Inductive and Deductive Reasoning

Inquire: Types of Argumentative Reasoning

Overview
Sometimes, when we write an essay, we’re setting out to write a really compelling and convincing argument. As we begin to think about argumentative writing in its various forms, it’s important to understand the kinds of reasoning that make up argumentative arguments. Two kinds of reasoning are the foundation of any argument: inductive reasoning and deductive reasoning. Both kinds of reasoning will lead you to a premise, which you’ll need to evaluate the validity of as you write. Understanding these concepts will ensure that you are ready to start writing argumentative essays.

Big Question: What are the two kinds of reasoning, and how do they impact an argumentative argument?

Watch: What is an Argument?
Sometimes, when we think of the word “argue” or “argument,” we think of angry, red-faced, finger-pointing yelling. This is not, however, the only kind of argument that exists. When we consider arguments in writing, we are talking about something far more subtle, more deliberate, more persuasive, and more effective.

We use these kinds of arguments in our everyday lives, too. Think about a lively debate you’ve had about nature versus nurture or about the last time you tried to persuade someone to join you for lunch at one of your favorite restaurants. Both of these are arguments, even though they may not be what immediately comes to mind when you think of making or having an argument.

Within the category of argument are two subtypes of argument: inductive reasoning and deductive reasoning.

Induction helps you draw conclusions based on available data. Imagine that you broke out in hives every time you applied a new type of lotion. After it happens three times, especially if you know that hives are a sign of an allergy, you are likely to use inductive reasoning to conclude that you are allergic to your new lotion.
Deduction is when two true statements share a logical relationship that can lead you to a third conclusion. For example:

- All men are mortal.
- Dwayne “The Rock” Johnson is a man.
- Therefore, Dwayne “The Rock” Johnson is mortal.

Inductive and deductive reasoning both have rules they need to follow in order to work as sound forms of reasoning, but both provide the foundations for sound and valid arguments. Partly, you need to make sure that your underlying warrants are correct. A warrant is an underlying assumption that you base your reasoning on. In the previous example, our warrant — or assumption — is that all men are mortal. This is an objectively true statement. However, if your warrant was instead that all men are humble, your warrant is no longer objectively true. Having a faulty warrant can and will lead your reader to ignore your argument.

Understanding warrants and the two foundational types of reasoning will help you think about writing arguments. What are some examples of inductive or deductive reasoning from your everyday life?

Read: Inductive and Deductive Reasoning

Overview

Within the category of argument are two subtypes of argument: inductive reasoning and deductive reasoning. Inductive reasoning results in conclusions that are likely or probable but that can never be proven beyond a shadow of a doubt. Deductive reasoning can lead to unquestionable results — but only if certain rules of reasoning are followed.

What is Inductive Reasoning?

You have employed inductive reasoning for a very long time. Inductive reasoning is based on your ability to recognize meaningful patterns and connections. By taking into account both examples and your understanding of how the world works, induction allows you to conclude that something is likely to be true. By using induction, you move from specific data to a generalization that tries to capture what the data means.

Imagine that you ate a dish of strawberries and soon afterward your lips swelled. Now imagine that a few weeks later you ate strawberries and soon afterwards your lips again became swollen. The following month, you ate yet another dish of strawberries, and you had the same reaction as before. You are aware that swollen lips can be a sign of an allergy to strawberries. Using induction, you conclude that, more likely than not, you are allergic to strawberries.

Data: After I ate strawberries, my lips swelled (1st time).
Data: After I ate strawberries, my lips swelled (2nd time).
Data: After I ate strawberries, my lips swelled (3rd time).
Warrant: Swollen lips after eating strawberries may be a sign of an allergy.
Claim: Likely, I am allergic to strawberries.
The Limits of Inductive Reasoning

Inductive reasoning can never lead to absolute certainty. Instead, induction allows you to say that, given the data and the warrant, the claim more likely than not is true. Because of the limitations of inductive reasoning, a claim will be more credible if multiple lines of reasoning are presented in its support.

When applying inductive reasoning, always keep in mind that the better and more complete the data and the more relevant the warrant, the likelier it is that the claim will be credible. For example, medical researchers report their results with greater confidence if they can say that the participants in a study were a representative sample and that the sample size was a large one. The larger and more representative a sample, the less likely it is that the results arose out of random variation.

Also keep in mind that the results of inductive thinking can be skewed if relevant data or warrants are overlooked. In the previous example, inductive reasoning was used to conclude that one is likely allergic to strawberries after suffering multiple instances of swelling lips. Would someone be as confident in the claim if they were eating strawberry shortcake on each of those occasions? Is it reasonable to assume that the allergic reaction might be due to another ingredient besides strawberries?

This example illustrates that inductive reasoning must be used with care. When evaluating an inductive argument, consider:

- the amount of the data;
- the quality of the data;
- the existence of additional data;
- the relevance of the warrant;
- the existence of additional warrants.

What is Deductive Reasoning?

Deductive reasoning is built on two statements whose logical relationship should lead to a third statement that is an unquestionably correct conclusion, as in the following example.

All raccoons are omnivores.
This animal is a raccoon.
This animal is an omnivore.

If the first statement is true (All raccoons are omnivores) and the second statement is true (This animal is a raccoon), then the conclusion (This animal is an omnivore) is unavoidable. If a group must have a certain quality, and an individual is a member of that group, then the individual must have that quality.

Unlike inductive reasoning, deductive reasoning allows for certainty as long as certain rules are followed.

The Underlying Assumptions of Reasoning

Inductive and deductive reasoning both have rules they need to follow in order to work as sound forms of reasoning, but both provide the foundations for sound and valid arguments. Partly, you need to make sure that your underlying warrants are correct. A warrant is an underlying assumption that you base your reasoning on. In the previous example, our warrant — or assumption — is that all raccoons are omnivores. This is an objectively true statement, but if your warrant was instead that all raccoons are cuddly, your warrant is no longer objectively true. Having a faulty warrant can and will lead your reader to ignore your argument.
Reflect Poll: Daily Reasoning
Which kind of reasoning would you say you encounter most often in your life?
- inductive reasoning
- deductive reasoning

Expand: Evaluating the Truth of Premises

Premises and Evaluating Their Truth
So, what is a premise? In a deductive argument, the premises are the statements whose logical relationship allows for the conclusion. The first premise is checked against the second premise in order to infer a conclusion.

Premise: All raccoons are omnivores.
Premise: This animal is a raccoon.
Conclusion: This animal is an omnivore.

Why Should I Evaluate the Truth of a Premise?
A formal argument may be set up so that, on its face, it looks logical. However, no matter how well-constructed the argument is, the premises must be true or any inferences based on the premises will be unsound.
Inductive reasoning often stands behind the premises in a deductive argument. That is, a generalization reached through inductive reasoning is the claim in an inductive argument, but a speaker or writer can turn around and use that generalization as a premise in a deductive argument.

Premise (induced): Most labrador retrievers are friendly.
Premise (deduced): Kimber is a labrador retriever.
Conclusion: Therefore, Kimber is friendly.

In this case, we cannot know for certain that Kimber is a friendly labrador retriever. The structure of the argument may look logical, but it is based on observations and generalizations rather than indisputable facts.

How do I Evaluate the Truth of a Premise?
One way to test the accuracy of a premise is to determine whether the premise is based upon a sample that is both representative and sufficiently large, and ask yourself whether all relevant factors have been taken into account in the analysis of data that leads to a generalization. Another way to evaluate a premise is to determine whether its source is credible. Are the authors identified? What is their background? Was the premise something you found on an undocumented website? Did you find it in a popular publication or a scholarly one? How complete, how recent, and how relevant were the studies or statistics discussed in the source?
Lesson Toolbox

Additional Resources and Readings

A video highlighting the difference between the two types of reasoning
  ● Link to resource: https://www.youtube.com/watch?v=VXW5mLE5Y2g

An overview of the differences between inductive and deductive reasoning

A website providing examples of inductive and deductive reasoning
  ● Link to resource: https://www.mometrix.com/academy/inductive-and-deductive-reasoning/

Lesson Glossary

**warrant**: a concept that, when applied to the data, leads to the claim; a warrant is a commonly shared assumption

**premise**: a statement whose logical relationship allows for the conclusion

Check Your Knowledge

1. Deductive reasoning is always sound.
   a. True
   b. False

2. Inductive reasoning can be proven beyond a shadow of a doubt.
   a. True
   b. False

3. The better and more complete the data, and the more relevant the warrant, the likelier it is that the claim will be credible.
   a. True
   b. False

Answer Key:
1. B  2. B  3. A

Citations

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