

1. Validity, Soundness, and Rationally Convincing Deductions

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An argument/deduction/inference (these three terms are synonymous) is **valid** if the conclusion follows logically from the premises.

An argument is **sound** if it is valid and all its premises are true. An argument must be valid and its premises must be true.

Validity

An argument is valid if all of the premises are true and it is *impossible* for the conclusion to be false **BUT** saying 'impossible' creates philosophical problems such that we can never truly be certain if something is impossible.

A better way to phrase this is to say 'There is *no situation* in which the premises are true and the conclusion is false at the same time'

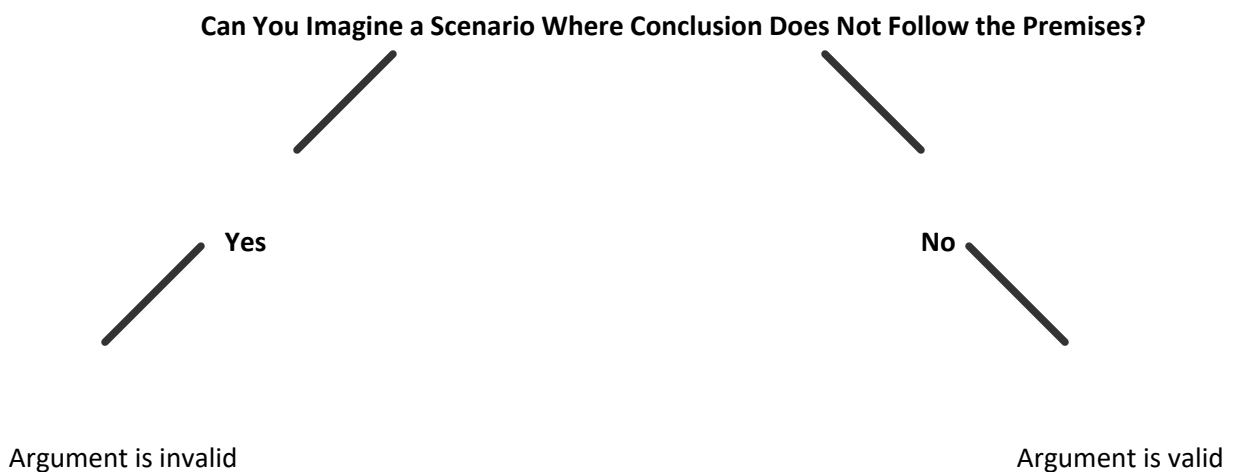
The Test for Validity

A simple test on whether or not an argument is valid is to try and imagine a scenario where the premises are true and the conclusion is false at the same time.

If there is a possible situation in which the premises are true and the conclusion is false then the argument is invalid.

If there is no situation where the premises are true and the conclusion is false, then the argument is valid

Structure of the Test



An Example

- P1. Fred is enrolled in PHIL208 to the bitter end
- P2. Everyone in PHIL208 will pass the course

C. Fred will pass the course

The argument is valid. The conclusion follows the premises in every situation. **But** although the argument is **valid**, it is not **sound**.

The reason the argument is valid but not sound is because the second premise could be false given a number of arguments.

Rationally Convincing

There are three types of arguments: Valid, Sound, and **Rationally Convincing**.

An argument is rationally convincing if it is *valid*, *but it is not sound* **BUT** it is believed by the audience to be true even if the premises may not be true (i.e., not sound).

The reason for this third term is because soundness can be nearly impossible to achieve. There are always revolutions of thought and things can change, we may think that one thing works a certain way only to discover later on with more evidence that it actually works a different way. Therefore we can rarely ever ***be sure with 100% certainty*** that our premises aren't false given the nature of how knowledge shifts.

That's not to say that there are no sound arguments where it is impossible for the premises to be false, there are however a number less than there are unsound arguments.

The third term gives some extra room, meaning we can be almost certain that the premises are true, and that is generally good enough. Science works using this principle.

2. Valid, Invalid, and Fallacious Inferences

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Examples of Sentences That Cannot Possibly Be False

1. If X is true, then X is true.
2. If X and Y are both true then X is true

The reason it is pretty hard to find sentences that can't possibly be false is because they are really uncommon.

Examples of Sentences That Cannot Possibly Be True

1. Any contradiction is an example of a sentence that cannot be true (X is true, X is false).
2. I am in my office and I am not in my office at one and the same time.

One response to this sentence could be that you could have one foot in the office and one foot out. To get the true contradiction the sentence could instead be:

3. I am standing in the middle of my office and I am outside my office at one and the same time.
4. This sentence is false.

This sentence cannot be true. What is "this" referring to? What sentence is it talking about? Even if "this" means its own sentences it still cannot be true because the sentence is *true* then it is *false*.

The Three Fundamental Terms in Logic:

1. **Valid / Invalid**
2. **Sound / Unsound**
3. **Rationally Convincing / Not Rationally Convincing**

One thing to note about these terms is that they can **only** be used in the context of inferences/arguments/deductions. You cannot apply these terms to statements, it must be an argument that they're applied to.

You can say an individual premise is true or false or that the conclusion is true or false but only can the entire inference be either of the three terms. I.e., '*the first premise is valid*' is an illegitimate use of the term valid.

They only apply to **whole** inferences.

Definitions

1. **Valid**

An inference is valid if the conclusion follows logically from the premises, or in other words there is no possible scenario in which the premises are true and the conclusion is false at the same time. The premises don't necessarily have to be true.

2. Sound

An inference is sound if it is **valid** and its premises are true.

3. Rationally Convincing

An inference is rationally convincing if the inference is valid and the premises are acceptable as true to the intended audience.

Generally you won't know whether the premises are definitely true, so you won't be in the position to say an argument is sound. But if an argument is valid and the premises are generally accepted as true by the intended audience then the argument is rationally convincing.

Is it possible to have an INVALID inference whose premises and conclusion are all TRUE?

Yes it is possible. The fact that an argument is INVALID doesn't tell you anything about whether the premises are all true or not. If you know that an argument is INVALID, all you know is that it is not possible to have the premises true and the conclusion false i.e., the argument cannot be valid.

If an argument is INVALID, then you know that there is a possible scenario where the premises are true and the conclusion is false. This doesn't tell you anything about whether the premises are true *in the real world*. They could all be true even though there is a possible situation where the premises are true and the conclusion is false, it just isn't the actual situation.

An example of an invalid argument whose premises and conclusion are true:

- P1. Christchurch is in New Zealand
- P2. Grey Mouth is approximately 200km from Christchurch
- C. Grey Mouth is in New Zealand

The argument is INVALID because it is possible to imagine a scenario where the premises are true and the conclusion is false. Australia invades New Zealand and cedes Grey Mouth i.e., Grey Mouth is no longer in New Zealand, it is now in Australia.

It's important to remember that the *possible* situation doesn't need to reflect the *real world* situation.

Is it possible to have a VALID inference with TRUE premises and a FALSE conclusion

No. In order for an inference to be valid, there can be no possible scenario where the premises are true and the conclusion is false.

Are These Inferences Valid

- P1. If that's the right key, then the lock is open now
- P2. The lock is open now
- C. That's the right key

INVALID: The lock could have been picked, or the lock was never locked in the first place.

This argument takes a form that is always invalid:

If X then Y

Y is true
Therefore X is true

This is a pretty common argument form, it is a well-known fallacy that we're potentially wired to use even though it is invalid. This is the **Fallacy of Affirming the Consequent**.

Some Terminology

An If-Then (If X then Y) statement is called a **Conditional Statement**. This is anything that says "If...then something else". It is called this because you're saying that Y is true *on the condition* that X is true.

X is called the **Antecedent** of the statement. It is the first part of the argument.

Y is called the **Consequent** of the statement. It follows after the antecedent

We can then see why it is called the *Fallacy of Affirming the Consequent* because Y is the consequent and in premise 2 we're saying that Y is true and then you continue on to infer the antecedent, that X is true.

Is Affirming the Antecedent a Fallacy?

Affirming the Antecedent is inferring that if X is true, then Y is true, and then going on to say that X is true, therefore Y is true:

If X then Y
X is true
Therefore Y is true

This is **not a fallacy** because you can't possibly imagine a scenario in which the premises are true and the conclusion is false. The conclusion follows from the premises in a valid manner.

If X is true and its also the case that Y is true, then it logically follows that Y has to be true. Its a very basic form of inference, and generally we all argue in this way often. It is a basic principle of reasoning.

This is called **Modus Ponens (MP)** in Latin.

Is Denying the Consequent a Fallacy?

Denying the Consequent is inferring that if X is true, then Y is true, and then going on to say that Y is false, therefore X is false:

If X then Y
Y is false
Therefore X is false

This **is not a fallacy** because there is no possible situation in which the premises are true and the conclusion is false.

An example:

- P1. If John is on the campus today, then he is in the library
- P2. It is false that he is in the library
- C. He is not on campus