

## VI. Evaluating Arguments (Part II)

In part I, we learned that a **good (deductive) argument** gives us adequate reason to believe that its conclusion is true (or at least, a better answer to a certain question than some other answer), because:

- I. its premises are worthy of our belief,
- II. its premises are true, and
- III. its conclusion follows logically from the truth of the premises.

These criteria assess both an argument's *form* and its *content*. **Content** refers to *what the premises and conclusion actually say*, whereas **form** only has to do with *how the premises and conclusion are related to one another*.

You will sometimes need to analyze an argument's form independently of its content. The easiest way to do this is to write it in **logical form**. To do so:

- a. Stack the premises on top of a line, and write the conclusion under the line.
- b. Identify each **proposition** in the argument: these are *phrases that can stand alone as sentences*.
  - Premise-flags and conclusion-flags are *not* part of propositions.
  - Note that one sentence may contain *multiple propositions*, linked together by connective words (such as *and, or, if/then*). (These connective words are *not* part of propositions, either.)
    - A sentence with propositions joined by '**and**' is a **conjunction**.
    - A sentence with propositions joined by '**or**' is a **disjunction**.
    - A sentence which says '**If** \_\_\_\_, **then** \_\_\_\_' is a **conditional**.
      - We call the *proposition in blank #1* (following 'if') the **antecedent**.
      - We call the *proposition in blank #2* (following 'then') the **consequent**.
  - Be sure to take note of any propositions which **negate** each other.
    - **Negation** is the denial or falsification of a proposition by the word '*not*' or the phrase '*it is not the case that*'.
      - E.g., "the sky is *not* blue" and "the sky is blue" negate each other. (The sky is blue" negates its opposition even though there's no 'not' in it, because it's equivalent to "The sky is *not not* blue".)
- c. Assign a letter to each proposition that appears in the argument: for example, let 'P' = 'you are enrolled in PHI 1500'. The letter will symbolize that proposition.
  - *The negation of P* gets symbolized as *Not-P*.
- d. Replace the propositions in the argument with the letters symbolizing them.

Let's try this out with some sample arguments (where step a. is already taken care of). While we're at it, we'll learn some names of argument forms.

**Ex. #1**

- 1) If you are enrolled in PHI 1500, then your name is on the roster.
- 2) You are enrolled in PHI 1500.
- 3) Therefore, your name is on the roster.

The propositions in this argument are "you are enrolled in PHI 1500", and "your name is on the roster".

Let 'P' = 'you are enrolled in PHI 1500', and 'Q' = 'your name is on the roster'.

Both of these are in premise 1, which is a *conditional* (an if '\_\_\_, then \_\_\_' sentence).

Neither of the propositions negate one another.

By replacing the propositions with the letters symbolizing them, we get an argument in a form called **MODUS PONENS**:

- 1) **If P, then Q**
- 2) **P.**
- 3) **Therefore, Q.**

**Ex. #2**

- 1) If someone is enrolled in PHI 1500, then their name is on the roster.
- 2) Taylor Swift's name is not on the roster.
- 3) Therefore, Taylor Swift is not enrolled in PHI 1500.

The propositions are "someone is enrolled in PHI 1500", "their name is on the roster", "Taylor Swift's name is not on the roster", "Taylor Swift is not enrolled in PHI 1500".

The first and last propositions negate each other, & the middle two negate each other.

(That might not be obvious at first – because in each of these pairs, one says "someone" or "they" where the other says "Taylor Swift".

But since Taylor Swift *is* a someone (and we call a someone "they"), the two propositions say essentially the same thing, except that they negate each other.)

Now let 'P' = "someone is enrolled in PHI 1500" and let 'Q' = "someone's name is on the roster". Both of these appear in premise 4) – another conditional (If P, then Q).

Premise 5) says "Taylor Swift is *not* enrolled in PHI 1500": that's 'Not-P'.

And the conclusion says "Taylor Swift's name is *not* on the roster": that's 'Not-Q'.

The resulting logical form is called a **MODUS TOLLENS**:

- 1) **If P, then Q**
- 2) **Not-Q.**
- 3) **Therefore, Not-P.**

Now that you know how to convert an argument into logical form, you can assess its *validity*, *soundness*, *consistency*, and *persuasiveness*.

## VALIDITY

An argument is **valid** when it is structured so that when the premises are true, you can **infer** that the conclusion is true as well. (In general, making an **inference** is using logic to derive a conclusion from premises you assume to be true.)

Validity is a property of an argument's **form**, *not* its **content**. That means that it doesn't matter at all what the premises and conclusion say, nor whether they are true or false – it only matters how the premises and conclusion *relate to each other logically*. So if you want to make sure the argument is making is valid, you'll need to choose a **valid argument form**.

You've already come across *two valid argument forms*: **Modus Ponens (MP)** and **Modus Tollens (MT)**. Let's see them side-by-side, for comparison:

### MODUS PONENS (MP)

- 1) If P, then Q.
- 2) P
- 3) **Therefore Q.**

### MODUS TOLLENS (MT)

- 1) If P, then Q.
- 2) Not-Q.
- 3) **Therefore Not-P.**

Both MP & MT begin with a **conditional** (*If* \_\_, *then* \_\_) as premise 1).

In a **modus ponens**, premise 2) says *P is true*: it **affirms the antecedent**. That allows us to infer that the *consequent is true* (i.e., Q).

In a **modus tollens**, premise 2) says *not-Q is true*: it **denies the consequent**. (That's because saying "not-Q is true" is the same as saying "Q is false".) That allows us to infer that the *antecedent is false* (i.e., not-P).

One other very useful valid argument form is called a **disjunctive syllogism**:

### DISJUNCTIVE SYLLOGISM (DS)

- 1) P or Q.
- 2) Not-P.
- 3) **Therefore Q.**

A disjunctive syllogism is so called because its first premise is a **disjunction**: a *statement of the form ' \_\_\_or \_\_\_ '*.

Making an argument in the form of a disjunctive syllogism is like using a *process of elimination*. The disjunction in premise 1 indicates that either proposition P is true, or

proposition Q is true. Premise 2 rules out the truth of one of the propositions, by declaring it to be false. That allows you to infer that the other proposition is true. E.g.:

**Ex. #3**

- 1) Socrates was a philosopher or Socrates was a historian.
- 2) Socrates was *not* a historian.
- 3) Therefore Socrates was a philosopher.

It will also help to be familiar with three ***invalid argument forms***.

These look *deceptively* similar to the three valid forms above, which just goes to show that very subtle changes in an argument can make all the difference for whether it is good or bad.

Affirming the Consequent	Denying the Antecedent	Dysfunctional Syllogism
1) If P, then Q.	1) If P, then Q.	1) P or Q.
2) Q. _____	2) Not-P. _____	2) P. _____.
3) Therefore P.	3) Therefore Not-Q.	3) Therefore Q.

Each of these argument forms is invalid because an argument structured this way does *not* guarantee that the conclusion will be true whenever the premises are true. E.g.:

**Ex. #4**

- 1) If there is a hedgehog in my engine, my car will not start.
- 2) My car will not start.
- 3) Therefore there must be a hedgehog in my engine.

There are many reasons why a car might not start. While having a hedgehog in your engine is one of them, that is certainly not the *only* explanation for why a car wouldn't run (and it is much more likely that your car will not start because you're out of gas, or your battery is dead, etc.)

This example helps us see that an argument in this invalid form (*Affirming the Consequent*) does *not* guarantee that the conclusion is true when the premises are true. The reason why is that a conditional ('If P, then Q') promises that when P is true, Q is true too – but it *doesn't* promise that Q can *only* be true when P is true. So, Q's being true doesn't supply enough evidence for us to infer that P is true.)

**Ex. #5**

- 1) If I forget my friend's birthday, she will be mad at me.
- 2) I will not forget my friend's birthday.
- 3) Therefore my friend will not be mad at me.

Ah, if only friendship was that straightforward! The trouble here is that the author has not accounted for the possibility that her friend might get mad at her for *some other reason* besides having her birthday forgotten.

This argument, which has the form *Denying the Antecedent*, also fails to guarantee the truth of its conclusion when the premises are true. It's because a conditional promises that when Q is false, P is false too – but it doesn't promise that P is *only* false when Q is false. So P's falseness doesn't supply enough evidence to infer that Q is false.

#### Ex. #6

- 1) Baruch is in Manhattan or Baruch is in New York.
- 2) Baruch is in Manhattan.
- 3) Therefore Baruch is in New York.

This one is a bit tricky. Its conclusion (3) happens to be true, but the argument is not valid. That's because it has the form of a *Dysfunctional Syllogism*.

In a disjunctive syllogism, Premise 2 declares that one of the two options given in the disjunction (Premise 1) is false, that lets us infer that the other is true, by process of elimination. But here the author infers that one is true even though the other has *not* been ruled out.

This example is instructive because it shows that an argument can be invalid *even if its conclusion is true*. The truth of the conclusion is irrelevant to the argument's validity: all that matters is whether the argument is structured in such a way that the truth of the premises allows you to infer that the conclusion is true.

#### (a brief aside on) HIDDEN PREMISES

Sometimes authors will not state one of the premises in support of their argument outright; rather, they will take it for granted that their reader will also assume that premise to be true. Consider the following example:

- 1) Lady Gaga is from Mars.
- 2) Therefore, Lady Gaga is from the fourth planet from the sun.

As written, this argument is not valid. The premise doesn't give us enough information on its own to allow us to infer the conclusion. The author who wrote this is probably assuming that everybody knows that Mars is the fourth planet from the sun, and that readers will fill in that missing information. In other words, the argument only functions when we add "Mars is the fourth planet from the sun" as a second premise. We can call this a **hidden premise**, because the author takes it for granted without actually stating it explicitly.

When writing your own arguments, you want make sure that the validity of your argument does not depend upon any hidden premises. Try to be as explicit as possible about what pieces of evidence are functioning in your reasoning – even if they seem incredibly obvious to you.

## SOUNDNESS

An argument is **sound** when *it has a valid form and all of its premises are true*. Hence, soundness depends both an argument's **form** and its **content** – specifically, whether what the premises say corresponds with reality. Consider:

### Ex. #7

- 1) If the sky is purple, then pigs can fly.
- 2) The sky is purple.
- 3) Therefore pigs can fly.

Argument #4 is valid, since it has the form of a modus ponens (P= “the sky is purple” and Q=“pigs can fly”). But premise 2) is *false*: the sky is *not* purple. In order for this argument to be *sound*, it would have to not only be *valid*, but *also* have *only true premises*. But since at least one of its premises is false, #4 is *not sound*.

When an argument is unsound, its premises do not support the conclusion, even if the argument has a valid form. (That's because a valid argument guarantees the truth of the conclusion *only on the condition* that all the premises are true – but with unsound arguments, that condition is not met.)

Having true premises is *not enough* for an argument to be sound: *it must be valid, too*.  
E.g.:

### Ex. #8

- 1) If you are enrolled in PHI 1500, then you are a student at Baruch.
- 2) You are a student at Baruch.
- 3) Therefore you are enrolled in PHI 1500.

Both of those premises are true (you *are* a student at Baruch, aren't you), but the conclusion is *not* supported because the argument is *invalid*: it has the form of *Affirming the Consequent*. Therefore, the argument is *not sound*.

Here are a few more examples:

**Ex. #9**

- 1) If you attend Baruch, then your school mascot is a banana slug.
- 2) Your school mascot is not a banana slug.
- 3) Therefore, you do not attend Baruch.

This argument is valid, written in the form of a *modus tollens*. But it is *not sound* because premise 1 is *false*. (A conditional is false when the promise it makes – that when P is true, Q will be true too – is a broken promise: when P is true, but Q is false.)

**Ex. #10**

- 1) If you attend Baruch, then your school mascot is a bearcat.
- 2) You attend Baruch.
- 3) Therefore, your school mascot is a bearcat.

This argument has the form of a *modus ponens*, and both of its premises are true. That means it is both *valid and sound*, and that it supports its conclusion well.

**CONSISTENCY**

An argument is **consistent** as long as *none of its premises are contradictory*.

A **contradiction** occurs when a premise is inconsistent with itself (saying something like 'P and not-P'), or when two premises are inconsistent with each other ('P', 'not-P'). A contradiction cannot possibly be true, so an argument that contains a contradiction, and therefore is not consistent, is also unsound.

**PERSUASIVENESS**

An argument is **persuasive** if it is not only valid and sound, but its premises are *obviously true*. Consider the following argument:

**Ex. #11**

- 1) Either God exists or  $2+2 = 5$ .
- 2)  $2+2 \neq 5$ .
- 3) Therefore God exists.

This argument is valid, because it has the form of a disjunctive syllogism. However, premise 1 is not *obviously true*, so it is *not persuasive*. To make this argument persuasive, the author would have to provide an *auxiliary argument* in defense of that disjunction, in order to convince us that it is true.

**Works Cited**

Pryor, Jim. (2006) "What is An Argument?", "Vocabulary Describing Arguments", and "Some Good and Bad Forms of Argument." <http://www.jimpryor.net/teaching/vocab/index.html>