

Understanding Logical and Logical Fallacies

Logic

What is logic?

Definition: A proper or reasonable way of thinking about or understanding something

Definition: A form of deductive reasoning consisting of a major premise, a minor premise, and a conclusion

Inductive Reasoning:

Definition: A logical process in which multiple premises, all believed true or found true most of the time, are combined to obtain a specific conclusion. Inductive reasoning is often used in applications that involve prediction, forecasting, or behavior

Deductive Reasoning:

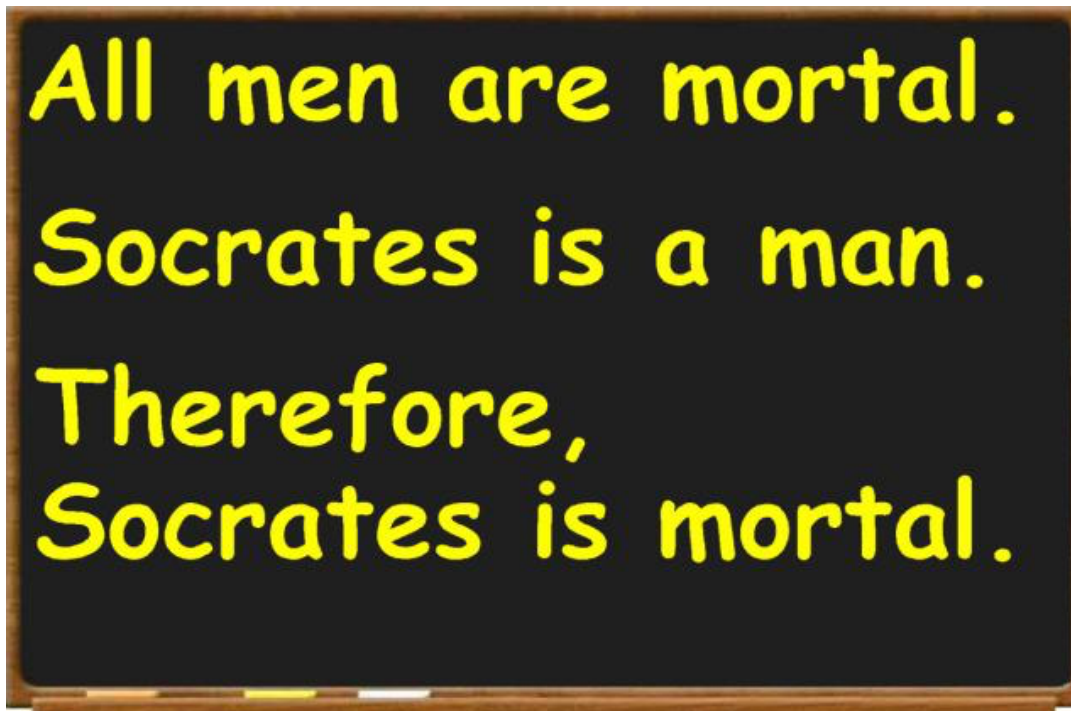
Definition: A logical process in which a conclusion is based on the concordance of multiple premises that are generally assumed to be true. Deductive reasoning is sometimes referred to as top-down logic. Its counterpart, inductive reasoning, is sometimes referred to as bottom-up logic.

[Thinking Logically Tedx](#)

[Inductive vs. Deductive Video](#)

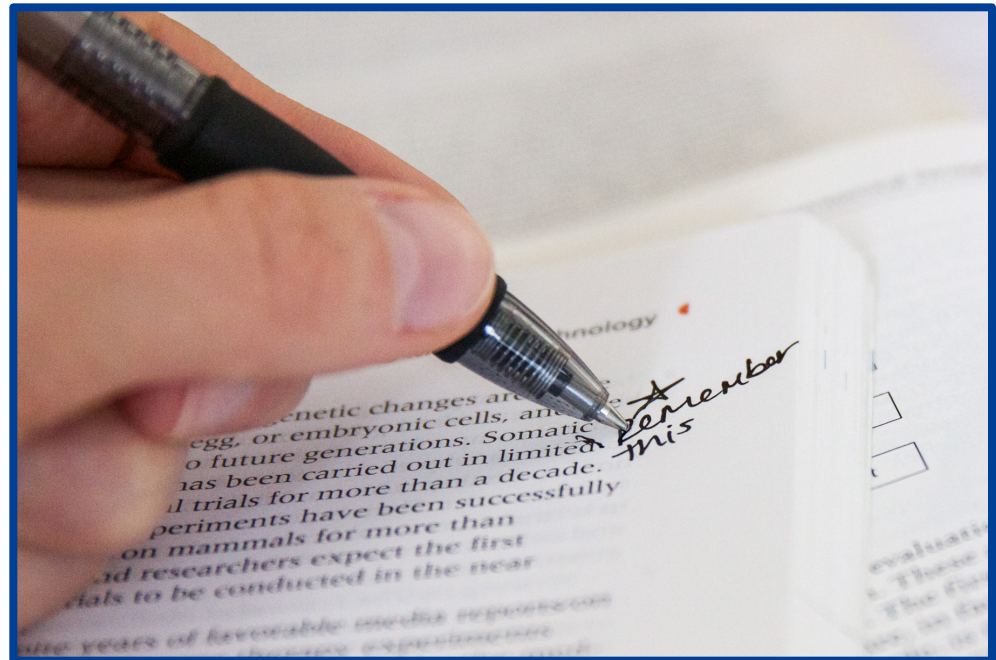
Syllogism:

Definition: an instance of a form of reasoning in which a conclusion is drawn (whether validly or not) from two given or assumed propositions (premises), each of which shares a term with the conclusion, and shares a common or middle term not present in the conclusion.



What is a fallacy?

A fallacy is an error in reasoning.
Including fallacies in your writing will
weaken your argument.



Why is it important to know about logical fallacies?

If you know about fallacies, and the different kinds of logical fallacies, you will be able to do two things.

1. You will be able to improve your own argument writing because you will be able to stay away from including logical fallacies.
2. You will be able to recognize logical fallacies in other people's writings.

Type of Logical Fallacies

- Ad hominem
- Ad populum
- Begging the Question
- Circular Reasoning
- False Analogy
- Hasty Generalizations
- Non-Sequitur
- Post hoc ergo propter hoc
- Red Herring
- Slippery Slope
- Straw Man

These are just some of the many logical fallacies.

Ad hominem

- An attack on the person, or the character of the person, rather than his or her arguments or opinions.
- In Latin, ad hominem means, “against the man.”

This is what an ad hominem can look like.

Person A makes claim X

Person B makes an attack on Person A

Therefore, A's claim is not true

Ad hominem example

Claim



Michael Vick is not a good football player; **he is a criminal who is cruel to animals.**



Supporting evidence

Why is this an example of an ad hominem?

Ad hominem example

Claim

Michael Vick is not a good football player; **he is a criminal who is cruel to animals.**



Supporting evidence

While the claim may be true, the arguer does not support his or her claim with reason and logic. It is simply an attack on Michael Vick. Therefore, it is an ad hominem fallacy.

Ad populum

- A fallacious argument that appeals to the popularity of the claim as a reason to accept it.
- In Latin, ad populum means, “appeal to the people.”


This is what an ad populum can look like.

Person A makes claim X

Person A is popular and widely liked

Therefore, A's claim is true because of his/her popularity.


Ad populum example

Supporting evidence 


Most people think that Gatorade is better than Powerade, so Gatorade is the superior sports beverage.

Why is this an example of an ad populum? 

Ad populum example

Supporting evidence 

Most people think that Gatorade is better than Powerade, so Gatorade is the superior sports beverage.

While the claim may be true, all of the supporting evidence relies in its popularity, not on researched data. 

Begging the Question


- An argument that assumes that the premise of the claim is true
- This is a type of circular reasoning

This is what begging the question can look like.

Claim Z assumes that Z is true

Therefore, claim Z is true


Begging the Question example

Supporting evidence 


Useless and wasteful plastic grocery bags should be banned.

Why is this an example of **Claim**  begging the question?

Begging the Question example

Supporting evidence 

Useless and wasteful plastic grocery bags should be banned.

This is an example of begging the question because the person arguing the claim is assuming that the supporting evidence (that plastic grocery bags are useless and wasteful) is a valid claim in itself. 

Circular Reasoning

- A fallacious argument that restates the argument or claim rather than proving it.
- The argument goes in a circle
- The arguer assumes what he or she is attempting to prove.

This is what circular reasoning can look like.


Claim A is true because of claim B

B is true because of A

Circular Reasoning example

The president of the United States is a good leader **because he is the leader of the country.**

Claim



Why is **this an example** of circular reasoning?



Circular Reasoning example

The president of the United States is a good leader because he is the leader of the country.

Claim

Supporting evidence

This argument is an example of circular reasoning because the claim and the supporting evidence are nearly identical. The arguer simply restated the claim as the supporting evidence.

False Analogy

- This is an argument that is based on a misleading comparison.

This is what false analogy can look like.

Item A and item B are similar

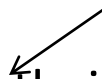
Item A likes Z

Therefore, B should like Z also

False Analogy example

Students should be able to use their notes and textbooks on exams because surgeons get to use X-ray and MRI images during surgery.

Claim



Why is this an example of a false analogy?

Supporting evidence



False Analogy example

↙ Claim

Students should be able to use their notes and textbooks on exams because surgeons get to use X-ray and MRI images during surgery.

This is an example of false analogy because students and surgeons are not alike. During exams, students need to show what they have learned, whereas surgeons have already proven their knowledge and they are completing a task.

↖ Supporting evidence

Hasty Generalizations

- A conclusion, or a claim, that is based on insufficient evidence. This happens when the arguer rushes to a conclusion before having enough relevant facts.

This is what a hasty generalization can look like.

Z is true for A

Z is true for B

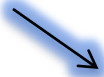
Z is true for C

Z is true for D

Therefore, Z must be true for E, F, G.....Y, Z

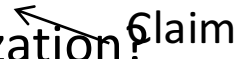
Hasty Generalizations example

Supporting evidence



Even though it is only the first day of school, I can already tell I'm going to hate this year.

Why is this an example of a hasty generalization?



Claim

Hasty Generalizations example

Supporting evidence



Even though it is only the first day of school, I can already tell I'm going to hate this year.

This argument is an example of a hasty generalization because the arguer is making a claim based on insufficient evidence. One day's worth of evidence is not sufficient to make a claim for an entire year.

← Claim

Non-Sequitur

- This type of fallacy occurs when a conclusion does not follow from its premises.
- In Latin non-sequitur means, “it does not follow.”

This is what a non-sequitur can look like.

Person A makes claim 1

Person A provides support for claim 1

Therefore, claim 2 must be true

Non-Sequitur example

Supporting evidence



Students like to eat French fries. French fries are made from potatoes.
Therefore, it is healthy to eat French fries everyday.

Why is this an example of a non-sequitur? ~~Claim~~ Claim

Non-Sequitur example

Supporting evidence



Students like to eat French fries. French fries are made from potatoes. Therefore, it is healthy to eat French fries everyday.

This is an example of a non-sequitur because the real claim in the argument (that it is healthy to eat French fries everyday) is not supported by any evidence or logic. The claim does not properly follow the premises of the argument.

Post hoc ergo propter hoc

- This logical fallacy occurs when it is assumed that one thing caused another when the two events happen sequentially.
- In Latin, post hoc ergo propter hoc means, “after this, therefore because of this.”
- Shortened to “post hoc”

This is what post hoc ergo propter hoc can look like.

Event A happens

Then, event B happens

Therefore, event A must have caused event B

Post hoc ergo propter hoc example

Supporting evidence



The stoplight always turns red right before I reach the intersection.
Therefore, my car must be the reason why the stoplight always changes.

Why is this an example of post hoc?



Claim

Post hoc ergo propter hoc example

Supporting evidence



The stoplight always turns red right before I reach the intersection. Therefore, my car must be the reason why the stoplight always changes.

This is an example of post hoc because there are many reasons why the lights might turn red. However, my car is most likely not one of them.

Red Herring

- This is a logical fallacy that is a diversion tactic that leads people away from the key or real issues.
- To create a red herring, people will oppose arguments rather than addressing them.
- Leads the reader or audience to a false conclusion.

This is what a red herring can look like.

Issue Y is being discussed

Issue Z is disguised to look relevant to Y

Issue Y is ignored/abandoned

Red Herring example

Energy drinks can be potentially very dangerous. **However, how else are students supposed to have enough energy to study and get good grades?**

← Claim

Why is this an example of a red herring?

Supporting evidence ↗

Red Herring example

Energy drinks can be potentially very dangerous. **However, how else are students supposed to have enough energy to study and get good grades?**

← Claim

The highlighted **Supporting evidence** portion of the argument is a red herring because it distracts the audience from the issue at hand (energy drinks can be potentially dangerous).

Slippery Slope

- This fallacy occurs when a person argues that an event will inevitably happen without providing any examples that this may happen.
- In most cases, a series of steps is intentionally left out.

This is what a slippery slope can look like.

Event A happens (or may happen)

Therefore, event Z will inevitably happen

Slippery Slope example

Supporting evidence




School districts have the ability to monitor student Internet use at school, therefore the districts will eventually monitor all student Internet activity.

Why is this an example of a slippery slope?

Claim

Slippery Slope example

Supporting evidence 

School districts have the ability to monitor student Internet use at school, therefore the districts will eventually monitor all student Internet activity.

This is a slippery slope because there is no logical evidence or reasoning that school districts will monitor all student Internet activity

Straw Man

- This logical fallacy happens when someone oversimplifies or misrepresents another person's argument in order to make it easier to attack.

This is what a straw man can look like.

Person 1 believes A

Person 2 says B (which is a misrepresented version of A)

Person 2 attacks B

Therefore, A is wrong

Straw Man example

Person 1: I like the rain

Person 2: Yes, but if it is never sunny out, people will suffer from Vitamin D deficiency, all of our crops will die, and we will die of starvation.

Why is this an example of a straw man?

Straw Man example

Person 1: I like the rain

Person 2: Yes, but if it is never sunny out, people will suffer from Vitamin D deficiency, all of our crops will die, and we will die of starvation.

This is a straw man argument because Person 2 misrepresents Person 1's argument to make it easier to attack. Person 1 never said that it shouldn't ever be sunny.

Videos

- [Five Logical Fallacies- PBS Digital Studios](#)
- [Your Logical Fallacy](#)



strawman

Misrepresenting someone's argument to make it easier to attack.

After Will said that we should put more money into health and education, Warren responded by saying that he was surprised that Will hates our country so much that he wants to leave it defenceless by cutting military spending.



false cause

Presuming that a real or perceived relationship between things means that one is the cause of the other.

Pointing to a fancy chart, Roger shows how temperatures have been rising over the past few centuries, whilst at the same time the numbers of plagues have been decreasing, thus plagues cool the world and global warming is a hoax.



slippery slope

Asserting that if we allow A to happen, then Z will consequently happen too, therefore A should not happen.

Colin Closet asserts that if we allow same-sex couples to marry, then the next thing we know we'll be allowing people to marry their parents, their cars and even monkeys.



ad hominem

Attacking your opponent's character or personal traits in an attempt to undermine their argument.

After Sally presents an eloquent and compelling case for a more equitable taxation system, Sam asks the audience whether we should believe anything from a woman who isn't married, was once arrested, and smells a bit weird.



special pleading

Moving the goalposts to create exceptions when a claim is shown to be false.

Edward Johns claimed to be psychic, but when his 'abilities' were tested under proper scientific conditions, they magically disappeared. Edward explained this saying that one had to have faith in his abilities for them to work.



loaded question

Asking a question that has an assumption built into it so that it can't be answered without appearing guilty.

Grace and Helen were both romantically interested in Brad. One day, with Brad sitting within earshot, Grace asked in an inquisitive tone whether Helen was having any problems with a fungal infection.



the gambler's fallacy

Believing that 'runs' occur to statistically independent phenomena such as roulette wheel spins.

Red had come up six times in a row on the roulette wheel, so Greg knew that it was close to certain that black would be next up. Suffering an economic form of natural selection with this thinking, he soon lost all of his savings.



bandwagon

Appealing to popularity or the fact that many people do something as an attempted form of validation.

Shamus pointed a drunken finger at Sean and asked him to explain how so many people could believe in werewolves if they're only a silly old superstition. Sean, however, had had a few too many Guinnesses himself and fell off his chair.



black-or-white

Where two alternative states are presented as the only possibilities, when in fact more possibilities exist.

Whilst talking support for his plan to fundamentally undermine citizens' rights, the Supreme Leader told the people they were either on his side, or on the side of the enemy.



begging the question

A circular argument in which the conclusion is included in the premise.

The word of Zorbo the Great is flawless and perfect. We know this because it says so in The Great and Infalible Book of Zorbo's Best and Most Trustworthy Things that are Definitely True and Should Not Ever Be Questioned.



appeal to emotion

Manipulating an emotional response in place of a valid or compelling argument.

Luke didn't want to eat his sheep's brains with chopped liver and brussels sprouts, but his father told him to think about the poor starving children in a third world country who weren't fortunate enough to have any food at all.



tu quoque

Avoiding having to engage with criticism by turning it back on the accuser - answering criticism with criticism.

The blue candidate accused the red candidate of committing the tu quoque fallacy. The red candidate responded by accusing the blue candidate of the same, after which each spent an hour of back and forth criticism with not much progress.



burden of proof

Saying that the burden of proof lies not with the person making the claim, but with someone else to disprove.

Bertrand declares that a leoprot is, at this very moment, in orbit around the Sun between the Earth and Mars, and that because no one can prove him wrong his claim is therefore a valid one.



no true scotsman

Making what could be called an appeal to purity as a way to dismiss relevant criticisms or flaws of an argument.

Angus declares that Scotsmen do not put sugar on their porridge, to which Lachlan points out that he is a Scotsman and puts sugar on his porridge. Furious, like a true Scot, Angus yells that no true Scotsman sugars his porridge.



appeal to authority

Using the opinion or position of an authority figure, or institution of authority, in place of an actual argument.

Not able to defend his position that evolution isn't true? Bob says that he knows a scientist who also questions evolution (and presumably isn't a primate).



composition /division

Assuming that what's true about one part of something has to be applied to all, or other, parts of it.

Daniel was a precocious child and had a liking for logic. He reasoned that atoms are invisible, and that he was made of atoms and therefore invisible too. Unfortunately, despite his trinkly skills, he lost the game of hide and go seek.



the texas sharpshooter

Cherry-picking data clusters to suit an argument, or finding a pattern to fit a presumption.

The makers of Sugarette Candy Drinks point to research showing that of the five countries where Sugarette drinks sell the most units, three of them are in the top ten healthiest countries on Earth, therefore Sugarette drinks are healthy.



appeal to nature

Making the argument that because something is 'natural' it is therefore valid, justified, inevitable, good, or ideal.

The medicine man rolled into town on his bandwagon offering various natural remedies, such as very special plain water. He said that it was only natural that people should be wary of artificial medicines such as antibiotics.



anecdotal

Using personal experience or an isolated example instead of a valid argument, especially to dismiss statistics.

Jason said that that was all cool and everything, but his grandfather smoked, like, 30 cigarettes a day and lived until 97 - so don't believe everything you read about meta analyses of sound studies showing proven causal relationships.



the fallacy fallacy

Presuming that because a claim has been poorly argued, or a fallacy has been made, that it is necessarily wrong.

Recognising that Amanda had committed a fallacy in arguing that we should eat healthy food because a nutritionist said it was popular, Alyse said we should therefore eat bacon double cheeseburgers every day.



personal incredulity

Saying that because one finds something difficult to understand that it's therefore not true.

Yik drew a picture of a fish and a human and with effusive disdain asked Richard if he really thought we were stupid enough to believe that a fish somehow turned into a human through just, like, random things happening over time.



ambiguity

Using double meanings or ambiguities of language to mislead or misrepresent the truth.

When the judge asked the defendant why he hadn't paid his parking fine, he said that he shouldn't have to pay them because the sign said 'Fine for parking here and so the naturally presumed that it would be fine to park there.



genetic

Judging something good or bad on the basis of where it comes from, or from whom it comes.

Accused on the 6 o'clock news of corruption and taking bribes, the senator said that we should all be very wary of the things we hear in the media, because we all know how very unreliable the media can be.

thou shalt not commit logical fallacies

A logical fallacy is a flaw in reasoning. Strong arguments are void of logical fallacies, whilst arguments that are weak tend to use logical fallacies to appear stronger than they are. They're like tricks or illusions of logic, and they're often very sneakily used by politicians, the media, and others to fool people.

Don't be fooled! This poster has been designed to help you identify some of the more common fallacies. If you see someone committing a logical fallacy online, link them to the relevant fallacy to school them in thinness e.g. yourlogicalfallacyis.com/strawman

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