Chapter Five

Logical Reasoning and Fallacies

1.1 Introduction

Logical reasoning is the process of using a rational, systematic series of steps based on sound mathematical procedures and given statements to arrive at a conclusion. Geometric proofs use logical reasoning and the definitions and properties of geometric figures and terms to state definitively that something is always true.

What is a fallacy?
The term fallacies comes from the Latin words which is called “fallo”, “fallacia” which means deception, trick or cheating. This implies that fallacy is a defect in an argument that consists in something other than merely false premises. It is a logical error of some sort, which is entirely independent of the actual truth or falsity of the premises or conclusion. Fallacies can be committed in many ways, but usually they involve either a mistake in reasoning or the creations of some illusion that make a bad argument appear good (or both). Both deductive and inductive arguments may contain fallacies; if they do, they are either unsound or uncogent, depending on the kind of argument. Conversely, if an argument is unsound or uncogent, it has one or more false premises or it contains a fallacy (or both).

Fallacies can be committed in many ways, but usually they involve either a mistake in reasoning or the creation of some illusion that make bad argument appear good. It has one or more false premise or it contains fallacy (or both).

5.2 Types of Fallacies: Formal and Informal

Fallacies can be committed in many ways, but usually they involve either a mistake in reasoning or the creation of some illusion that make bad argument appear good. It has one or more false premise or it contains fallacy (or both).

Fallacy divided into two groups:

1. Formal fallacies: - are **deductively invalid arguments** that typically commit an easily recognizable logical error because of incorrect use of logical structure. Because **the premises fail to support the conclusion with strict necessity.**

E.g. - All tigers are animals. All A are B

All mammals are animals All C are B

Therefore, all tigers are mammals. Therefore, A are C

- If apes are intelligent, then apes can solve puzzles. If X, then Y

  Apes can solve puzzles. Y

  Then, apes are intelligent. Therefore, X
- If someone is allergic to peanuts. Therefore, she doesn't eat peanut butter.

  Almaz doesn't eat peanut butter. Therefore, Almaz is allergic to peanuts.

Modus ponens: - is the rule of inference

If X, then Y. Valid affirming consequence

X.

Therefore, Y.

If someone is philosopher, then he publishes articles in philosophy.

Abebe is philosopher.

Therefore, Abebe publishes articles in philosophy.

2. **Informal fallacies**: - are errors in reasoning which are dictated through examining the **content** of an argument, not through detecting the form of an argument. Because, **it uses correct logical structure, but incorrect premises**. It may appear in both deductive and inductive argument. An argument containing **informal fallacies may be formally valid, but still fallacious.**

E.g. all factories are plants.

All plants are things that contain chlorophyll.

Therefore, all factories are things that contain chlorophyll.

5.3 Categories of Informal Fallacies

This category is for arguments that are fallacious for reasons other than structural ("formal") flaws, such as a due to ambiguity or a common error in their premises.

5.3.1 Fallacies of Relevance

Fallacies of Relevance

The fallacies of relevance share the common characteristics that the arguments in which they occur have premises that are logically irrelevant to the conclusion. Yet the premises are relevant psychologically, so the conclusion may seem to follow logically. In a good argument the premises provide genuine evidence in support of the conclusion. In a fallacy of relevance the connection between premises and conclusion is emotional. Therefore one must be able to distinguish genuine evidence from various forms of emotional appeal.

1. **Appeal to Force (argumentum ad baculum)**

It is also called **appeal to fear**. It is **physical or psychological intimidation**. It replaces reason with stick or force. In short, the threat does not prove or disprove the truth of the statement.

> **E.g.** 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 fallacies of this argument is based on the hard- luck story of the arguer or based on inciting pity sympathy by mentioning one's sad circumstances from the reader or listener.

> **E.g.** 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 come 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 (Argument ad poplum)**

It is a fallacies argument that concludes that a proposition must be true because many or most people believe it, often concisely encapsulated as “if many believe so, it is so.”

Nearly everyone wants to be exploiting of people’s strong emotions and feelings such as loved, esteemed, anger, admired, valued, recognized, and accepted by others. The appeal to the people uses these desires to get the reader or listener to accept a conclusion.

Generally, it is the argument one wants to be recognized or accepted by others.

In this argument two approaches are involved, direct and indirect approaches.

a. **Direct approach** occurs when an arguer, addressing a large group of people, excites the emotions and enthusiasm of the crowed to win acceptance for his conclusion. The objective is to rouse a kind of mob mentality by referring to mass belief, mass commitment or mass sentiment. This is the strategy used by nearly every propagandist and demagogue.

   E.g. – “All American should stand up and oppose this threat to our freedom! We are the oldest freedom- loving country on the face of the earth!”

The direct approach is not limited to oral argumentation a similar effect can be accomplished in writing. By employing such emotionally charged phraseology as “fighter of communism”, defender of the working man etc…

b. **Indirect approach** the arguer directs his or her appeal not to the crowed as a whole but to one or more individuals separately, focusing upon some aspect of their relationship to the crowd. The indirect approach includes such specific forms as the bandwagon argument, the appeal to vanity, and the appeal to snobbery. All are standard techniques of the advertising industry.

The arguer tries to get individuals to accept a conclusion by appealing to the following emotions identification:

i. **Bandwagon (popular appeal): -** is based on the assumption that because many people or group do or accept **X**, and then **X** is good or true.

Here is an **example** of the band wagon argument:

- Of course you want to buy signal tooth paste. Why, 90% of Ethiopian brushes with it.

- "You should buy the latest Toshiba laptop. Everyone is buying it."

The idea is that you will be left behind or left out of the group if you do not use the product.

ii. **The appeal to vanity (flattery) –** often associates the product with a certain celebrity who is admired and pursued, the idea being that you, too, will be admired and pursued if you use it. Therefore, the argument associates the conclusion with someone who is admired.

Example: - who is going to buy these new fashion jeans, which is the first choice of famous artist Teddy Afro?

The message is that you will be admired and respected just like Teddy.

iii. **Appeal to snobbery:** an argument commits the appeal to snobbery from of the appeal to the people fallacy when the arguer associates the conclusion with some elite group of people. Therefore, the argument associates the conclusion with our desire to be rich and powerful.

Example: - do you want to flight to Canada? Ethiopia Dreamliner is a waiting to you and you would better buy first level ticket. But, note that Dreamliner is only for respected customers and distinguished personalities. (Hurry up!)

- The best way to spend your leisure time is to play football. That is how all of society's elite spend their leisure time.

4. **Argument against the person (Argument ad hominem)**

This fallacy always involves two arguers. One of them advances (either directly or implicitly) a certain argument and the other than responds by directing his or her attention not to the first person's argument but to the first person himself. This argument occurs by attack person's character or motives rather than their argument or evidence. When this occurs, the second person is said to commit an argument against person.

This type of argument has the following form:

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

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

Ad hominem abusive: in ad hominem abusive, the second person responds to the first person's argument by verbally abusing the first person or by attacking the personal character instead of attacking the details of the argument itself.

Example: - Her idea that environmental protection needs to be given priority is non-sense. 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.

- Some of the so-called activists who Vietnam was depraved maniacs whose brains were "burnt out" on drugs. This is enough to prove that their views about USA involvement in Vietnam were wrong.

Explanation: even if the speaker's beliefs and attitudes about the "activists" bearing on the question of the merits of America involvement in Vietnam War. The fallacy of this argument is that it attacks the individuals who protested the war, instead of offering direct reasons why their views were incorrect.

Ad hominem circumstantial: begins the same way as the ad hominem abusive, but instead of heaping verbal abuse on his or her opponent, the respondent attempts to discredit the opponent's argument by alluding to certain circumstances (such as the person's religion, political affiliation, ethnic background, position or interest) that affect the opponent . By doing so the respondent hopes to show that the opponent is predisposed to argue the way he or she does and should therefore not be taken seriously.

This fallacy has the following form:

1. Person A make's claim X.
2. Person B make's an attack on A's circumstances because it is in A's interest to claim X.
3. Therefore, claim X is false.

Example: - Einstein, who advanced the theory or special relativity, was a Jew. According to the Nazis, it followed that Einstein's theory was false.

Explanation: Einstein's religious, racial, or ethnic back ground and circumstances have no bearing on the acceptability of his scientific theories. Such theories in any case are subject to experimental testing.

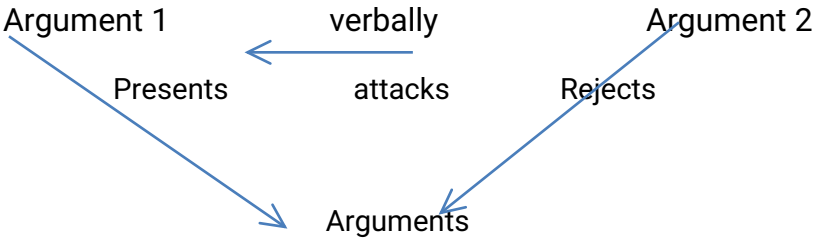
Tu quoque ("you too"): this fallacy committed when we say that a person's claim is false because it's inconsistent or contrary with something else the person has said or done before.

This fallacy has the following form:

1. Person A make's 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.

Fallacy begins the same way as the other two varieties of the ad hominem argument, except that the second arguer attempts to make the first appear to be hypocritical or arguing in bad faith. The second arguer usually accomplishes this by citing features in the life or behaviour of the first arguer that conflict with the latter's conclusion.

Example: child to **father:** 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.



In general, the above chart shows that argument against the person.

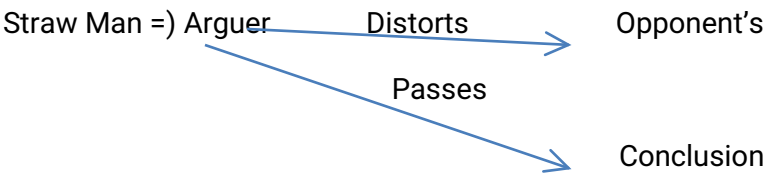
5. **Straw Man**

It fallacy is committed when an arguer distorts an opponent's argument for the purpose of more easily attacking it, demolishes the distorted argument, and then concludes that the opponent's real argument has been demolished. In other words, when some distorts or substitutes the original version of his/her opponent's argument by deliberately weakened version and tries to attack the distorted one, she/he commits straw man fallacy.

An argument commits the straw man fallacy when the arguer distorts another person's actual position or argument and attacks the (weaker) misrepresentation.

For example: - Dr. Kebede has just argued against affirmative action for women. It seems what he is saying is that women should stay out of the work place altogether.

Just keep them barefoot and pregnant. That is what Dr. Kebede wants. Well! I think we all smart enough to reject his argument.



6. **Red Herring**

This fallacy is an attempt to divert the attention of audiences to the totally different issue. He or she then finishes by either drawing a conclusion about this different issue or by merely presuming that some conclusion has been established.

An argument commits the red herring fallacy when the arguer changes the subject mid-argument to draw the attention of the audience away from the original target. The new subject to which the arguer diverts the argument is generally related to the original topic so as to obscure the shift.

Example: - Child: Mom I want that toy.

Mother: Honey, let's rush home.

Yummy treat for you!

- Abortion is wrong because it puts an end to a life that is inherently valuable. And it is not just human lives that are valuable. Dogs and cats are precious creatures. Just look at them. They are so cute. It would be very wrong indeed to hurt these little animals.

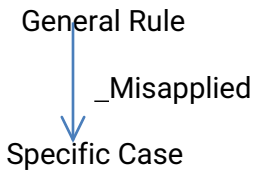
7. **Accident**

The fallacy of accident is committed by an arguer who intends to wrongly apply general rule to a specific case that cannot cover the former. The general rule is cited (either directly or implicitly) in the premises and then wrongly applied to the specific case mentioned in the conclusion. Because of the "accidental" features of the specific case, the general rule, principles or the truth does not fit the particular instance or situation.

Example: - children should obey their parents. Therefore, little Abush should follow his alcoholic fathers orders to drop out of school and get a job.

- Freedom of speech is a constitutionally guaranteed right. Therefore, John Q. radical should not be arrested for his speech that incited the riot last week.

The right of freedom of speech has its limits, s does the rule that property be returned to its rightful owner. These rules are obviously misapplied in the above circumstances. The arguments therefore commit the fallacy of accident.



The above chart show that the fallacy of accident in general.

8. **Missing the point (Ignoratio Elenchi)**

It occurs when someone draws a conclusion, which completely misses the point, she/he commits missing the point fallacy.

These fallacies arise when we are misled into accepting a conclusion on the basis of premises which make us want to believe the conclusion, although the premises do not logically support it. Since it is not so much an argument that misapplies a logical principle or confuses a grammatical similarity with a similarity of logical form, as it is a way of passing off non logical consideration as if they were logical in force. It illustrates a special form of irrelevance. 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. He /she should be able to identify the correct conclusion, the conclusion that the premises logically imply. This conclusion must be significantly different from the conclusion that is actually drawn.

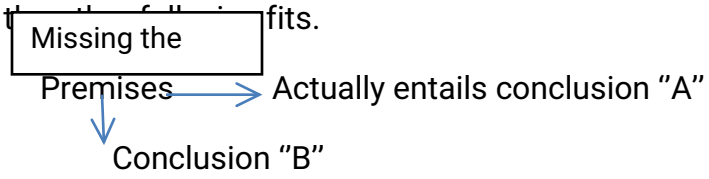
Example: - Haile G/Silassie has won many cross country championships. He is still dedicated, hard worker, disciplined, courageous and determined to win marathon. Therefore, Ethiopians should save their lives from HIV- AIDS.

- 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.

At least two correct conclusions are implied by the premises of the first argument either “we should increase police protection in vulnerable neighbourhoods” or” we should initiate programs to eliminate the causes of the crimes”. Reinstating the death penalty is not a logical conclusion at all. Theft and robbery are not capital crimes. In the second argument the premises logically suggest some systematic effort to eliminate the

cheaters rather than eliminating the system altogether.

Ignoratio elenchi means “ignorance of the proof”. The arguer is ignorant of the logical implications of his or her own premises and, as a result, draws a conclusion that misses the point entirely. The fallacy has a distinct structure all its own, but in some ways it serves as a catchall for arguments that are not clear instances of one or more of the other fallacies. An argument should not be identified as a case of missing the point, however, if one of t fits.



5.3.2 Fallacies of weak Induction

Fallacies of Weak Induction

Fallacies of weak induction occur not when the premises are logically irrelevant to the conclusion but when the premises are not strong enough to support the conclusion.

1. **Appeal to Unqualified Authority**

It is customary that individuals need to get suggestion, comment, opinion and advice from others so as to achieve a certain conclusion. However, there are cases where those individuals who are entitled to deliver information might not be trustworthy. Because: - They lack the expertise in a certain profession.

- They may be biased
- They may have the motive to lie or misinformation etc.

E.g.: - Omar the magnificent, who is the country’s the country’s astrologer, says that AIDS epidemic is caused by perverse alignment of the planets, and that there is nothing any one can do about it. Therefore, we can only conclude that all of these efforts to find a cure for AIDS are a waste of time.

2. **Appeal to Ignorance (argumentum ad ignoratiam)**

This is a fallacy is committed when the lack to evidence or proof for something is used to support the conclusion.

In any case, appeal to ignorance will be committed when:

- Someone argues that something is not the case (true) because no

has proved to be false.

- Someone argued that something is not the case (false) because no has proved to be true.

E.g.: - Nobody has every proved the existence of ghosts. Therefore, we have no alternative but to conclude that ghosts are figments of the imagination.

3. **Hasty Generalization (Converse Accident)**

It is drawing conclusion/ generalization based on unrepresentative or small evidence or information will result in an argument with hasty generalization fallacy.

E.g.: - My last two girlfriends complained a lot. It has become very apparent to me from these experiences that all women are just complainers.

It should be obvious that a single instance is not enough to establish the truth of such a general principle. Since it's easy for this conclusion to be false even though the premise is true, the argument is unreliable.

4. **False Cause**

It occurs whenever the link between premises and conclusion depends no some imagined causal connection that probably does not exists, an attempt to suppose that "X" causes "Y" whereas "X" probably does not cause "Y" at all. It occurs when an argument mistakenly attempt to establish a causal connection. There are two basic interrelated kinds. These are:

A. **Post hoc ergo propter hoc** (Literally "after this, therefore because of this"): the fallacy arguing that one event was caused by another event merely because it occurred after that event.

Mere succession in time is not enough to establish causal connection.

E.g.: - Consider" since hair always precedes the growth of teeth in babies, the growth of hair causes the growth of teeth."

B. **Non causa pro causa** (literally "no cause for a cause"): the fallacy of making a mistake about the ascription of some cause to an effect.

E.g.: - "putting more police on the streets actually causes crime to increase!

5. **Slippery Slope**

It is an argument that suggests taking a minor action will lead to major and sometimes ludicrous consequences. It is a specific type of logical fallacy.



Chain reaction of slippery slope

E.g.: - If I don't get 2point in my study, I won't be able to graduate. If I don't graduate, I probably won't be able to get a good job.

6. **Weak Analogy**

Occurs when an analogy upon which the argument depends is too weak to support the argument.

E.g. No one would blame a bartender for having a few drinks on the job. But an airline pilot is no less a human being than a bartender. So, no one should blame an airline pilot for having a few drinks on the job.

5.3.3 Fallacies of Presumption

Fallacies of Presumption

Fallacies of presumption are a part of the group of logical fallacies classified as fallacies of sufficiency. This means that the argument a person make is based on assumption, rather than a proven fact. This can only occur when the argument rests on inductive reasoning, which means creating the argument by building up on the conclusion. Therefore, the fallacies of presumption fail to provide adequate reason for believing the truth of their conclusions. In these instances, however, the erroneous reasoning results from an implicit supposition of some further proposition whose truth is uncertain or implausible. Again, we'll consider each of them in turn, seeking always to identify the **unwarranted assumption** upon which it is based.

1. **Begging the Question (petitio principii)**

Begging the question is the fallacy of using the conclusion of an argument as one of the premises offered in its own support. Although this often happens in an implicit or disguised fashion, an explicit version would look like this:

E.g. - All dogs are mammals.

All mammals have hair.

Since animals with hair bear live young, dogs bear live young.

But all animals that bear live young are mammals.

Therefore, all dogs are mammals.

Unlike the other fallacies we've considered, begging the question involves an argument (or chain of arguments) that is formally valid: if its premises (including the first) are true, then the conclusion must be true. The problem is that this valid argument doesn't really provide support for the truth its conclusion; we can't use it unless we have already granted that.

2. **Complex Question (ad ignorantiam)**

The fallacy of complex question presupposes the truth of its own conclusion by including it implicitly in the statement of the issue to be considered:

E.g. - Have you tried to stop watching too much television?

If so, then you admit that you do watch too much television.

If not, then you must still be watching too much television.

Therefore, you watch too much television.

In a somewhat more subtle fashion, this involves the same difficulty as the previous fallacy. We would not willingly agree to the first premise unless we already accepted the truth of the conclusion that the argument is supposed to prove.

3. **False Dilemma/Dichotomy (absolute disjunction)**

This fallacy occurs when it is presumed that there are only two choices while in fact more options are available. This fallacy is also called “black and white thinking”, because it oversimplifies the options by assuming that one of the two extreme views must be true.
E.g. - either you are my friend or my enemy.

- Either you love a person or hate him.

- A person is either wise or a fool.

5.3.4 Fallacies of Ambiguity

Fallacies of Ambiguity/ Fallacies of Grammatical Analogy

Ambiguous Language

These fallacies occur because they are grammatically similar to arguments that are good ones.

In addition to the fallacies of relevance and presumption we examined in our previous lessons, there are several patterns of incorrect reasoning that arise from the imprecise use of language. An ambiguous word, phrase, or sentence is one that has two or more distinct meanings. The inferential relationship between the propositions included in a single argument will be sure to hold only if we are careful to employ exactly the same meaning in each of them. The fallacies of ambiguity all involve a confusion of two or more different senses.

1. **Equivocation**

An equivocation trades upon the use of an ambiguous word or phrase in one of its meanings in one of the propositions of an argument but also in another of its meanings in a second proposition.

E.g. - Really exciting novels are rare.

But rare books are expensive.

Therefore, really exciting novels are expensive.

Here, the word "rare" is used in different ways in the two premises of the argument, so the link they seem to establish between the terms of the conclusion is spurious. In its more subtle occurrences, this fallacy can undermine the reliability of otherwise valid deductive arguments.

2. **Division**

The fallacy of division involves an inference from the attribution of some feature to an entire class (or whole) to the possession of the same feature by each of its individual members (or parts).
E.g. – women in the United States are paid less than men. Therefore, my mom must make less money than my dad.
- The boy in my neighborhood likes to play basketball after school. So my new neighbor, Girma, will like to play basketball with them.

The essential point in the fallacy of division is that even when something can be truly said of a whole class, it does not follow that the same can be truly said of each of its individual parts.

3. **Composition**

The fallacy of composition involves an inference from the attribution of some feature to every individual member of a class (or part of a greater whole) to the possession of the same feature by the entire class (or whole).

E.g. – Every course I took in college was well- organized.

Therefore, my college education was well- organized.

Even if the premise is true of each and every component of my curriculum, the whole could have been a chaotic mess, so this reasoning is defective. Notice that this is distinct from the fallacy of converse accident, which improperly generalizes from an unusual specific case (as in "My philosophy course was well-organized; therefore, college courses are well-organized."). Another example Steve likes pickles. Steve likes coke. It follows that Steve likes pickled coke.

For the fallacy of composition, the crucial fact is that even when something can be truly said of each and every individual part, it does not follow that the same can be truly said of the whole class. The difference between hasty generalization and composition, composition proceeds from the members of the class to the class itself, whereas hasty generalization proceeds from the specific to the general.

4. **Amphiboly**

An amphiboly can occur even when every term in an argument is univocal or when the premises used in ambiguous because of careless /ungrammatical, if the grammatical construction of a sentence creates its own ambiguity.

E.g. - A reckless motorist Thursday struck and injured a student who was jogging through the campus in his pickup truck.

Therefore, it is unsafe to jog in your pickup truck.

In this example, the premise (actually heard on a radio broadcast) could be interpreted in different ways, creating the possibility of a fallacious inference to the conclusion.

Here the premise may be true if read without inflection, but if it is read with heavy stress

on the last word seems to imply the truth of the conclusion.