

Evaluation and Analysis of Arguments

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WHAT'S COVERED

Every argument must make both an inferential and a factual claim. To succeed, an argument must do both things well, but each must be evaluated separately. However, before we can precisely evaluate an argument, we must know whether it is deductive or inductive. Knowing this tells us how strict the standards are for the inference and enables us to evaluate each argument accordingly.

This tutorial examines the evaluation and analysis of arguments in three parts:

1. Reviewing Deductive and Inductive Arguments
2. Identifying Deductive and Inductive Arguments
3. Evaluating Deductive Arguments
 - 3a. Valid or Invalid
 - 3b. Sound or Unsound
4. Evaluating Inductive Arguments
 - 4a. Strong or Weak
 - 4b. Cogent or Uncogent

1. Reviewing Deductive and Inductive Arguments

Consider this argument:

“People are under seven feet tall, so the next person to come through the door will be under seven feet tall.”

Is this reasonable or unreasonable? The answer depends on what was intended. If the intention was to assert that “*All* people are under seven feet tall, so it is *guaranteed* that the next person to come through the door will be under seven feet tall,” then this is a foolish argument. However, if the intended meaning was “People are *generally* under seven feet tall, so the next person to come through the door will *likely* be under seven feet tall,” the argument is reasonable. Note that these two different evaluations depend on whether the claim was about certainty or likelihood.

These considerations are closely linked to the concepts of **deductive and inductive arguments**. Reviewing the terms below will help you to understand these concepts.

TERMS TO KNOW

Argument

A group of statements containing both a factual claim (or claims), and an inferential claim (or claims)

Factual Claim

A claim that some fact (or facts) corresponds to reality

Inferential Claim

A claim that the premises support the conclusion

Deductive Argument

A type of argument in which the inferential claim is a claim of logical certainty

Logical Certainty

A state in which it is inconceivable that the conclusion is not supported by the premises

Inductive Argument

An argument in which the inferential claim is of less than logical certainty

Premise

A statement presented for acceptance or rejection in an argument without support, but that is intended to support a conclusion

Conclusion

A statement that is intended to be supported by the premises of an argument

2. Identifying Deductive and Inductive Arguments

You *cannot* properly evaluate a sophisticated argument without first identifying whether it is deductive or inductive. This is so because the evaluations are different. *All* evaluation is based on kind.

⇒ **EXAMPLE** When someone asks, “Is 6’10” tall?” the only proper answer is, “It depends on what kind of thing you’re asking about” because “tall” is an evaluative term. Is 6’10” tall? For a human, yes. For a giraffe, no.

Similarly, if someone asks, “Is this a good inference,” the only proper answer is, “It depends on the kind of inference.” And as the first argument in this section demonstrates, we evaluate differently depending on whether we are trying to achieve logical certainty or probability.

For the original example, a statement that “People are generally under seven feet tall, so the next person to come through the door will *likely* be under seven feet tall” indicates that most people who pass through the door will be shorter than seven feet tall, but some of them may be taller.

People are generally under 7 feet tall.	Premise/Factual Claim
So,	Inferential Claim

the next person to come through the door will likely be under 7 feet tall.	Conclusion
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Is this argument intending logical certainty? Does it assert that, because people are usually under seven feet tall, it is not possible that a person over seven feet tall will walk through the door? It does not. Therefore, this is an inductive argument (a generalization) that does not convey logical certainty, only probability. We must evaluate it accordingly.

Now consider the following argument:

The sun has risen every day for the past billion years.

Our current understanding of the laws of astrophysics tells us that this phenomenon should continue.

Therefore, the sun will rise tomorrow.

The sun has risen every day for the past billion years.	Premise/Factual Claim
Our current understanding of the laws of astrophysics tells us that this phenomenon should continue.	Premise/Factual Claim
Therefore,	Inferential Claim
the sun will rise tomorrow.	Conclusion

Before we evaluate this argument, we must first determine whether it is deductive or inductive: whether the conclusion is intended to follow with logical certainty. Can you imagine not only that the premises are true (which should not be difficult because they are true), *but also* the conclusion being false (at the same time)? You can.

Imagine that a meteor obliterates Earth tonight or the sun enters the "red giant" phase of its life cycle and consumes Mercury, Venus, and Earth. In both of these cases, the conclusion will not be reached.

Based on what we have just learned, this argument is inductive because it makes no claim to logical certainty. However, the certainty that the sun will rise tomorrow is *inductive certainty*. This indicates two things: First, there is nothing wrong with induction, just because it is induction. It is not unreasonable to believe that the sun will rise tomorrow. (Problems generally arise only when people evaluate induction deductively, or vice versa.) Second, the *vast* majority of our reasoning is inductive, so the *vast* majority of our beliefs are justified inductively.

Consider some more of your beliefs that are based on induction: that your parents really are your parents, that Julius Caesar lived, that summer is warm and winter is cold, that your arm won't fall off in the next 30 seconds, etc.



THINK ABOUT IT

Consider the arguments that you would use to justify these beliefs, and why none of them achieve logical certainty.

But if the majority of our reasoning is inductive, what is deduction? Note that induction always involves cause and effect, and the world, in making inferences. Deduction involves neither of these. The inferences of

deduction rely on definition and form.

⇒ EXAMPLE Consider the following argument:

LeBron James is over six feet tall. Therefore, he is over five feet tall.

It would be incorrect to assert that the fact that LeBron James is over six feet tall *causes* him to be over five feet tall. Instead, it is part of the definition of being over six feet tall, an entailment. Note that this type of argument *does* attain logical certainty, but remember that logical certainty is about the relationship between the premises and the conclusion, not just about the conclusion. Therefore, the question is *not* "can I imagine LeBron James not being over five feet tall?" (you can). Instead, it is "Can I imagine him being over six feet tall" *and* "not being over five feet tall?" No, this is impossible. This argument attains logical certainty because it is about definitions, rather than the world. Other common deductive arguments are categorical (from the definitions of "all," "no," and "some"), hypothetical (from the definition of "if...then"), and disjunctive (from the meaning of "either/or").

3. Evaluating Deductive Arguments

3a. Valid or Invalid

Once we have determined whether an argument is deductive or inductive, the evaluation follows the pattern discussed in previous tutorials, but with more precision. We still ask the inferential question first: "Assuming all premises are true, do they support the conclusion?" However, now we understand the notion of support deductively, that is, as *guaranteeing* or *logically entailing* the conclusion. When considering an inferential claim deductively, we label the argument as valid or invalid, where:

- A **valid** argument is a deductive argument in which the premise(s) logically guarantee their conclusion.
- A **invalid** argument is a deductive argument in which the premise(s) do not logically guarantee their conclusion.

A valid argument must have a good deductive structure; an invalid argument has a bad deductive structure *and that is all*. Whether the premises are true or false (i.e., whether the factual claim is a good one or not), does not have anything to do with the argument's validity. Consider this categorical syllogism:

All reptiles are dinosaurs.

Hamsters are reptiles.

Therefore, turtles are dinosaurs.

This argument is valid. We ask, “If it is true that all reptiles are dinosaurs and it is true that hamsters are reptiles, does that guarantee that hamsters are dinosaurs?” The answer is *yes*. We must establish an argument's validity (or lack of it) before checking the factual claims.



TRY IT

Now try to evaluate these three arguments (the solutions are provided below).

1. *LeBron James is over five feet tall.*
Therefore, LeBron James is over seven feet tall.

Is the argument valid or invalid?



Ask yourself, if it is true that LeBron James is over five feet tall, then does it guarantee that he is over seven feet tall?

The answer is “no,” so this argument is invalid.

2. *LeBron James is over twelve feet tall.*
Therefore, LeBron James is over seven feet tall.

Is the argument valid or invalid?



Ask yourself, if it is true that LeBron James is over twelve feet tall, then does it guarantee that he is over seven feet tall?

The answer is “yes”, so this argument is valid.

3. *LeBron James is over five feet tall.*
Therefore, LeBron James is over six feet tall.

Is the argument valid or invalid?



Ask yourself, if it is true that LeBron James is over five feet tall, then does it guarantee that he is over six feet tall?

The answer is no, so this is an invalid argument.



TERMS TO KNOW

Valid

A deductive argument in which the premise(s) logically guarantee their conclusion

Invalid

A deductive argument in which the premise(s) do not logically guarantee their conclusion

3b. Sound or Unsound

Whether or not the premises or conclusion are true does *not* enter into the determination of validity. However, validity is important because it means that the premises *guarantee* the conclusion. When validity has been established, we simply have to decide whether we accept the premises. If the argument is valid, we only need to ask a question of fact: “Are all of the premises true?” This will determine the soundness or unsoundness of the argument, where:

- A **sound** argument is a deductively valid argument in which all premises are true.
- An **unsound** argument is a deductive argument that is not sound.

Note that a sound argument *must* be valid. Think of a sound argument as a good deductive argument. Since an argument must do two things, a sound argument is a deductive argument that does both of them well. It makes a good (i.e., valid) inferential claim *and* a good factual claim. As a result, a sound argument has a conclusion that is guaranteed and cannot be resisted. That’s why soundness matters.

An unsound argument is a bad deductive argument. It falls short of soundness by either making a bad (i.e., invalid) inferential claim or by containing at least one false premise. It does not provide an adequate reason to accept its conclusion. Invalid arguments—and valid arguments with at least one false premise—are unsound. Each of these types of arguments gives reason to not accept its conclusion.

Note that if one wants to reject the conclusion of a valid argument, one *must* reject a premise. Try to evaluate the following argument:

If there is gratuitous evil, there is no God.

There is gratuitous evil.

Ergo, there is no God.

This is a deductively valid argument known as the logical problem of evil. To reject the conclusion—that is, to maintain that there is a god—we must show that a premise is false or (as is more generally the case in a philosophical debate), that there is a better reason to believe that the premise is false than to believe it is true. Because this argument is valid, we are left with no other options if we want to reject the conclusion.



TERMS TO KNOW

Sound

A deductively valid argument in which all premises are true

Unsound

A deductive argument that is not sound

4. Evaluating Inductive Arguments

4a. Strong or Weak

With a few minor changes, everything that applies to deductive arguments also applies to inductive arguments. The inferential question must be asked first: "Assuming all premises are true, do they support the conclusion?" However, in the case of inductive arguments, the notion of support is understood inductively, that is, as *making probable* the conclusion. When considering an inferential claim inductively, we say that the argument is strong or weak, where:

- A **strong** argument is an inductive argument in which the premises render the conclusion probable.
- A **weak** argument is an inductive argument in which the premises do not render the conclusion probable.

Hence, a strong argument has a good inductive structure; a weak argument has a bad inductive structure *and that is all*. Whether the premises are true or false does not have anything to do with an argument's strength. Consider the following argument:

*The overwhelming majority of climate scientists believe that there is climate change caused by humans.
Therefore, there is climate change caused by humans.*

This is an inductive argument called an "argument from authority." To determine its strength, the question to be asked isn't whether scientists believe such a thing but, if they do believe such a thing, does that make the conclusion probable? In this case, the answer is yes, so the argument is strong.



THINK ABOUT IT

Arguments from authority are some of the strongest we have. Consider the following things you believe that are based on authority:

- You've never met Julius Caesar, but you believe he existed.
- You've never been to Uranus, but you believe it exists.
- You cannot predict the weather, but you believe the meteorologist's prediction.

The fact that authorities are occasionally wrong doesn't make the argument weak, it makes it inductive.



TRY IT

Now consider three more inductive arguments and see if you can determine their strength or weakness:

*Kim Kardashian says X about healthcare.
Therefore, X about healthcare.*



HINT

“X” doesn’t need to be filled in because that is only relevant to the factual claim.

Is the argument strong or weak?

+

The answer is that this argument is weak. Kim Kardashian may be an authority about some things, but she is not generally considered an authority on healthcare, *even if you agree with her*. Agreeing with her means that you accept the conclusion, not that the argument establishes it. If the only reason we have to believe X about healthcare is that Kim Kardashian said X, that is not enough for us to believe that X is true.

*The Browns have played terribly so far this season.
Therefore, they will lose this week.*

Is the argument strong or weak?

+

This argument is strong (it is a prediction, in which we use the past to assert the future). If it is true that the Browns have played terribly all season, we might bet (perhaps literally) that they will lose this week. It is a good bet. If we lose our bet, it’s because induction involves chance, not because our bet is irrational.

*Some people got sick from eating at the restaurant.
Therefore, I will get sick from eating there.*

Is the argument strong or weak?

+

This argument is weak because the conclusion is *possible*, not *probable*. Because induction deals in probability, it also involves scaling, because it makes sense to talk about stronger arguments and weaker arguments. This is unlike a deduction, in which premises establish their conclusion with either 100% or 0% certainty. For example, both the conclusion that the sun will rise tomorrow and that the

Browns will lose this week, are supported by strong arguments, but we should be more certain of one than the other.



TERMS TO KNOW

Strong

An inductive argument in which the premises render the conclusion probable

Weak

An inductive argument in which the premises do not render the conclusion probable

4b. Cogent or Uncogent

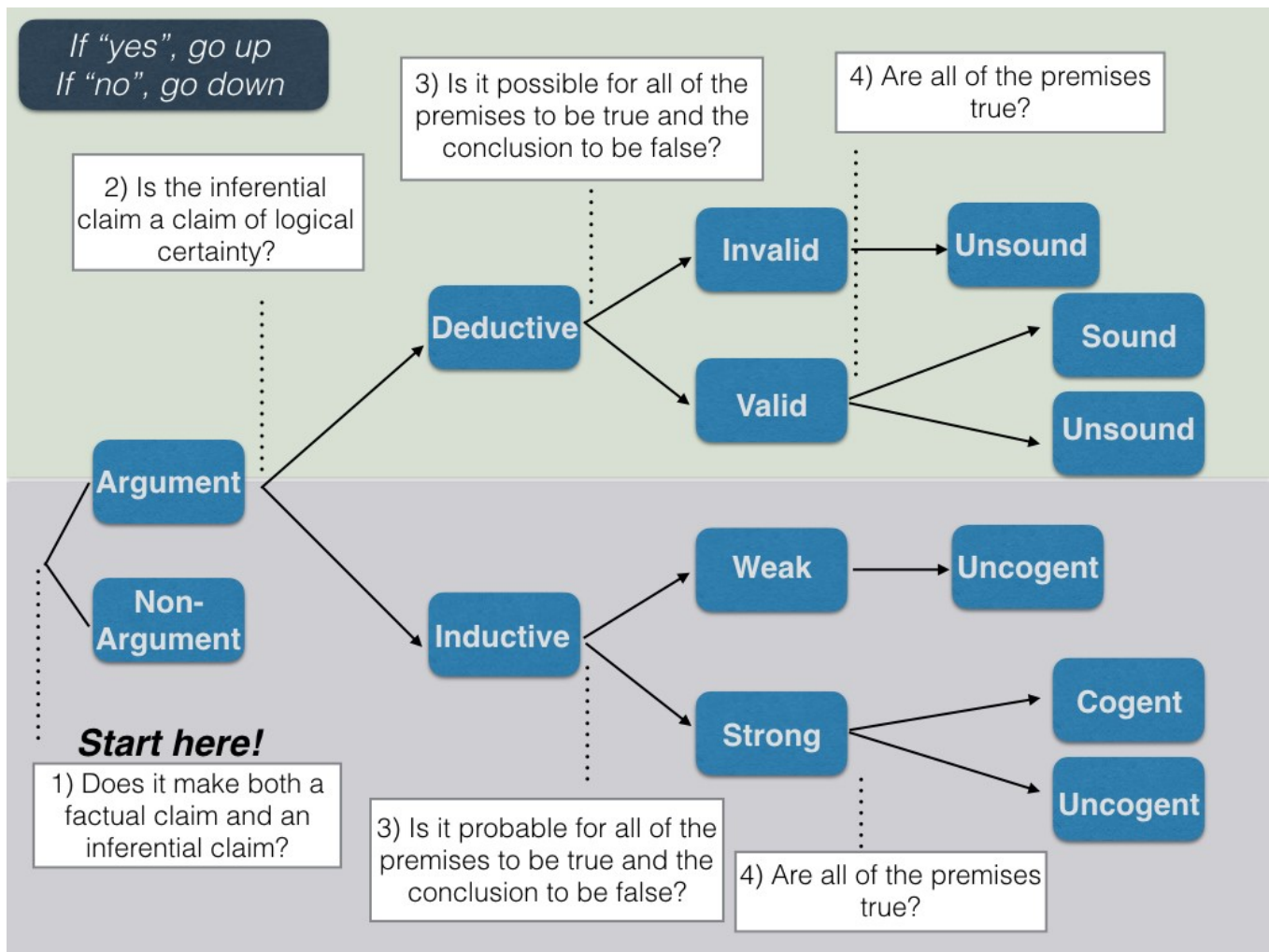
After we have determined strength, we must check the factual claim and ask, “Are all of the premises true?” to establish whether the final evaluation is cogent or uncogent, where:

- A **cogent** argument is an inductively strong argument in which all premises are true
- An **uncogent** argument is an inductive argument that is not cogent.

Note that a cogent argument must be strong. Cogent arguments are good inductive arguments. Since an argument must do two things, a cogent argument is an inductive argument that does both of them well. It makes a good (i.e., strong) inferential claim *and* a good factual claim. Therefore, a cogent argument provides us with reason to believe that its conclusion is probably true (*how* probable is proportionate to how strong).

An uncogent argument is a bad inductive argument. It falls short of cogency by either making a bad (i.e., weak) inferential claim or by containing at least one false premise. It does not provide an adequate reason to accept its conclusion. Therefore, weak arguments, and strong arguments with at least one false premise, are uncogent. Either of them gives us reason to not accept their conclusions.

The following flow chart below is a useful tool to which you can refer when evaluating arguments.



TERMS TO KNOW

Cogent

An inductively strong argument in which all premises are true

Uncogent

An inductive argument that is not cogent



SUMMARY

Before we **evaluate an argument**, we must first determine whether it attempts to establish its conclusion using logical certainty, which (therefore) makes it **deductive**, or something less, which makes it **inductive**. Once we have determined this, we can check the inferential claims in a more refined way, using the concepts of **valid and invalid** for deduction, and **strong and weak** for induction. We then consider the factual claim to arrive at a final evaluation of the argument: sound and unsound for deductive arguments; **cogent and uncogent** for inductive arguments.

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**Argument**

A group of statements containing both a factual claim or claims and an inferential claim or claims

Cogent

An inductively strong argument in which all premises are true

Conclusion

A statement that is intended to be supported by the premises of an argument

Deductive Argument

A type of argument in which the inferential claim is a claim of logical certainty

Factual Claim

A claim that some fact or facts obtained in the world is true

Inductive Argument

An argument in which the inferential claim is of less than logical certainty

Inferential Claim

A claim that the premises support the conclusion

Invalid

A deductive argument in which the premise(s) do not logically guarantee their conclusion

Logical Certainty

A state in which it is inconceivable that the conclusion is not supported by the premises

Premise

A statement presented for acceptance or rejection in an argument without support but that is intended to support a conclusion

Sound

A deductively valid argument in which all premises are true

Strong

An inductive argument in which the premises render the conclusion probable

Uncogent

An inductive argument that is not cogent

Unsound

A deductive argument that is not sound

Valid

A deductive argument in which the premise(s) logically guarantee their conclusion

Weak

An inductive argument in which the premises do not render the conclusion probable