reduced smoking, safer highways, and more stringent occupational safety standards.

13. Slippery Slope: it occurs when the conclusion of an argument rests upon an alleged chain reaction and there is not sufficient reason to think that the chain reaction will actually take place. The Slippery Slope is a fallacy in which a person asserts that some event must inevitably follow from another without any argument for the inevitability of the event in question. In most cases, there are a series of steps or gradations between one event and the one in question and no reason is given as to why the intervening steps or gradations will simply be bypassed. This "argument" has the following form:

1. Event X has occurred (or will or might occur).
2. Therefore event Y will inevitably happen.

Example #1: Immediate steps should be taken to outlaw pornography once and for all. The continued manufacture and sale of pornographic material will almost certainly lead to an increase in sex-related crimes such as rape and incest. This in turn will gradually erode the moral fabric of society and result in an increase in crimes of all sorts. Eventually a complete disintegration of law and order will occur, leading in the end to the total collapse of civilization.

Example #2: "Ethiopia shouldn't get involved militarily in other countries. Once the governments send in a few troops, then they will send in thousands to die."

Example #3: "We've got to stop them from banning pornographic web sites. Once they start banning that, they will never stop. Next thing you know, they will be burning all the books!"

14. Weak Analogy: committed when the analogy is not strong enough to support the conclusion that is drawn, or significant differences between two or more things are ignored, or the contrasted things are considered alike only in unimportant ways.

Example #1: Harper's new car is bright blue, has leather upholstery, and gets excellent gas mileage. Crowley's new car is also bright blue and has leather upholstery. Therefore, it probably gets excellent gas mileage, too.

Example #2: The flow of electricity through a wire is similar to the flow of water through a pipe. When water runs downhill through a pipe, the pressure at the bottom of the hill is greater than it is at the top. Thus, when electricity flows downhill through a wire, the voltage should be greater at the bottom of the hill than at the top.

Example #3: The accumulation of pressure in a society is similar to the build-up of pressure in a boiler. If the pressure in a boiler increases beyond a critical point, the boiler will explode. Accordingly, if a government represses its people beyond a certain point, the people will rise up in revolt.

The first argument, because the color of a car and the choice of upholstery have nothing to do with gasoline consumption, is fallacious. The second argument depends on the similarity between water molecules flowing through a pipe and electrons flowing through a wire. But, the causal connection that exists between difference in elevation and increase in pressure holds only for water but not for electricity. Water molecules flowing through a pipe are affected by gravity, but electrons flowing through a wire are not. Thus, the second argument is fallacious either. Too much compression of gas indeed causes the explosion of container but it is not necessary that repression causes revolt or uprising. So, the third argument is also fallacious.

C. Fallacies of presumption

Fallacies of presumption arise not because the premises are irrelevant to the conclusion or provide insufficient reason for believing the conclusion but because the premises presume what they purport to prove. The fallacies of presumption also fail to provide adequate reason for believing the truth of their conclusions. The conclusion is based on an implicit supposition of some further proposition whose truth is uncertain or implausible, or based on unwarranted (unjustifiable) assumption upon which it is based but are assumed as true. Fallacies of presumption request us their conclusion as it is or at face value.

15. Begging the Question (*Petitio Principii*)

Beginning the question literally means assuming the truth of the proposition that requires proof. It is committed whenever the arguer creates the illusion that inadequate premises provide adequate support for the conclusion by leaving out a possibly false (shaky) key premise, by restating a possibly false premise as the conclusion, or by reasoning in a circle. The shaky premise usually can't be verified as true or not, which is why it's left out, since it undermines the argument. So the arguer creates the illusion that the premise supports the conclusion when it does not. The arguer commits it when he presupposes exactly the claim he is arguing for. The argument asks us that the statement to be taken for granted beforehand. The argument either relies on a premise that says the same thing as the conclusion (which you might hear referred to as "being circular" or "circular reasoning"), or simply ignores an important (but questionable) assumption that the argument rests on. After reading or hearing the argument, the observer is inclined to ask, ''But how do you know *X*?'' where *X* is the needed support. General pattern"

1. Premises in which the truth of the conclusion is claimed or the truth of the conclusion is assumed (either directly or indirectly).
2. Claim C (the conclusion) is true.
Example #1: "Active euthanasia is morally acceptable. It is a decent, ethical thing to help another human being escape suffering through death." Let's lay this out in premise-conclusion form:

Premise: It is a decent, ethical thing to help another human being escape suffering through death.
Conclusion: Active euthanasia is morally acceptable.

If we "translate" the premise, we'll see that the arguer has really just said the same thing twice: "decent, ethical" means pretty much the same thing as "morally acceptable," and "help another human being escape suffering through death" means "active euthanasia." So the premise basically

says, "Active euthanasia is morally acceptable," just like the conclusion does! The arguer hasn't yet given us any real reasons *why* euthanasia is acceptable; instead, she has left us asking "well, really, why do you think active euthanasia is acceptable?" Her argument "begs" (that is, evades) the real question (think of "beg off").

Example #2:

 MARTHA: Of course I know that the operation was successful.
BULCHA: How do know that?
MARTHA: The doctor told me so, and he wouldn't have told me that, if it wasn't successful.   The premise and the conclusion say the same thing..
Example #3: "The word of Bible is flawless and perfect. We know this because it says so in Book of the Holy Bible that the words of bible are definitely true, infallible and should not ever be questioned". The conclusion is already included in the premise; the premise of this argument merely restates the conclusion in slightly different language.
Example #3: "Ford Motor Company clearly produces the finest cars in the United States. We know they produce the finest cars because they have the best design engineers. This is true because they can afford to pay them more than other manufacturers. Obviously they can afford to pay them more because they produce the finest cars in the United States." Since the argument goes in a circle, it has no beginning or source, and as a result it proves nothing.

16. Complex Question
It is committed when a single question that is really two (or more) questions is asked and a single answer is then applied to both questions. This argument is usually intended to trap the respondent into acknowledging something that he or she might otherwise not want to acknowledge. The desired answer is already tacitly assumed in the question. Loaded question fallacies are particularly effective at devastating rational debates because of their inflammatory nature - the recipient of the loaded question is compelled to defend themselves and may appear troubled or on the back foot. Examples:
1. Have you stopped cheating on exams?
2. Have you stopped beating your wife?
3. Where did you hide the cookies you stole?

The first question has the spirit that "Did you cheat on exams in the past? If you did cheat in the past, have you stopped now?" You were asked whether you have stopped cheating on exams. If you answer ''yes'', therefore, it follows that you have cheated in the past. If your answer is ''no'', therefore, you continue to cheat.

17. False Dichotomy or False dilemma

It is also known as ''false bifurcation'', the ''either or fallacy'', or Black & White Thinking. It is committed when a disjunctive statement presents two jointly exhaustive alternatives (two unlikely alternatives) as if they were the only available choices (as if no third alternative were possible). And the arguer eliminates the unfavorable alternative, leaving the desirable alternative as a conclusion. The arguer pretends that he /she

has tried out all possible alternatives but found only the two choices which are mutually exclusive (excluding each other), that is if one is true, and then the other is false. General pattern:

1. Either claim X is true or claim Y is true (when X and Y could both be false).
2. Claim Y is false.
    3. Therefore claim X is true.

Ordinarily this fallacy occurs when the "Either… or…" claim involved considers only extremes and fails to take a third (or the middle) choice into account

Example #1: MARTHA: Let me put it this way, BULCHA. You're either a genius or an idiot. After the balloon incident, however, I know you're no genius, it follows that you are an idiot.   **Example #2:** "Every nation in every region now has a decision to make. Either you are with us, or you are with the terrorists. From this day forward any nation that continues to harbor or support terrorism will be regarded by Ethiopia as a hostile regime." This argument ignores the possibility that a nation could be neither with Ethiopia nor with the terrorists. **Example #3:** Either you buy only American-made products or you don't deserve to be called a loyal America. Yesterday you bought a new Toyota. It's clear you don't deserve to be called a loyal American. But, the person may still be a very loyal citizen.

18. Suppressed Evidence

It occurred when the premises ignore some important piece of evidence that outweighs the presented evidence and entails a very different conclusion. The Arguer ignores or hides important evidences or clues that require a different conclusion in order to draw the conclusion that is more favorable to the arguer. The evidence left out typically would support a different conclusion than the one given. It is a tendency to look only for evidence in favor of one's position and not look for disconfirming evidences. The arguer omits out, de-emphasizes or overemphasizes information or evidence which is suspected of being significant and relevant but which will count against his own conclusion.

Example #1: Most dogs are friendly and pose no threat to people who pet them. Therefore, it would be safe to pet the little dog that is approaching us now.   The arguer ignores the fact that the little dog may be excited and foaming at the mouth which can cause rabies.

Example #2: "This tablet is very small, beautifully shaped and it smells good. So, it is good if I give it to my child."   Here the arguer fails to show the danger of giving medical tablet for children without doctor's prescription.

Example #3: Used car salesman: "This car is a great value. It's clean and has low mileage."   The salesman may not be telling you that the car had been in a serious crash.

D. Fallacies of ambiguity

The conclusion depends on some kind of linguistic ambiguity: an expression is ambiguous if it is susceptible to different interpretations in a given context. It is the result of misuse of language or grammatical structure.

19. Equivocation

To equivocate means, literally, to speak in more than one voice. It occurs when the conclusion of an argument depends on the fact that a word or phrase is used, either explicitly or implicitly, in two different senses a context in which validity requires a single meaning of that word (or phrase). Word ambiguity (Equivocation) occurs when a word can be taken in more than one sense (there is a semantic ambiguity), or when it is unclear to what a word refers. More specifically, equivocation occurs when the conclusion of an argument relies on the shift in sense of a word from one premise to another, or from the premise to a conclusion.

Example #1: "Some triangles are obtuse. Whatever is obtuse is ignorant. Therefore, some triangles are ignorant." The word ''obtuse'' is used in two different senses. In the first premise it describes a certain kind of angle, while in the second it means dull or stupid.

Example #2: "Any law can be repealed (revoked) by the legislative authority. But the law of gravity is a law. Therefore, the law of gravity can be repealed by the legislative authority."
The argument equivocates on the word ''law.'' In the first premise it means statutory law, and in the second it means law of nature.

Example #3: "Giving money to charity is the right thing to do. So charities have a right to our money." The equivocation here is on the word "right": "right" in the premise can mean something that is correct or good and something to which someone has a claim in the conclusion.

Example #4: All men are created equal. Since women are not men, women are not created equal with men. The word "men" is used in two senses: the first use the word "men" refers all human being and the second use of the word "men" refers only male human beings.

20. Amphiboly

Grammatical ambiguity (Amphiboly) takes place when **sentence structure** is flawed. The conclusion depends on an incorrect interpretation of ambiguous statement (misinterpretation of the sentence's meaning) made by someone other than the arguer. The syntactical ambiguity usually arises from a mistake in grammar or punctuation—a missing comma, a dangling modifier, an ambiguous antecedent of a pronoun, or some other careless arrangement of words. The structure of the sentence allows two different interpretations. It is the result of error in grammatical construction. Like equivocation, amphiboly turns on ambiguity. The difference is that amphiboly turns on ambiguity in <u>sentence structure</u> not in vocabulary.

Example #1: John told Henry that he had made a mistake. It follows that John has at least the courage to admit his own mistakes. In The argument the pronoun ''he'' has an ambiguous antecedent; it can refer either to John or to Henry. Perhaps John told Henry that *Henry* had made a mistake. OR
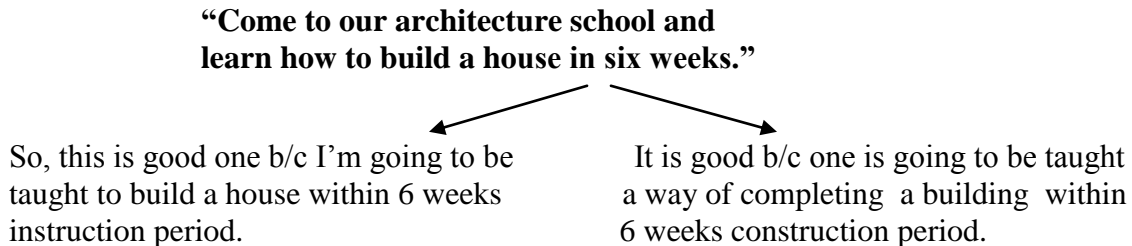
John told Henry that he made a mistake,

So, John has the courage   So, John blames Henry
to admit his own mistake.   and is confronting him.
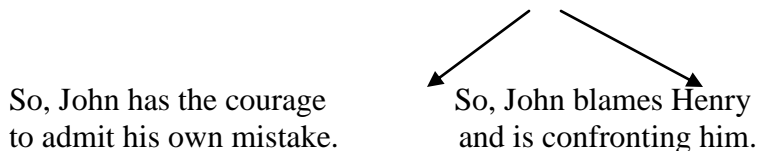
Example #2: "The tour guide said that standing in Greenwich Village, the Empire State Building could easily be seen. It follows that the Empire State Building is in Greenwich Village." It is not clear whether it

is the observer or the Empire State Building that is supposed to be standing in Greenwich Village. The correct interpretation is the former.

Example #3: A television advertisement says: **"**Come to our architecture school and learn how to build a house in six weeks." It is not clear that the phrase "learn how to build a house in six weeks" is to mean six weeks **construction period or instruction period**. Or

**"Come to our architecture school and
learn how to build a house in six weeks."**

So, this is good one b/c I'm going to be taught to build a house within 6 weeks instruction period.

It is good b/c one is going to be taught a way of completing a building within 6 weeks construction period.

Example #4: "Research on virus harming pregnant women will be delivered. So, this research on virus must be banned." What the premise is saying is not clear: is it to mean a research on a virus that hurts pregnant women should be stopped or the research done on virus harms pregnant women.

E.   Fallacies of Grammatical Analogy

A defective argument appears to be good as a result of its being grammatically similar to another argument that is not fallacious but, there is only similarity in linguistic structure. It is caused by the presumption of analogy of attributes of the whole entity and its parts, that is, either giving the characteristics of the whole to the parts or vice versa.

21. Composition

It is committed when the conclusion of an argument depends on the erroneous (Unjustified) transference of an attribute from the parts of something onto the whole, or involves moving illegitimately from claims about parts or individuals to claims about the whole or the group. When a property belongs to all the members of a class (or all the parts of a whole), it is thought to apply to the class itself. **General Pattern:**

Since each and every member of the class has some property A, it follows that the class itself has property A.
Example #1: Each atom in the table is invisible to the naked eye. Therefore, the table is invisible.
Example #2: Selfishly pursuing only one's own desires is the best way for the individual to achieve what they want. Therefore, selfish pursuit of each individual's desires is the best way to achieve what the society wants.
Example #2: Sodium and chlorine, the atomic components of salt, are both deadly poisons. Therefore, salt is a deadly poison.

22. Division

It takes place when the conclusion of an argument depends on the erroneous (illegitimate)   transference of an attribute from a whole (or a class) onto its parts (or members). It is the transferring of attributes of wholes to its parts; mistaking properties of the parts for properties of the whole.

General pattern: The group or class has some property, A. Therefore, the individual member of the group or class has that same property, A.

Example #1: America is a wealthy country. Bill Smith is an American; therefore, he is wealthy.
Example #1: The team is excellent. Therefore each member of the team is excellent.
Example #1: This perfume smells great. Therefore, each of the ingredients in the perfume will smell great.

Chapter Four: Syllogistic Logic

It is a deductive logic in which the premises begin with **categorical words** such as 'All', 'No' and 'some', and its subject content is categorical proposition and categorical syllogism. Categorical proposition is a part of **deductive reasoning** that contains two categorical terms, the subject and predicate terms, and affirms or denies. **Category refers to class of similar things. The subject term is any categorical term which is stated by referring to the other class term, that is, what the proposition is about. The predicate term is any categorical term that serves as a reference for the subject term, that is, what the proposition affirms or denies about the subject term**. In other words, a categorical proposition joins together exactly two categorical terms and asserts that some relationship holds between the classes they designate. Thus, for example, "All cows are mammals" and "Some philosophy teachers are young mothers" are categorical propositions whose subject terms are "cows" and "philosophy teachers" and whose predicate terms are "mammals" and "young mothers" respectively.

Components of Categorical Proposition

Any standard form categorical proposition has one of the following forms, and there are four kinds of categorical proposition based on their quantity quality and distribution, and are named A, E, I &O for convenience.

A: All S are P   e.g. All men are pigs.

E: NO S are P   e.g. No women are servants

I: Some S are P   e.g. Some guys are jerks

O: Some S are not P   e.g. Some people are not believers

The four components of categorical proposition are:

A**. Quantifie**r refers to the amount of the members of the subject class that are used in the proposition. It specifies "How much" or "How many" members of the subject class are included in or excluded from the class of the predicate. In the above categorical propositions, the word "All", "Some" and "No" are called quantifiers.

B. **Copula** refers to words that joined together the subject and the predicate terms. The word "are" and "are not" are called **copulas.**

C**. The subject term**: the word "men", "women", "guys" and "people" are the subject terms in the above examples.

D. **The predicate term**: the word "pigs", "Servants", "jerks" and "believers" are the predicate terms in the above examples.

There are two types of **quantative proposition**: Universal and Particular. If the proposition refers to all members of the subject or the predicate class, it is universal. It asserts that the whole subject class is included in or excluded from the class of the predicate. If the proposition does not employ all members of the subject class, it is particular. It asserts that at least one (part) of the subject class is included in or excluded from the predicate class.

There are two types of qualitative propositions: affirmative and negative. **Quality** refers to whether the proposition affirms or denies the inclusion of the subject class with in the class of the predicate. It tells us that the entire or part of the member of subject class is included in or excluded from the predicate class. Affirmative proposition asserts that the whole or part of the subject class is included in the predicate class. Negative proposition asserts that the whole or part of the member of the subject class is excluded from the class of the predicate. Examples:

A. complete inclusion:"All people are good beings." A

B. Complete exclusion:"No people are good beings." E

C. partial inclusion: "Some people are good beings." I

D.partial exclusion:"Some people are not good beings." O

✓ A and E are universal propositions

✓ I and O are particular propositions

✓ A and I are affirmative proposition

✓ E and O are negative proposition

Distribution refers to whether all or some members of a class are affected by the proposition. If all members of a class are affected by the proposition, then that class is distributed. Thus, if a statement asserts something about every member of the "S" class, then S is distributed; if it asserts about every member of the P class, then P is distributed and P are undistributed. In nutshell, a **distributed** term is a term of a categorical proposition that is used with reference to every member of a class. If the term is not being used to refer to each and every member of the class, it is said to be **undistributed** .The quality of E proposition is determined by its quantifier and the quality of A, I and O propositions is determined by their copula.

An **"A"** proposition distributes the **subject class**. For instance , "**All dogs are mammals**" asserts that Every member of the "class of dogs" is included in the class of mammals but it would be false to say that all mammals are dogs . Since all dogs are included in the class of mammals and all members of the class dogs affected by the proposition, dog is said to be distributed. But, it is not the case that all members of the class of mammals are affected by the proposition and, hence, the class of mammals is undistributed. Therefore, the predicate class is **undistributed** in "A" proposition.

An "**E**" proposition distributes bidirectionally between the subject and the predicate class. Example: **No beetles are mammals**. Since all beetles are defined not to be mammals and all mammals are defined not to be beetles, both the class of beetles and mammals are affected by the proposition. In other word, the whole class of beetles is excluded from the class of mammals implies that the entire class of mammals is excluded from the class of beetles. Hence, both classes, that is, class of beetles and mammals are distributed, and both the subject and predicate class are distributed.

In an "**I**" proposition both the subject and predicate terms are *undistributed.* Example: **Some Ethiopians are Conservative**. Neither class is wholly included in the other class; neither the entire class of Ethiopians nor the entire class of Conservative is affected by the proposition. It is not possible to say that all Ethiopians are Conservative, or all Conservatives are Ethiopians. Some Ethiopians are Conservative tells us that some members of the class of Ethiopians are also the members of the class of Conservatives. Both the class of Conservative and Ethiopians are not distributed. Therefore, neither the subject nor the predicate term is distributed.

An "**O**" proposition distributes only the predicate class. For example, in the proposition "**some politicians are not corrupt**", the members of the subject class is not wholly included in the predicate class; it says nothing about "all" politician but refers to some members of the class of politicians is excluded from the whole of the corrupt people .All politicians are excluded from some corrupt people. Each and every member of the class of **corrupt** people is distinct and separate from the class of **politicians**. The entire member of corrupt people is affected by the proposition but not the entire member of politicians. The term "corrupt people" is distributed but not the term politicians. Hence, an "O" proposition distributes its predicate term.

To sum up, for the subject to be distributed, the proposition must be universal; particular propositions don't distribute their subjects. Thus, the quantity of any categorical proposition determines whether its subject is distributed. For the predicate to be distributed, the statement must be negative. Negative propositions distribute their predicate terms but affirmative propositions don't distribute their predicate terms. Thus, the quality of any categorical proposition determines whether its predicate is distributed. **The following table summarizes the aforementioned idea**.

Name	Form	Quantity	Quality	Distribution	
				Subject	Predicate

A	All S are P	Universal	Affirmative	Distributed	Undistributed
E	No S are P	Universal	Negative	Distributed	Distributed
I	Some S are P	Particular	Affirmative	Undistributed	Undistributed
O	Some S are not P	Particular	Negative	Undistributed	Distributed

Diagramming Categorical Proposition

Venn diagram is the **logical geography** of the standard form of any categorical proposition. Diagramming categorical proposition is useful to show the relation of the two classes stated in the proposition, and the valid arguments of immediate inferences. ***Immediate inference is a deductive argument in which the conclusion is directly drawn from the given one premise.*** In Venn diagram, each one of the four propositions is represented by ***two overlapping circles***. To this effect, three kinds of marks are used: Empty circle, shading an area and placing an "X" mark in an area.

1. An *empty circle* is used to represent a subject class or a predicate class and is generally so labeled with an **S** or a **P**. The area inside the circle represents members of the class in question, *if there are any*. The area outside the circle represents all other individuals (the complementary class) if there are any.

2. *Shading* or many parallel lines are used to indicate areas which are known to be empty. *I.e.*, there are no individuals existing in that area. *Shading* an area means that the shaded area is empty. Shading is always used to represent the content of universal propositions.

3. The third symbol used is an "*X*" which represents "at least one" or "some" individual exists in the area in which it is placed. The diagram to the right indicates "something." Placing an "X" in an area is always used to represent the content of particular propositions.

4. If no mark appears in an area, this means that nothing is known about that area; it may contain members or it may be empty.

The four types of proposition are interpreted as follows to simplify the idea.

All S are P means no members S are outside P, or all Ss are included in P class.

No S are P means no members of S are inside P, or all Ss are outside P class.

Some S are P means at least one S exists, &that S is a P

Some S are not P means at least one S exists, &that S is not P

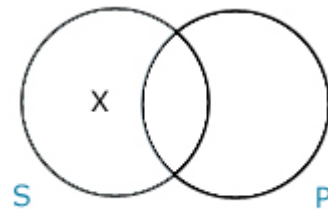All S are P(**A**)   No S are P(**E**)
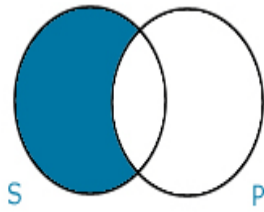
Nothing exists in the part of S circle

that lies outside the P circle

No members of S are outside P

*Some S are P (**I**)*
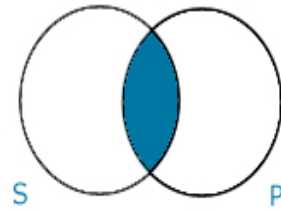
Nothing exists that is both S and P

No members of S are inside P and

the intersection area is empty.

*some S are not P(**O**)*
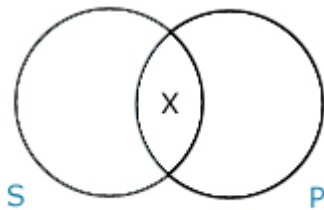
At least one S exists, &that S is a P

, depicted by placing an X in the

intersection area.

At least one S exists, &that S is not a P,

depicted by placing an X in the part

of the S circle that lies outside the

P circle.

Successive Immediate Inferences: Two types

1. Immediate inferences of conversion, Obversion and contraposition

2. Immediate inferences of the square of opposition

Immediate inference is an argument that has one premise and one conclusion, that is, the conclusion is directly drawn from the given one premise. The operation of conversion, obversion and contraposition are applied on the four categorical propositions to yield new categorical propositions that may or not have the same meaning and truth value of the original proposition; such operation is used to produce immediate inference or argument.

Conversion: Any categorical proposition is the new categorical proposition that results from putting the predicate term of the original proposition in the subject place of the new proposition and the subject term of the original in the predicate place of the new.

Proposition	Name	Converse
All *A* are *B*.	**A**	All *B* are *A*.
No *A* are *B*.	**E**	No *B* are *A*.
Some *A* are *B*.	**I**	Some *B* are *A*.
Some *A* are not *B*.	**O**	Some *B* are not *A*.

Thus, for example, the converse of "No dogs are felines" is "No felines are dogs," and the converse of "Some snakes are poisonous animals" is "Some poisonous animals are snakes."

Conversion grounds an immediate inference for both *E* and *I* propositions That is, the converse of any *E* or *I* proposition is true if and only if the original proposition was true. An A and O propositions, and their converse are logically undetermined or inequivalent. Two propositions are said to be logically equivalent when they necessarily have the same truth- value. Generally speaking, however, conversion doesn't hold for *A* and *O* propositions: it is entirely possible for "All dogs are mammals" to be true while "All mammals are dogs" is false, for example, and for "Some females are not mothers" to be true while "Some mothers are not females" is false. Thus, conversion does not warrant a reliable immediate inference with respect to *A* and *O* propositions.

Obversion

In order to form the ***obverse*** of a categorical proposition, we replace the predicate term of the proposition with its complement and reverse the quality of the proposition, either from affirmative to negative or from negative to affirmative or vice versa. That is, the obverse of any given proposition has the opposite quality of the given proposition. For example, the obverse of the E proposition is an A proposition and vice versa, and the obverse of an I proposition is an O proposition and vice versa. **The Complement** is the group consisting of everything outside the given class. The complement of a term can be formed by adding the prefix "Non" before the given term, and, hence, the complement of the term "dog" is "non-dog".

Proposition	Name	Obverse
All *A* are *B*.	**A**	No *A* are non-*B*.
No *A* are *B*.	**E**	All *A* are non-*B*.
Some *A* are *B*.	**I**	Some *A* are not non-*B*.
Some *A* are not *B*.	**O**	Some *A* are non-*B*.

Thus, for example, the obverse of "All ants are insects" is "No ants are non-insects"; the obverse of "No fish are mammals" is "All fish are non-mammals"; the obverse of "Some musicians are males" is "Some musicians are not non-males"; and the obverse of "Some cars are not sedans" is "Some cars are non-sedans."

Obversion is the only immediate inference that is valid for categorical propositions of every form. In each of the instances cited above, the original proposition and its obverse must have exactly the same truth-

value, whether it turns out to be true or false. In short, **any categorical proposition logically implies the truth value of its obverse**, that is, the given proposition and its obverse have identical truth value and can not have different truth value For example, it should be clear that the A proposition "All roses are flowers" is logically equivalent in truth-value to the E proposition "No roses are non-flowers," and vice versa.

Contraposition

The contrapositive of any categorical proposition is the new categorical proposition that results from putting the complement of the predicate term of the original proposition in the subject place of the new proposition and the complement of the subject term of the original in the predicate place of the new.

Proposition	Name	Contrapositive
All *A* are *B*.	**A**	All non-*B* are non-*A*.
No *A* are *B*.	**E**	No non-*B* are non-*A*.
Some *A* are *B*.	**I**	Some non-*B* are non-*A*.
Some *A* are not *B*.	**O**	Some non-*B* are not non-*A*.

Thus, for example, the contrapositive of "All crows are birds" is "All non-birds are non-crows," and the contrapositive of "Some carnivores are not mammals" is "Some non-mammals are not non-carnivores."

Contraposition is a reliable immediate inference for both *A* and *O* propositions; that is, the contrapositive of any *A* or *O* proposition is true if and only if the original proposition was true. Thus, in each of the pairs in the paragraph above, both propositions have exactly the same truth-value. In general, however, contraposition is not valid for *E* and *I* propositions: "No birds are plants" and "No non-plants are non-birds" need not have the same truth-value, nor do "Some spiders are insects" and "Some non-insects are non-spiders." Thus, contraposition does not hold as an immediate inference for *E* and *I* propositions.

Summary

1. Conversion: Switch Subject and Predicate.
2. Obversion: Change Quality and replace predicate with its Complement. Contraposition: Convert Proposition then replace Subject and Predicate with Complements

Symbol	Proposition	Conversion	Obversion	Contraposition
A	All S are P.	All P are S. **Invalid**	All S are not non-P. **Valid**	All non-P are non-S. **Valid**
E	No S are not P.	No P are not S. --**Valid**	All S are non-P. **Valid**	No non-P are not non-S-- **Invali**
I	Some S are P.	Some P are S.-- **Valid**	Some S are not non-P--**Valid**	Some non-P are non-S --**Invali**
O	Some S are not P	Some P are not S -- **Invalid**	Some S are non-P**. Valid**	Some non-P are not non-S--**Val**

Testing arguments for validity: Three Steps

1. Symbolize the argument.

 2. Determine which of the three new moves: conversion, contraposition or obversion has taken place between the premise and conclusion of the argument.

 3. If the move is a legal move, then the argument is valid. If the move is illegal/illicit, the argument is invalid. When a move is applied to a statement according to the rules of conversion, obversion and contraposition, it is called a **legal move**.

❖ **When you make a legal move, statements keep/retain their originally truth values, that is,** the beginning statement and the statement generated after making the move are said to be **logically equivalent** (i.e., this indicates both statements mean the same thing).

❖ When a move is applied to a statement and violates one of the rules, it is called an **illegal/illicit move** and the truth value for the resulting statement will be **undetermined** (i.e., the beginning statement and the statement generated after making the move have different truth value).

Examples of immediate arguments of conversion

1. No human beings are pigs". It follows that "No pigs are human beings. :(It is an "E" proposition)

❖ The relation b/n the premise (P) and conclusion (C) is conversion.
❖ The P is true, and the C is true, so the move is legal or correct. The argument is valid
2. "Some roses are flowers."Therefore, "Some flowers are roses." : (It is an "I" proposition)
❖ The relation b/n the premise (P) and conclusion (C) is conversion.
❖ The P is true, and the C is true, so the move is legal or correct. The argument is **valid**
3. All men are mortal, it follows that all mortal are men.   : ("A "proposition)
❖ The relation b/n the premise (P) and conclusion (C) is conversion.
❖ The P is true, and the C is false, so the move is illegal or incorrect. So, the argument is invalid and commits the fallacy of **Illicit conversion.**
4."All humans are men, consequently all men are humans."   ("A "proposition)
❖ The relation b/n the premise (P) and conclusion (C) is conversion.
❖ The P is false, and the C is true, so the move is illegal or incorrect b/c the P and the C have different truth value. So, the argument is invalid and commits the fallacy of **Illicit conversion.**
4. "Some animals are not dogs. Therefore, some dogs are not animals." "(It is an 'O' proposition)
❖ The relation b/n the premise (P) and conclusion (C) is conversion.
❖ The P is true, and the C is false, so the move is illegal or incorrect b/c the P and the C *have* different truth value. So, the argument is invalid and commits the fallacy of **Illicit conversion.**

E&I propositions and their converse are logically equivalent and A &O propositions and their converse are not logically equivalent.

   Examples of immediate arguments of obversion

1. All horses are animals, it follows that No horses are non-animals
❖ *P is "A" proposition ,and   is true*
❖ *C is "E" proposition, and   is true. So, the move is legal and the argument is valid.*
2. Some Lions are not mammals. It implies that Some Lions are non-mammals.

❖   P is "O" proposition ,and is False
❖   C is "I" proposition, and is False. So, the move is legal and the argument is valid.

3. No politicians are educated people, so all politicians are non-educated people
❖   P is "E" proposition ,and is False
❖   C is "A" proposition, and is False. So, the move is legal and the argument is valid.

4. Some runners are Ethiopians. So, some runners are not non-Ethiopians.
❖   P is "I" proposition ,and is true
❖   C is "I" proposition, and is true. So, the move is legal and the argument is valid.

All categorical statements are logically equivalent to their obverses.

Examples of immediate arguments of contraposition

1. No dogs are cat. Therefore, no non-cats are non-dogs
❖   P is "E" proposition ,and is true
❖   C is False. So, the move is illegal and the argument is invalid.

2. Some animals are non-cats .it fallows that some cats are non-animals
❖   P is "I" proposition ,and is true
❖   C is False. So, the move is illegal and the argument is invalid. Both arguments commit the fallacy of **Illicit contraposition**

3. All goats are animals, so all non-animals are non-goats
❖   P is "A" proposition ,and is true
❖   C is true. So, the move is legal and the argument is valid

4. Some human beings are not professional firefighters. This implies that some non-professional firefighters are not non-human beings
❖   P is "O" proposition ,and is true
❖   C is true. So, the move is legal and the argument is valid

A &O propositions and their contrapositives are logically equivalent and E&I propositions and their contrapositives are not logically equivalent

The Square of Opposition: Traditional and Modern

The Square of Opposition is a diagram specifying the logical relation of categorical propositions, and a study in equivalences of truth functional-relation. Classical and modern logicians have different standpoint *on whether universal categorical propositions (A&E) have existential import, that is, the subjects of universal propositions imply actually existing things.* A statement has existential assumption when its truth depends on evidence for the existence of things in a certain category. In other words, a proposition

has existential import if it implies that some class is not empty, that is, there is at least one member of the class.

The Traditional Square of opposition, which is Aristotelian standpoint, *asserts that universal propositions about existing have existential import.* The classical square of opposition presupposes that the terms of any categorical proposition have referents, that is, the classes of things referred to by the subject and the predicate terms of categorical proposition were non-empty. The modern square of opposition, which was developed by George Boole, holds that universal propositions (A&E) necessarily lack existential import.

Form Aristotelian standpoint, "all bears are blue" implies that bears actually exist and "no red cars are blue" implies red cars exist. So, A & E have existential import. From Boolean interpretation, "all people are happy" does not imply people actually exist, and "no dogs are cats" does not entail the exite4nce of actual dogs. So, A & E don't have existential assumption. The idea behind Boolean interpretation as lacking existential import is that:

A&E are conditionals: the do assert the existence of any Ss; All S are P becomes if there are any Ss ,then they are P, and No S are P becomes if there are any Ss ,the they are not P. For instance, "all dogs are mammals" implies that if there are dogs in the universe, then they are mammals; it is a kind of hypothetical assertion but not a complete or absolute assertion about the existence of real dogs in the universe. What is real is only particulars but universals don't have existence.

Universal claims about **empty denotations (sets)** are all trivially or dimly true because there are no falsifying instances or counter examples that make false the truths of universal categorical propositions. "All irrational prime numbers are odd" is true because there are no irrational prime numbers, and "All irrational prime numbers are even" is true for there are no irrational prime numbers. Both "All unicorns are mammals" and "No unicorns are mammals" are trivially true since there are no unicorns that prove or disprove whether unicorns are mammals or not. So, a universal conditional whose subject class empty is true.

However, *I&O propositions have existential import, both in Aristotelian and Boolean standpoint, since they assert that the classes designated by their subject terms can't be true.* The proposition "Some S are P" entails that there is at least one S exists and that S is a P and "some S are not p" implies that there is one S and that S is not a P. Therefore, particular propositions assert the existence of S class denoted by the term. For example, "some bats are mammals" implies actually existing bats in the universe.

Traditional Square of opposition shows the logical relations among the four types of categorical propositions, and allowed the truth value of one proposition to be determined on the basis of the truth value of another. Such truth–functional relations give rise to four types of immediate inferences. Therefore, there are four kinds of logical oppositions in the traditional square of opposition.

Traditional Square

Contraries cannot both be true.
Subcontraries cannot both be false.
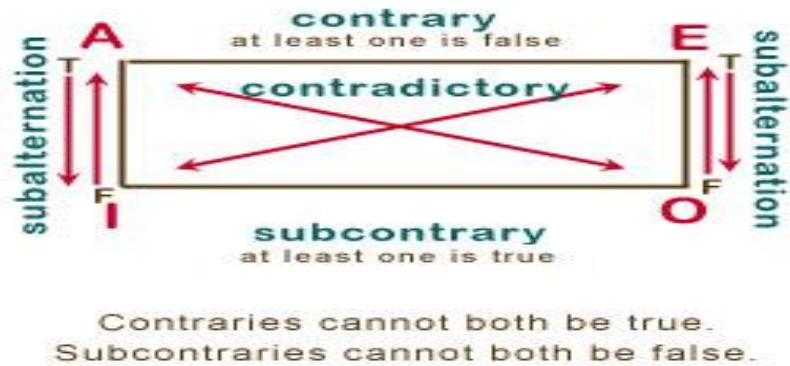
Contradictory =opposite truth value
Subalternation= truth flows downward; falsity flows upward

While contrary is the relation between universal affirmative and universal negative, subalteration is the opposition of particular affirmative and particular negative propositions.

1. **Contradictories**: two propositions are contradictory if one is the denial or the negation of the other, that is, they can't be both true at the same time and can't be both false at the same time. A&O are contradictory, as are E &I. One of the pair must be true and the other must be false. If "all dogs are animals" is true, then "some dogs are not animals" must be false or vice versa.

2. **Contraries**: two propositions are contrary if they can't be true but they can both be false. A &E are contrary; "All dogs are animals" and "No dogs are animals" can't both be true at a glance. If one of the universal proposition (, that is, the premise) is given as true, then the next proposition (, that is, the conclusion) will be automatically false.

If one of the universal proposition (, that is, the premise) is given as false, then the next proposition (, that is, the conclusion) will be *logically undetermined*, either be true or false depending on conditions, and the immediate argument will be invalid. Examples:

 No drinking water are chlorinate (false): E   **both have the**
Therefore, all drinking water are chlorinate (false): A   *same truth value*

No mammals are animals (false): E   **they have**
  So, all mammals are animals (true): A   **different** *truth value*

This implies that if the premise is false, the truth value of the conclusion is undetermined. So, the above examples are **invalid**,and commit the fallcy of *Illicit contrary.*

All politicians are human beings (true):   A

So, No politicians are human beings (false): E   This argument is valid because it fulfills the rule of contrary that *at least one is false, both can't be both true and the premise should be true for the argument to be valid.*

3**. Subcontraries**: two propositions are subcontrary if they can't be both false, but can be both true. I &O are subcontrary; some athletes are human and some athletes are not humans can't be false at the same time. If the first proposition (the premise) is given as false, then the corresponding proposition (the conclusion) will be true.

If the first proposition (the premise) is given as true, then the corresponding proposition (the conclusion) will be **logically undetermined**, either be true or false depending on conditions, and the immediate argument will be invalid. Examples:

Some birds are not mammals (true): O   -- both **have the**
 So, some birds are mammals (true): I   *same truth value*

Some dogs are not cats (true): O   -- **they have**
   Therefore, some dogs are cats (false):   **different** *truth value*

   Some women are mothers (true): I   -- **both have the**
    Therefore, some women are not mothers (true): O   *same truth value*

This implies that if the premise is true, the truth value of the conclusion is undetermined. So, the above examples are **invalid**, and commit *Illicit subcontrary.*

Some murderers are good citizens (false): I

Therefore, some murderers are not good citizens (true): O.   This argument is valid because it fulfills the rule of contrary that *at least one is true, both can't be both false and the premise should be false for the argument to be valid.*

4. **Subalternation:** subalterns are different sort of "opposition", because   sub- alternation does not imply a contradiction at all, and subalterns are the same in quality but different in quantity.   Propositions are subalternates:

❖   When "True" truth-value flows downward from universals to particulars, the corresponding particular propositions become true.

❖   When "False" truth-value flows upward from particulars to universals, the corresponding particular propositions become false.

❖   Subalternates would have undetermined truth-value when the above rules are violated, that is, when A is false—I will be undetermined; when I is true—A will be undetermined. The same is true for E &O.

           Examples:

All students are learners (true):A   truth flows downward

Therefore, some students are learners (true); I

Some Christians are Muslims (false): I
So, All Christians are Muslims (false): A   falsity flows upward

Some plants are not producing (false): O
So, No plants are producing (false): E   **Since the move is legal, the above arguments are valid.**

No women are educated (E): false
Therefore, some women are not educated (O): true

Some officials are corrupt (I): true
So, all officials are corrupt (A): false.   These arguments are invalid because the move from premises to the conclusions is illegal/illicit, and therefore commit the fallacy of *Illicit sub- alternation.*

   Testing immediate inferences using the traditional square of opposition only

Three Steps:
1. Assume premise is true *except you see the phrase that "it is false..."*
2. Determine the type of relation that exists between the premise and conclusion.
3. using the basic relations from the traditional square of opposition, deduce the remaining truth values if possible.
4. If the move is a legal move, then the argument is valid. If the move is illegal/illicit, the argument is invalid.
Three Fallacies: these fallacies occur when arguments ask us to violate the relational rules in the traditional square.
1. **Illicit contrary:** argument tries to use an invalid application of the contrary relation.
2. **Illicit subcontrary:** argument tries to use an invalid application of the subcontrary relation.
3. **Illicit subalternation:** argument tries to use an invalid application of the subalternation relation.
Examples:

It is false that all A are B   Invalid: Illicit contrary
Therefore, no A are B

Some A are B   Invalid: Illicit subcontrary
Therefore, it is false that some A are not B

It is false that All A are B   Inavalid: Illicit subalteration
Therefore, some A are B

The Modern Square of Opposition: **Modern Logic: Existential Import:**

Universal is always interpreted as Hypothetical (CONDITIONAL) or as existentially neutral: All men are mortal implies If there is such a thing as a man, that thing is mortal.

The Particular is assumed to have EXISTENTIAL IMPORT: Some men are mortal = There exists a thing and that thing is a man and that thing is mortal.

N.B: Two Ways of Interpreting Universal Categorical Propositions

1. Aristotelian: things actually exist in all propositions

2. Boolean: no assumptions about existence:

If universal propositions lack existential import, Only Contradiction remains valid in the modern square of opposition. Aristotelian and Boolean differ only in regard to A and E propositions. For I and O propositions, there is a positive claim about existence (things actually exist)from both Aristotelian and Boolean standpoints.
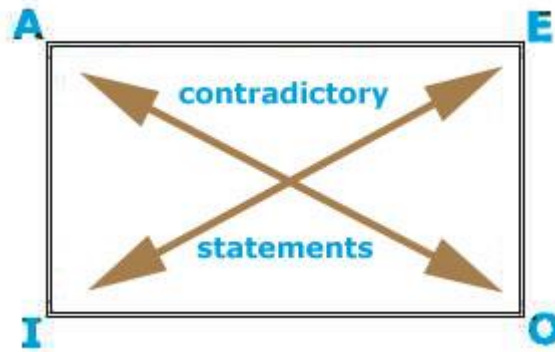
Only contradictory relation survives in Boolean standpoint: the relation of contrary, subcontrary and sub alternation are invalid in the modern square of opposition.

Modern Square of Opposition: Contradictories

In some cases, there are propositions that cannot both be true and both be false. Propositions that have this relationship are called **contradictories**.

Example: *A* and *O*:

If you accept the O *proposition "Some bread is not nutritious," then you cannot also accept the* A *proposition, "All bread is nutritious," and vice versa. They cannot both be true.*

O *and* A *cannot both be false. The only way for* A *to be false is for there to be at least one* S *that is not* P *(some bread that is not nutritious), and in that case* O *is true. Similarly, the only way for* O *to be false is for there to be not even one* S *that is not* P *(not even some bread that is not nutritious), and in that case all* S *are* P *(all bread is nutritious) -- the* A *proposition is true.*

Example: *E* and *I*:

E *and* I *are also contradictories. They cannot both be true and they cannot both be false. If it is false that no bread is nutritious, that could only be because at least some bread is nutritious, in which case* I *is true. On*

the other hand, if I *is false, that means not even one* S *is* P*, and thus it would be true to say that no* S *is* P -- E *would be true.*

***Thus, the modern square of opposition invalidates the* of contrary, subcontrary and sub alternation are invalid in the modern square of opposition.**

Subalternation and the Modern Square of Opposition

If the *I* proposition, "Some *S* are *P*" implies the existence of *S*s, while the corresponding *A* proposition does not, then the truth of the *A* proposition does not imply the truth of the corresponding *I*. The same is true for *E* and *O*. In other words, subalternation must be removed from the square.

Subcontrary and the Modern Square of Opposition

Two statements are subcontraries if, by virtue of their logical form, they could both be true but could not both be false. However, if no *S*s exist, then both particular statements are false. *I* and *O* no longer fit the definition of subcontraries. Thus, subcontrary must be removed from the square.

Contrary and the Modern Square of Opposition

Since neither of the universal statements have existential import, then they are both true in the case where there are no *S*s. Thus, *A* and *E* are no longer contraries. Contrary must, then, be removed from the square.

Testing immediate inferences from Boolean Standpoint: Two ways

      A. by the modern square of opposition   B. by Venn diagram

  A. by the modern square of opposition

1. Symbolize the argument.
2. Draw a small square.
3. Assume the premise as true if the is no the phrase "it is false that…"
4. Plot the truth value given for the premise and deduce the truth value of the conclusion by using the modern square.
5. If the square indicates the conclusion is true then the argument is valid: if not the argument is invalid.

Examples

Some T are not M   it is false that All T are M

a. First identify the type of proposition of the premise and the conclusion   ⇌O & C=A
b. Insert them in the small square if the conclusion became true, it is valid.

Given the premise true, by contradictory relation, the conclusion is false. Since we are told that the conclusion (A proposition) is false, this falsity makes true the "False" truth value of the conclusion that we derived by contradictory relation. "F" is the truth value of A that is derived from contradictory relation.

A: T
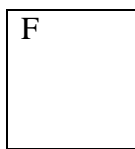
```
┌─────────┐
│ F       │
│         │
│         │
└─────────┘
      O: T
```

This square indicates that the conclusion is true and, by definition, therefore, the immediate inference is valid.

B. by Venn diagram

A Venn diagram is an analytical tool used to display the logical relations in the categorical proposition. The conventional symbols of Venn Diagrams that we have discussed are:
1. Drawing 2 intersecting circles to represent any proposition' subject and predicate terms.
2 Shading out an area represent the fact that **no individuals can be included** in the category.
3. Using an X to indicate Individuals.
Process for testing arguments for validity with Venn diagrams:
1. Determine the letter names for both the premise and conclusion statements.
2. Draw a Venn diagram for the premise.
3. Draw a Venn diagram for the conclusion.
4. What to do when you have a false statement: When you have a statement that begins with the phrase "it is false that..." draw the diagram for the contradictory proposition of that statement. For example, if you have an A statement, "It is false that all S are P." [A statement false], draw the Venn diagram for the statement, "Some S are not P." [O statement True]

GIVEN STATEMENT	DIAGRAM TO DRAW
False A	**O**
False E	**I**
False I	**E**
False O	**A**

5. If the two diagrams (the premise and conclusion diagrams) express the same information (, that is, they are alike or identical), then the argument is valid; if not the argument is invalid. Example

Some T are not M   it is false that All T are M

The premise and conclusion are O &A propositions. "A" is given as false; therefore, we draw for it the diagram of an O proposition.
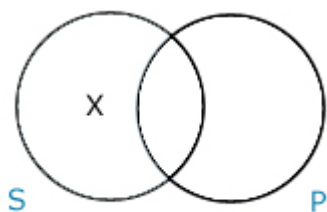
The premise diagram: S stands for T   **the conclusion diagram: S stands for T**

and P stands for M ; it is an O proposition   **and P stands for M; it is an "A" proposition since A is given as false we do just the opposite of it, That is, the Venn circle of O proposition.**

Then evaluate whether the premise and conclusion diagrams contain the same information: if they do, the argument is valid; if not the argument is invalid. But, these diagrams read the same thing, that is, what is asserted in the conclusion is already asserted in the premise. The definition of valid argument is that the premise must support the conclusion, or the premise must assert at least as much as the conclusion does. The above argument fulfills the requirement. Therefore, the argument is valid as we have tested it through the square of opposition.

Example

All S are P, it follows that No S are P

Premise=A proposition   Conclusion=E proposition
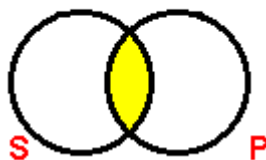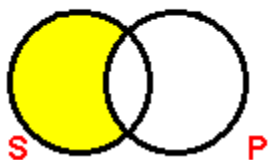
The premise and conclusion diagrams read different information. The premise Venn circle says all members of S are included in the members of P class, but that of the conclusion says no members of S are included in the P class. By **definition, the immediate inference is invalid**.

Testing immediate inferences through Venn Diagrams from the Traditional Standpoint

The difference between the Boolean standpoint and Aristotelian standpoint concerns only universal (A&E) propositions. From Boolean standpoint, univerasal propositions have no existential import, but from Boolean standpoint they do have existential import when their subject terms refer to actually existing things. If we are to construct a Venn diagram to represent the existential import implied by universal propositions, we need symbol that represents this implication of existence. To this effect we will use an X surrounded by a circle. Like the X that we have used up till now, this circled X signifies that something exists in the area in which it is placed. However, the two symbols differ in that the uncircled X represents the positive claims of existence made by particular(O&I) propositions, whereas the circled X represents

the implication of existence made by universal propositions about actually existing things. Such statements may be diagrammed from Aristotelian standpoint as

The "A" diagram
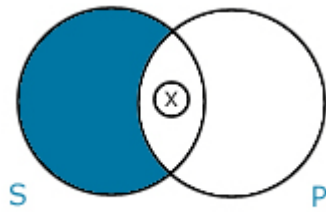
The "E" diagram
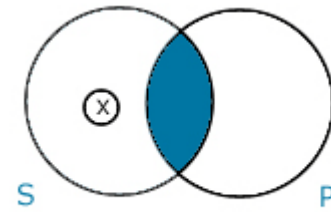
Steps to test immediate inference from Aristotelian standpoint

1 symbolizes the argument and test it from Boolean standpoint .if the form is   valid stops there because the inference is valid from both standpoint.

2.if the inference form is invalid from Boolean standpoint **and has a   particular conclusion** ,then adopt the Aristotelian standpoint and look to see if the left–hand premise circle is partly shaded. If it is, enter a **circled X** in the unshaded part &retest it. If it is valid, it is conditionally valid.

3. If the inference form is conditionally valid, determine if the **circled X** represents something that exists. If it does, the condition is fulfilled, and the inference is valid from Aristotelian standpoint .if it doesn't, the inference is invalid, and it commits **existential fallacy.** Example

All S are P .Therefore, some S are P

 First from Boolean standpoint for the premise and the conclusion

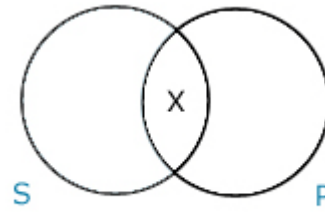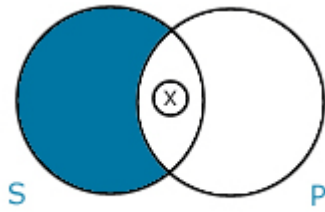Premise ("A") diagram
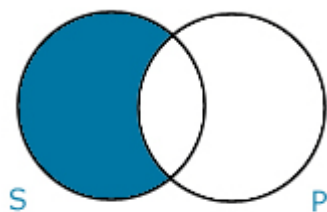
conclusion "I" diagram

All S are P

some S are P
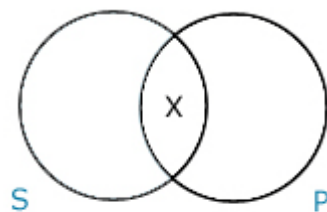
The information of the conclusion diagram is not represented in the premise diagram, so the infernce form is not valid   from Boolean standpont .Thus noting the conclusion is particular   ,we adopt the Aristetelian standpoint   and assime fot the moment that subject of the premise denotes at least one thing esists. This thing is represented by placing a circled X in the opon area of premise circle:

All S are P

some S are P

Now, the information of the conclusion diagram is represented in the premise diagram, so the infernce form is conditionally valid from Aristetelian standpoint .It is valid on the condition that the circled X represents at least one existing thing.

No S are P. Therefore it is false that all S are P

The premise is an **E** proposition   the conclusion is an **A**   proposition
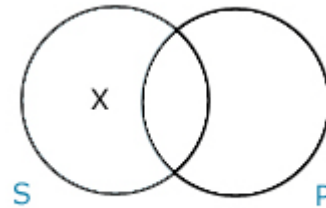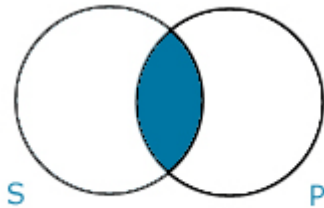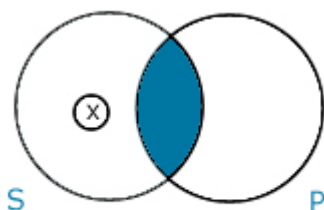

But, we draw the opposite of A proposition, that is, **O** because we are told that **A** is false.

The premise diagram and conclusion diagram read different information or the information of conclusion diagram is not contained in the premise diagram .Therefore, it is invalid from Boolean standpoint. So we should test it from Aristotelian standpoint.

No S are P   It is false that all S are P
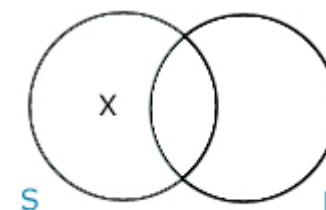
The Venn diagrams show that the left most regions of both diagrams asserts the same thing, that is, there is at least one member of S which is outside the class of **P**. So, it is conditionally valid on the condition that the circled X represents at least one actually existing thing.
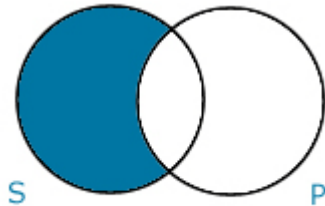
All Dinosaurs are mammals

Therefore, some Dinosaurs are mammals

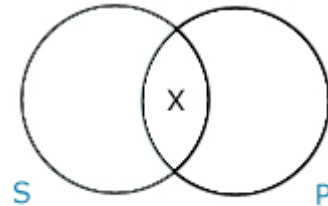First, symbolize the argument and test it from Boolean standpoint.

All D are M. Therefore, some D are M

:D" stands for the subject(S) term and "M" stands for the predicate term (P)

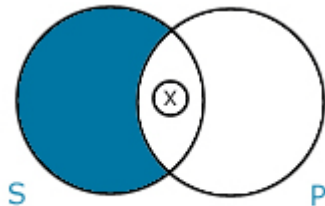All D are M   some D are M
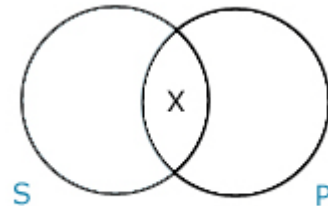

The premise diagram and conclusion diagram read different information or the information of conclusion diagram is not contained in the premise diagram .Therefore, it is invalid from Boolean standpoint. So we should test it from Aristotelian standpoint.

All D are M   some D are M

Now the inference form is conditionally valid from Aristotelian standpoint   because the Venn diagrams shows that the intersection of S& P in both diagrams asserts the same thing, that is, there is at least one member of S which is inside the class of **P.**   The final step is to see if the circled X represents at least one existing thing. The circled X is in the S circle and S stands for   "Dinosaurs", which do not exist. Thus, the required condition is not fulfilled, and the inference form is not valid from valid from Aristotelian standpoint. The inference commits **existential fallacy**.

Summary of rules how to test the validity of immediate argument from Aristotelian standpoint

Test by Boolean Method

Valid

STOP!
Argument is universally **VALID**.

Invalid

Is left-hand premise a universal? If yes enter circled 'X'. Retest.

Valid

Test for existence.

If object exists, then argument is **VALID**.

No existence = **INVALID**.

Invalid

Argument is always **INVALID**.