

### Definition

#### Fallacy is the use of invalid or faulty reasoning

Some fallacies are committed intentionally to manipulate or persuade by deception, while others are committed unintentionally due to carelessness or ignorance

Aristotle was the first to systematize logical errors into a list, as being able to refute an opponent's thesis is one way of winning an argument

Richard Whately defines a fallacy broadly as, "any argument, or apparent argument, which professes to be decisive of the matter at hand, while in reality it is not"

[https://en.wikipedia.org/wiki/List\\_of\\_fallacies](https://en.wikipedia.org/wiki/List_of_fallacies)

*The first principle is that you must not fool yourself and you are the easiest person to fool*, **Richard P. Feynman**

### Types of Fallacies

**Formal** 🌀 *An error in logic in the argument's form.*

Non Sequiturs

☰ Propositional fallacies

▣ Quantification fallacies

↻ Syllogistic fallacies

**Informal** 🌀 *Reasons other than structural, require examination of the argument's content*

🌀 Faulty generalizations

🌀 Red herring fallacies

**Conditional or questionable** ☹️ *Arguments disregard or confusion*

### Other systems of classification

The most famous are those of Francis Bacon and J. S. Mill. Bacon divided fallacies into 4 Idola (Idols, False Appearances), summarize the kinds of mistakes the human intellect is prone.

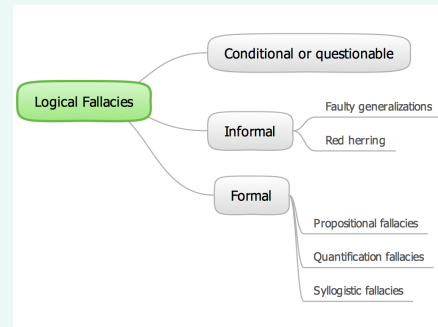
**Offendicula** of Roger Bacon

Opus maius, J. S. Mill book of his Logic, Jeremy Bentham's Book of Fallacies (1824).

Whately's Logic, A. de Morgan, Formal Logic (1847)

Sidgwick, Fallacies (1883)

### Mindmap



### Formal fallacies 🌀

**Appeal to probability** Takes something for granted because it would probably be the case. Something can go wrong (premise). Therefore, something will go wrong (invalid conclusion)

**Argument from fallacy** Aka fallacy fallacy, assumes that if an argument is fallacious, then the conclusion is false. If P, then Q. P is a fallacious argument. Therefore, Q is false



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### Formal fallacies § (cont)

**Base rate fallacy** Making a probability judgment based on conditional probabilities, without taking into account the effect of prior probabilities. Police officers have breathalyzers displaying false drunkenness in 5% of the cases the driver is sober. However, the breathalyzers never fail to detect a truly drunk person. One in a thousand drivers is driving drunk. The police officers stop a driver at random, and force the driver to take the test. The test is positive. You don't know anything else about him or her. How high is the probability he or she really is drunk? Many would answer as high as 0.95, but the correct probability is about 0.02. To find the correct answer, one should use Bayes's theorem

### Formal fallacies § (cont)

**Conjunction fallacy** Assumption that an outcome simultaneously satisfying multiple conditions is more probable than an outcome satisfying a single one of them. Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations. Which is more probable? Linda is a bank teller. Linda is a bank teller and active in the feminist movement. The majority of those asked chose second option. However the probability of two events occurring together is always less than or equal to the probability of either one occurring alone

**Masked-man fallacy** Substitution of identical designators in a true statement can lead to a false one. Lois Lane believes that Superman can fly. Lois Lane does not believe that Clark Kent can fly. Therefore Superman and Clark Kent are not the same person

### Propositional fallacies

*A propositional fallacy is an error in logic that concerns compound propositions. For a compound proposition to be true, the truth values of its constituent parts must satisfy the relevant logical connectives and, or, not, only if, if and only if*



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### Formal fallacies § (cont)

**Affirming a disjunct** Concluding that one disjunct of a logical disjunction must be false because the other disjunct is true Max is a mammal or Max is a cat. Max is a mammal. Therefore, Max is not a cat

**Affirming the consequent** The antecedent is claimed to be true because the consequent is true; if A, then B; B, therefore A If someone owns Fort Knox, then he is rich. Bill Gates is rich. Therefore, Bill Gates owns Fort Knox

**Denying the antecedent** The consequent is claimed to be false because the antecedent is false; if A, then B; not A, therefore not B If you are a ski instructor, then you have a job. You are not a ski instructor, Therefore, you have no job

### Quantification fallacies

A quantification fallacy is an error in logic where the quantifiers of the premises are in contradiction to the quantifier of the conclusion

**Existential fallacy** An argument that has a universal premise and a particular conclusion Every unicorn definitely has a horn on its forehead

### Informal Fallacies

#### Informal fallacies

Arguments that are fallacious for reasons other than structural (formal) flaws and usually require examination of the argument's content.

**Appeal to the stone** *argumentum ad lapidem* Dismissing a claim as absurd without demonstrating proof for its absurdity A: Infectious diseases are caused by microbes B: What a ridiculous idea! A: How so? B: It's obviously ridiculous

### Informal Fallacies (cont)

**Argument from ignorance** *argumentum ad ignorantiam* It asserts that a proposition is true because it has not yet been proven false (or vice versa) There may be seventy kazillion other worlds, but not one is known to have the moral advancement of the Earth, so we're still central to the Universe

**Argument from incredulity** Appeal to common sense "I cannot imagine how this could be true; therefore, it must be false." Argument from ignorance

**Argument from repetition** *argumentum ad nauseam, argumentum ad infinitum* signifies that it has been discussed extensively until nobody cares to discuss it anymore; sometimes confused with proof by assertion

**Argument from silence** *argumentum ex silentio* conclusion is based on the absence of evidence, rather than the existence of evidence

**Argument to moderation** *ad temperantiam* false compromise, middle ground, fallacy of the mean. Assuming that the compromise between two positions is always correct

**Argumentum verbosum** See: by verbosity

**Begging the question** *petitio principii* providing what is essentially the conclusion of the argument as a premise Opium induces sleep because it has a soporific quality A kind of circular reasoning

**Shifting the burden of proof** See: *onus probandi* I need not prove my claim, you must prove it is false



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### Informal Fallacies (cont)

**Circular reasoning** *circulus in demonstrando* when the reasoner begins with what he or she is trying to end up with; sometimes called assuming the conclusion Whatever is less dense than water will float, because such objects won't sink in water

**Circular cause and consequence** The consequence of the phenomenon is claimed to be its root cause. Correlation does not imply causation

**Continuum fallacy** Improperly rejecting a claim for being imprecise Fred is clean-shaven now. If a person has no beard, one more day of growth will not cause them to have a beard. Therefore Fred can never grow a beard

**Correlative-based fallacies** **Correlation proves causation** *post hoc ergo propter hoc* a faulty assumption that because there is a correlation between two variables that one caused the other. **Suppressed correlative** where a correlative is redefined so that one alternative is made impossible

**Divine fallacy** Argument from incredulity. Because something is so incredible / amazing / understandable, it must be the result of superior, divine, alien or paranormal agency

### Informal Fallacies (cont)

**Double counting** Counting events or occurrences more than once in probabilistic reasoning, which leads to the sum of the probabilities of all cases exceeding unity

**Equivocation** **Misleading use of a term with more than one meaning** *Ambiguous middle term* a common ambiguity in syllogisms in which the middle term is equivocated *Definitional retreat* changing the meaning of a word to deal with an objection raised against the original wording.

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