

Error in Logic or Another Error

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Abstract

People often describe a statement, decision, or disagreement as “illogical,” even when no error in logical form has occurred. Logic evaluates how conclusions are supported by premises, whereas factual accuracy, word choice, emotional reaction, and differences of opinion involve related but distinct questions. This paper explains the difference between validity, soundness, truth, inductive strength, and informal fallacy through the example: “All dogs have tails; Maizie is a dog; therefore, Maizie has a tail.” The argument has a valid deductive form, but it is unsound if the universal premise is false because some dogs do not have tails. The paper also examines appeals to popularity, hasty generalization, ambiguity, relevance, and factual error. It argues that careful reasoning requires two stages: evaluating whether the conclusion follows from the premises and evaluating whether the premises themselves are acceptable. Recognizing this distinction prevents people from dismissing unfamiliar opinions as illogical and helps them identify genuine errors in reasoning.

For a detailed classification, see [common types of logical fallacies](#).

Introduction

Logic is the systematic study of arguments. An argument, in the logical sense, is not necessarily a quarrel. It is a group of statements in which one or more premises are offered as support for a conclusion. Logic asks whether the support is adequate. This question differs from whether a speaker is polite, whether a conclusion is popular, or whether a claim happens to be true.

Everyday language blurs these distinctions. A person may call an inaccurate statistic illogical, describe an emotionally surprising choice as illogical, or reject an opposing value judgment as illogical. Some of these cases involve poor reasoning, but others involve factual error, incomplete information, ambiguous language, or disagreement about goals.

The example involving Maizie provides a useful starting point because it separates logical structure from truth. This paper argues that the reasoning is deductively valid but not sound when Maizie lacks a tail. The conclusion follows from the stated premises, but one premise is false. Understanding why requires a careful distinction among validity, soundness, truth, and fallacy.

Arguments, Premises, and Conclusions

An argument contains at least one premise and a conclusion. Premises are the reasons presented; the conclusion is the claim those reasons are intended to establish. Indicator words may help identify structure. “Because,” “since,” and “given that” often introduce premises, while “therefore,” “thus,” and “consequently” often introduce conclusions. However, arguments can appear without these words.

Consider the following:

1. All dogs have tails.
2. Maizie is a dog.
3. Therefore, Maizie has a tail.

The first two statements are premises. The third is the conclusion. To evaluate the argument, one should first ask whether the conclusion must be true if the premises are true. Only after examining this relationship should one ask whether the premises actually are true.

Deductive Validity

A deductive argument claims that its conclusion follows necessarily from its premises. An argument is valid when there is no possible interpretation or circumstance in which all its premises are true and its conclusion is false. The Stanford Encyclopedia of Philosophy describes validity as truth preservation: valid form prevents movement from true premises to a false conclusion (Shapiro & Kouri Kissel, 2025).

The Maizie argument has the form:

1. All members of category D possess property T.
2. M is a member of category D.
3. Therefore, M possesses property T.

This form is valid. If it were genuinely true that every dog has a tail and genuinely true that Maizie is a dog, Maizie could not fail to have a tail. The conclusion is contained in the universal premise when applied to the individual case.

Validity belongs to the relationship between premises and conclusion, not to one statement considered alone. Statements are true or false; arguments are valid or invalid. A true conclusion can appear in an invalid argument, and a false conclusion can appear in a valid argument when one or more premises are false.

Soundness

A sound argument is both valid and based on true premises. Soundness therefore adds factual adequacy to logical structure. Every sound deductive argument has a true conclusion because valid form preserves the truth of its true premises.

If Maizie has no tail, the premise “All dogs have tails” is false. Some dogs may be born without tails, may have very short natural tails, or may lose a tail through injury or surgery. The universal claim allows no exception. The argument remains valid because the conclusion follows from the premises, but it is unsound because the first premise is false.

This distinction corrects a common mistake in the original response. It initially states that the premises are true and then acknowledges that the universal premise is false. Both cannot be correct. The proper evaluation is:

Question	Evaluation	Reason
Is the conclusion logically entailed by the premises?	Yes	The argument has a valid categorical form.
Are all premises true?	No	Not every dog has a tail.
Is the argument valid?	Yes	No case can have both premises true and the conclusion false.
Is the argument sound?	No	A valid argument with a false premise is unsound.
Is the actual conclusion true?	No, given the information about Maizie	Maizie does not have a tail.

Why a False Conclusion Does Not Automatically Make an Argument Invalid

People often judge an argument by checking whether they agree with its conclusion. This approach is unreliable. Validity asks what would follow if the premises were true, even when they are not. For example:

1. All birds are mammals.
2. All mammals live underwater.
3. Therefore, all birds live underwater.

The premises and conclusion are false, but the structure is valid: if all birds belonged to the class of mammals and all mammals belonged to the class of underwater creatures, all birds would belong to that class. The argument is valid and profoundly unsound.

The reverse can also occur:

1. All dogs are reptiles.
2. Maizie is a reptile.
3. Therefore, Maizie is a dog.

Suppose the conclusion “Maizie is a dog” is true in real life. The argument is still invalid because the premises do not guarantee it. A reptile would not have to be a dog even if the premises were accepted. Truth of the conclusion cannot repair a broken inferential relationship.

Deductive and Inductive Reasoning

Not all arguments claim necessity. Inductive arguments aim to make a conclusion probable. If a veterinarian has examined thousands of dogs and observed that nearly all have tails, the veterinarian might infer that the next dog will probably have a tail. A tailless dog would not show that the inference had no evidential support; it would show that a probable conclusion can still be false.

Inductive arguments are evaluated as strong or weak rather than valid or invalid in the strict deductive sense. A strong inductive argument has premises that make its conclusion highly probable, while a cogent argument is strong and has acceptable premises.

Confusing universal and statistical claims creates errors. “All dogs have tails” is a universal proposition refuted by one counterexample. “Most dogs have tails” is a statistical claim that remains compatible with exceptions. Precise language therefore improves reasoning.

Factual Errors and Logical Errors

A factual error occurs when a statement misrepresents reality. Saying that Canberra is the capital of New Zealand is factually false. It may be asserted without any argument at all, so there may be no inferential error to evaluate.

A logical error concerns the relationship between reasons and conclusion. For example:

1. If a city is the capital of Australia, it is Canberra.

2. Wellington is not Canberra.
3. Therefore, Wellington is not the capital of Australia.

This is valid reasoning. By contrast, “Canberra is a capital city; Wellington is a capital city; therefore, Canberra is in New Zealand” is invalid because the shared property does not establish country membership.

Some arguments contain both factual and logical errors. Good critical thinking should identify them separately so the correction addresses the real problem.

Errors in Terminology and Ambiguity

Terminological errors arise when a word is used incorrectly or when participants attach different meanings to it. Ambiguity can become a logical problem when an argument shifts meaning during the inference. This is the fallacy of equivocation.

For example:

1. Feathers are light.
2. What is light cannot be dark.
3. Therefore, feathers cannot be dark.

The word “light” means low in weight in the first premise and the opposite of dark in the second. The argument appears connected only because one word carries two meanings.

Terminological precision is especially important in legal, medical, scientific, and political discussions. Participants may disagree because they use terms such as “risk,” “theory,” “rights,” or “evidence” differently. Clarification may resolve the conflict without any formal proof.

Differences of Opinion

A difference of opinion is not automatically a logical error. People may accept the same facts while assigning different values or priorities. One person may prefer a policy that maximizes economic growth, while another prioritizes environmental protection or equality. Logic can test whether each person’s conclusion follows from stated values and evidence, but logic alone may not determine which ultimate value must be chosen.

Dismissing an opposing judgment as “illogical” can conceal the actual dispute. A better response identifies the premise, value, or prediction that differs. Participants can then examine evidence, consequences, consistency, and trade-offs.

Appeal to Popularity

The claim that “all politicians are corrupt because everyone knows it” illustrates an appeal to popularity, also called *argumentum ad populum*. The number of people who believe a claim does not, by itself, establish its truth. Many widely accepted beliefs have later proved false.

The error lies in treating popularity as sufficient evidence. Public belief may sometimes be relevant evidence—for example, when the claim concerns public preference—but it is not adequate proof of corruption. The claim also makes a universal generalization. Evidence about some politicians cannot justify a conclusion about every politician without a representative and comprehensive basis.

A better argument would define corruption, identify reliable evidence, specify the population, and avoid a claim broader than the data support. Even then, findings would likely establish a rate or pattern rather than a universal proposition.

Other Common Informal Fallacies

Informal fallacies arise from problems of relevance, insufficient evidence, presumption, or language. A hasty generalization draws a broad conclusion from too few or unrepresentative cases. An *ad hominem* rejects a claim by attacking the person rather than addressing the evidence. A false dilemma presents two options as exhaustive when alternatives exist. A straw man misrepresents an opponent’s position so it is easier to attack.

Begging the question assumes within the premises what the argument is supposed to prove. A causal fallacy treats sequence or correlation as sufficient proof of causation. Appeals to authority are weak when the authority lacks relevant expertise, is misrepresented, or replaces evidence rather than supporting it.

Labels should not be used as shortcuts. Merely naming a fallacy does not explain why the reasoning fails. A responsible critique reconstructs the argument, identifies the inferential gap, and shows what additional evidence would be needed.

A Method for Evaluating Everyday Reasoning

A practical evaluation can follow seven steps:

1. Identify the conclusion. What is the speaker trying to establish?
2. List the premises. What reasons are offered?
3. Clarify terms. Are important words ambiguous or changing meaning?
4. Classify the inference. Does it claim necessity or probability?
5. Test the support. Could the premises be true while the conclusion is false?

6. Evaluate the premises. Are they true, credible, relevant, and sufficiently supported?
7. Consider missing alternatives. Has the argument ignored plausible explanations or counterexamples?

This process encourages charitable interpretation. Before criticizing, the reader should present the strongest reasonable version of the argument. Charitable reconstruction does not require agreement; it makes criticism more accurate.

Conclusion

The Maizie argument is logical in form but defective as an account of reality. “All dogs have tails; Maizie is a dog; therefore, Maizie has a tail” is deductively valid because the conclusion necessarily follows if both premises are true. It is not sound because the universal premise is false, and the actual conclusion is false in Maizie’s case.

This example demonstrates why validity, soundness, and truth must be distinguished. Validity concerns inferential structure. Soundness combines validity with true premises. Factual error concerns the accuracy of statements, while informal fallacies concern defective support shaped by relevance, evidence, presumption, or ambiguity.

People improve reasoning when they stop using “illogical” as a general expression of disagreement. Careful analysis asks exactly what went wrong: Was a premise false? Did a term change meaning? Was the evidence too weak? Did the conclusion fail to follow? These distinctions make criticism fairer, clearer, and more useful.

References

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