

Logic

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Topics

- Laws of Logic
- Formal Logic
- Formal Fallacies
- Informal Fallacies
- Terms

Laws of Logic

- The law of identity (A is A)
 - *Everything is itself and not something else*
- The law of non-contradiction (A is not non-A)
 - *Two or more contrary statements cannot both be true in the same place, time or sense*
- The law of excluded middle (Either A or non-A)
 - *Everything must either be or not be*

Formal and Informal Logic

- Argument
- Deductive vs Inductive Reasoning
- Syllogism
- Disjunctive Syllogism
- Modus Ponens
- Modus Tollens

Argument

- A reason or set of reasons arranged in statements called premises with a conclusion given for the purpose of persuading others that an idea is right or wrong. An argument can be deductive or inductive.

Deductive vs Inductive Reasoning

- A deductive argument is an argument that is intended by the arguer to be deductively valid, that is, to provide a guarantee of the truth of the conclusion provided that the argument's premises are true. This point can be expressed also by saying that, in a deductive argument, the premises are intended to provide such strong support for the conclusion that, if the premises are true, then it would be impossible for the conclusion to be false. An argument in which the premises do succeed in guaranteeing the conclusion is called a (deductively) valid argument. If a valid argument has true premises, then the argument is said also to be sound. All arguments are either valid or invalid, and either sound or unsound; there is no middle ground, such as being somewhat valid. – *Internet Encyclopedia of Philosophy* (<http://www.iep.utm.edu/ded-ind/>)
- An inductive argument is an argument that is intended by the arguer to be strong enough that, if the premises were to be true, then it would be unlikely that the conclusion is false. So, an inductive argument's success or strength is a matter of degree, unlike with deductive arguments. There is no standard term for a successful inductive argument, but this article uses the term "strong." Inductive arguments that are not strong are said to be weak; there is no sharp line between strong and weak. The strength of the above argument would become stronger if there were more times in which the person has walked by the dog and the dog has not tried to bite; the argument would become weaker if the person has walked by the dog only once. – *Internet Encyclopedia of Philosophy* (<http://www.iep.utm.edu/ded-ind/>)

Syllogism

A logical argument that applies deductive or inductive reasoning based on two or more premises to arrive at a conclusion.

Major Premise: All A are B

Minor Premise: C is A

Conclusion: Therefore C is B

Major Premise: All men are mortal

Minor Premise: Socrates is a man

Conclusion: Therefore Socrates is mortal

Disjunctive Syllogism

A form of reasoning in which one of two propositions must be true. If one of the propositions is proved invalid the other by necessity must be true.

Either P or Q

Not P

Therefore Q

The light is either on or off

The light is not on

Therefore the light is off

Morality is either subjective or objective

Morality is not subjective

Therefore morality is objective

Modus Ponens

Affirming the Antecedent

An argument using propositional deductive logic that can be summarized as "P implies Q and P is asserted to be true, so therefore Q must be true." Can also be referred to as *affirming the antecedent*.

If P then Q

P is true

Therefore Q is true

If P (Antecedent) then Q (Consequent)

P (Antecedent) is true

Therefore Q (Consequent) is true

If it is raining the lawn is wet

It is raining

Therefore the lawn is wet

Modus Tollens

Denying the Consequent

An argument using propositional deductive logic that can be summarized as "P implies Q and Q is asserted to not be true, so therefore P must not be true." Can also be referred to as *denying the consequent*.

If P then Q

Q is not true

Therefore P is not true

If P (Antecedent) then Q (Consequent)

Q (Consequent) is not true

Therefore P (Antecedent) is not true

If it is raining the lawn is wet

The lawn is not wet

Therefore it is not raining

Logical Fallacies

A logical fallacy is defined as a flaw in the structure of a deductive or inductive argument which renders the argument invalid. Logical Fallacies are usually placed in the categories of formal or informal. A **formal fallacy** occurs when a mistake has been made in the form of a deductive or inductive argument. (i.e. *Affirming the Consequent* or *Denying the Antecedent*) An **informal fallacy** is when an argument's premises fail to support the conclusion. The form of the argument may be correct but the premises are false. (i.e. *Begging the Question*, *Circular Reasoning*, *Argumentum ad populum*, *Ad hominem*, *Tu quoque*, *self-refuting statements*, etc.)

Formal Fallacies

- Affirming the Antecedent
- Denying the Consequent

Formal Fallacy

Affirming the Consequent

A formal logical fallacy confusing the directionality of if-then propositions.

If it is raining then the lawn is wet.

'it is raining' (Antecedent)

'lawn is wet' (Consequent)

It is raining therefore the lawn is wet. (Affirming the Antecedent)
(Correct) – Modus Ponens

The lawn is wet therefore it is raining. (Affirming the Consequent)
(Wrong)

Formal Fallacy

Denying the Antecedent

A formal logical fallacy confusing the directionality of if-then propositions.

If it is raining then the lawn is wet.

'it is raining' (Antecedent)

'lawn is wet' (Consequent)

It is not raining therefore the lawn is not wet. (Denying the Antecedent) **(Wrong)**

The lawn is not wet therefore it is not raining. (Denying the Consequent) **(Correct)** – *Modus Tollens*

Fallacy Test

If there was a common ancestor then DNA would be similar between living organisms.

DNA is similar between living organisms therefore there is a common ancestor. (Correct or Wrong?)

If there was a common designer then DNA would be similar between living organisms.

Fallacy Test

If man has libertarian free will then God would tell him to believe.

God tells man to believe therefore man has libertarian free will.
(Correct or Wrong?)

If God used the proclamation of the Gospel as the means to sovereignly bring about His will then God would tell man to believe.

Fallacy Test

If a Christian could lose his salvation then God would warn him to not fall away.

God warns man to not fall away therefore a Christian can lose his salvation. (Correct or Wrong?)

If God used the warnings of Scripture as the means to persevere a Christian then God would warn Christians to not fall away.

Informal Fallacies

- *Circular Reasoning*
- *Begging the question*
- *Tu quoque*
- *Ad hominin*
- *Reification*
- *Red Herring*
- *Self-refuting statements*

Informal Fallacy

Circular Reasoning

A informal logical fallacy in which the argument begins with the conclusion. In a circular argument there is no reason to accept the premises unless one already believes the conclusion.

My reasoning is valid because it has always worked for me in the past.
The Bible is true because 2 Timothy 3:16 says the Bible is inspired by God.

We date the geological rock layers with the index fossils that we find in the layers and we date the fossils by the rock layer they are found in.

Informal Fallacy

Begging the question

A informal logical fallacy in which the premise of an argument presupposes the truth of its conclusion; in other words, the argument takes for granted what it is supposed to prove. A form of circular reasoning.

I expect the laws of science to be the same in the future (uniformity) because they have always been that way in the past.

Creationism is not science because it is a supernatural explanation of origins. Evolution is science because it is a naturalistic explanation of origins.

The belief in God is Universal, after all everyone does believe in God.
I think therefore I am. – René Descartes

There is no need for objective morality, after all we believe in human rights.

Survival of the fittest

Evolution is an example of information arising from natural processes.

Informal Fallacy

Tu quoque

An appeal to hypocrisy is an informal logical fallacy that intends to discredit the validity of the opponent's logical argument by asserting the opponent's failure to act consistently in accordance with its conclusion.

Fred: You should not smoke cigarettes, it is a bad habit and brings with it health problems

Jake: Don't tell me not to smoke. You do it to.

Christian: God has revealed that it is wrong for couples to shack up, so what you are doing is wrong.

Unbeliever: Remember you shacked up with your boyfriend back in 2004.

Informal Fallacy

Ad hominem

An informal logical fallacy in which an argument is rebutted by attacking the character, motive, or other attribute of the person making the argument, or persons associated with the argument, rather than attacking the substance of the argument itself.

Creationism is false because all YEC scientists are stupid.

Calvinism should be avoided because Calvinists are arrogant.

Bob can't be right because as you know he never completed his masters degree.

Informal Fallacy

Reification

Reification is an informal logical fallacy when an abstraction or belief is treated as if it were a concrete real event or physical entity.

Science has conclusively established that one animal kind can transition into another kind.

Christianity has always believed that man has free will

If you are go to the ball, love will find you.

My stomach is telling me to eat the steak.

Informal Fallacy

Red Herring

A Red Herring is an informal logical fallacy in which an irrelevant topic is presented in order to divert attention from the original issue. The basic idea is to "win" an argument by leading attention away from the argument and to another topic.

Calvinist: Do you believe that Christ's death made salvation possible or did Jesus actually accomplish salvation on the cross?

Arminian: John 3:16 says that God so loved the World.

Jenny: Girls are smarter than boys

Bert: Really?! How do you know that?

Jenny: Well I am smart and you are dumb, so that proves it.

Informal Fallacy

Self-refuting statement

A claim or statement that does not meet its own conditions. A statement that contradicts itself.

All truth must be empirically confirmed with science.

There is no absolute truth.

We cannot be certain about anything.

I live in a world of I don't know.

You should not judge.

Your not being tolerant, I believe in tolerance.

You are close minded, I am open minded.

The scientific method is the only means of knowing truth

You should be tolerant of views not your own

All truth is relative.

What is true for you is not true for me.

I don't have a World View because I come to the evidence completely neutral and let it lead me to rational conclusions.

Everything in moderation

It isn't right to be so dogmatic

You always think your right

Language cannot carry meaning

Truth cannot be known

You should not force your morals on others

Terms

- Metaphysics
- Ontology
- Epistemology
- Ethics
- Tautology
- Objective
- Subjective