Logic and Critical Thinking

Course code: PHIL1011

What is the course of Logic and Critical Thinking?

- Dear students, this course aimed at making students to **critically question** the **idea** of people, **gather information**, and e**valuate the argument** of others and themselves.

Course Content

- Chapter one: Logic and Philosophy
- Chapter Two: Basic concepts of logic
- Chapter Three: Logic and Language
- Chapter Four: Basic concepts of Critical Thinking
- Chapter Five: Logical Reasoning and Fallacies
- Chapter Six: Categorical Proposition

Chapter One: Logic and Philosophy

- **Logic:**
  - **As a field of study**: branch of philosophy that deals with the study of arguments
  - **As an instrument**: a means to construct rational arguments and evaluate the argument of others.
- **Philosophy:** is the study of general and fundamental problems concerning matters such as existence, knowledge, truth, beauty, law, justice, validity, mind, and language.

Objectives of the chapter:

- Understand the meaning, nature and features of philosophy;
- Recognize the major fields of philosophy; and
- Understand why it is so important to learn logic and philosophy.

1.1. Meaning and Nature of Philosophy

- No specific subject matter , so it is difficult to define it.
- It is the development of critical habits, the continuous search for truth, and the questioning of the apparent.
- Philosophy deals primarily with issues than subject matters.
- **Philosophy begins from wonder!**
  - *"Wonder is the feeling of a philosopher, and philosophy begins in wonder" (Socrates)*

- **Etymologically: from two Greek words: ‘philo’ and ‘sophia’ which means** Love and wisdom respectively!
- Hence, it means **love of wisdom**!
- Philosophical questions:
  - Does God exist?
  - What is reality?
  - What is knowledge?
  - What does it mean to know?
- N.B. Philosophy is wisdom but not all wisdom are philosophy!

- Philosophy deals with **questioning the apparent**; to **go beyond the common understanding**, and to speculate about things that other people accept with no doubt.
- The **philosophical enterprise**: is "*an active imaginative process of formulating proper questions and resolving them by rigorous, persistent analysis*". (Vincent Barry).
- Therefore, philosophy is a rational and critical enterprise that tries to formulate and answer fundamental questions through an intensive application of reason.

- Critical thinking is changeable; because:
  - Philosophers have different views and assumptions,
  - The universe is dynamic/changeable,
  - Human experience is incomplete.

3. *Philosophy is a rational attempt to look at the world as a whole.*

4. Philosophy is the logical analysis of language and the clarification of the meaning of words and concepts.

5. Philosophy is a group of perennial problems that interest people and for which philosophers always have sought answers.

- *what is right and wrong?*
- *What is life and Why I'm here?*
- *How things operate in the universe? Chance or order?*
- *Free will or pre-determinism?*

- Dear students, philosophy is an activity:
  - Master it can’t make you a philosopher; rather when you critically think and do it.

1.3. Fields of Philosophy

- Metaphysics:
- Epistemology:
- Axiology:
- Logic:

1.3.1. Metaphysics:

- studies the ultimate nature of reality or existence.
  - *Does God exist, and if so, can we prove it?*
  - *Are human actions free, or predetermined by a supernatural force?*
- It is evident that the question of reality is not as simplistic as it appears.
- Example: What is exactly the nature of the floor upon which you stand?
  - It is obviously flat, solid, and smooth; it has a particular color; it is composed of an identifiable material, such as wood or concrete

- **For a physics:** floor is made of molecules; that molecules consist of atoms, electrons, protons, and neutrons;
- **For a chemist: f**loor is a hotbed of hydrocarbons associated in a particular way and subject to certain kinds of environmental influences, such as heat, cold, wetness, dryness, and oxidation.

- **Metaphysics questions** can be divided in to four aspects:
- **Cosmological**: study of theories about the origin, nature, and development of the universe as an orderly system.
  - E.g. how the world comes? By design or accident
- **Theological**: religious theory that deals with God.
  - E.g. If God is both all good and all powerful, why does evil exist?

- **Anthropological**: deals with the study of human beings.
  - What is relationship between mind and body?
  - Is mind more fundamental than body?
  - Are people born good, evil, or morally neutral?
  - Do we have free will or predetermined?
- **Ontological**: the study of the nature of existence,

1.3.2. Epistemology: Study about knowledge

- What is true?" and "How do we know?"
- *Skepticism and agnosticism???*
- ***Sources of Knowledge:***
  - *Empiricism:* knowledge obtained through the senses/experience.
  - ***Rationalism:*** claims that humans are capable of arriving at irrefutable knowledge independently of sensory experience. Knowledge is based on reason.
  - *Intuition: immediate cognition;* ***knowledge which is immediately evident without experience***.
  - ***Revelation:*** *religious knowledge as a source of knowledge.*
  - ***Authority****:*

1.3.3. Axiology

- From two Greek words: *Axios* (worth, value) and *logy* (study)
- Axiology is the philosophical study of value, which originally meant the worth of something.
- It includes the studies of moral values, aesthetic values, as well as political and social values.
- Deals with: **aesthetics, ethics, and social/political philosophy.**

- **Aesthetics:** study of beauty!
- **Ethics**: study of **morality/action of right of wrong.**
  - **Meta-ethics: investigation of the meaning of good or bad.**
  - **Normative ethics: studies moral principles of conducts.**
    - **Can be consequential, deontological, virtue.**
  - **Applied ethics:** explain, justify, apply moral rules, principles
- **Social/political philosophy:** studies about of the value judgments operating in a civil society.
  - *What form of government is best?*
  - *What economic system is best?*
  - *What is justice/injustice?*

1.4. Importance of philosophy

- *to examine one's life in the world,*
- *to actualize our selves.*
- *Intellectual and Behavioral Independence*
- *Reflective self-awareness… knowing your self.*
- *Flexibility, Tolerance, and Open-Mindedness*
- *Creative and Critical Thinking*
- *To deal with uncertainty of living*

Chapter 2:Basic concepts of Logic

Tips of the Chapter

2.1. Basic Concepts of Logic: Arguments, Premises and Conclusions

2.2. Techniques of Recognizing Arguments

2.3. Types of Arguments: deduction and induction

2.4. Evaluating arguments

2.1. Basic concepts of Logic: Argument, premise and conclusion

I. Meaning:

- Etymologically, the term” logic” is derived from the Greek word **“Logos”** which means reason, thought, principle, law, etc.
- It is the science that evaluates arguments
- Logic is the science of those principles, laws, rules and methods which the mind of man in its thinking must follow for accurate and secure treatment of truth.
- In other words, logic is the study of methods for evaluating arguments.

Cont….

II. Purpose of Logic

- The primary task of logic is to setup criteria for distinguishing good arguments from bad ones.
- The purpose or objective of logic is to test, evaluate and analyze arguments of one’s own and the arguments of others.
- To increase confidence of arguers.

The meaning of Argument

- **Argument**

- In logic, **argument** is a group of **statements** in which one (premise) provides support to believe in another (conclusion).
- It doesn’t mean ***verbal fight***!!!
- Analyzing arguments is important to distinguish premises from conclusion.
- The reasoning process expressed by an argument is said to be **inference**. Sometimes, it is used alternatively with the term argument.

Cont..

- **Premise**

- is the statement which provides reason (evidence) for believing the truth of the conclusion
- It is the statement on the basis of which the conclusion is affirmed.

- **Conclusion**

- is the statement that is claimed to follow from the premise
- It is the statement that is affirmed on the basis of the premise.

Cont..

- **Statement (proposition)**

- a sentence that is either true or false but not both
- a sentence used to assert or deny something and evaluated as true or false
- This type of sentence is called declarative sentence.
- Truth and falsity are called the two possible truth values of statements.

Cont..

Example:

- Hawassa is the capital city of Tigray Region. (F)
- Ethiopia is endowed with various heritages. (T)
- **Note that all statements are sentences but not all sentences are statements.**

Example:

- How old are u? (Question)
- Stop cheating! (Command)
- Let us go Lake Langano today (proposal)
- We suggest welfare state to Ethiopia (suggestion)
- You are beautiful! (Exclamation)

Recognizing Premise and Conclusion

- **There are two ways of identifying conclusion and premises**
  1. **Using indictors:**
     - Conclusion follows from the conclusion indicator and premises follow from premise indicators.
     - Mere occurrence of indicators is not guarantee for the existence of an argument.
- E.g. since 1991, Ethiopia has adopted ethnic federalism.

Premise Indicators	Conclusion indicators
Since	Therefore
as indicated by	wherefore
because	accordingly
for	hence
in that	we may conclude
may be inferred from	entail that
as	consequently
given that	it follows that
seeing	Implies
for the reason that	for this reason
owing to	in consequence
indicated by	proves that
may be deduced from	I conclude that

Cont..

Example:

- All students of this class are cleaver. Yoseph is a student of this class. Therefore, Yoseph is cleaver.
- He scored “F” grade since he didn’t study hard.
  - ✓ conclusion comes next to conclusion indicator and before premise indicator
  - ✓ Premise comes next to premise indicator and before conclusion indicator.

Cont..

II. using inferential claim

- It implies by studying the nature of statements (statements that serve as evidence or a statement stated as the final assertion).
- If a sentence is given as the main point of the argument or as a closing statement, it is a conclusion.
- On the other hand, if the sentence is taken as information, reason or evidence, it is premise.

Cont..

Example:

1. Women of the rural society are not empowered. The majority of them lack education opportunity and equal access to resources.
2. These days quality of Education has reduced in our country. Students scope has reducing yearly.

3. The sky is dark. There will be rain today.

2.2. Recognizing Arguments

- **There are two criteria for a passage to be argument:**
  - **Factual Claim (**At least one of the statements must claim to present evidence or reasons**). A claim that something is true.**
  - **Inferential claim (**there must be a claim that something follows from the alleged evidence).
- Inferential claim cab be **explicit** (indicated by indicators) or **implicit** (identified by inferential relationship).

Cont..

The following are non-argument forms:

- **Passage lacking an inferential claim**
  - Piece of advice
  - An illustration
  - Loosely associated statements may
  - A report
  - An expository passage
  - Statement of belief or opinion
  - Warning

Cont..

- Conditional Sentences
- Explanations

Conditional statements have two parts: **antecedent and consequent**

- If---***antecedent-***----then---***consequent***---------
- ***------Consequent*** ------ if -----***antecedent------***

- E.g. If **you study hard**, then **you will score 'A'**.
- **Summary on Conditional Sentences:**

❖ Single conditional statements are not arguments

E.g. If iron is dense than mercury, then it will float in mercury.

❖ A conditional statement may serve as either the premises or conclusion (or both) of an argument.

E.g. If FDRE does not change its platform, it will not attract new supporters.

If FDRE doe not attract new supporters, it will lose the next election.

Therefore, if FDRE does not change its platform; it will lose the next election

❖**The inferential content of a conditional statement may be re -expressed to form an argument.**

- **E.g.** If both Saturn and Uranus have rings, then the Saturn has rings. The inferential content of this statement may be re-expressed to form argument:
- Both Saturn and Uranus have rings.
- Therefore, Saturn has rings.

Cont..

- Conditional statements are especially important in logic because they express the relationship between **necessary** and **sufficient** conditions.

- ‘A’ is a sufficient condition for ‘B’ = occurrence of A is need for occurrence of ‘B’
- ‘A’ is a necessary condition for ‘B’ = B can’t occur without the occurrence of A.

Example:

- If **X** is a dog, then **X** is an animal.
- If **X** is not an animal, then **X** is not a dog.

The first statement says that being a dog is a sufficient condition for being an animal and the second that being an animal is a necessary condition for being a dog.

Here is another example:

- **If oxygen is not present, then there can be no fire.**

It means that oxygen is a necessary condition for the occurrence of fire; that is, in the absence of oxygen, fire cannot exist.

- **If there is rain, then streets are wet.**

Rain makes streets wet, but it is not the only one. Streets can be wet even without the presence of rain, like for example by leakage of pipe water.

2.3. Types of Arguments

- Arguments can broadly be classified as **deductive** and **inductive**.
- Deductive and inductive arguments differ in the strength of the inferential claim of the argument.
- They differ with respect to the ways in which the premise supports the conclusion.

Cont..

❖**Deductive Arguments**

- Conclusion is claimed to follow from its premises with absolute necessity.
- Makes a claim that the conclusion follows from the reason, evidences, or premises with the force of necessity.
- Involve necessary reasoning

Examples:

- All human beings are mortal. Taye is a human being. Therefore, Taye is mortal.
- All sub- Saharan countries are least developed countries. Ethiopia is found in sub- Saharan region. It follows that Ethiopia is a least developed country.

Cont..

We can identify deductive argument using 3 methods:

1. **Using indicators: necessarily, certainly, absolutely, definitely, etc.**
2. **Studying the Actual Strength of the Premise and the Conclusion:**

If the conclusion actual does follow with strict necessity from the premises, the argument is clearly deductive.

Example

All dogs are mammals.

Boby is a dog.

Therefore, boby is mammal.

3. The Character or Form of Argumentation the Arguer Uses

I. Argument based on mathematics

e.g. I **have one red pen and two black pens. Hence, I have three pens.**

II. An argument from Definition

e.g. **God is omniscient. Hence, he knows every thing**.

Angel is honest; it is follows that Angel tells the truth.

III. Syllogism

- **Categorical syllogism(two** premises and one conclusion)
- **Hypothetical syllogism** (**syllogism having a conditional statement for one or both of its premises**.)
- **Disjunctive syllogism** (syllogism having "either…… or" statement)

Example 1:

- *All Egyptians are Muslims.*
- *No Muslim is a Christian.*
- *Hence, no Egyptian is a Christian.*

Example 2:

If there is democracy in one country, then there would be rule of law. If there is rule of law, there would be development. Hence, if there is democracy in one country, then there would be development.

Example 3:

Robert is either an American or Ethiopia. Robert is not an American. Hence, Robert is an Ethiopian.

2. Inductive Arguments:

- It is one whose conclusion is claimed to follow from its premises only with probability.
- It is **improbable** for the conclusion to be **false if the premises is true**.
- Involves probabilistic reasoning process
- We can identify deductive argument using 3 methods:

i. Using Indicator words (probably, improbably, plausible, implausible, likely, unlikely, reasonable to conclude, etc.)

ii. Studying the Actual Strength of the Premise and the Conclusion

- Example:

  The majority of Alkan University College Students are cleaver.

  Alemitu is Alkan University College student.

  Therefore, Alemitu is cleaver student.

III. The Character or Form of Argumentation the Arguer Uses

A. Agument based on prediction:

E.g. ***Yesterday and today, Bahir Dar is sunny. Hence, Bahir Dar may be sunny by tomorrow.***

B. Argument from analogy:

Aster's Car is blue in color, travels 300 kms.hr. and made in Japan.

Hana's Car is also blue in color, and travels 300kms/hr. Hence, Hana's car may be made in Japan.

Computer A and Computer B both are manufactured by 2012.

Computer A is fast processing.

Hence, Computer B is fast processing.

C. Inductive generalization:

E.g. I have got 10 out of 10 in the first quiz of logic. Hence, I probably will score A.

D. Argument from authority:

E.g. ***According to Dr. Abiy, Ethiopia is growing fast. Hence, the country is on the right truck of development.***

E. Argument based on signs:

E.g. *Across the road, I am looking a flag. Hence, there may be a school around.*

F. Argument based on causation:

E.g. The cloud is becoming **dark** and the thunder is **roaming**. So, let us go home quickly, the **rain is inevitable**

Summary:

- Mostly, inductive argument proceed from particular to general and deductive from general to particular.
- However, sometimes deductive arguments may proceed from particular to general, general to general, and particular to particular. The same fashion works for inductive arguments.

Example 1: (Deductive from particular to general)

Three is a prime number.

Five is a prime number.

Seven is a prime number.

Therefore, all odd numbers between two and eight are prime numbers.

Example 2 (inductive from general to particular)

All GC previous awards of BDU were taken by Economics dep't.

Therefore, the next award will be for economics dep't.

2.4. Evaluation of Arguments

Argument type	Evaluation Criteria
Deductive	❑ Valid ❑ Invalid ❑ Sound (Valid Argument + all true Premises). **It is the most perfect DA** ❑ Unsound
Inductive	• Strong • Weak • Cogent (Strong argument + all true premises). It is the most perfect IA.

Cont..

Valid: is an argument in w/c it is impossible for the conclusion to be false and the p

Deductive argument				
Case	Argument		Evaluation	
	Premises	Conclusion	Valid	**Invalid**
1	T(True)	T	✓	✓
2	T	F	___	✓
3	F	T	✓	✓
4	**F**	**F**	✓	✓

Cont..

Case 1: True P + True C (Valid)

E.g. 1:

- All television networks are media companies.
- **ASRAT** is a television network.
- Therefore, **ASRAT** is a media company
- This argument is an example of sound argument.

Sound Argument = Valid Argument + All Premises True

E.g2. True Ps + True C (Invalid)

- All cows are animals.
- All mammals are animals.
- Therefore, all cows are mammals

Cont..

Case 2: True premises and False conclusion (Always invalid)

E.g. 1:

All Ethiopians are mortal (T)

President Trump is mortal (T)

Hence, Pr. Trump is an Ethiopian (F)

E.g. 2:

- All birds are animals (T)
- All dogs are animals (T)
- Therefore, all birds are dogs (F).

Case 3: False Premises and True Conclusion

I. Valid:

All birds are Mammals. (Fp1)

All Women are birds (Fp2)

So, all women are mammals. (Tc)

II. Invalid:

All birds are mammals.

All Ostriches are mammals

All ostriches are birds.

- **Case 4: False premises and False Conclusion**

Valid:

All Americans are Ethiopians

All Egyptians are Americans.

So, All Egyptians are Ethiopians.

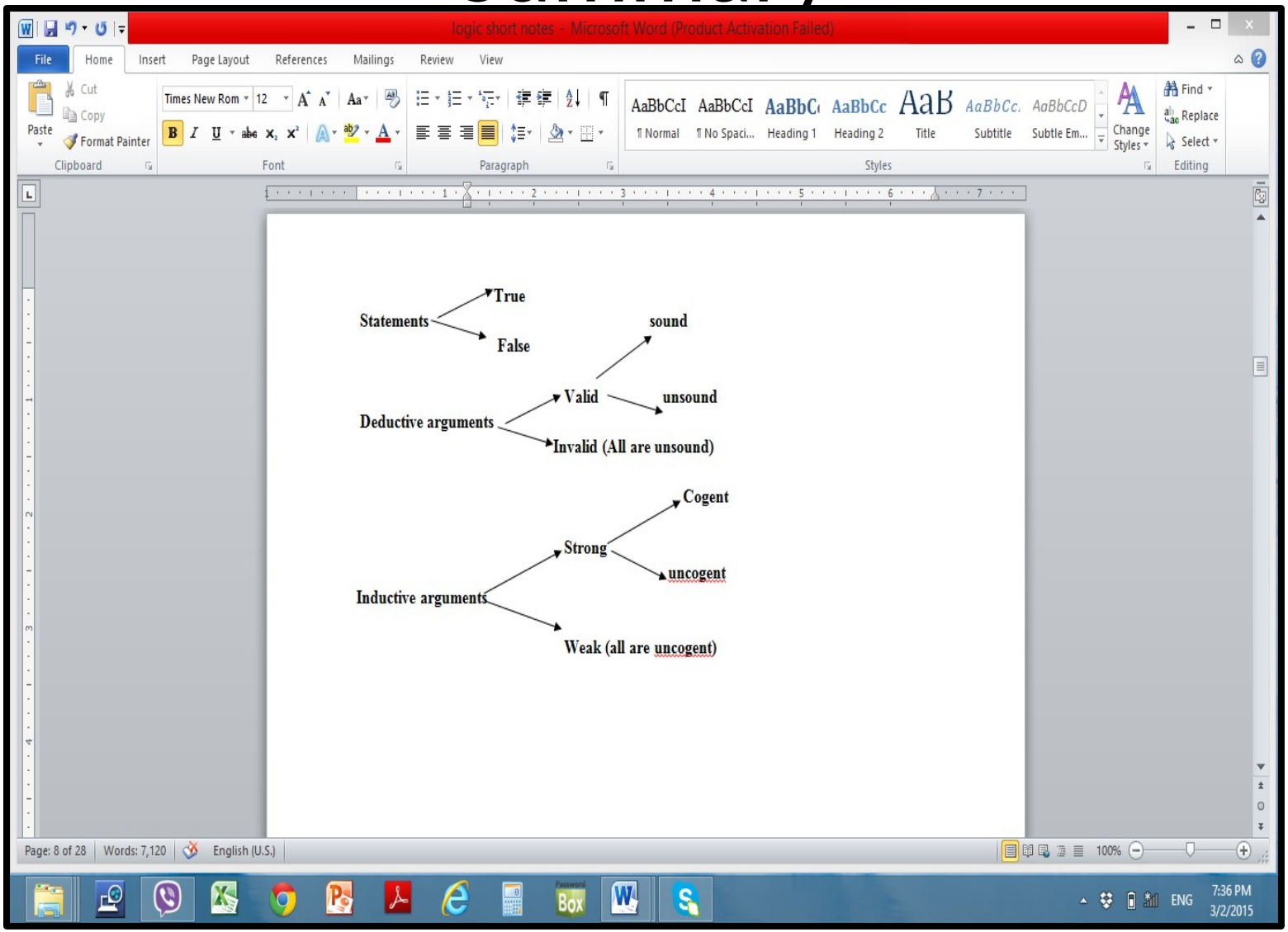
Invalid:

All Birds are Mammals

All ants are Mammals

So, All ants are Birds.

Summary


logic short notes - Microsoft Word (Product Activation Failed)
Statements
True
False
Deductive arguments
Valid
sound
unsound
Invalid (All are unsound)
Inductive arguments
Strong
Cogent
uncogent
Weak (all are uncogent)

Chapter Thee: Meaning and Definition

3.1. Function of Language

I. Expressive/emotive function of language

- Used to express our feelings and emotions.
- Can’t be evaluated as true or false.

Example: I dislike logic.

I hate him.

She is smart

II. Directive Function

- To give order and command
- Can’t be evaluated as true / false.

EXAMPLE:

Leave me alone

What is your name?

Do not close that door.

Give me your pen

1. **Purpose of language** (Emotive, directive, informative)
2. **Meanings of terms** (intention + extension)
3. **Types of definition**
   - Stipulative, Lexical, precise, theoretical, persuasive
4. **Definitional Techniques**
   1. **Intentional Tech**: (Synonymous, Etymological, **operational**, Genus and difference)
   2. **Extensional Tech**: (Demonstrative, Enumerative, sub-class)

Cont..

III. Cognitive (Informative) Function

- Conveys information about something.
- Refers to the content of something.
- Communicates the meaning of something concepts (terms).
- Can be evaluated as true/false.

Example:

1. Ethiopia is a developed country.
2. Hawassa city is a capital of SNNPRS

Cont…

3.2. The Intentional and extension of terms

Term is a subject of statement that contains **proper names**, **common names** and **descriptive**

Proper Name	Common Name	Descriptive Phrases
Ethiopia John Kidist Ras Dashen	House Person Animal	The late president of Ethiopia Third world countries Those who work hard

Cont..

- **Note that** verbs, adverbs, prepositions, adjectives and conjunctions are not terms.
- There are two types of terms**: intentional and extensions**
- **Intentional meaning:** consist of qualities and attributes that the term **connotes**.
- **Extensional meaning:** consists of the **members** of the term denotes.

Cont..

- The intentional meaning of a term is called ***intention or connotation***, and the extensional meaning of is called ***extension or denotation***.

Example

1. **Ship** is 'vehicle for conveyance on water' (**Intention**)
2. **Ship** is like things as cargo ships, passenger ships, battle ships, and sailing ships (**extension)**

Cont..

3. "**Inventor**" means a person who is, clever, intuitive, creative and imaginative.

4. "**Inventor**" means such as Thomas Edison, Alexander Graham Bell, and Samuel F.B. Morse. (**N.B**:

- **Connotation of a term remains more or less the same from person to person and from time to time.**
- **The denotation of a term also remains the same from person to person, but it may change with the passage of time.**

Cont..

- So, terms can have **empty extension**.
  - No class member for the term
  - E. g. Dinosaur, Current king of Ethiopia, Satan

- If terms have extension, they have intention
- But, if terms have intention, they might not have extension.
- So intension determines extension.

Cont..

- **Terms may be put in the order of increasing intention, increasing extension, decreasing intention, decreasing extension.**
- **Increasing intention:** when each term in the series has more attributes than the one which comes before it.
- The order of **decreasing intension** is the reverse of that of increasing intension.

Cont..

Increasing extension (decreasing intension)

Africa, East Africa, Ethiopia, Addis Ababa

Increasing intension (decreasing extension)

Cont..

Exceptions:

- **There are certain cases where there is empty extension but increasing intension.**
- **Example: Unicorn, unicorn with blue eyes, unicorn with blue eyes and green horn.**

- **This example illustrates:**
- Existence of empty extension.
- Increasing intention
- Constant extension.

Cont..

- **There are also cases where there no empty extension, but increasing intention.**
- Example: Living human being; living human being with a genetic code; living human being with a genetic code and a brain; living human being with a genetic code, a brain, and a height of less than 100 feet
- ***This example illustrates increasing intension but constant extension.***

Definitions and Their Purpose

- **Definition is** a group of words that assigns a meaning to some word or group of words. Accordingly, every definition consists of two parts: the **definiendum** and the **definiens**.
- The **definiendum** is the word or group of words that is supposed to be defined, and
- the **definiens** is the word or group of words that does the defining.

Cont..

- **EXAMPLE:** ‘‘Tiger” means a large, striped, ferocious feline indigenous to the jungles of India and Asia’’
  - **Tiger = definiendum**
  - **Difiniens: everything after the word ‘‘means’’**

3.3.Types of Definition

1. **Stipulative Definition**

- Assigns a meaning to a word for the first time.
- Creating a new word or give a new meaning to an old word.
- A recommendation or proposal to use a term in a certain manner.
- It becomes lexical definition when it becomes part of established language.
- Can’t be evaluated as true or false.

Cont..

- Example:
  - ‘‘**Tigon’’** refers to ‘‘offspring of male tiger and female lion’’
  - **‘‘Liger’’** mans ‘‘offspring of male lion and female tiger’’
  - ‘‘**Operation Barbarosa’’** was the name the Germans gave to the invasion of Russia; and
  - **‘‘Operation Overlord’’** was the name the allied forces gave to the planned invasion of Normandy
- “**Operation sunset”** was the name that Ethiopian forces gave to invade Eritrea.

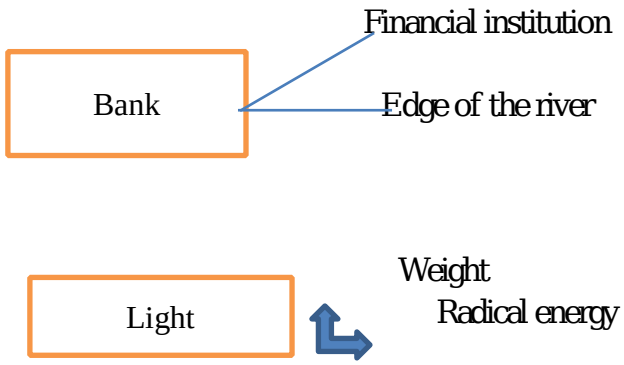
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2. Lexical Definition

- Used to report the meaning that a word already has in a language.
- Dictionary definitions are all instances of lexical definitions.
- Can be evaluated as true/false.
- Has purpose of eliminating **ambiguity** of a word. A word is said to be ambiguous when it can be interpreted as having two or more clearly distinct meanings in a given context.

Cont..

Example: Bank, Light, Mad



Cont..

3. Precise Definition

- Has purpose of reducing vagueness.
- An expression is **vague** if there are borderline cases in which it is impossible to tell if the word applies or does not apply.
- Words such as ‘‘fresh,’’ ‘‘rich,’’ and ‘‘poor’’, “love” are vague.
- So, there is a need for a law to be applied.
- Example: *‘Poor’ means having an a daily income of less than $1.2*

Cont..

- **The terms ‘‘force,’’ ‘‘energy,’’ ‘‘acid,’’ ‘‘element’’, ‘‘number’’ ‘‘equality,’’ ‘‘contract,’’ and ‘‘agent”, “rich”, “poor”, etc… requires precise definition**.

- N.B: precise definition differs from **stipulative** definition in that assignment of meaning in later case is arbitrary but not in case of precise definition.

Cont..

4. Theoretical Definition

- Assigns a meaning to a word by suggesting a theory that gives a certain characterization to the entities that the term denotes.
- Can’t be evaluated as true/false.
- Not all theoretical definitions are associated with science.
- Example:
  - ‘‘Light’’ is a form of electromagnetic radiation.
  - ‘‘*F = MA*.’’
  - “Right” means approved by the gods.
  - “Materialism” is a philosophical doctrine asserting nothing exists but matter.

Cont..

5. **Persuasive Definition**

- To persuade/convince listeners/readers.
- To change the attitude of audiences.
- To win the acceptance of audiences.
-
- **Example:**
  - “Federalism” is a political intrigue that provides legitimate ground for the emergence of new regional warlords.
  - “Abortion” means the ruthless murdering of innocent human beings.
  - “Taxation” means the procedure by means of which our common wealth is preserved and sustained.

Cont..

- **Exercise 2: determine the type of definition**
- Let us use the word "**grellow**" to mean the color of things that are either green or yellow.
- "Miracle" means an event that (a) is an exception to a law of nature and (b) is brought about by the decision of divine being.
- "Tall man" male human over 6 feet in height.
- "Tome" large book.
- "A deductively sound argument" is one that (a) has only true premises and (b) is valid.

3.4.Techniques of intentional and extensional definitions

A. Techniques of Intentional Definition

1. Synonymous Definition

- Using a Word Having Identical Meaning.
  - Example:
- “Trouble” means difficulty.
- “Student” means pupil.
- ‘‘Physician’’ means doctor.
- ‘‘Intentional’’ means willful.
- ‘‘Voracious’’ means ravenous.
- ‘‘Observe’’ means see.

Cont..

2. **Etymological definition**

- Using root/ancestor words.
- Example
- “Ethics” is from Greek word Ethos, meaning habit and tradition.
- “LOGIC” is from Greek word logos, means science of reasoning.
- ‘Morality’ is from Latin, *moralis*, which means custom and tradition.

Cont..

3. **Operational definition**

- Specifies set of procedures
- Indicates actions and procedures
- Assigns experimental procedures.
  - **Example:**
- “Insane” means when a person lost control of his/her consciousness and perform unusual things.
- “Acid” means a substance that turns the color of blue litmus paper red, when brought contact with it.

Cont..

4. Definition by Genus

- **Avoids ambiguity/vagueness of terms.**
  - **Genus =** relatively larger class.
  - **Species =** relatively smaller sub-class
  - **Difference =** attributes that distinguishes species within genus**.**
- **Species Difference Genus**
- **“Mother” means female parent**
- **“Ice” means frozen water**
- **“Kitten” means young cat.**

Cont..

B. Techniques of Extension

1. **Demonstrative (Ostensive)**

- **Assigning meaning by point out an object.**
- **Example:**
  - » ‘‘Chair’’ means this and this and this—as you point to a number of chairs, one after the other.
- “Flower” means  one (using a picture that demonstrates flowers.)

Cont..

2. Enumerative:

- **By listing partial/complete members of the class**
- **Example:**
- ‘‘Actor’’ means a person such as Nick Nolte, Al Pacino, or Richard Gere.
- “Continent” means such as Africa, Asia, Latin America and Europe
- “Athlete” means such as Kenenissa Bekele, Tirunesh Dibaba, and Meseret Defar.

Cont..

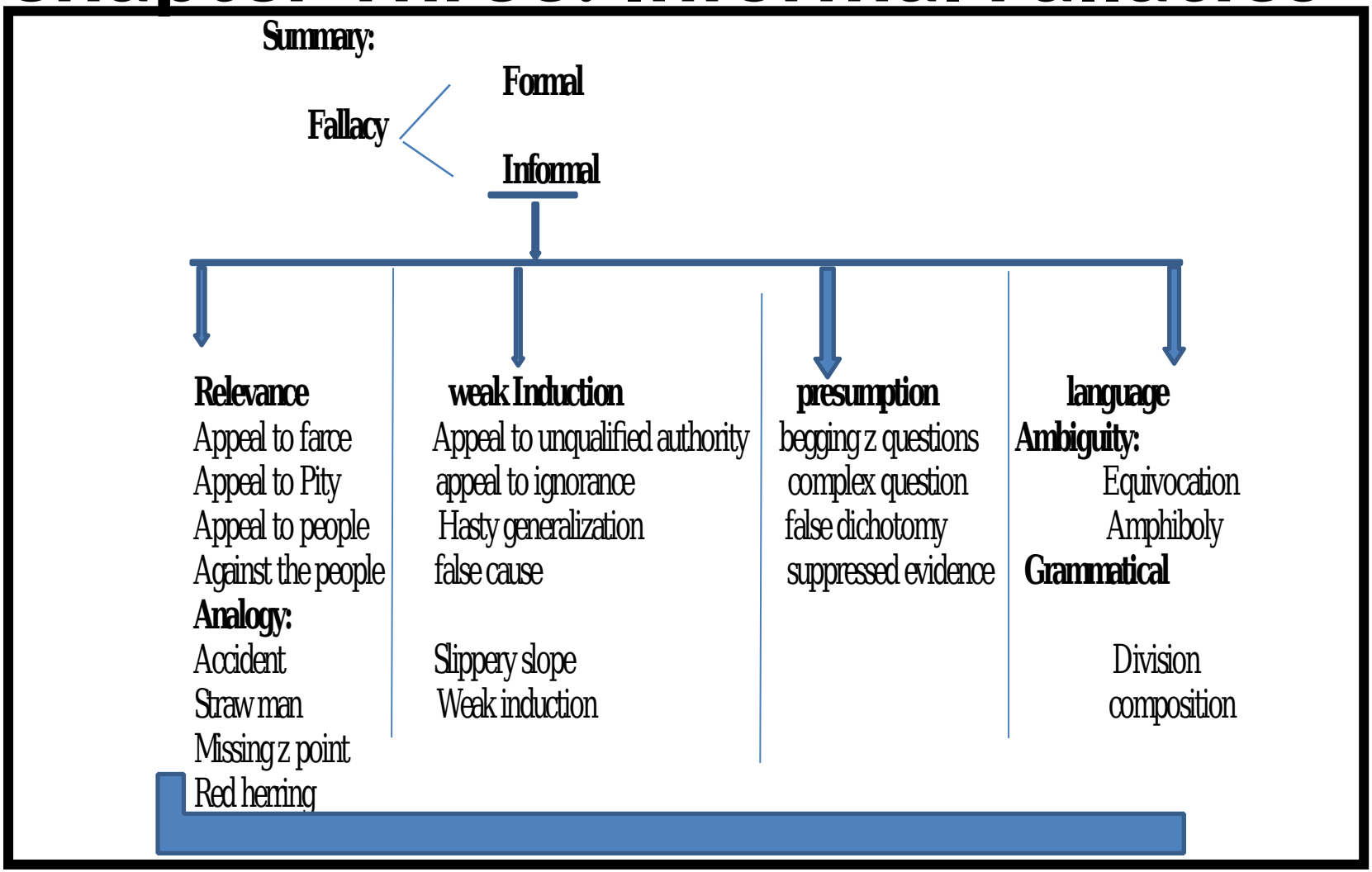
3. Definition by Sub-class

- By listing sub groups/sub-class.
- Example:
- “Plant” means such as grasses, fruits and vegetable.
- “Vertebrate” means such as reptiles, birds, or mammals.

Techniques of Dentition and their relationships with types of definition

- **Techniques of Intentional definition**
  - **Synonymous =** can serve as a method of constructing lexical definition
  - **Etymological =** can serve as a method of constructing lexical definition.
  - **Operational =** for stipulative, theoretical, lexical (not always), precise and persuasive
  - **Genus and difference = most effective to construct all definitions.**
- **Techniques of Extensional Definition**
- To construct lexical and stipulative definition, and sometimes theoretical and persuasive definition, but not precise definition.

Chapter Three: Informal Fallacies



Chapter Three: Informal Fallacies

- Fallacy refers to **error in reasoning**
- It is from Latin word**, fallacia** means delude, illusion, cheat.
- Fallacies always seem good arguments; but in reality they are bad arguments.
- Can be committed **intentionally** or **unintentionally.**
  - Committed when the speaker/writer fails to provide sufficient evidence or reason for his/her claim.
  - Can be **formal** and **informal**.

Cont...

A. Formal Fallacies

- Found in incorrect deductive arguments.
- Fallacies due to invalidity of arguments.
- Have standard form/structure.
- Example:
- All elephants are animals. (T)
- All mammals are animals. (T)
- Therefore, all elephants are mammals. (T)

Cont.

B. Informal Fallacies

- Are those that can be detected only through analysis of the **content of the argument**.

Consider the following example:

- All factories are plants.
- All plants are things that contain chlorophyll.
- Therefore, all factories are things that contain chlorophyll.

Cont.

Form:

All A are B.

All B are C.

All A are C.

Valid form, but invalid content. Bcz. The argument has true premised and false conclusion.

- Some fallacies work by getting the reader or listener to feel various emotions, such as fear, pity, or camaraderie, and then attaching a certain conclusion to those emotions.

Cont..

3.2. Types of Informal Fallacies

- We can categorize informal fallacies in to four:
- Fallacies of relevance
- Fallacies of weak induction
- Fallacies of presumption
- Fallacies of language

Cont..

1. Fallacies of Relevance

- Occur when premises are logically irrelevant to the conclusion.
- Yet the premises are relevant psychologically.
- The connection between premises and conclusion is emotional.

Cont..

- **Include :**

❖**Appeal to force (**Argumentum ad Baculum: Appeal to the “Stick

❖Appeal to Pity (Argumentum ad Misericordiam)

❖ Appeal to the People (Argumentum ad Populum)

❖ Argument Against the Person (Argumentum ad Hominem)

❖ Accident

❖Straw Man

❖ Missing the Point (Ignoratio Elenchi)

❖ Red Herring

Cont….

1. Appeal to Force

- Arguer 1: poses harm to the second arguer to get acceptance of the conclusion.
- This harm can be: **physical or psychological**
- The danger is on **the second arguer**.

Cont..

- Examples:

1. Ethiopia is the best country that has its own precious cultures. If you don't accept this, I will blow your head by this pestle. (Physical threat)

2. "I'm the best man for the job. Anyone who says otherwise is in for a world of hurt." (Physical Threat)

3. You should accept what I say, unless you know that I am brother of your wife; you will miss her one day. (Physiological threat)

2. Appeal to pity

- Occurs when an arguer attempts to support a conclusion by merely evoking **pity** from the reader or listener.
- The danger of rejecting the conclusion is on the **first** arguer him/herself.
- It is opposite of appeal to force

Cont..

Example:

- ***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.

- Student to Professor: "But, I really NEED to pass this class. I need this class in order to graduate this semester, and I can't afford to pay for more classes in the future. I already work 60 hours a week and supporting four children all by myself, and I'm barely scraping by as it is. You should give me a passing grade."

Cont….

3. Appeal to People:

- **Has two approaches: direct and indirect.**

1. Direct Approach of appeal to people:

- The *direct approach:* arguer addresses large group of people.
- Has the objective of rising a kind of **mob mentality.** This is the strategy used by nearly every propagandist and demagogue.

Cont...

2. Indirect Approach of Appeal to People Fallacy

- the arguer aims appealing to individuals separately.
- Three types:
  - B**andwagon** argument, The majority choice is seen as correct
  - the appeal to **vanity**, (pdts. Are associted with recognized people)
  - the **appeal to snobbery (things are given a class)**.

Cont..

A. Appeal to Bandwagon

- **Majority choice is the correct one.**
- Chewing chat can’t be all wrong because 70% of Hawassa university students see nothing wrong with it.

B. Appeal to Vanity

ⷷ Associates the product with someone who is admired, pursued, or imitated, the idea being that you, too, will be admired and pursued if you use it.

Cont..

E.g. “Who is going to wear this new fashion T-shirt worn by the famous artist Gosaye for the new Ethiopian Millennium?”

C. Appeal to Snobbery

- **It is an appeal to the desire to be regarded as superior to others.**
- This Jacket is not for ordinary people. If you want to be from among the selected few dignitaries buy the shoe.

Cont...

4. Argument Against the Person (Argumentum ad Hominem)

- This fallacy always contains two arguers.
- The second arguer attacks the second arguer him/herself not his/her idea.
- Has three forms: **abusive, circumstantial and you too (*tu quoque*).**

I. Ad hominem abusive

- The second person responds to the first person's argument by verbally abusing the first person.

Cont…

E.g. 1How a **stingy** person can tell us about charity. Hence, let’s stop discussing about these issue raised by Tamirat.

E.g. 2. 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 thoroughgoing advocate of the drug culture.

Cont..

***II. Ad hominem* circumstantial**

- The respondent attempts to discredit the opponent's argument by mentioning to certain circumstances that affect the opponent.

Example:

- Dr. Tewodros advocates a policy of increasing financial spending for higher education. But that is not innocent advocacy, for the reason that he is a college professor and would benefit financially from such a policy.

- "Of COURSE my opponent is arguing against taxation of the rich. Just look at him! He's the richest person in town. There's no way someone like that could argue anything else."

Cont..

***III. Tu quoque* (“you too”):**

- The second arguer says, ‘‘How dare you argue that I should stop doing *X*; why, you do (or have done) *X* yourself.

Example:

- ***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.
- **Selam**: “You shouldn’t eat fast food. I hear it’s really bad for you and could lead to health complications.”
- **Hana**: “Whatever! You eat fast food all the time!”

Cont..

- **Doctor**: “I see abnormalities on your breathing and heartbeat. You should stop smoking cigarettes.
- **Patient:** “What do you mean doctor? I have seen you by my necked eyes that the other day that you too were smoking. So, your advice is not correct.

Cont..

5. Accident

- Committed when a general rule is applied to a specific case it was not intended to cover.
- Example:

➢ *Freedom of speech* is a constitutionally guaranteed right. Therefore, Abebe should not be arrested for his speech that inspired the riot last week.

➢ You Kidist that all *good students obey the order of their teachers*. Hence, you should not refuse when your teacher invites you for bed.

➢ POLICE OFFICER: “Are you lost? Where’s your Mom and Dad? Talk to me.”

➢ CHILD: “I can’t talk to strangers.”

Cont..

6. Straw man Fallacy

- The arguer distorts the argument and reached another distorted conclusion.

Example:

- 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 may be a chain of bars all over campus? Such a proposal is ridiculous!

Cont..

- Gutema: “I’m just saying that nuclear energy would provide a lot of energy in a clean way, so we should at least consider it as an option.”
- Bekele: “Oh, so you’re in favor of nuclear war? Is that what you want? For all of the countries to be nuking each other until we’re all dead? How ridiculous!”

- Dr. Belay has argued against prayer in the public schools. Obviously Dr. Belay 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 Dr. Belay’s argument is nonsense.

Cont..

7. Missing the Point (*Ignoratio Elenchi*)

- 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.
- The conclusion drawn is not correct based on the given premises.
- Example:
- “Our daughter got all D’s this semester at CU. Every single professor there should be fired!”

Cont..

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

- Abuse of the welfare system is rampant nowadays. Our only alternative is to abolish the system altogether.

- Hawassa University has a lot of problems. Student serves and facilities are inadequate. Many of the instructors are inexperienced. It follows that; the university should be entirely closed.

Cont..

8. Red Herring (Off the Truck Fallacy)

- the arguer **diverts** the attention of the reader or listener by changing the subject to a different but sometimes subtly related one.
- Example:
- **Habtamu:** Do you know, Abdurrahman that Tesfa has got “A” in Introduction to Logic.

- **Bewketu:** It is not surprising. Tesfa always wear miniskirts and she attracts teachers with her half- naked body. That is, it is not hers own effort.

Cont..

- **Beti:** “The scientific community is in unanimous agreement. We are altering the climate, and if we continue on our present course, the results will be disastrous. Climate change is a real problem in this world.”
- **Sosi:** “You know what’s a problem in this world? People just believing everything they hear. People will believe just about anything, as long as it’s said on television.

2. **Weak induction Fallacies**

- When the **connection** between **premises** and **conclusion is not strong** enough to support the conclusion.
- Include:
  - Appeal to Unqualified Authority (Argumentum ad Verecundiam)
  - Appeal to Ignorance (Argumentum ad Ignorantiam)
  - Hasty Generalization (Converse Accident)
  - False Cause
  - Slippery Slope
  - Weak Analogy

Cont..

1. **Appeal to Unqualified authority:**

- ***When an authority or witness is not trustworthy? How/why? Due to:***
  - ***Lack of expertise***
  - ***Motive to lie***
  - ***Bias***

  E.g. Dr. Abebe who is a famous Engineer in Ethiopia told me that all development policies of Ethiopia are wrong. It implies that, Ethiopia is following wrong direction of development policy.

Cont..

E.g.2: According to Dawit who is a paster in Mekane Eyesus Church, Catholic is simply a collection of people waiting for irrelevant mercy of God. I should stop attending churches of catholic.

E.g. 3: Acordning to Mr. John who is the manager of Tobacco company, testified that Tobacco is not adictive substance and that smoking cigarettes does not produce any addiction. Therefore, we should believe him and conclude that smoking does not in fact lead to any addiction.

Cont..

2. **Appeal to Ignorance:**

- Something is true because not it is not proven false, and the reverse.

1. After centuries of trying, no one has been able to prove that reincarnation occurs. So, at this point, i think we can safely conclude that reincarnation doesn't exist.
2. People have been trying for centuries to provide conclusive evidence for the claims of astrology, and no one has ever succeeded. Therefore, we must conclude that astrology is a lot of nonsense.

Cont..

Exceptions:

- **Courtroom procedures**
- E.g. a person is presumed innocent until proven guilty.
- **Some issues don’t require special qualification**
- E.g. No one has ever seen Mr. Andrews drink a glass of wine, beer, or any other alcoholic beverage. Probably Mr. Andrews is a nondrinker.

Cont..

3. <u>Hasty Generalization (Converse Accident)</u>

- **Reaching at conclusion based on little evidence/non representative sample.**
- **Example:**
  - » I have asked 3 female students for marriage. 3 of them are financial oriented. This implies that all female students are finance oriented.
  - » 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.

Cont..

- **Note that large sample may not always necessary.**
- **Example:**

❖On separate occasions, i drank a bottle of wine and found tasty. Probably, i would find every bottle of wine tasty.

❖ 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.

- ❖ **These two arguments are not fallacious.**

Cont..

4. False Cause:

- **Post hoc**
  - Conclude that one event cause another simply because occurred before the proposed effect.
    - A black cat crossed my path and later I tripped and sprained my ankle. It must be that black cats really are bad luck.
- **Non-causa pro causa**
- **Oversimplified cause Fallacy**

Cont..

Non-causa pro causa:

- Not the cause for the cause
  - E.g.
- 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.
- Successful Instructors paid salaries more than 6000 ETB. Therefore, the best way to ensure that Tewodros will become a successful Instructor is to raise his salary to at least 6000 ETB.

Cont..

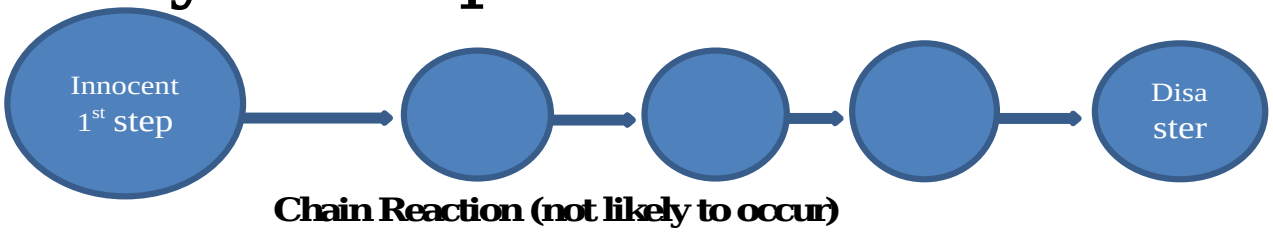
Oversimplified Cause:

- The quality of education in Hawassa University has been declining for years. Clearly, our teachers just aren’t doing their job these days.
- 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.

Cont..

5. **Fallacy of 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.



Cont..

E.g.1 . The government should enact a law that female students should not be dismissed from the campus at first year. Kidist was First Year student of Hawassa University. She has dismissed during first yeay of study. As a result, she has joined Bars in Hawassa. This in turn made Kidist carrier of HIV which led her to death.

Cont..

6. **Weak Analogy**:

- Object “A” has attributes of a, b, c and z. object “B” has attributes of a, b & c. therefore, object “B” probably has attribute z.
- EXAMPLE;

1. Tadesse’s new car is bright blue, has leather upholstery, and gets excellent gas mileage.

Tewabe’s new car is also bright blue and has leather upholstery. Therefore, it probably gets excellent gas mileage, too.

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.

3. Presumption Fallacy

- The premises presume what they purport to prove.
- Includes:
  - Begging the question
  - Complex question
  - False dichotomy
  - Suppressed evidence

Cont….

1. **Begging the question:**

- The assumption of the truth of the conclusion need to be proved
- The premise is not obliviously correct; concealed by tricky expressions.

❑It has the **form of circular reasoning.**

E.g. 1. God exists, because I don’t want to sent to hell.

2. I believe the president is telling the truth because he says he is telling the truth.

Cont..

Form 2: **Chain of intervening statements**

E.g. I can assure you that in the near future human race will began living permanently upon other planets. This is the great concern of many scientist nowadays. Many of these scientists are in NASA. NASA holds lots of amazing secrets about the other world. So, our future settlement will be certainly on other planets.

Cont..

Form 3: Ignoring questionable premise

- Federalism is contrary to Unitaianism. So, divide and rule is contrary to unitaruianism.
  - Missed premise: Federalism is a form of divide and rule.

2. Complex Question/ Loaded Question:

E.g.

1. Have you continued drinking in pubs all the night?
2. Are you still proud of yourself being a person having many girlfriends in campus?

Cont..

3. False Dichotomy

- Black-and white thinking
- Limited alternative
- Either---or---fallacy

e.g.

1. If you are not for me, you are against me.
2. Either you have to accept my love request or I will commit suicide.

Cont..

4. Suppressed Evidence

- The correct evidence is ignored and replaced by irrelevant ones.
- **1. Hawassa University is one of the prominent universities in Africa, because the color of buildings are impressive, the flowers and other plans gets enough water and it has ample gets around the compound.**

2. This tablet is very small, beautifully shaped an it smells good. So, it is good I give it to my child.

4. Linguistic Fallacies

A. Ambiguity

I. Equivocation

II. Amphiboly

B. Grammatical analogy

I. Composition

II. Division

1. Equivocation: Due to ambiguous word.

e.g.

All factories are plants.

All plants have chlorophyll

Therefore, all factories are things that can contain chlorophyll.

Cont..

2. I heard a sweet music yesterday. I have made a sweet talk there with a person that I could not remember him now. Hence, I could not remember the music I heard yesterday./ (*taste of music) vs. Conversation.*

3. Odd things arouse human suspicion. Fifteen is an odd number. Therefore, fifteen arouses human suspicion.

Cont…

Amphiboly:

Due to ambiguous statement.

1. TV advertisement “ Come to our Architecture school and learn how to build a house in six weeks’ (***period of instruction? Construction***?)
2. Tewodros told me that he always quarrels with his father when **he** is drunk. (Son? Father??)

Cont..

Division:

1. USA is the richest country in the world. Hence, my uncle who lives in USA is rich.
2. Ethiopia is a leading country exporting quality coffee. Gonder, which is one of the regions in Ethiopia, must be the exporter of quality coffee.
3. Salt is non-poisonous. It must be true that its components of sodium and chloride are non-poisonous.

Cont..

Composition:

- Opposite to division
- Wrong transfer of attributes from parts to whole.

E.G.

1. Particles of chalk are not visible. Hence, chalk is visible
2. Sodium and chloride are poisonous. Hence, salt, which is made up of sodium and chloride is poisonous.