

# Fundamentals of Argumentation and Logic

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## Summary:

In this lesson you will learn: what arguments are, the elements of an argument, different kinds of arguments, and some ways to analyze them.

## What will be covered:

### 1. Argument Basics

#### 1.1 Definition of an argument

#### 1.2 Parts of an argument

#### 1.3 But how do we get to the conclusion?

#### 1.4 Two basic kinds of arguments

#### 1.5 Truth? Truth? You can't handle the truth!

#### 1.6 Types of Claims and statements

#### 1.7 Is that your final answer?

#### 1.8 Symbols

#### 1.9 Claim letters

#### 1.10 Deductive Argument Patterns

#### 1.1 Definition of an argument

What is an argument? An argument is a statement (or series) of statements offered in support for another statement. Let's take a look at my favorite argument: **The Welfare Queen.**

Statement #1: All black women are welfare queens.

Statement #2: Prof. Pam is a black woman.

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Statement #3: Therefore, Prof. Pam is a welfare queen.

The Welfare Queen argument is indeed an argument:  
Statements are offered in support of some other statement.

Someone wants to show that I'm a welfare queen, i.e., she wants to prove Statement #3. Statements #1 and #2 constitute evidence given in support of #3.

Somebody out there is spreading lies about me. They're calling me a "welfare queen"-someone who lives quite well, thank you, supporting herself by receiving government welfare checks. No job, no real income, yet she manages to drive a new Cadillac, wear fancy clothes, has tons of jewelry--all at government expense.

### **1.2. The parts of an argument**

We said that Statements #1 and #2 are the reasons given in support for Statement #3. A statement given as a reason is called a premise. The plural form of premise is premises (pronounced: prem-mi-sees). The statement we're arguing for is called the conclusion. So, Statement #3 is the conclusion. Often one argument may be composed of several smaller arguments. The conclusions of these "mini-arguments" are called sub-conclusions. The final conclusion of the argument is called the main conclusion.

### **1.3 But how do we get to the conclusion?**

How do we get from the premises to the conclusion? By a connection or a movement logicians called an inference.

Suppose your significant other comes home, later and later each night. You notice lipstick smudges on your significant other's collar. You smell a fragrance on your significant other's clothing that is not yours. AHA! You have clues or reasons that lead you to believe that your partner is cheating on you.

How did you reach this conclusion? Based on the clues you inferred the conclusion. What you've done is to draw an inference from the premises to the conclusion.

✓ The two main parts of an argument are the premises and the conclusion. We reach the conclusion by means of an inference drawn from the premises.

### **1.4 Two basic kinds of arguments**

There are two basic kinds of arguments: deductive and inductive

arguments. Deductive arguments come in two forms: valid and invalid. Inductive arguments come in two forms: strong and weak.

#### **1.4.1 Deductive Arguments**

The aim of any deductive argument is to offer 100% conclusive support for the conclusion. No wiggle room. No if's, and's or but's. Slam dunk. In your face. Money-back guarantee. A deductive argument intends to show that based on the premises we're given, there's no way to reject the conclusion.

Take another look at the Welfare Queen argument. Given Statements #1 and #2, is there any way for Prof. Pam not to be a welfare queen? Nope. When an argument is as air-tight as the Welfare Queen argument is, we call it a valid argument.

Note that for philosophers, the word "valid" has a different meaning from it's everyday meaning of "well-founded" or even "good". There's nothing well-founded about the Welfare Queen argument, but this doesn't stop philosopher's from considering the Welfare Queen argument to be valid. That's because, logically speaking, an argument is valid when the premises lend 100% conclusive support for the conclusion.

Invalid arguments are arguments that look like valid arguments but fail miserably in achieving the results we expect from a valid argument. Consider the following:

**Statement #1: Today is Thursday.**

**Statement #2: All black women are welfare queens.**

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**Statement #3: Therefore, Prof. Pam is a black woman.**

We have an argument: there are statements offered in support of another statement. But notice that the premises do not succeed in lending 100% conclusive support for the conclusion. Even though Prof. Pam actually is a black woman, this argument has given us absolutely none of the supporting evidence or reasons we need to be able to accept the conclusion.

Invalid arguments are, to be blunt, totally bogus. We cannot infer the conclusion from the premises.

### **1.4.2 Inductive Arguments**

Inductive arguments are arguments in which the premises are meant to lend probable, but not 100% conclusive, support for the conclusion.

Consider the following argument:

**Statement #1: Typically, black women are welfare queens..**

**Statement #2: Prof. Pam is a black woman.**

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**Statement #3: Therefore, Prof. Pam is a most likely welfare queen.**

The argument's premises lend probable support, but not 100% conclusive support, for the conclusion. There's always the possibility that Prof. Pam is not a welfare queen at all.

We judge inductive arguments based on the likelihood of our being able to accept the conclusion based on the premises given to us. Specifically, we judge inductive argument by its strength. An inductive argument is strong only if its premises lend, um, strong support, for the conclusion. An inductive argument is called weak if its premises give only weak support for the conclusion.

Here's an example of a weak inductive argument:

**Statement #1: Prof. Pam and Oprah are black women.**

**Statement #2: Prof. Pam is a philosophy professor.**

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**Statement #3: Oprah is probably a philosophy professor, too.**

The premises don't give us hardly any basis to accept the conclusion. That is why the argument is weak.

### **1.5 Truth? Truth? You can't handle the truth!**

"But Prof. Pam," you plead, "what about the truth?"

Ah, the truth. Philosophers are funny people. Sometimes it seems that philosophers care little about "truth". This is, in fact, correct. This ability to forego questions about truth is what allows philosophers to call the Welfare Queen a valid argument.

But philosophers aren't completely anti-social misfits: we do care about the "truth". Once we've considered the argument's validity, we turn to the question of the truthfulness of its statements.

Consider this argument:

**Statement #1: All movie stars have five heads. FALSE**

**Statement #2: Prof. Pam is a movie star. FALSE**

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**Statement #3: Therefore, Prof. Pam has five heads. FALSE**

First, let's determine what kind of argument we're dealing with. It's a valid argument, which means it's a deductive argument. Now, let's do a reality check: Are any of the premises actually true? No. What we've got is valid argument whose premises are all false.

Try this argument:

**Statement #1: Orange is a color. TRUE**

**Statement #2: Prof. Pam is a black woman. TRUE**

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**Statement #3: Therefore, violins are musical instruments. TRUE**

Here all the statements are true. But the argument is invalid because the premises do not lend any support to the conclusion.

Based on these findings, we can make some further distinctions about arguments.

Truth and validity, then, are two completely different things. An argument can be valid, but be composed of completely false

statements. On the other hand, you can have an invalid argument that has all true statements.

✎ For judging whether an argument is valid or invalid, the truth of any of the statements is irrelevant.

Now, if an argument is valid and has genuinely true premises, then its conclusion is will be true, too. We say that such an argument is sound. If there's a false premise, however, then even if the argument is valid, we say that it is unsound.

We make the same kind of distinction with inductive arguments.

If an inductively strong argument has genuinely true premises, then we say that the argument is cogent. This means that not only are the premises really true, but the inference from the premises is quite likely to lead to the conclusion. A cogent argument, then, is an inductively strong argument with true premises.

A weak inductive argument is always uncogent as well. It may be uncogent because it has false premises or it may omit information necessary to reach the stated conclusion.

Consider this argument:

**Statement #1: The ocean is usually a wonderful place to swim.**

**Statement #2: The waves are gentle and the water is warm**

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**Statement #3: It's safe to go swimming in the ocean right now.**

Suppose Statement #2 is false. What if the waves are choppy? The premises don't give us good reasons for accepting the conclusion. But even if all the premises are genuinely true, might there be other factors we should consider? Say, sharks in the area? How about the undertows? And what about a lifeguard? For my money, the above argument is weak and thus uncogent.

To recap: Deductive Arguments can be categorized being valid or invalid. If it is valid, we can do a "reality check" to determine whether the premises are actually true. If all the premises of a valid argument are true, then the argument is valid and sound. If there's even one premise that's not really true, then the argument is valid but unsound.

Inductive arguments are distinguished as being either strong or weak depending on whether the conclusion very likely follows from the premises or not. If a strong argument has true premises, it's cogent. An inductively weak argument is uncogent either because it has false premises or the premises leave some much needed information out. In either case, an inductively weak argument doesn't give us enough assurance to say that the conclusion is likely to follow from the premises.

! Arguments are not true or false. Only statements are either true or false. This means that premises and conclusions are said to be true or false.

### **Deductive Arguments**

- Valid : sound or unsound
- Invalid

### **Inductive Arguments**

- Strong + Cogent
- Weak + Uncogent

**Prof. Pam says:** Friends don't let friends accept invalid or unsound arguments, or weak uncogent ones.

**Question:** Now why do you suppose that is?

## **1.6 Types of Claims and statements**

Arguments of whatever type are composed of statements given in support of other statements. As we've seen, sometimes the

inference from the premises to the conclusion is indisputable; sometimes the inference is disputable.

Statements-whether they're used as premises, sub-conclusions, or main conclusions-typically come in four varieties:

Simple statements

*Prof. Pam is a welfare queen.  
Today is Thursday.*

conjuncts

*He loves fries AND onion rings*

This statement has two conjuncts: the "fries" side and the "onion rings" side. Each side is separated by the grammatical conjunction "and".

disjuncts

*You can have a crispy taco OR a burrito*

Disjunctive statements are "either - or" type statements. Here the two halves are separated by the disjunction "or".

conditionals

*IF today is Tuesday, THEN tomorrow will be Wednesday.*

Conditional sentences are comprised of two parts. The IF part is called the **antecedent**. The "ante" part of "antecedent" means "to come before". The THEN part is called the **consequent**.

### **1.7 Is that your final answer?**

Our argument statements are never given in the form of a question. (We're not playing Jeopardy! here) Nevertheless,

philosophers must sometimes grapple with the presumed answers to questions. Is Tu Pac alive? Was there another gunman on the grassy knoll? Is that a Klingon bird of prey? Is it raining in Milwaukee? "Yes, Tu Pac is alive" or "It is not raining in Milpitas". We either affirm or deny the claim(s) being made.

The following statement is an affirmation.

**It is raining in Milpitas.**

I am affirming that it is raining in Milpitas. On the other hand, the following statement:

**It is not raining in Milpitas.**

is a denial of a certain state of affairs in the great state of California.

These are rather easy examples of affirming or denying a statement. Sometimes statements can get pretty convoluted such that it is difficult to determine whether something is being affirmed or denied.

Consider the following:

**It is not the case that Prof. Pam is unavailable today.**

Remember your integers? Positives and negatives? Two negatives "cancel each other out" and become a "positive", right? The same thing applies here.

negative clause + un +  
available

Remember that the prefix 'un' is a negative prefix. Once you do the math, you will see that we've got:

negative clause + negative  
clause + available

or

**Prof. Pam is available today.**

### 1.8 Symbols

Even though it may seem like philosophers love to argue incessantly, we really can be a rather impatient bunch. Hence, the need for symbols to simplify our arguments and make them easier to analyze.

There are lots of symbols used in symbolic logic, but for this course, you'll only need to master the basic ones. We'll use these to form conjuncts, disjuncts, conditionals, and negations.

Symbol	How to read it	Its function
&	"and"	forms a conjunction
v -- that's a lower case "V" and is short for "vel", which is Latin for "or".	"or"	forms a disjunction
→		
The antecedent is to the left of the arrow (the IF part); the consequent (the THEN part) is on the right	"if ... then"	forms a conditional statement
~	"not"	forms a negation or a denial

### 1.9 Claim letters

Instead of laboriously writing out every single solitary word of an argument, we use letters to represent the claims being made. The letters can be alphabetically related to the statement, or you can select any old letter you want.

Here's how we might symbolize the statements in the Welfare Queen argument.

First, you want to jot down all the main statements and/or parts of statements in the argument.

black women  
welfare queens  
Prof. Pam

Next, give each one its own claim letter. We can use 'B' for "black women", 'W' for welfare queens, and 'P' for "Prof. Pam". What we've got is something like this:

**All B's are W's**

**P is a B**

---

**Therefore, P is a W.**

\*\*Using symbols and claim letters allows philosophers to jot down incredibly complex arguments on scraps of paper or on tiny napkins. Symbols and claim letters: they're a good thing!

### 1.10 Deductive Argument Patterns

As we've seen, for deductive arguments, as long as the premises conclusively lead to the conclusion, we've got a valid argument. The truth of the statements of which the argument is composed has absolutely nothing to do with an argument's logical validity.

In fact, valid deductive arguments are so immune to concerns of truth, that logicians have developed argument patterns that automatically produce valid arguments. You can think of these patterns as argument templates: they work first time, every time. Guaranteed to produce a valid argument or your money back.

There are four such patterns we'll be using:

- Modus ponens
- Modus tollens
- disjunctive syllogism
- hypothetical syllogism

You've probably used all of them at one time or another. Any argument whatsoever that uses these forms is a valid argument. With these logical argument patterns, all you need to do is fill in the blanks with the appropriate statements and presto: valid argument.

**1. Modus ponens** ("moe-duhs poe-nenz"). Latin for "the mode of affirming".

- 1. If \_\_\_\_\_, then \_\_\_\_\_**
- 2. \_\_\_\_\_**
- 3. Therefore, \_\_\_\_\_.**

To craft an argument using modus ponens, we make sure Statement #2 affirms the antecedent of the conditional in Statement #1.

1. If antecedent, then consequent.
2. We affirm the antecedent.
3. Therefore, the consequent follows.

Here's an example of a modus ponens:

If people work at night, then  
they like quiet.  
You work at night.  
Therefore, you like quiet.

Is the pattern clear to you? The second statement affirms the antecedent (i.e., someone working at night). Let's symbolize the argument using the claim letters **P** and **Q** - philosophers really like using these two letters for some reason.

**P--->Q**  
**P**  
**Therefore, Q**

We can use modus ponens to express the **Welfare Queen argument**.

If you're a black woman,  
then you're a welfare queen  
This person here (namely  
Prof. Pam) is a black woman.  
Therefore, she's a welfare  
queen

Or the super-short form which is simply:

**B --->W**  
**B**  
**Therefore, W**

**2. Modus tollens** ("moe-duhs toll-enz"). Literally, "the mode of denying or taking (away)" Here's a symbolization of the form:

- 1. If \_\_\_\_\_, then \_\_\_\_\_.**
- 2. NOT \_\_\_\_\_**
- 3. Therefore, NOT \_\_\_\_\_.**

To craft an argument using modus tollens, we make sure Statement #2 denies the consequent of the conditional in Statement #1.

1. If antecedent, then consequent.
2. We deny the consequent.
3. Therefore, the antecedent does not follow.

If you're Prof. Pam, then you're a fantastic dancer.  
You're not a fantastic dancer.  
Therefore, you're not Prof. Pam.

**P--->Q**  
**~ Q**  
**Therefore, ~ P**

**3. Disjunctive syllogism** ("diss-junk-tive sill-oh-jiz-em")  
A syllogism, basically, is an argument or a deduction.

A disjunctive syllogism has the following form:

**Either P or Q** [You pose only two alternatives ]  
**NOT P** [One choice is rejected ]  
**Therefore, Q** [Only one option is left]

You have no choice but to accept the only remaining option

Armed robbers and frustrated mothers use disjunctive syllogisms all the time.

Robber: "Your money or your life!"

You: "Don't shoot! Don't shoot!"  
Robber: "OK. Gimme the money."

**Either M or L**

$\sim L$  (i.e., "do not take my life")

**Therefore, M**

#### **4. Hypothetical syllogism** ("high-poe-theh-tickle sill-oh-jiz-em")

This one sounds more ominous than it is: Basically, if you've ever had more month at the end of your money or reflected carefully about the risks involved in having unprotected sex, or any other decision, you've probably asked yourself a series of "what will happen if I do \_\_\_\_\_?" questions. If you've done that, then you've probably used a hypothetical syllogism.

Here's the form:

**Statement #1** If I spend my last \$300 on a new CD player, then I won't have money left to pay the rent.)

**Statement #2** If I don't pay the rent, then my roommate will kick me out of the house and I'll be homeless.

**Statement #3** So, if I buy the new CD player, then I'll be homeless.

Here are my claim letters:

Let 'A' be: spending my last \$300 on a new CD player  
Let 'B' be: not having money left to pay the rent  
Let 'C' be: being homeless

This gives us:

**If A, then B**  
**If B, then C**  
**So, if A, then C**

Note that all by itself C conveys a "negative state of affairs", i.e., that state of being without a home, or having "no home". Therefore, we do not want to negate C by putting a tilde in front of it like this: ' $\sim C$ '.

' $\sim C$ ' would stand for:

**It is **not** the case that I do  
not have a home.**

or

**It is **not** the case that I  
am homeless.**

You can double check this by canceling out the two negatives: "not" of "it is not the case that" and the "do not" of "do not have a home" [or the suffix "less" of "homeless"]. Like this:

**It is --- the case that I do  
--- have a home.**

Then you'll get:

**It is the case that I do  
have a home.**

But that's not what the argument says.

**Summary:**

In this lesson you learned: what arguments are, the elements of an argument, different kinds of arguments, and some ways to analyze them.

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